



APPENDIX C

Linear
Phytophthora
Dieback Risk
Assessment

**Linear *Phytophthora* Dieback Risk Assessment of
M2091 Ioppolo Road, Chittering**

Prepared for Coffey Environments Australia Pty Ltd

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Executive Summary

Coffey Environments Australia Pty Ltd commissioned Terratree Pty Ltd to undertake a linear *Phytophthora* Dieback assessment of tracks and other potential disease vectors within and surrounding a block of native vegetation. The site is located in the Shire of Chittering approximately 80 km north of Perth. The site is 983 ha and mainly comprised of Banksia woodland with some areas of Marri (*Corymbia calophylla*) open forest.

The assessment was conducted in accordance with the Department of Parks and Wildlife's (DPaW) *Manual for detecting Phytophthora Dieback disease* (Procedures for DPaW managed lands) (DPaW 2013). Tracks, water courses and hard-hooved feral animals are considered to be the most likely vectors of disease into the study area. A linear Dieback assessment was determined to be an appropriate method for assessing the risk and likelihood of Dieback presence within and adjacent to the site.

Vegetation within the study area was categorised according to three different levels of risk:

1. High Risk: Areas where *P. cinnamomi* has been recovered from samples and disease symptoms are consistent with the presence of Dieback.

2. Moderate Risk: Areas exhibiting past or current disturbances (logging, grazing, dumping etc.) which has altered vegetation structure and composition and areas downslope of confirmed infestations, or vegetation exhibiting disease symptoms but have not returned positive results for *P. cinnamomi*.

3. Low Risk: Areas of protectable uninfested vegetation (as determined by a registered Dieback interpreter), which exhibit multiple healthy indicator species, vegetation in Pristine to Very Good condition (Keighery scale 1-3), no disease pattern or chronology, and no significant risks from disease vectors or current land use.

The total study area, in terms of the linear corridor that was assessed, is 119.2ha. This is comprised of 19.4 ha of High Risk (16.3 %), 12.2 ha of Moderate Risk (10.2 %) and 87.6 ha (73.5 %) of Low Risk vegetation

In total, 11 soil and tissue samples were taken from recently dead and dying disease indicator species. Two positive results for *P. cinnamomi* were reported. In addition, a tissue sample was taken to test for canker and this returned a positive result for *Cytospora* sp.

In conclusion, the linear assessment determined that the majority of the study area (linear assessment corridor) is uninfested and therefore presented a low risk of spreading Dieback into areas outside the study corridor. While it is likely that the majority of the 983 ha site is uninfested, caution must be exercised when extrapolating the disease status and/or risk to vegetation that has not been assessed outside the study area.

Terratree makes the following recommendations in relation to assessment and management of Dieback at the site:

- A comprehensive Dieback assessment of the site should be completed in accordance with current Department of Parks and Wildlife standards (DPaW 2013).
- Protectable areas should be clearly demarcated and signposted.
- Additional sampling should be done in moderate risk areas.
- A Dieback management plan, including an access management strategy, should be developed for the site.

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1 Introduction

Coffey International (Coffey) commissioned Terratree Pty Ltd (Terratree) to undertake a linear *Phytophthora* Dieback (Dieback) assessment of tracks and other potential disease vectors within and surrounding a 983 ha block of native vegetation ('the site') in the Shire of Chittering. The linear assessment corridor includes a 25 m area either side of tracks and unsealed roads within and adjacent to the site, watercourses and other potential disease vectors (hereafter referred to as the 'study area').

1.1 Background

Phytophthora Dieback ('Dieback') is a soil borne pathogen with a range of plant hosts in the southwest of Western Australia. These predominantly belong to the Proteaceae, Ericaceae, Myrtaceae, Xanthorrhoeaceae and Fabaceae plant families. While some plant species are resistant, others are susceptible to the disease caused by the pathogen resulting in chlorosis, dieback and usually death.

According to the most recent Western Australian (WA) State of the Environment Report (Environmental Protection Authority 2007) *Phytophthora* Dieback, a Priority 1 Threat, is the third greatest threat to biodiversity after salinity and climate change. It is a more serious threat than weeds, native vegetation clearing, acid sulphate soils and soil erosion. It is significant in WA because:

- Over 40% (2,300) of the native plant species and half of the endangered plant species in the southwest of WA are susceptible to the pathogen
- The changes in plant community composition and structure that Dieback causes has impacts throughout the whole ecosystem, including on the indigenous fauna
- Dieback can lead to significant soil erosion as a result of the loss of susceptible vegetation

The Dieback pathogen is widespread in areas with greater than 800 mm of annual rainfall, less extensive in areas that receive between 600–800 mm and mainly restricted to water-gaining sites in areas that receive 400–600 mm. The pathogen does not occur in areas that receive less than 400 mm of annual rainfall. In WA, Dieback is a significant environmental issue for projects between Geraldton in the Midwest and Esperance on the South Coast and is widespread in the Southwest region.

1.2 Project Location and Description

The study area is located in the Shire of Chittering approximately 80 km north of Perth, approximately 15 km north of Muchea (**Figure 1**). The 960 ha site is mainly comprised of Banksia woodland with some Marri (*Corymbia calophylla*) open forest.

1.3 Regulatory Context

Phytophthora Dieback management is required under the following regulatory mechanisms in WA:

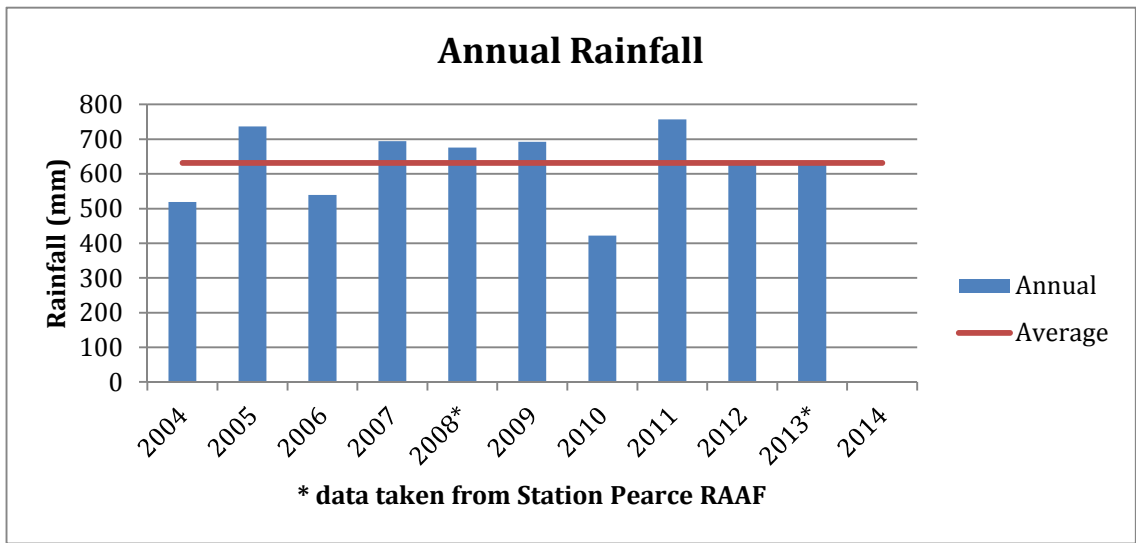
- *Phytophthora* Dieback is listed as a Key Threatening Process with the Federal Government under the *Environmental Protection and Biodiversity Conservation Act (1999)*
- *Environmental Protection Act (1986)* Part V S.50A "Serious Environmental Harm" provisions

2 Existing Environment

2.1 Climate

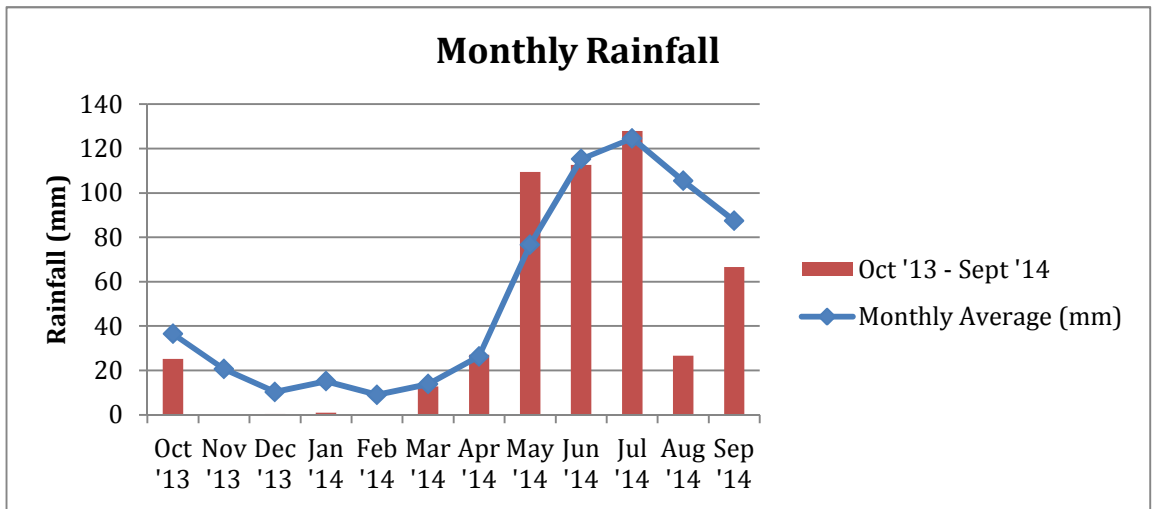
The Swan Coastal Plain region has a Mediterranean type climate with hot dry summers and cool wet winters. The warmest month is February, with an average monthly temperature of 30.4°C. The coolest month is July, with an average temperature of 18.3 °C.

Based on data from the Gingin Aero station (# 9178), the average annual rainfall for Muchea is 631.7 mm. The seasonal rainfall pattern for Muchea indicates an overall reduction in rainfall compared to historical averages, but exhibits variability in this trend, with years of significantly reduced rainfall interspersed with years of average to slightly above average rainfall (**Graph 1**). Significantly, the rainfall for 2010 was only 422 mm, which is 33% below average annual rainfall.



Graph 1: Annual rainfall at Gingin Aero station # 9178 (BoM, 2014)

Most rain falls in the cooler months of June-August. During winter 2014, this station received average or above-average rainfall until July, but a significant drop in rainfall was recorded during August and September compared to the long-term average.



Graph 2: Monthly rainfall at Gingin Aero station (# 9178) (2013-14) (BOM, 2014)

2.2 Biogeography

The study area is located in the Swan Coastal Plain Interim Biogeographic Regionalisation of Australia (IBRA) Bioregion, Perth Sub-Region (SWA02). This sub-region is dominated by woodlands of *Banksia* and Tuart on sandy soils, Sheoak on outwash plains, and paperbark in swampy areas. The colluvial and aeolian sand areas represent three phases of Quaternary marine sand dune development (which provide relief), and include a complex series of seasonal fresh water wetlands, alluvial river flats, coastal limestone and several off-shore islands. Younger sandy areas and limestone are dominated by heath and/or Tuart woodlands, while *Banksia* and Jarrah–*Banksia* woodlands are found on the older dune systems (Mitchell *et. al*, 2002).

2.3 Flora and Vegetation

Five vegetation complexes (Hedde *et. al* 1980) have been identified within the site. Descriptions of these vegetation complexes along with their interpretability for the presence of Dieback are presented below:

Moondah - supports predominantly a low closed to low open forest of *Banksia attenuata*, *B. menziesii*, *B. prionotes* and *Eucalyptus todtiana* on the slopes; and an open-woodland of Marri-*Banksia* in the valleys. Along the water courses, the vegetation is dominated by woodland of *E. rudis*, *Melaleuca raphiophylla* with some mixture of *M. preissiana* and thickets of *Kunzea vestita* in the understorey. One of the distinctive features of the Moondah vegetation complex is the presence of large number of *B. prionotes*. In other respects, due to the sandy soils, the vegetation has affinities with Mogumber, Cullala and Reagan complexes. Upland areas of the Moondah vegetation complex are highly interpretable for the presence of Dieback; however, the wetland areas are generally uninterpretable.

Reagan - supports vegetation ranging from low open-woodland of *B. attenuata*, *B. menziesii* and *E. todtiana* to closed heath depending on the depth of the soil. The composition of the understorey varies slightly depending on the proportion of sand and gravel. Plant species include *Adenanthos cygnorum*, *Petrophile linearis*, *Mesomelaena tetragona*, *Casuarina humilis*, *Mesomelaena stygia*, *Hakea trifurcata*, *Daviesia juncea* and species of *Hibbertia*, *Eremaea*, *Conospermum* and *Conostephium*. The Reagan complex is generally highly interpretable for the presence of Dieback.

Karamel South - is dominated by an open forest of Jarrah-Marri with a definite second storey of *B. grandis* on the gravelly soils with *B. attenuata* and *B. menziesii* on the sandier soils. Elsewhere on the Dandaragan Plateau, *B. grandis* is restricted mainly to the Gingin complex. Small areas of Wandoo occur in pockets on Karamal South. Other species in the open forest of Jarrah-Marri include *Stirlingia latifolia*, *B. sessilis*, *B. nivea*, *Hakea ruscifolia*, *Petrophile linearis*, *Jacksonia floribunda* and species of *Calytrix*, *Conostephium* and *Hakea*. The Karamel South complex is generally highly interpretable for the presence of Dieback.

Mogumber South - is dominated by an open-woodland of Marri with a well-defined second storey of Pricklybark-*Banksia* (*E. todtiana*, *B. attenuata*, *B. menziesii* and *B. ilicifolia*) The same pattern of Marri extending further north than Jarrah, seen of on the northern Swan Coastal Plain, is repeated in this area. Although localised patches of Jarrah are to be found, they are restricted in size and number. As one goes from the higher rainfall in the south to the lower rainfall in the north, Jarrah disappears first, then Marri. The intermingling of Pricklybark and Jarrah evident on the Bassendean sand dunes near Perth and Gnangara is repeated in the Mogumber complex. Understorey species vary considerably depending on proportion of sand and gravel, depth of sand and moisture levels, but include such species as *Nuytsia floribunda*, *Stirlingia latifolia*, *Petrophile linearis*, *Daviesia pectinata*, *Calothamnus sanguineus*, *Mesomelaena tetragona*, *Baeckea camphorosmae*, *Hypocalymma angustifolium*, *Leptocarpus scariosus*, *Casuarina humilis*, *Lyginia tenax* and *Bossiaea eriocarpa*. The Mogumber South complex is generally highly interpretable for the presence of Dieback.

Coonambidgee complex –this vegetation ranges from a low open forest to low woodland of *E. todtiana*, *Banksia attenuata*, *B. ilicifolia* with local admixtures of *B. prionotes*, to an open woodland of *Corymbia calophylla* and *Banksia* species. The Coonambidgee complex is generally highly interpretable for the presence of Dieback.

3 Methods

The Dieback assessment was done by DPAW registered Dieback Interpreter Joseph Grehan and Field Assistant Kelby Jennings in August 27th and 28th, 2014. While the assessment occurred during the optimal time of the year, sampling conditions were sub-optimal due to the lower than average winter rainfall.

The linear Dieback assessment was conducted in accordance with the *Manual for detecting Phytophthora Dieback disease* (Procedures for DPaW managed lands) (DPaW 2013). These recently updated Dieback Interpreters' guidelines now categorise land that has been cleared of native vegetation (such as farmland) as 'excluded' from assessment. Non-vegetated areas that are 'excluded' from assessment include pasture, pits, easements, development, large roads (sealed and unsealed) permanent flooding and parkland tree stands. Excluded areas are distinguished from unmappable areas by the fact that unmappable areas retain the ability to regenerate and eventually become mappable. **Table 1** presents the *Phytophthora* occurrence categories, impacts and syndromes (DPaW 2013), which include the unmappable category.

The unmappable category is allocated to areas of native vegetation which have been disturbed, but native vegetation will recover over time and may become interpretable and therefore mappable. Examples of unmappable areas include vegetation that has been impacted by fire, timber harvesting, flooding or mining with subsequent rehabilitation. The recovery time for unmappable areas may take longer than 3 years (DPaW 2013). **Table 1** presents details of the different Dieback occurrence categories as defined in DPaW's draft Dieback interpreter's guidelines (DPaW 2013).

Table 1: *Phytophthora* occurrence categories, impacts and syndromes (as cited in DPaW 2013)

<i>Phytophthora</i> occurrence mapping	Impact Rating	Syndrome	Comment
Infested: Impacts of <i>Phytophthora</i> Dieback are visible	High	Endemic or Extremely destructive Epidemic	
	Moderate	Commonly a variable epidemic but may also exist as or be progressing to an extremely destructive epidemic	This syndrome may not have reached full destructive potential, depending on the age of infestation. It might be progressing to High Impact, epidemic syndrome
	Low None of the susceptible overstorey is affected by disease	Variable epidemic Disease apparent	Although overall impact is low, it is not low enough to be given 'no apparent disease' syndrome
			May consist of very low level endemic disease in an environment not favourable to the pathogen
Uninfested: Areas of natural undisturbed or low disturbance vegetation free of symptoms that Indicate <i>Phytophthora</i> Dieback	Nil	No apparent disease	
Uninterpretable: Areas of natural undisturbed vegetation where susceptible plants are too few for interpretation of <i>Phytophthora</i> Dieback	None, or none perceptible	No apparent disease	May consist of very low level endemic disease in an environment not favourable to the pathogen
Unmappable: Keighery disturbance rating 4 or greater	Predicted impact rating may be forecast based using landform and vegetation types	Not assessable	

The Keighery vegetation disturbance scale (DPaW 2013) presented in **Table 2** was used to determine the interpretability of the vegetation. Areas with a vegetation condition rating of 1-3 (Pristine - Very Good) are considered to be mappable. In addition, there must be enough disease indicator species present to enable a diagnosis of the disease status. An area with a vegetation condition rating of 4 (Good) is possibly mappable; however, it is up to the interpreter's discretion. Unmappable and excluded areas are given a condition rating of 5 or 6 (Degraded or Completely Degraded).

Table 2: Keighery (1994) Vegetation Disturbance Scale and Assessability (as cited in DPaW 2013)

Interpretability	Scale		Condition
Mappable	1	Pristine	Pristine or nearly so, no obvious signs of disturbance
	2	Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species
	3	Very Good	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing
Possibly Mappable, discretion required	4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, Dieback and grazing.
Unmappable or Excluded from assessment	5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, Dieback and grazing.
	6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as "parkland cleared" with the flora comprising weed or crop species with isolated native trees or shrubs.

3.1 Linear Assessment

A linear Dieback assessment was done on the tracks and unsealed roads within and adjacent to the study area. During the assessment, visual evidence of disease absence or presence was recorded within a 50 m wide corridor, 25m either side of the track or unsealed road. Other potential disease vectors including watercourses and disturbed areas in and adjacent to the site were also assessed. Reconnaissance of the study area was completed prior to commencing the linear assessment to determine the following:

- Access
- Identify interpretable vegetation and disease expression if present
- Identify possible disease vectors e.g. tracks, utility corridors, ground disturbance, feral animals etc.
- Determine the location of high risk areas (e.g. areas of high disturbance and water-gaining sites)
- Identify other impacts to vegetation (e.g. drought, cankers, herbivory, *Armillaria luteobubalina*, fire)

The assessment involved driving the tracks and unsealed roads within and surrounding the study area recording evidence of presence or absence of Dieback. When necessary areas outside the linear corridor were assessed, including watercourses and disturbed areas, to determine the broader landscape context and to ensure uninfested areas were protectable.

3.2 Disease Risk Categories

Vegetation within the study area was categorised into three different disease risk categories as described below in **Table 3**.

Table 3: Disease Risk Categories

Disease Risk Category	Description
High	Areas where <i>Phytophthora cinnamomi</i> has been recovered from samples and disease symptoms are consistent with the presence of Dieback.
Medium	Areas exhibiting past or current disturbances (logging, grazing, dumping etc.) which have altered vegetation structure and composition. Also includes areas downslope of confirmed infestations, or which exhibit disease symptoms but have not returned positive results for <i>P. cinnamomi</i> .
Low	Areas of protectable uninfested vegetation (as determined by a registered Dieback interpreter), which exhibit multiple healthy indicator species, vegetation in Pristine to Very Good condition (Keighery scale 1-3), no disease pattern or chronology, and no significant risks from disease vectors or current land use.

3.3 Sampling

Soil and tissue samples of recently dead or dying disease indicator species were collected and lodged with the DPaW's Vegetation Health Services Laboratory (VHS) where diagnostic baiting was conducted. All sample point locations were recorded with a hand-held GPS. The following sampling strategy was applied when determining sample locations:

Initial standards sampling: Initial samples are taken to determine disease behaviour. The results inform the sampling strategy and enable testing of early hypotheses (e.g. are other factors causing the deaths of susceptible species such as *Armillaria luteobubalina* or drought).

Sampling to support infested diagnosis: Recently dead and dying indicator species are sampled to support an infested diagnosis.

Sampling to support an uninfested diagnosis: Recently dead and dying indicator species are sampled to support an uninfested diagnosis. Caution must be exercised when claiming that a negative result means that an area is uninfested, because false negative results can be recorded when inoculum levels are depleted from prolonged unfavourable environmental conditions for the pathogen.

All sampling strictly adheres to the following procedures:

- All tools used in sampling are thoroughly sterilised with a 70:30 mixture of methylated spirits and water before samples are taken. It must be ensured that the tools are dry prior to sampling so that the results are not compromised.
- The area around the base of the plant being sampled is cleared of leaf litter and debris so that this material is not included in the sample.
- The plant sampled is excavated to suitable depth to ensure that adequate plant tissue material can be obtained from the roots and cambium layer around the collar of the plant being sampled.
- Material from all around the plant is taken in addition to any obvious lesions to avoid missing any infected material. All the plant tissue material and a few handfuls of soil from around the roots and other places in the soil profile are placed in a polythene bag.
- Enough distilled water to moisten the soil is poured into the bag to ensure the survival of any inoculum that may be present in the sample.
- All relevant information pertaining to the plant sampled and sample location is recorded on the Sample Information Sheet.
- Two aluminium tags with the date, project name, sample number, species sampled and the name of the interpreter are written. One tag is placed in the sample bag and the other is tied near the sample site which is also flagged with a day-glow orange flagging banner.
- The sample hole is backfilled to prevent fauna from becoming trapped.
- All tools are brushed off (to remove excess soil) and sterilised to prevent contamination of the next sample site and sample.

3.4 Mapping

Field evidence and observations were used to prepare the Dieback risk map (**Figure 2**) within the study area. The information used in mapping includes:

1. Sample results
2. Interpretability determined from vegetation condition and disease indicator present
3. Topography and drainage

3.5 Limitations

The DPaW's draft Dieback interpreters guidelines (DPaW 2013) discuss the limitations of linear assessment (P.88)

While a linear assessment uses the same methods as comprehensive transect assessments, it is often regarded as significantly more difficult to do, because the linear assessment corridor is easily taken out of context from wider landscape units. Phytophthora occurrence assessment boundaries may only briefly intersect linear corridors, giving little relative perspective to the wider landscape unit.

The following limitations were encountered during the assessment:

- The widespread impact of drought on the vegetation made Dieback interpretation more difficult.
- The impacts of canker species on susceptible vegetation, particularly *Banksia* species, made Dieback interpretation more difficult.
- Some areas were uninterpretable due to past disturbance caused by logging and grazing.
- Although the survey was conducted during the optimal time, negative sample results can be due to low inoculum levels for *Phytophthora cinnamomi* and therefore it is possible to obtain false negative results.

4 Results

In total, 11 soil and tissue samples were collected from recently dead and dying disease indicator species. The samples were baited at the VHS laboratory. In addition, a tissue sample was taken to test for canker and this returned a positive result for *Cytospora* sp. *Banksia* species including *Banksia attenuata*, *B. menziesii*, and *B. grandis* were the preferred species to sample because they are highly susceptible to the pathogen (Brandis 1983). The sample results are presented in **Table 4** below.

Table 4: Sample Results

Sample No.	Species	Easting GDA 94, Zone 50	Northing GDA 94, Zone 50	Result
CS01	<i>Banksia attenuata</i>	404805	6514443	<i>P. cinnamomi</i>
CS02	<i>Banksia grandis</i>	404874	6511350	Negative
CS03	<i>Banksia menziesii</i>	405328	6517342	Negative
CS04	<i>Banksia attenuata</i>	406281	6517239	Negative
CS05	<i>Banksia grandis</i>	406273	6516533	Negative
CS06	<i>Banksia menziesii</i> & <i>Banksia attenuata</i>	402347	6517398	<i>P. cinnamomi</i>
CS07	<i>Banksia attenuata</i>	402678	6514603	Negative
CS08	<i>Banksia attenuata</i>	403319	6514552	Negative
CS9	<i>Banksia grandis</i>	404215	6514542	<i>Cytospora</i> sp. (Canker)
CS10	<i>Banksia attenuata</i>	404459	6517350	Negative
CS11	<i>Xanthorrhoea preissii</i>	402356	6516852	Negative

The total study area in terms of the linear corridor that was assessed is 119.2ha. This is comprised of 19.4 ha of High Risk (16.3 %), 12.2 ha of Moderate Risk (10.2 %) and 87.6 ha (73.5 %) of Low risk vegetation (**Figure 2**).

5 Discussion

5.1 High Risk Areas

High risk areas are defined as areas where *Phytophthora cinnamomi* has been recovered and disease symptoms consistent with Dieback have been observed. Depending on disease expression symptoms may include:

- Multiple disease indicator species deaths
- Disease pattern and chronology
- Reduction in species richness and cover
- The presence of a disease vector (e.g. track, watercourse, evidence of animal vectors such as pigs)

The linear assessment identified three high risk areas within and adjacent to the study area:

1. The northern section of the power line track near Ippolo Road is infested with recently dead *Banksia attenuata* and *B. menziesii* returning a positive result for *P. cinnamomi* (sample CS08). The infestation runs down the slope along the power line but doesn't appear to extend further than 50 to 100m either side of the track. This section of the power line track poses a high risk of spreading Dieback through the site (**Plates 1 & 2**).
2. The unsealed road along the western boundary of the unnamed DPaW reserve to the west of the study area boundary is infested with two historical results for *P. cinnamomi* (VHS 2014). This unsealed road poses a high risk of vectoring disease along Ippolo Road and into the study area.
3. A section of vegetation on the northern side of the creek located to the south of site boundary is infested. A recently dead *Banksia attenuata* returned a positive result for *P. cinnamomi* (Sample CS01). It is believed that the disease has been vectored into the riparian zone of the creek by feral pigs (**Plate 3**) because there was no distinct disease pattern along the watercourse. The track crossing the creek into the southern boundary of study area poses a high risk as a disease vector.

5.2 Moderate Risk Areas

Two of the moderate risk areas have past disturbances, including logging and grazing, which have resulted altered vegetation structure and some disease indicator species deaths, but have not yielded positive results for *P. cinnamomi* (**Plate 4**). The other moderate risk area is along the power line track downslope of a confirmed infestation. Although this area did not yield a positive result for *P. cinnamomi* there were multiple disease indicator species deaths and additional sampling may recover a positive result

5.3 Low Risk Areas

Low risk areas are areas that have been determined to be uninfested by a DPaW registered Dieback Interpreter. While an uninfested diagnosis can be supported by negative sample results for *P. cinnamomi*, an area cannot be determined to be uninfested on sample results alone (**Plate 5**). Observable factors which can be used in making an uninfested diagnosis include the following:

- Multiple healthy disease indicator species.
- Vegetation condition is rated as 1-3 on the Keighery vegetation condition scale.
- No evidence of disease pattern or chronology.
- Indicator species deaths can be attributed to other factors i.e. drought, canker or *Armillaria*.

5.4 Other Potential Impacts to Vegetation

There may be other factors that caused the observed deaths of disease indicator species, including drought, other *Phytophthora* species, pathogenic fungi and *Armillaria luteobubalina* (*Armillaria* or Australian Honey Fungus).

5.4.1 Other *Phytophthora* species

Phytophthora arenaria is thought to be a native Australian species of *Phytophthora*, however its centre of diversity is still to be determined (C, Crane. Pers. Comm 16/12/2014). The website 'Phytophthora Database' describes the characteristics of *P. arenaria* as follows:

Phytophthora arenaria A. Rea, M. Stukely & T. Jung has been isolated in Western Australia from kwongan heath-land stands since the early 1980s (Burgess et al. 2009, Rea et al. 2011), but was misidentified as *P. citricola*. With the exception of one isolate from Bunbury (south-west coast) *P. arenaria* has been isolated exclusively from the northern sand plains. Most isolates were associated with dead or dying *Banksia* or *Eucalyptus* species; however, isolates were also recovered in association with asymptomatic *Banksia* and *Eucalyptus* species. The first isolation of this taxon was from soil in native kwongan vegetation near Kalbarri in 1986. *Phytophthora arenaria* has thick oospore walls and physiological characteristics that appear to be adaptations favouring survival in the harsh kwongan ecosystem suggesting that this species may be endemic to Western Australia. However, the most closely related species is *P. alticola* a species described from South Africa and the origin of both species requires further examination (<http://www.phytophthoradb.org>).

Another species, *Phytophthora multivora*, which has often been misdiagnosed for *P. citricola*, can persist in alkaline soil (Scott et al. 2009) which is suppressive to *P. cinnamomi*. The ability of *P. multivora* to survive in alkaline soils has implications for hygiene management because using limestone as a sterilising road-base material, as it has been previously used due to its antagonism to *P. cinnamomi*, may not be effective for managing *P. multivora* spread.

5.4.2 Other Pathogenic Fungi

The impact of cankers caused by pathogenic fungus on Proteaceous species was examined by Crane and Burgess (2013). The study examined the impact that aerial cankers are having on coastal vegetation between Esperance and Cervantes and demonstrated pathogenicity in seven *Banksia* spp. over a wide geographic range. The pathogenic fungus was identified as a new genus and species within the *Cryphonectriaceae* (*Diaporthales*) and is described as *Luteocirrhus shearii* gen. sp. nov. The fungus causes the death of single branches; however, it can lead to multiple branch deaths or cause complete crown dieback as occurred with some of the *Banksia baxteri* and *B. verticillata* sampled (Crane and Burgess 2013).

A tissue sample taken from a recently dead *Banksia grandis* was tested for the presence of canker at VHS. *Cytospora* sp. was recovered from the sample which is likely to indicate an inability of the plant to contain the fungi because this canker species can also be present on healthy plants (**Appendix 1**). *Banksia* species including *Banksia attenuata*, *B. grandis*, *B. prionotes* and *B. menziesii* displaying symptoms consistent with those described by Crane and Burgess, but not characteristic of *P. cinnamomi* disease expression, were observed throughout the study area. Canker impacts were observed throughout the study area and were generally discernible from Dieback symptoms by the death of single branches or lesions emanating above the trunk collar (**Plates 6, 7 & 8**).

5.4.3 Drought

Impacts to vegetation as a result of prolonged drought were differentiated from impacts caused by *P. cinnamomi* by the following characteristics:

- No disease pattern or chronology in the surrounding vegetation.
- The plant had senesced gradually rather than succumbing quickly as is usually the case with deaths attributed to *P. cinnamomi*.

- No visible lesions or mycelium on the roots of the dead or dying plant.
- Re-shooting or epicormic growth visible on dying plants (**Plates 9 & 10**).

The presence of single or multiple dead branches with the remainder of the plant appearing to be healthy may be attributed to drought or pathogenic fungi.

5.4.4 *Armillaria* (Australian Honey Fungus)

Armillaria luteobubalina (Armillaria or Australian Honey Fungus) is a species of mushroom which causes Armillaria root-rot in affected plants. The fungus is widespread in Jarrah (*Eucalyptus marginata*) and Karri (*E. diversicolor*) forests of the southwest of WA, but has also been recorded in coastal vegetation between Cape Arid (120 km east of Esperance) to Cervantes (160 km north-west of Perth) (Shearer *et al* 1997). *Armillaria* is dispersed by spores produced by the mushroom and also reproduces vegetatively through the roots of affected plants. It affects many of the same plant genera as *Phytophthora* in particular members of the Myrtaceae and Proteaceae plant families, such as *Eucalyptus* and *Banksia* species. *Armillaria* forms a quite visible white or yellow leathery mycelial sheath which is visible beneath the bark in the roots or lower stem. Other observable factors that can be applied in the diagnosis of *Armillaria* infection include:

- Clusters of fruiting bodies around or near the base of the plant
- A pungent mushroom smell
- An inverted V shaped scar at the base of the plant
- Yellow-white stringy rot under the bark in the roots and base of affected plants (DEC, 2012)

While some of the mycelium observed may be as a result of *Armillaria*, the assessment occurred at the wrong time of the year to observe fruiting bodies and therefore confirm the presence of the fungus. It is possible that *Armillaria luteobubalina* is present within the study area and contributing to the death of the vegetation.

6 Conclusion and Recommendations

Tracks, water courses and hard-hooved feral animals are considered to be the most likely vectors of disease in the study area. Therefore a linear Dieback assessment was considered an appropriate method for assessing the risk and likelihood of Dieback presence within and adjacent to the study area. The linear assessment determined that the majority of the study area is uninfested and therefore presents a low risk of spreading Dieback into areas outside the study corridor. While it is likely that the majority of the 983 ha site is uninfested, caution should be used when extrapolating the disease status and/or risk to vegetation that has not been assessed outside the study area.

Terratree makes the following recommendations in relation to the linear *Phytophthora* Dieback assessment of the study area:

- A comprehensive Dieback assessment of the site should be completed in accordance with *Manual for detecting and mapping Phytophthora Dieback disease* (Procedures for DPaW managed lands) (DPaW 2013).
- Protectable areas should be clearly demarcated and signposted.
- Additional samples from moderate risk areas should be taken.
- A Dieback management plan, including an access management strategy, should be developed for the site.

7 References

Brandis, A.J. (1983) Introduction to the detection and Interpretation of the symptoms of Jarrah Dieback Disease in Western Australia, Technical Paper No.3, Forests Department of Western Australia.

Bureau of Meteorology (BOM) <http://www.bom.gov.au/> accessed October 10th 2014

CALM (2001) *Phytophthora cinnamomi* and the diseases caused by it - Volume 2: Interpreters Guidelines for Detection, Diagnosis and Mapping. WA Department of Conservation and Land Management, Perth, Western Australia.

CALM (2004) *Phytophthora cinnamomi* and disease caused by it. Volume 1 – Management Guidelines.

Commonwealth of Australia (2005) Interim Biogeographical Regionalisation for Australia (IBRA) Mapping, Version 6.1 (2004). Department of Environment and Heritage, March 2005.

Crane, C. and Burgess, T.I. (2013) *Luteocirrhus shearii* gen. sp. nov. (*Diaporthales, Cryphonectriaceae*) pathogenic to Proteaceae in the south Western Australian Floristic Region. IMA Fungus Volume 4 No.1 (2013) pp111-122

Crone M., McComb, J.A., O'Brien P.A., Hardy G.E.St J. (2012) *Survival of Phytophthora cinnamomi* as oospores, stromata, and thick-walled chlamydospores in roots of symptomatic and asymptomatic annual and herbaceous perennial plant species. Fungal Biology 117 (2013) pp112-123.

Department of Environment and Conservation (2012) *Manual for detecting Phytophthora Dieback disease* (Procedures for DPaW managed lands) Draft

Department of Parks and Wildlife (2013) *Manual for detecting Phytophthora Dieback disease* (Procedures for DPaW managed lands) Working Draft

Environmental Protection Authority (2007) *State of the Environment Report*. Report published by the EPA for the Government of Western Australia.

Hedde, E.M., Loneragan, O.W. and Havel, J.J. (1980). Pinjarra Sheet. Vegetation Complexes of the Darling System, Western Australia. In: Atlas of Natural Resources Darling System, Western Australia. Western Australian Department of Conservation and Environment, Perth.

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

Mitchell, D, Williams, K & Desmond, A (2002), 'Swan Coastal Plain 2 (SWA – Swan Coastal Plain subregion)', in N McKenzie, J May & S McKenna (eds.), Bioregional Summary of the 2002 Biodiversity Audit for Western Australia, Department of

Conservation and Land Management, Western Australia Scott P.M., Burgess T.I., Barber P.A., Shearer B.L., Stukely M.J.C., Hardy G.E.St J., Jung T. (2009) *Phytophthora multivora* sp. nov., a new species recovered from declining *Eucalyptus*, *Banksia*, *Agonis* and other plant species in Western Australia. *Persoonia*. 22: 1–13. Published online 2009 February 2. doi: 10.3767/003158509X415450

Shearer, B.L., Crane, C.E., Fairman, R.G., Grant, M.J. (1997) Occurrence of *Armillaria luteobubalina* and Pathogen-mediated Changes in Coastal Dune Vegetation of South-Western Australia. *Aust. J. Bot.*, (1997), 45, 905–917

Western Australian Native Plants Susceptible and Resistant to *Phytophthora cinnamomi* Compiled by E. Groves, G. Hardy & J. McComb, Murdoch University

Wills, R.T. and Keighery, G.J. (1994). The ecological impact of plant disease on plant communities. *Journal of Royal Society of Western Australia* **77**: 127-132.

8 Glossary of Terms

Assessment – (*Phytophthora* occurrence) any combination of activities including, detection, diagnosis (interpretation), mapping and demarcation of *Phytophthora* Dieback disease in natural ecosystems.

Assessment Area – An area where *Phytophthora* occurrence assessment is possible, or will be possible in the short to medium term. This area may be larger or smaller than the proponent's project area.

Disease - The combination of a pathogen, host and correct environmental conditions, which results in disease symptoms or death of a host.

Environment - The sum of all external factors which act on an individual organism during its lifetime.

Excluded Area – An area of high disturbance in which native vegetation is unlikely to recover.

Host - means the plant which is invaded by a pathogen and from which the pathogen derives its energy.

Indicator species – Plant species that are more susceptible to *Phytophthora* disease and reliably show symptoms earlier than other species.

Infection – The invasion of a host organism's bodily tissue by disease causing organisms. In relation to Dieback this refers to an individual plant and not the population.

Infested – The state of being invaded or overrun by pests or parasites. In relation to Dieback it refers to a population of plants and not individual plants.

Inoculum – Cells, tissue, or viruses that are used to inoculate a new culture

Pathogen – Any organism or factor causing disease within a host

Pathogenic – Causing or capable of causing disease

***Phytophthora* Dieback** – A term referring to the disease symptoms caused by *Phytophthora* species in susceptible vegetation.

Susceptible – Likely to be influenced or able to be harmed by particular pathogen

Sporulation - a type of reproduction that occurs in fungi, algae, and protozoa and involves the formation of spores by the spontaneous division of a cell into four or more daughter cells, each of which contains a part of the original nucleus.

Symptom – A phenomenon that arises from, and accompanies a particular disease or disorder and serves as an indication of it

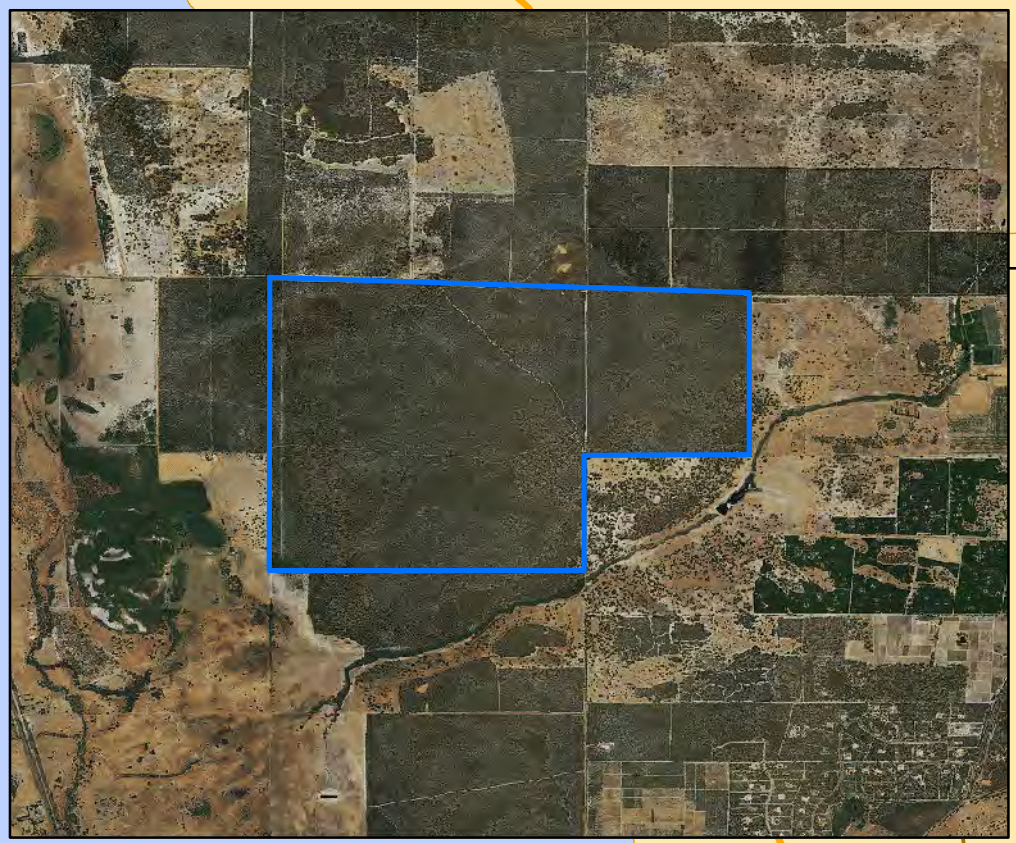
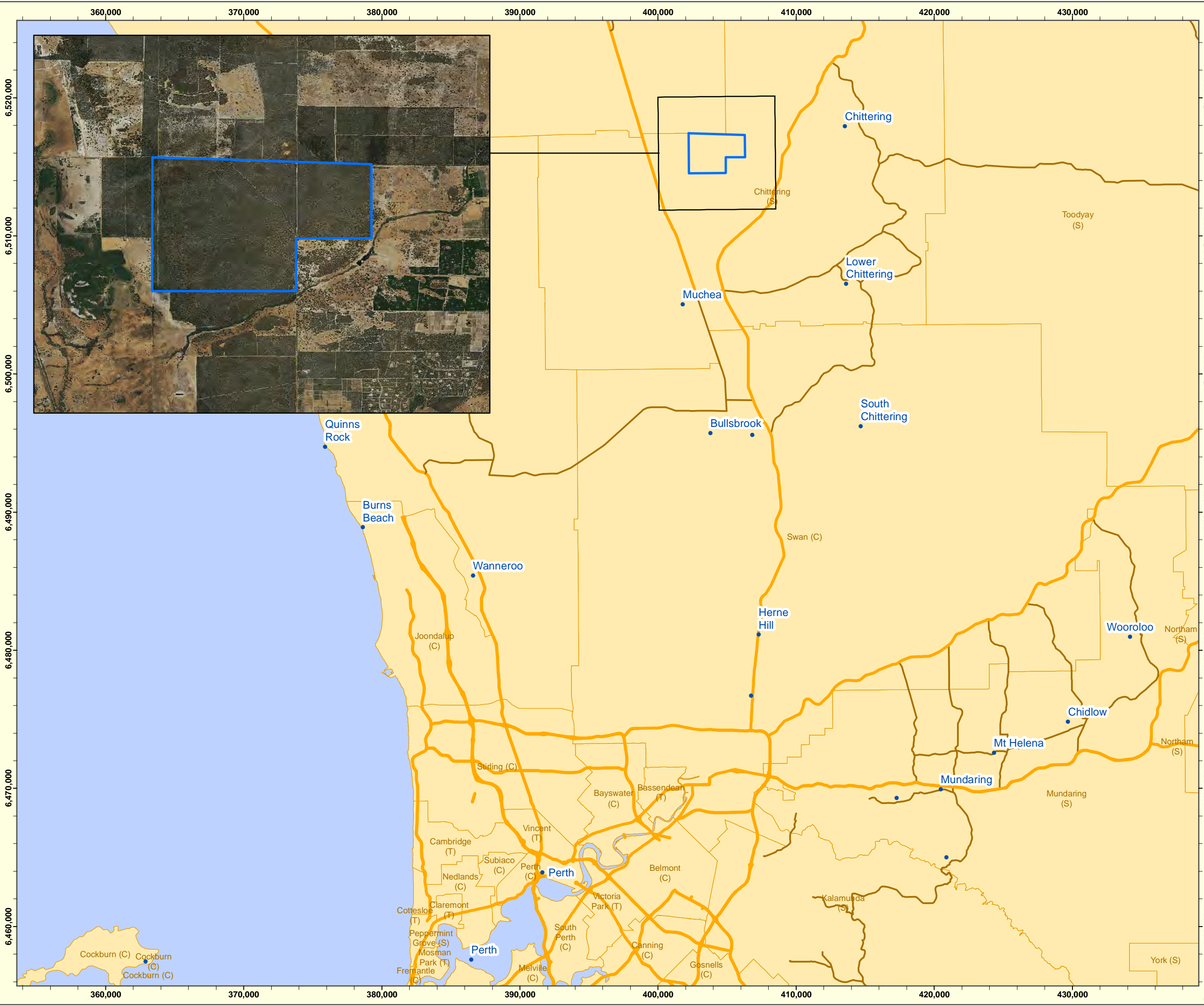
Uninfested – An area that does not contain infected plants or show visible signs of disease

Uninterpretable – a natural area where there are inadequate visible symptoms present to make a diagnosis

Unmappable – A naturally vegetated area that has had disturbance and from which is likely to recover in the short term

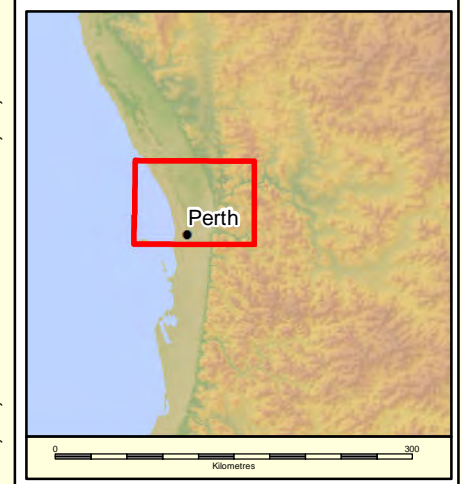
Unprotectable – A disease free area that is likely to become infested within a given time

Figures


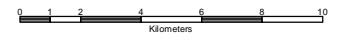




LEGEND

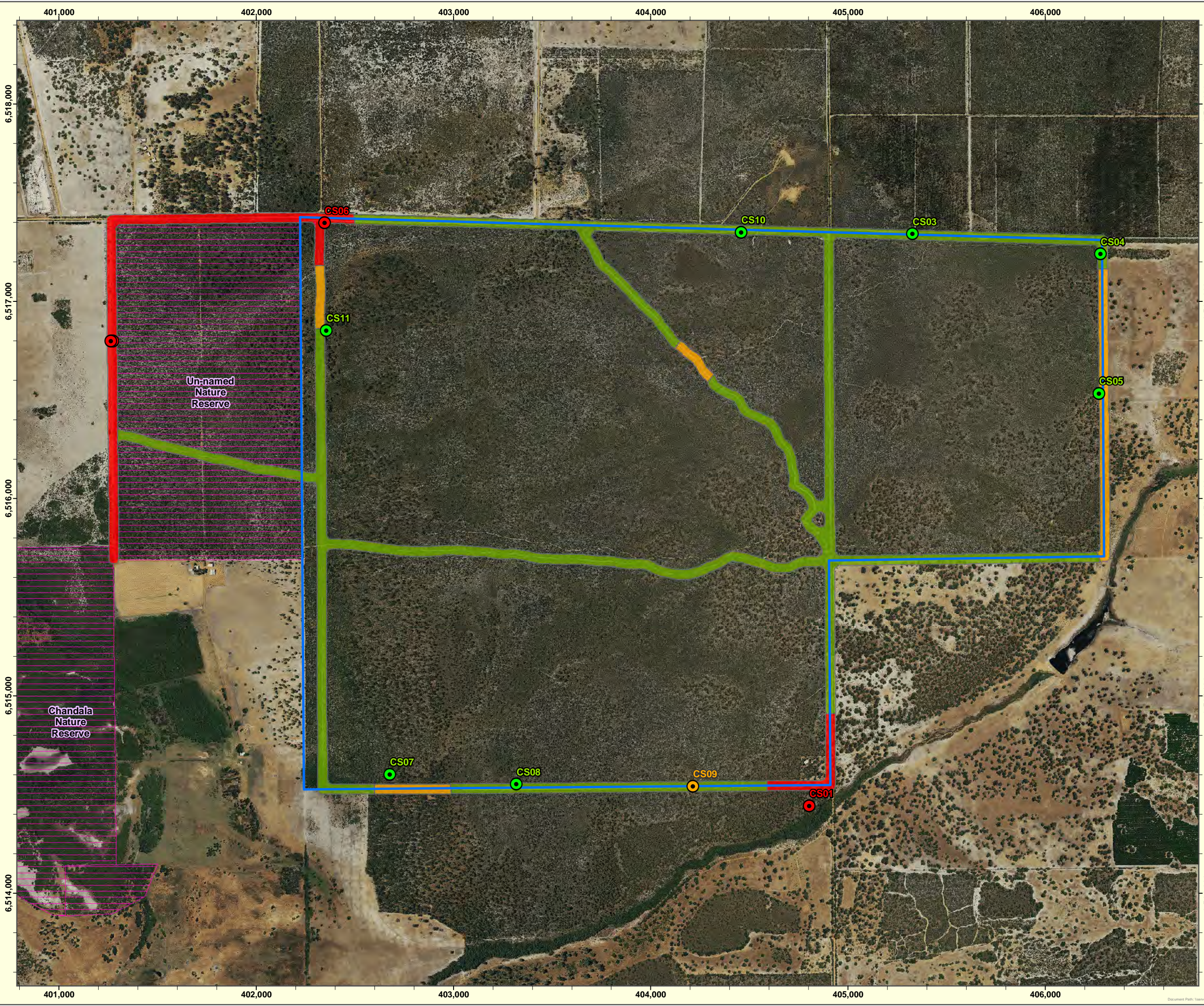
- Site boundary
- Towns
- Road (Primary Distributor)
- Road (Regional Distributor)



SITE LOCALITY
Chittering Dieback
Reconnaissance Survey


 Coordinate System: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter


Scale @ A3: 1:250,000	Figure 01
Date: 22/09/2014	 
Revision: Rev A	
Project No: TS14013	
Prepared: R Cullen	
Checked: J Botterill	
Reviewed: N King	



LEGEND

- Site boundary
- DPaW managed lands

Dieback sample results

- Cytospora* sp. (canker)
- P. cinnamomi*
- Negative

Dieback risk assessment

- High
- Moderate
- Low



LINEAR DIEBACK RISK ASSESSMENT AND SAMPLE RESULTS
Chittering Dieback
 Reconnaissance Survey

Coordinate System: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:17,500	Figure 02
Date: 22/09/2014	
Revision: Rev C	
Project No: TS14013	
Prepared: R Cullen	
Checked: J Botterill	
Reviewed: N King	

9 Plates



Plate 1: High risk vegetation: Infested *Banksia* woodland with multiple indicator species deaths, disease pattern and chronology



Plate 2: Dead *Banksia attenuata* adjacent to disease vector (power line access track)



Plate 3: Evidence of feral pig activity, a likely vector for the positive *P. cinnamomi* sample



Plate 4: Medium risk vegetation - Area at risk due to historical disturbance due to logging, nearby areas of Infested vegetation and indicator species deaths.



Plate 5: Low risk vegetation - Uninfested woodland with low levels of disturbance and intact vegetation in Excellent condition



Plate 6: *Banksia grandis* exhibiting canker impacts



Plate 7: *Banksia* trunk exhibiting canker lesions on the cambium layer



Plate 8: *Banksia attenuata* exhibiting partial death due to canker



Plate 9: *Banksia* woodland exhibiting drought impacts



Plate 10: *Banksia attenuata* re-shooting after drought impact

10 Appendices

Appendix 1: Vegetation Health Services Laboratory report on positive identification of *Cytospora* sp. (canker) in CS11

Appendix 2: Sample Results from the Vegetation Health Services laboratory

PLANT DISEASE SAMPLE INFORMATION SHEET

CLIENT NAME Terratree Joe Grehan joeg@terratree.com.au

SAMPLE *Banksia grandis* canker CS 11 (canker) Fig. 1.

DIAGNOSIS A *Cytospora* sp. (Fig 2 & 3) was isolated and most likely indicates some inability of the plant to contain the fungi which can also be present on healthy plants.



Fig. 1 sample

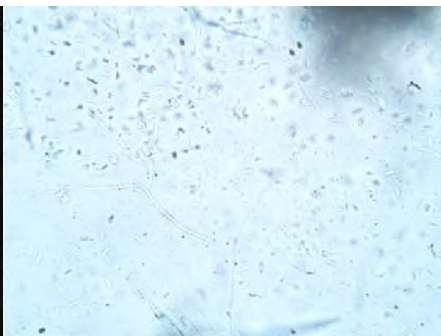


Fig. 2 Curved conidia



Fig.3 Alantoid conidia

THE PATHOGEN *Cytospora* sp. along with other genera in the Valsaceae, are commonly isolated from stem and twig cankers of *Eucalyptus*, *Hakea* and *Banksia* sp. of south-western Australia (Shearer 1994) They have a worldwide reputation as pathogens and cause extensive damage to tree crops. However in south-western Australia they often exist as benign endophytes (present in host tissues asymptotically) or wound pathogens causing disease only when the host is compromised in some way. Trees affected by drought, insect attack, defoliation by fungi, sunscald, herbicides or mechanical injury are predisposed to infection and disease development.

SYMPTOMS Twig and branch death.

HOST RANGE Myrtaceae, Proteaceae and Ericaceae

DISTRIBUTION Ubiquitous across the south-west but can have local high inoculum levels in infection pockets.

CONTROL Really need to trial this first to look at host/pathogen/fungicide response. Unsure? Is it warranted?

LABORATORY SAMPLES CC1721 not retained

SITE CS 11 Chittering

Boulder

MAP REFERENCE E 404215 N 6514542 Zone 50

19/9/2014

Colin Crane

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Department of Parks and Wildlife

Science Division

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Fax.(08) 9334 0327

Email: colin.crane@dpaw.wa.gov.au

Shearer BL (1994) The major plant pathogens occurring in native ecosystems of south-western Australia, *Journal of the Royal Society of Western Australia* 77, 113-122.

VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

SEND TO: Vegetation Health Service, Science Division – D.E.C, 17 Dick Perry Ave KENSINGTON 6151 Phone: (08) 9334 0317 Fax: (08) 9334 0114

CONTACT DETAILS of sender




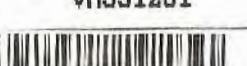


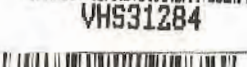
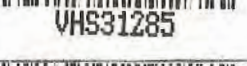
Name Joe Graham Terratree
 Fax No. Ph. 9335 4228 Phone No. 0412003658
 DEC Office or Company Name Terratree Pty Ltd

GDA
(1)
GDA 94

Job Type (Please indicate)
 D.E.C. (C) Alcoa (A)
 Recoup (R) FPC
 Private (P) Other _____

VHS USE ONLY

Date processed 29/9/14
 Date faxed 12/9/14

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
 VHS31279	27/8/14	CS01 (chittering)	<i>Banksia attenuata</i>	M	50	E 404805 N 6514443	P		CIN
 VHS31280	27/8/14	CS02 "	<i>Banksia grandis</i>	M	50	E 404874 N 6511350	P		NEG
 VHS31281	27/8/14	CS03 "	<i>Banksia menziesii</i>	M	50	E 405328 N 6512242	P		NEG
 VHS31282	27/8/14	CS04 "	<i>Banksia attenuata</i>	M	50	E 406281 N 6512232	P		NEG
 VHS31283	27/8/14	CS05 "	<i>Banksia grandis</i>	H	50	E 406273 N 6516522	P		NEG
 VHS31284	27/8/14	CS06 "	<i>B. menziesii</i>	L	50	E 401375 N 6516788	P		SUB
 VHS31285	28/8/14	CS07 "	<i>B. menziesii</i>	AA	50	E 401281 N 6517193	P		AS FOR 31284
 VHS31286	28/8/14	CS08 "	<i>B. menziesii</i> + <i>B. attenuata</i>	H	50	E 402347 N 6517398	P		CIN

NOTES:

1. Please tick this box if your map references are supplied in the GDA 94 standard. If not, please specify the datum used.
2. Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
3. An MGA map reference with prefixes must be supplied for all samples.
4. Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
5. Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS:

VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

SEND TO: Vegetation Health Service, Science Division – D.E.C, 17 Dick Perry Ave KENSINGTON 6151 Phone: (08) 9334 0317 Fax: (08) 9334 0114

CONTACT DETAILS of sender

Name Joe Graham
 Fax No. Mob 040003688 Phone No. 93354228
 DEC Office or Company Name Terracore Pty Ltd

GDA
(1)
GDA 94

Job Type (Please indicate)
 D.E.C. (C) Alcoa (A)
 Recoup (R) FPC
 Private (P) Other _____

VHS USE ONLY
 Date received 30/8/14
 Date sampled 12/9/14

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
 VHS31287	28/8/14	CS09 (chittingang)	<i>Banksia attenuata</i>	M	50	E 402678 N 6574603	P		NEG
 VHS31288	28/8/14	CS10 "	<i>B. attenuata</i>	L	50	E 403319 N 6574552	P		NEG
	28/8/14	CS11 "	CANKER sample <i>B. grandis</i>	M	50	E 404215 N 6574342	P		
 VHS31289	28/8/14	CS12 "	<i>B. attenuata</i>	L	50	E 404459 N 6577350	P		NEG
 VHS31290		CS13 "	<i>Xanthorrhoea fraxilli</i>	M	50	E 402356 N 6576552	P		NEG
						E ----- N -----			
						E ----- N -----			
						E ----- N -----			

- NOTES:**
- Please tick this box if your map references are supplied in the GDA 94 standard. If not, please specify the datum used
 - Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
 - An MGA map reference with prefixes must be supplied for all samples.
 - Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
 - Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicoletiana*, CON = *P. constricta*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS:



APPENDIX D

Conservation
Significant Flora
Known to Occur or
Potentially Occur
Within the Study
Area

Species ¹	Conservation code ²			Habit ³	Habitat ³	Flowering period ³	Likelihood of occurrence
	EPBC Act	WC Act	DPAW				
<i>Acacia anomala</i>	VU	VU		Slender, rush-like shrub	Lateritic soils. Slopes.	Aug to Sep	Possible
<i>Acacia cummingiana</i>			3	Sprawling, straggly, rush-like shrub	Grey or yellow sand, lateritic gravel. Sandplains, lateritic breakaways.	May to Jun/ Aug	Likely
<i>Acacia drummondii</i> subsp. <i>affinis</i>			3	Erect shrub	Lateritic gravelly soils.	Jul to Aug	Likely
<i>Acacia pulchella</i> var. <i>reflexa</i> acuminate bracteole variant (R.J. Cumming 882)			3	Shrub, 0.3-1 m high	Sandy loam or sandy clay over laterite. Woodland.	Jul to Sep	Possible
<i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i>			3	Prostrate, mat-forming, non-lignotuberous shrub	Grey sand, lateritic gravel.	Jul/Sep to Dec/Jan	Possible
<i>Andersonia gracilis</i>	EN	VU		Slender erect or open straggly shrub	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Sep to Nov	Unlikely
<i>Anigozanthos viridis</i> subsp. <i>terraspectans</i>	VU	VU		Rhizomatous, perennial, herb	Grey sand, clay loam. Winter-wet depressions.	Aug to Sep	Unlikely
<i>Caladenia huegelii</i>	EN	CR		Tuberous, perennial, herb	Grey or brown sand, clay loam.	Sep to Oct	Possible
<i>Caustis</i> sp. Gigas (A.S. George 9318)			2	Erect, open sedge	Flat, dry white sand.	Aug to Nov	Likely
<i>Centrolepis caespitosa</i>	EN		4	Tufted annual, herb	White sand, clay. Salt flats, wet areas.	Oct to Dec	Unlikely
<i>Chamaescilla gibsonii</i>			3	Clumped tuberous, herb	Clay to sandy clay. Winter-wet flats, shallow water-filled claypans.	Sep	Unlikely

Species ¹	Conservation code ²			Habit ³	Habitat ³	Flowering period ³	Likelihood of occurrence
	EPBC Act	WC Act	DPAW				
<i>Chamelaucium</i> sp. Gingin (N.G. Marchant 6)	EN	VU		Unknown	Unknown.	Unknown	Likely
<i>Conospermum densiflorum</i> subsp. <i>Unicephalatum</i>	EN	EN		Erect, much-branched shrub	Clay soils. Low-lying areas.	Sep to Nov	Unlikely
<i>Cyathochaeta teretifolia</i>			3	Rhizomatous, clumped, robust perennial, grass-like or herb (sedge),	Grey sand, sandy clay. Swamps, creek.	Unknown	Unlikely
<i>Darwinia foetida</i>	CR	EN		Unknown	Unknown.	Unknown	Unlikely
<i>Diuris micrantha</i>	VU	VU		Tuberous, perennial, herb	Brown loamy clay. Winter-wet swamps, in shallow water.	Sep to Oct	Unlikely
<i>Diuris purdiei</i>	EN	EN		Tuberous, perennial, herb	Grey-black sand, moist. Winter-wet swamps.	Sep to Oct	Unlikely
<i>Drakaea elastica</i>	EN	CR		Tuberous, perennial, herb	White or grey sand. Low-lying situations adjoining winter-wet swamps.	Oct to Nov	Unlikely
<i>Drosera occidentalis</i> Morrison subsp. <i>occidentalis</i>				Fibrous-rooted, rosetted perennial, herb	Sandy & clayey soils. Swamps & wet depressions.	Nov to Dec	Unlikely
<i>Drosera sewelliae</i>			1	Fibrous-rooted, rosetted perennial, herb	Laterite & silica sand soils.	Oct	Possible
<i>Eleocharis keigheryi</i>	VU	VU		Rhizomatous, clumped perennial, grass-like or herb (sedge),	Clay, sandy loam. Emergent in freshwater: creeks, claypans.	Aug to Nov	Unlikely
<i>Eucalyptus balanites</i>	EN	CR		Mallee	Sandy soils with lateritic gravel	Oct to Dec	Unlikely

Species ¹	Conservation code ²			Habit ³	Habitat ³	Flowering period ³	Likelihood of occurrence
	EPBC Act	WC Act	DPAW				
<i>Eucalyptus leprophloia</i>	EN	EN		Mallee	White or grey sand over laterite. Valley slopes.	Aug to Oct	Unlikely
<i>Gastrolobium nudum</i>			2	Spreading, twiggy shrub	Red-brown clay, brown loam, gravel, laterite, granite. Flats, slopes, hilltops, ridges, valleys, breakaways.	Feb	Possible
<i>Grevillea candolleana</i>			2	Spreading shrub	Laterite, lateritic loam. Hillsides.	Aug to Sep	Possible
<i>Grevillea corrugata</i>	EN	VU		Shrub, 1.5-2.5 m high	Gravelly loam. Roadsides.	Aug to Sep	Unlikely
<i>Grevillea curviloba</i> subsp. <i>curviloba</i>	EN	CR		Prostrate to erect shrub	Grey sand. Winter-wet heath.	Oct	Possible
<i>Grevillea curviloba</i> subsp. <i>incurva</i>	EN	EN		Prostrate to erect shrub	Sand, sandy loam. Winter-wet heath.	Aug to Sep	Possible
<i>Grevillea evanescens</i>			1	Erect, robust shrub	Brown Spearwood sand.	Unknown	Possible
<i>Hibbertia glomerata</i> subsp. <i>ginginensis</i>			1	Erect shrub	Sand, brown clay, laterite. Near roadsides.	Jul to Sep	Possible
<i>Hibbertia helianthemoides</i>			4	Spreading to erect, low or prostrate shrub	Clayey sand over sandstone or loam over quartzite. Hills and scree slopes.	Jul/Sep to Oct	Unlikely
<i>Hypocalymma sylvestre</i>		CR		Spreading shrub	Yellow-brown sandy loam. Woodland on lateritic hilltop.	Aug	Unlikely
<i>Hypolaena robusta</i>			4	Dioecious rhizomatous, perennial, herb	White sand. Sandplains.	Sep to Oct	Likely

Species ¹	Conservation code ²			Habit ³	Habitat ³	Flowering period ³	Likelihood of occurrence
	EPBC Act	WC Act	DPAW				
<i>Isotropis cuneifolia</i> subsp. <i>glabra</i> Keighery			2	Prostrate to ascending, spreading perennial, herb or shrub	Sand, clay loam. Winter-wet flats.	Sep	Unlikely
<i>Lepidosperma rostratum</i>	EN	EN		Rhizomatous, tufted perennial, grass-like or herb (sedge)	Peaty sand, clay.	Unknown	Unlikely
<i>Leucopogon squarrosus</i> subsp. <i>trigynus</i>			2	Unknown	Unknown.	Unknown	Unlikely
<i>Meionectes tenuifolia</i>			3	Unknown	Unknown.	Unknown	Unlikely
<i>Myriophyllum echinatum</i>			3	Erect annual, herb	Clay. Winter-wet flats.	Nov	Unlikely
<i>Oxymyrrhine coronata</i>			4	Unknown	Unknown.	Unknown	Unlikely
<i>Persoonia rudis</i>			3	Erect, often spreading shrub	White, grey or yellow sand, often over laterite.	Sep to Dec/Jan	Possible
<i>Pithocarpa corymbulosa</i>			3	Erect to scrambling perennial, herb	Gravelly or sandy loam. Amongst granite outcrops.	Jan to Apr	Unlikely
<i>Platysace ramosissima</i>			3	Perennial, herb	Sandy soils.	Oct to Nov	Possible
<i>Ptychosema pusillum</i>	VU	VU		Perennial, herb	Sand. Rises	Aug to Oct	Possible
<i>Schoenus griffinianus</i>			3	Small, tufted perennial, grass-like or herb (sedge),	White sand.	Sep to Oct	Likely
<i>Stylidium cymiferum</i>			3	Rosetted perennial, herb	Brown loam over laterite. Uplands, Wandoo woodland.	Oct to Nov	Unlikely
<i>Stylidium longitubum</i>			3	Erect annual (ephemeral), herb	Sandy clay, clay. Seasonal wetlands.	Oct to Dec	Likely

Species ¹	Conservation code ²			Habit ³	Habitat ³	Flowering period ³	Likelihood of occurrence
	EPBC Act	WC Act	DPAW				
<i>Stylidium squamellosum</i>			2	Caespitose perennial, herb	Brown to red-brown clay loam. Winter-wet habitats and depressions, open woodland, shrubland.	Oct to Nov	Unlikely
<i>Synaphea grandis</i>			4	Tufted shrub	Laterite.	Oct to Nov	Possible
<i>Tetraria</i> sp. Chandala (G.J. Keighery 17055)			2	Unknown	Unknown.	Unknown	Likely
<i>Tetratheca pilifera</i>			3	Spreading shrub	Gravelly soils.	Aug to Oct	Unlikely
<i>Thelymitra stellata</i>	EN	EN		Tuberous, perennial, herb	Sand, gravel, lateritic loam.	Oct to Nov	Unlikely
<i>Trichocline</i> sp. Treeton (B.J. Keighery & N. Gibson 564)			2	Tuberous, perennial, herb	Sand over limestone, sandy clay over ironstone. Seasonally wet flats.	Unknown	Unlikely
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>			4	Erect shrub	Sand, sandy clay. Winter-wet depressions.	May/Nov to Dec/Jan	Unlikely
<i>Verticordia rutilastra</i>			3	Shrub	Sand & lateritic gravel. Hills.	Sep to Nov	Likely
<i>Verticordia serrata</i> var. <i>linearis</i>			3	Shrub, to 1 m high	White sand, gravel. Open woodland.	Sep to Oct	Likely

1. See Section 4.1 for a comprehensive list of databases and reports reviewed to obtain the list of conservation significant flora.

2. See Appendix D for the descriptions of the conservation codes.

3. Descriptions and flowering periods obtained from DPAW (2014).



APPENDIX E

State and Federal Conservation Code Descriptions



1 STATE CONSERVATION CODES

1.1 Flora and fauna

T: Threatened species

Specially protected under the *Wildlife Conservation Act 1950*, listed under Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

Species which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

X: Presumed extinct species

Specially protected under the *Wildlife Conservation Act 1950*, listed under Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora (which may also be referred to as Declared Rare Flora).

Species which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.

IA: Migratory birds protected under an international agreement

Specially protected under the *Wildlife Conservation Act 1950*, listed under Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice.

Birds that are subject to an agreement between governments of Australia and Japan, China and The Republic of Korea relating to the protection of migratory birds and birds in danger of extinction.

S: Other specially protected fauna

Specially protected under the *Wildlife Conservation Act 1950*, listed under Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice.

Threatened Fauna and Flora are further recognised by the Department of Parks and Wildlife according to their level of threat using IUCN Red List criteria. The ranking are:

CR Critically Endangered - considered to be facing an extremely high risk of extinction in the wild.


EN Endangered – considered to be facing a very high risk of extinction in the wild.

VU Vulnerable – considered to be facing a high risk of extinction in the wild.

Species that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora and Priority Fauna Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna. Species that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Conservation Dependent species are placed in Priority 5.

1: Priority One: Poorly-known species

Species that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, rail reserves and Main



Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.

2: Priority Two: Poorly-known species

Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.

3: Priority Three: Poorly-known species

Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.

4: Priority Four: Rare, Near Threatened and other species in need of monitoring

- (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.
- (b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
- (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

5: Priority Five: Conservation dependent species

Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

1.2 Ecological Communities

Presumed Totally Destroyed (PD)

An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies (A or B):

- A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or
- B) All occurrences recorded within the last 50 years have since been destroyed



Critically Endangered (CR)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):


- A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii):
 - i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);
 - ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.
- B) Current distribution is limited, and one or more of the following apply (i, ii or iii):
 - i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);
 - ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;
 - iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.
- C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).

Endangered (EN)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):

- A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii):
 - i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);
 - ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

- 
- B) Current distribution is limited, and one or more of the following apply (i, ii or iii):
 - i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);
 - ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;
 - iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.
 - C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

Vulnerable (VU)

An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C):

- A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.
- B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.
- C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

Possible Threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as Threatened ecological communities. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly-known ecological communities

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 100 ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly-known ecological communities

Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

- (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:
- (ii) Communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;
- (iii) Communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

- (i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.
- (ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
- (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

2 FEDERAL CONSERVATION CODES

2.1 Flora and fauna

Extinct

A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.



Extinct in the wild

A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time:

- (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
- (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.

Critically endangered

A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

Endangered

A native species is eligible to be included in the endangered category at a particular time if, at that time:

- (a) it is not critically endangered; and
- (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

Vulnerable

A native species is eligible to be included in the vulnerable category at a particular time if, at that time:

- (a) it is not critically endangered or endangered; and
- (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.

Conservation dependent

A native species is eligible to be included in the conservation dependent category at a particular time if, at that time:

- (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or
- (b) the following subparagraphs are satisfied:
 - (i) the species is a species of fish;
 - (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised;
 - (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory;
 - (iv) cessation of the plan of management would adversely affect the conservation status of the species.

2.2 Ecological communities

Critically endangered

An ecological community is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.



Endangered

An ecological community is eligible to be included in the endangered category at a particular time if, at that time:

- (a) it is not critically endangered; and
- (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

Vulnerable

An ecological community is eligible to be included in the vulnerable category at a particular time if, at that time:

- (a) it is not critically endangered nor endangered; and
- (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.



APPENDIX F

Relevé Floristic Data

RELEVÉ DATA

Site: COR01
Described: CvdB & LD **Date:** 10/07/2014 **Type:** Releve
MGA Zone: 50 404219mE; 6517177mN
Habitat: Mid to upper north facing slope of a laterite rise
Soil: Black brown sandy loam with laterite
Rock Type: Laterite
Vegetation: *Eucalyptus marginata* and *Corymbia calophylla* mid sparse woodland over *Xanthorrhoea preissii* and *Allocasuarina humilis* mid open shrubland over *Hibbertia hypericoides*, *Conostephium pendulum* and *Hakea stenocarpa* low open shrubland
Condition: Excellent
Fire Age: >5 years
Notes Leaf Litter (%): 5
Rock Size (cm): 1-15
Exposed Rock (%): 17
Rock Cover (%): 22



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia drummondii</i> subsp. <i>drummondii</i>		
<i>Allocasuarina humilis</i>	1	1.5
<i>Astroloma pallidum</i>		
<i>Astroloma stomarrhena</i>		
<i>Banksia bipinnatifida</i> subsp. <i>multifida</i>		
<i>Banksia bipinnatifida</i> subsp. <i>multifida</i>		
<i>Calectasia narragara</i>		
<i>Calothamnus sanguineus</i>		
<i>Conostephium pendulum</i>	1	0.5
<i>Corymbia calophylla</i>	1	10
<i>Daviesia physodes</i>		
<i>Daviesia physodes</i>		
<i>Eucalyptus marginata</i>	9	11
<i>Gonocarpus cordiger</i>		
<i>Grevillea pilulifera</i>		
<i>Hakea lissocarpa</i> (forma)	1	0.7
<i>Hakea stenocarpa</i>		
<i>Hibbertia hypericoides</i>	5	0.3
<i>Jacksonia floribunda</i>		
<i>Lepidosperma pubisquameum</i> (flat form)		
<i>Mesomelaena tetragona</i>		
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		
<i>Petrophile divaricata</i>		
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		
<i>Xanthorrhoea preissii</i>	12	1.8

Site: COR02
Described: CvdB & LD **Date:** 8/07/2014 **Type:** Relve
MGA Zone: 50 405595mE; 6516948mN
Habitat: Consolidated dune rise
Soil: Grey white coarse grained sand
Rock Type: N/A
Vegetation: *Eucalyptus marginata* mid sparse woodland over *Xanthorrhoea preissii* mid sparse shrubland over *Hibbertia hypericoides* and *Melaleuca systema* low heath shrubland over *Lepidosperma pubisquameum* (flat form) and *Mesomelaena pseudostygia* low sparse sedgeland over *Lyginia imberbis* low isolated rushes
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 12



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Bossiaea eriocarpa</i>		
<i>Calytrix flavescens</i>		
<i>Calytrix variabilis</i>		
<i>Conostephium pendulum</i>		0.2
<i>Daviesia physodes</i>		
<i>Eucalyptus marginata</i>	6	13
<i>Gladiolus caryophyllaceus</i>		0.1
<i>Gompholobium tomentosum</i>		
<i>Hakea ruscifolia</i>		
<i>Hibbertia hypericoides</i>	15	0.3
<i>Hibbertia racemosa</i>		
<i>Hyalochlamys globifera</i>		
<i>Isopogon linearis</i>		
<i>Jacksonia floribunda</i>		
<i>Lepidosperma pubisquameum</i> (flat form)	1	0.3
<i>Lepidosperma squamatum</i>		
<i>Leucopogon conostephioides</i>		
<i>Leucopogon gracillimus</i>		
<i>Lomandra hermaphrodita</i>		
<i>Lyginia imberbis</i>	<1	0.3
<i>Melaleuca systema</i>	3	0.3
<i>Mesomelaena pseudostygia</i>	1	0.3
<i>Nuytsia floribunda</i>		
<i>Paterersonia occidentalis</i> var. <i>occidentalis</i>		
<i>Persoonia saccata</i>		
<i>Stirlingia latifolia</i>		
<i>Xanthorrhoea preissii</i>	7	2

Site: COR03
Described: CvdB & LD **Date:** 8/07/2014 **Type:** Releve
MGA Zone: 50 405202mE; 6516708mN
Habitat: Upper plain on a consolidated dune rise
Soil: Yellow grey brown coarse-grained sand
Rock Type: N/A
Vegetation: *Banksia attenuata* and *B. menziesii* tall sparse shrubland over *Allocasuarina humilis*, *Daviesia divaricata* subsp. *divaricata* and *Xanthorrhoea preissii* mid heath shrubland over *Eremaea pauciflora* var. *pauciflora* and *Stirlingia latifolia* low open shrubland over *Mesomelaena pseudostygia* low sparse shrubland
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 10



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Allocasuarina humilis</i>	37	1.5
<i>Banksia attenuata</i>	5	3.5
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		
<i>Banksia menziesii</i>	3	3.5
<i>Bossiaea eriocarpa</i>		
<i>Calectasia narragara</i>		
<i>Calytrix flavescens</i>		
<i>Calytrix sylvana</i>		
<i>Calytrix variabilis</i>		
<i>Conospermum stoechadis</i>		
<i>Conostephium pendulum</i>		
<i>Conostylis aurea</i>		
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>	1	2
<i>Daviesia triflora</i>		
<i>Drosera</i> ? <i>erythrorhiza</i>		
<i>Drosera pallida</i>		Creeper
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	4	0.5
<i>Hypocalymma xanthopetalum</i>		
<i>Jacksonia floribunda</i>		
<i>Lomandra sericea</i>		
<i>Lysinema pentapetalum</i>		
<i>Melaleuca systema</i>		
<i>Mesomelaena pseudostygia</i>	2	0.4
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		
<i>Petrophile macrostachya</i>		
<i>Stirlingia latifolia</i>	1	0.8
<i>Stylidium</i> sp.		
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		
<i>Xanthorrhoea preissii</i>	1	1.4

Site: COR04
Described: CvdB & LD **Date:** 8/07/2014 **Type:** Releve
MGA Zone: 50 406021mE; 6516192mN
Habitat: Upper plain of a consolidated dune rise
Soil: White brown coarse-grained sand
Rock Type: N/A
Vegetation: *Eucalyptus marginata* mid sparse woodland over *Banksia attenuata*, *B. grandis* and *Nuytsia floribunda* tall sparse shrubland over *Jacksonia floribunda* and *Adenanthos cygnorum* subsp. *cygnorum* mid open shrubland over *Eremaea pauciflora* var. *pauciflora*, *Hibbertia hypericoides* and *Melaleuca systema* low heath shrubland over *Mesomelaena pseudostygia* low sparse sedgeland
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 12



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	1	1.8
<i>Alexgeorgea nitens</i>		0.3
<i>Banksia attenuata</i>	4	4.5
<i>Banksia grandis</i>	1	4
<i>Bossiaea eriocarpa</i>		0.4
<i>Calytrix variabilis</i>		0.4
<i>Cassytha pomiformis</i>		Creeper
<i>Conostephium pendulum</i>		0.2
<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>		0.1
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>		2
<i>Daviesia triflora</i>		0.4
<i>Drosera</i> ? <i>erythrorhiza</i>		Prostrate
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	1	0.5
<i>Eucalyptus marginata</i>	2	11
<i>Gladiolus caryophyllaceus</i>		0.1
<i>Hakea ruscifolia</i>		0.5
<i>Hibbertia hypericoides</i>	1	0.4
<i>Hibbertia racemosa</i>		0.3
<i>Isopogon linearis</i>		0.4
<i>Jacksonia floribunda</i>	1	1.1
<i>Lepidosperma pubisquameum</i> (flat form)		0.3
<i>Leucopogon conostephioides</i>		0.3
<i>Lyginia imberbis</i>		0.3
<i>Lysinema ciliatum</i>		0.6
<i>Melaleuca systema</i>	1	0.2
<i>Mesomelaena pseudostygia</i>	1	0.4
<i>Nuytsia floribunda</i>	1	4.5
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		0.4
<i>Persoonia saccata</i>		0.3
<i>Scholtzia involucrata</i>		0.3
<i>Stirlingia latifolia</i>		0.4
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		0.4

Site: COR05
Described: CvdB & LD **Date:** 8/07/2014 **Type:** Releve
MGA Zone: 50 406161mE; 6515925mN
Habitat: Upper to mid slope, Moderate slope facing East Southeast
Soil: Brown coarse-grained sandy loam with a laterite subsurface
Rock Type: Laterite
Vegetation: *Eucalyptus marginata* and *Corymbia calophylla* mid woodland over *Xanthorrhoea preissii* mid sparse shrubland over *Hibbertia hypericoides* low open shrubland over *Mesomelaena tetragona* low sparse sedgeland
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 15
 Rock Size (cm): 1-10
 Exposed Rock (%): <1
 Rock Cover (%): <2



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia applanata</i>		0.2
<i>Astroloma pallidum</i>		0.1
<i>Babingtonia camphorosmae</i>		0.3
<i>Banksia bipinnatifida</i> subsp. <i>multifida</i>		0.3
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		0.3
<i>Burchardia congesta</i>		0.3
<i>Conostephium pendulum</i>		0.2
<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>		0.1
<i>Corymbia calophylla</i>	5	12
<i>Daviesia physodes</i>		0.4
<i>Daviesia preissii</i>		0.4
<i>Drosera</i> ? <i>erythrorhiza</i>		
<i>Drosera pallida</i>		Creeper
<i>Eucalyptus marginata</i>	10	12
<i>Gladiolus caryophyllaceus</i>		0.1
<i>Gompholobium marginatum</i>		0.2
<i>Grevillea pilulifera</i>		0.2
<i>Hakea lissocarpha</i> (forma)		0.4
<i>Hibbertia hypericoides</i>	25	0.3
<i>Lagenophora huegelii</i>		
<i>Lepidosperma</i> sp. Northern Sandplains (R. Barrett)		0.1
<i>Lomandra preissii</i>		0.3
<i>Mesomelaena tetragona</i>	2	0.3
Orchidaceae sp.		
<i>Styphelia tenuiflora</i>		0.4
<i>Xanthorrhoea preissii</i>	3	1

Site: COR06
Described: CvdB & LD **Date:** 8/07/2014 **Type:** Releve
MGA Zone: 50 404958mE; 6516136mN
Habitat: Plain on top of a consolidated dune rise
Soil: Grey brown coarse-grained sand
Rock Type: N/A
Vegetation: *Eucalyptus marginata* low sparse woodland over *Banksia attenuata*, *B. menziesii* and *Adenanthos cygnorum* subsp. *cygnorum* tall open shrubland over *Jacksonia floribunda* mid isolated shrubs over *Hibbertia hypericoides* and *Stirlingia latifolia* low open shrubland over *Hypolaena exsulca* low sparse sedges over *Lyginia imberbis* and *Alexgeorgia nitens* low sparse rushland
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 10



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	2	4
<i>Alexgeorgia nitens</i>	1	0.1
<i>Astroloma xerophyllum</i>		0.5
<i>Banksia attenuata</i>	16	4.5
<i>Banksia menziesii</i>	2	4.0
<i>Bossiaea eriocarpa</i>		0.2
<i>Calytrix flavescens</i>		0.3
<i>Calytrix variabilis</i>		0.6
<i>Cassytha pomiformis</i>		Creeper
<i>Conospermum crassinervium</i>		0.3
<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>		0.1
<i>Drosera</i> ? <i>erythrorhiza</i>		0.1
<i>Drosera pallida</i>		creeper
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	10	0.5
<i>Eucalyptus marginata</i>	1	7.5
<i>Hibbertia hypericoides</i>	1	0.4
<i>Hibbertia subvaginata</i>		0.5
<i>Hypolaena exsulca</i>	1	0.5
<i>Isopogon linearis</i>		0.4
<i>Jacksonia floribunda</i>	0.25	1.2
<i>Leucopogon conostephioides</i>		0.3
<i>Lyginia imberbis</i>	1	0.2
<i>Melaleuca systema</i>		0.3
<i>Mesomelaena tetragona</i>		0.2
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		0.3
<i>Scholtzia involucrata</i>		0.2
<i>Stirlingia latifolia</i>	1	0.4

Site: COR07
Described: CvdB & LD **Date:** 9/07/2014 **Type:** Releve
MGA Zone: 50 404569mE; 6515568mN
Habitat: Consolidated low dune
Soil: Yellow grey coarse grey sand
Rock Type: N/A
Vegetation: *Eucalyptus marginata* and *Corymbia calophylla* mid sparse woodland over *Xanthorrhoea preissii* and *Calothamnus sanguineus* mid sparse shrubland over *Hibbertia hypericoides*, *Conostephium pendulum* and *Stirlingia latifolia* low heath shrubland over *Mesomelaena pseudostygia* low sparse sedgeland
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 7



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		
<i>Calothamnus sanguineus</i>	1	1
<i>Calytrix variabilis</i>		
<i>Cassytha pomiformis</i>		Creeper
<i>Conostephium pendulum</i>	1	0.5
<i>Corymbia calophylla</i>	1	10
<i>Daviesia physodes</i>		
<i>Drosera pallida</i>		Creeper
<i>Eucalyptus marginata</i>	8	14
<i>Gladiolus caryophyllaceus</i>		
<i>Gompholobium marginatum</i>		
<i>Hibbertia hypericoides</i>	6	0.5
<i>Hibbertia racemosa</i>		
<i>Isopogon linearis</i>		
<i>Kunzea glabrescens</i>		
<i>Lepidosperma pubisquameum</i> (flat form)		
<i>Lepidosperma squamatum</i>		
<i>Macrozamia riedlei</i>		
<i>Mesomelaena pseudostygia</i>	3	0.4
<i>Olearia lehmanniana</i>		0.2
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		
<i>Stirlingia latifolia</i>	1	0.4
<i>Stylidium</i> sp.		Prostrate
<i>Styphelia tenuiflora</i>		
<i>Xanthorrhoea preissii</i>	3	1.5
<i>Xanthosia huegelii</i>		0.1

Site: COR08
Described: CvdB & LD **Date:** 9/07/2014 **Type:** Releve
MGA Zone: 50 404538mE; 6515087mN
Habitat: Top of a consolidated dune
Soil: Yellow brown coarse sand
Rock Type: N/A
Vegetation: *Eucalyptus tottiana* mid sparse mallee woodland over *Banksia attenuata* tall sparse shrubland over *Allocasuarina humilis* and *Xanthorrhoea preissii* mid sparse shrubland over *Hibbertia hypericoides*, *Calothamnus sanguineus* and *Eremaea pauciflora* var. *pauciflora* low open shrubland
Condition: Excellent - Pristine
Fire Age: >5 years
Notes: Leaf Litter (%): 10



SPECIES LIST

Name	Cover	Height
<i>Acacia extensa</i>		
<i>Acacia sessilis</i>		
<i>Allocasuarina humilis</i>		
<i>Astroloma pallidum</i>		
<i>Banksia attenuata</i>		
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		
<i>Bossiaea eriocarpa</i>		
<i>Burchardia congesta</i>		
<i>Calothamnus sanguineus</i>		
<i>Cassytha pomiformis</i>		Creeper
<i>Conostephium pendulum</i>		
<i>Daviesia triflora</i>		
<i>Drosera ? erythrorhiza</i>		
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>		
<i>Eucalyptus tottiana</i>		
<i>Gladiolus caryophyllaceus</i>		
<i>Hakea lissocarpha</i> (forma)		
<i>Hibbertia hypericoides</i>		
<i>Hibbertia racemosa</i>		
<i>Isopogon linearis</i>		
<i>Leptomeria cunninghamii</i>		
<i>Lyginia imberbis</i>		
<i>Mesomelaena pseudostygia</i>		
<i>Nuytsia floribunda</i>		
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		
<i>Persoonia saccata</i>		
<i>Petrophile macrostachya</i>		
<i>Scholtzia involucrata</i>		
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		
<i>Xanthorrhoea preissii</i>		

Site: COR09
Described: CvdB & LD **Date:** 9/07/2014 **Type:** Releve
MGA Zone: 50 404642mE; 6514639mN
Habitat: Middle to upper slope, moderate slope facing south
Soil: Brown coarse sandy loam
Rock Type: laterite
Vegetation: *Eucalyptus marginata* mid sparse woodland over *Xanthorrhoea preissii* mid sparse shrubland over *Hibbertia hypericoides* low open shrubland over *Lepidosperma pubisquameum* (flat form) and *Mesomelaena tetragona* low sparse sedgeland
Condition: Excellent
Fire Age: >5 years
Notes Leaf Litter (%): 30
 Rock Size (cm): 5-10
 Exposed Rock (%): <1
 Rock Cover (%): 5



SPECIES LIST

Name	Cover	Height
<i>Acacia nervosa</i>		
<i>Astroloma pallidum</i>		
<i>Banksia bipinnatifida</i> subsp. <i>multifida</i>		
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		
<i>Bossiaea eriocarpa</i>		
<i>Conostephium pendulum</i>		
<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>		
<i>Daviesia preissii</i>		
<i>Drosera</i> ? <i>erythrorhiza</i>		
<i>Drosera pallida</i>		
<i>Eucalyptus marginata</i>	9	11
<i>Gompholobium marginatum</i>		
<i>Grevillea pilulifera</i>		
<i>Grevillea pilulifera</i>		
<i>Hakea lissocarpha</i> (forma)		
<i>Hakea trifurcata</i>		
<i>Hibbertia hypericoides</i>	6	0.3
<i>Hibbertia racemosa</i>		
<i>Lepidosperma pubisquameum</i> (flat form)	1	0.3
<i>Lepidosperma</i> sp. Northern Sandplains (R. Barrett)		
<i>Leucopogon gracillimus</i>		
<i>Leucopogon gracillimus</i>		
<i>Lomandra sericea</i>		
<i>Mesomelaena tetragona</i>	1	0.3
<i>Petrophile striata</i>		
<i>Stylidium</i> sp.		
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		
Unknown sp.		
<i>Xanthorrhoea preissii</i>	5	1.5

Site: COR10
Described: CvdB & LD **Date:** 9/07/2014 **Type:** Releve
MGA Zone: 50 403976mE; 6514919mN
Habitat: Mid consolidated dune
Soil: White grey coarse grained sand
Rock Type: N/A
Vegetation: *Eucalyptus todtiana* mid sparse mallee woodland over *Nuytsia floribunda* low sparse woodland over *Banksia attenuata* and *Adenanthos cygnorum* tall sparse shrubland over *Beaufortia elegans* and *Xanthorrhoea preissii* mid sparse shrubland over *Calothamnus sanguineus* and *Hibbertia hypericoides* low sparse shrubland
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 5



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia extensa</i>		
<i>Acacia pulchella</i> var. <i>pulchella</i>		
<i>Adenanthos cygnorum</i>	1	4
<i>Banksia attenuata</i>	2	4
<i>Beaufortia elegans</i>	5	1.4
<i>Bossiaea eriocarpa</i>		
<i>Calothamnus sanguineus</i>	3	0.9
<i>Calytrix variabilis</i>		
<i>Cassytha pomiformis</i>		
<i>Conostephium pendulum</i>		
<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>		
<i>Daviesia triflora</i>		
<i>Drosera</i> ? <i>erythrorhiza</i>		
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>		
<i>Eucalyptus todtiana</i>	4	6
<i>Hibbertia hypericoides</i>	1	0.5
<i>Hibbertia racemosa</i>		
<i>Hibbertia subvaginata</i>		
<i>Hypolaena robusta</i>		
<i>Isopogon linearis</i>		
<i>Jacksonia floribunda</i>		
<i>Leucopogon conostephioides</i>		
<i>Leucopogon gracillimus</i>		
<i>Lomandra sericea</i>		
<i>Lyginia imberbis</i>		
<i>Nuytsia floribunda</i>	1	6
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		
<i>Persoonia saccata</i>		
<i>Scholtzia involucrata</i>		
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		
<i>Xanthorrhoea preissii</i>	3	2

Site: COR11
Described: CvdB & LD **Date:** 9/07/2014 **Type:** Releve
MGA Zone: 50 403705mE; 6515359mN
Habitat: Consolidated dune, small depression in mid slope
Soil: Yellow brown coarse-grained sandy loam
Rock Type: N/A
Vegetation: *Banksia attenuata* and *B. menziesii* tall sparse shrubland over *Allocasuarina humilis* and *Xanthorrhoea preissii* mid sparse shrubland over *Eremaea pauciflora* var. *pauciflora*, *Hibbertia hypericoides* and *Melaleuca systema* low sparse shrubland over *Mesomelaena pseudostygia* low sparse sedgeland
Condition: Excellent - Pristine
Fire Age: >5 years
Notes: Leaf Litter (%): 8



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia sessilis</i>		
<i>Allocasuarina humilis</i>	1	1.5
<i>Banksia attenuata</i>	7	5
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		
<i>Banksia menziesii</i>	1	5
<i>Calothamnus sanguineus</i>		
<i>Calytrix flavescens</i>		
<i>Cryptandra scoparia</i>		
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>		
<i>Drosera</i> ? <i>erythrorhiza</i>		
<i>Drosera pallida</i>		Creeper
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	8	0.4
<i>Hakea lissocarpha</i> (forma)		
<i>Hibbertia hypericoides</i>	2	0.3
<i>Isopogon linearis</i>		
<i>Jacksonia floribunda</i>		
<i>Lepidobolus preissianus</i>		
<i>Leptospermum spinescens</i>		
<i>Melaleuca systema</i>	2	0.4
<i>Mesomelaena pseudostygia</i>	21	0.3
<i>Nuytsia floribunda</i>		
<i>Petrophile macrostachya</i>		
<i>Scholtzia involucrata</i>		
<i>Stylidium cygnorum</i>		
<i>Xanthorrhoea preissii</i>	1	1.5

Site: COR12
Described: CvdB & LD **Date:** 10/07/2014 **Type:** Releve
MGA Zone: 50 403022mE; 6515040mN
Habitat: Mid to upper west facing slope
Soil: Dark brown coarse-grained sandy loam, rocky
Rock Type: Laterite
Vegetation: *Eucalyptus marginata* and *Corymbia calophylla* mid sparse woodland over *Xanthorrhoea preissii* mid open shrubland over *Hibbertia hypericoides*, *Acacia celastrifolia* and *Hakea lissocarpha* low sparse shrubland
Condition: Very Good - Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 18
 Rock Size (cm): 1-15
 Exposed Rock (%): 1
 Rock Cover (%): 4



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia applanata</i>		
<i>Acacia celastrifolia</i>	1	1
<i>Acacia preissiana</i>		
<i>Corymbia calophylla</i>	1	10
<i>Drosera pallida</i>		Creeper
<i>Eucalyptus marginata</i>	3	12
<i>Gompholobium marginatum</i>		
<i>Gonocarpus cordiger</i>		
<i>Grevillea pilulifera</i>		
<i>Hakea lissocarpha</i> (forma)	1	0.4
<i>Hakea stenocarpa</i>		
<i>Hibbertia hypericoides</i>	2	0.7
<i>Hibbertia racemosa</i>		
<i>Hypochaeris glabra</i>		
<i>Lomandra sericea</i>		
<i>Macrozamia riedlei</i>		
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		
<i>Petrophile striata</i>		
<i>Phyllanthus calycinus</i>		
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		
<i>Xanthorrhoea preissii</i>	12	2

Site: COR13
Described: CvdB & LD **Date:** 10/07/2014 **Type:** Releve
MGA Zone: 50 403244mE; 6514681mN
Habitat: Top of a rocky rise
Soil: Black brown coarse loamy sand
Rock Type: laterite
Vegetation: *Corymbia calophylla* and *Nuytsia floribunda* mid sparse woodland over *Banksia sessilis* var. *sessilis* tall sparse shrubland over *Xanthorrhoea preissii* mid open shrubland over *Calothamnus sanguineus* and *Hibbertia hypericoides* low open shrubland
Condition: Very Good - Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 21
 Rock Size (cm): 1-11
 Exposed Rock (%): 2
 Rock Cover (%): 3



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia extensa</i>		
<i>Acacia preissiana</i>		
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		
<i>Banksia sessilis</i> var. <i>sessilis</i>	3	4.5
<i>Boronia ramosa</i> subsp. <i>anethifolia</i>		
<i>Bossiaea eriocarpa</i>		
<i>Calothamnus sanguineus</i>	9	0.6
<i>Calytrix variabilis</i>		
<i>Cassytha pomiformis</i>		Creeper
<i>Corymbia calophylla</i>	3	11
<i>Desmocladius flexuosus</i>		
<i>Drosera pallida</i>		Creeper
<i>Gompholobium marginatum</i>		
<i>Hakea lissocarpha</i> (forma)		
<i>Hakea ruscifolia</i>		
<i>Hibbertia hibbertioides</i>		
<i>Hibbertia hypericoides</i>	2	0.3
<i>Isopogon linearis</i>		
<i>Lepidosperma pubisquameum</i> (flat form)		
<i>Lomandra sericea</i>		
<i>Nuytsia floribunda</i>	1	8
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		
<i>Petrophile striata</i>		
<i>Phyllanthus calycinus</i>		
<i>Stirlingia latifolia</i>		
<i>Stylidium cygnorum</i>		
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		
<i>Xanthorrhoea preissii</i>	5	2

Site: COR14
Described: CvdB & LD **Date:** 9/07/2014 **Type:** Releve
MGA Zone: 50 402445mE; 6514595mN
Habitat: Depression on mid slope of a consolidated dune
Soil: Brown grey white coarse-grained sand
Rock Type: N/A
Vegetation: *Banksia attenuata* mid sparse woodland over *Kunzea glabrescens* and *Banksia menziesii* tall shrubland over *Macrozamia riedlei* and *Xanthorrhoea preissii* mid sparse shrubland over various sparse herbs
Condition: Very Good
Fire Age: >5 years
Notes: Leaf Litter (%):



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia huegelii</i>		
<i>Banksia attenuata</i>	10	12
<i>Banksia menziesii</i>	1	3.5
<i>Conostephium preissii</i>		
<i>Desmocladius flexuosus</i>		
<i>Dianella revoluta</i>		
<i>Drosera ? erythrorhiza</i>		
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>		
<i>Eucalyptus tottiana</i>	1	10
<i>Kunzea glabrescens</i>	25	4
<i>Macrozamia riedlei</i>	2	1.7
<i>Pterostylis sanguinea</i>		
<i>Xanthorrhoea preissii</i>	1	2

Site: COR15
Described: CvdB & LD **Date:** 9/07/2014 **Type:** Releve
MGA Zone: 50 402651mE; 6515634mN
Habitat: Mid slope of a consolidated dune facing west
Soil: Grey brown coarse sand
Rock Type: N/A
Vegetation: *Corymbia calophylla* and *Eucalyptus marginata* mid sparse woodland over *Banksia attenuata* and *B. menziesii* tall sparse shrubland over *Xanthorrhoea preissii* and *Macrozamia riedlei* mid sparse shrubland over *Hibbertia hypericoides*, *Conostephium pendulum* and *Stirlingia latifolia* low open shrubland over *Mesomelaena pseudostygia* low sparse sedgeland
Condition: Very Good - Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 30



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia pulchella</i> var. <i>pulchella</i>		
<i>Allocasuarina humilis</i>		
<i>Banksia attenuata</i>	3	7
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		
<i>Banksia menziesii</i>	1	4
<i>Conostephium pendulum</i>		
<i>Corymbia calophylla</i>	7	15
<i>Desmocladius flexuosus</i>		
<i>Drosera pallida</i>		
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>		
<i>Eucalyptus marginata</i>	2	15
<i>Hakea lissocarpha</i> (forma)		
<i>Hibbertia hypericoides</i>	4	0.5
<i>Hovea trisperma</i>		
<i>Hypochaeris glabra</i>		
<i>Isopogon linearis</i>		
<i>Lagenophora huegelii</i>		
<i>Lyginia imberbis</i>		
<i>Macrozamia riedlei</i>	1	1.9
<i>Mesomelaena pseudostygia</i>	1	0.4
<i>Phyllanthus calycinus</i>		
<i>Stirlingia latifolia</i>	1	1
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		
<i>Xanthorrhoea preissii</i>	3	2

Site: COR16
Described: CvdB & LD **Date:** 10/07/2014 **Type:** Releve
MGA Zone: 50 403124mE; 6516352mN
Habitat: Upper consolidated dune
Soil: Yellow brown coarse-grained sand
Rock Type: N/A
Vegetation: *Eucalyptus todtiana* mid isolated mallee trees over *Banksia attenuata* and *Nuytsia floribunda* tall sparse woodland over *Xanthorrhoea preissii* tall sparse shrubland over *Allocasuarina humilis* mid open shrubland over *Hibbertia hypericoides*, *H. racemosa* and *Calothamnus sanguineus* low sparse shrubland over *Mesomelaena pseudostygia* low isolated sedges and *Lyginia imberbis* low isolated rushes
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 10



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia extensa</i>		
<i>Acacia sessilis</i>		
<i>Allocasuarina humilis</i>	20	1.9
<i>Banksia attenuata</i>	2	7
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		
<i>Calothamnus sanguineus</i>	3	0.5
<i>Cassytha pomiformis</i>		
<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>		
<i>Drosera</i> ? <i>erythrorhiza</i>		
<i>Drosera pallida</i>		
<i>Eucalyptus todtiana</i>	1	7
<i>Hakea lissocarpha</i> (forma)		
<i>Hibbertia hypericoides</i>	5	0.4
<i>Hibbertia racemosa</i>	2	0.3
<i>Hibbertia subvaginata</i>		
<i>Isopogon linearis</i>		
<i>Isopogon linearis</i>		
<i>Lomandra sericea</i>		
<i>Lyginia imberbis</i>		
<i>Mesomelaena pseudostygia</i>	2	0.3
<i>Nuytsia floribunda</i>		5
<i>Petrophile macrostachya</i>		
<i>Stylidium cygnorum</i>		
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		
<i>Xanthorrhoea preissii</i>	1	2.6

Site: COR17
Described: CvdB & LD **Date:** 10/07/2014 **Type:** Revele
MGA Zone: 50 402519mE; 6516931mN
Habitat: Consolidated dune, upper to mid gently sloping Northwest facing slope
Soil: Brown white coarse-grained sand
Rock Type: N/A
Vegetation: *Corymbia calophylla* mid sparse woodland over *Xanthorrhoea preissii* and *Daviesia divaricata* subsp. *divaricata* tall sparse shrubland over *Hakea trifurcata* mid sparse shrubland over *Conostephium preissii* low sparse shrubland
Condition: Very Good
Fire Age: >5 years
Notes: Leaf Litter (%): 10



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia celastrifolia</i>		
<i>Anigozanthos humilis</i>		
<i>Babingtonia camphorosmae</i>		
<i>Banksia dallanneyi</i>		
<i>Beaufortia elegans</i>		
<i>Bossiaea eriocarpa</i>		
<i>Calothamnus sanguineus</i>		
<i>Calytrix sylvana</i>		
<i>Cheilanthes austrotenuifolia</i>		
<i>Conostephium preissii</i>	1	0.9
<i>Corymbia calophylla</i>	7	12
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>	1	5
<i>Daviesia physodes</i>		
<i>Hakea lissocarpha</i> (forma)	1	1.4
<i>Hakea trifurcata</i>	1	2
<i>Hypochaeris glabra</i>		
<i>Isopogon linearis</i>		
<i>Lechenaultia biloba</i>		
<i>Melaleuca systema</i>		
<i>Persoonia saccata</i>		
<i>Pimelea</i> sp. 1		
<i>Scholtzia involucrata</i>		
<i>Xanthorrhoea preissii</i>	7	3

Site: COR18
Described: CvdB & LD **Date:** 10/07/2014 **Type:** Releve
MGA Zone: 50 403130mE; 6517291mN
Habitat: Consolidated dune, lower north facing slope
Soil: Grey brown coarse-grained sand
Rock Type: N/A
Vegetation: *Banksia attenuata*, *B. menziesii* and *Nuytsia floribunda* mid woodland over *Xanthorrhoea preissii* and *Allocasuarina humilis* mid sparse shrubland over *Hibbertia subvaginata*, *Phlebocarya ciliata*, *Eremaea pauciflora* var. *pauciflora* and *Leucopogon conostephioides* low sparse shrubland
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 24



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia huegelii</i>		
<i>Allocasuarina humilis</i>		
<i>Banksia attenuata</i>	8	10
<i>Banksia menziesii</i>	4	8
<i>Bossiaea eriocarpa</i>		
<i>Calytrix sylvana</i>		
<i>Daviesia triflora</i>		
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>		
<i>Hibbertia subvaginata</i>	1	0.3
<i>Isopogon linearis</i>		
<i>Lepidosperma pubisquameum</i> (flat form)		
<i>Leucopogon conostephioides</i>	12	0.3
<i>Lyginia imberbis</i>		
<i>Melaleuca systema</i>		
<i>Nuytsia floribunda</i>	1	12
<i>Phlebocarya ciliata</i>	1	0.4
<i>Stirlingia latifolia</i>		
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		
<i>Xanthorrhoea preissii</i>	2	1.5

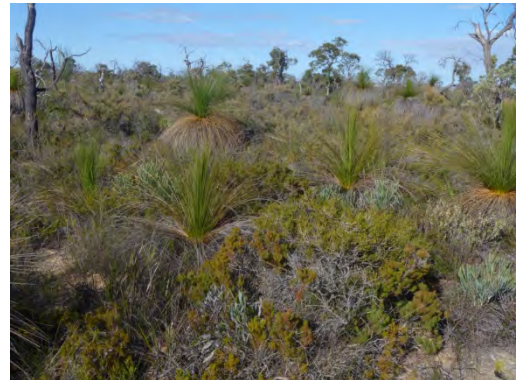
Site: COR19
Described: CvdB & LD **Date:** 10/07/2014 **Type:** Releve
MGA Zone: 50 403985mE; 6516766mN
Habitat: Mid slope of a consolidated dune
Soil: Grey brown coarse-grained sandy loam
Rock Type: N/A
Vegetation: *Banksia attenuata* and *B. menziesii* low sparse woodland over *Adenanthos cygnorum* subsp. *cygnorum* tall open shrubland over *Xanthorrhoea preissii* and *Beaufortia elegans* mid sparse shrubland over *Hibbertia hypericoides*, *Scholtzia involucrata* and *Calothamnus sanguineus* low sparse shrubland over *Mesomelaena pseudostygia* low sparse sedgeland
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 15



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	14	3.5
<i>Allocasuarina humilis</i>		
<i>Banksia attenuata</i>	2	6
<i>Banksia menziesii</i>	1	5.5
<i>Beaufortia elegans</i>	1.5	1.3
<i>Calothamnus sanguineus</i>	1	0.8
<i>Calytrix flavescens</i>		
<i>Calytrix sylvana</i>		
<i>Calytrix variabilis</i>		
<i>Conospermum crassinervium</i>		
<i>Conospermum stoechadis</i>		
<i>Daviesia triflora</i>		0.6
<i>Drosera ? erythrorhiza</i>		
<i>Drosera pallida</i>		
<i>Hibbertia hypericoides</i>	3	
<i>Hibbertia racemosa</i>		
<i>Hibbertia racemosa</i>		
<i>Hibbertia subvaginata</i>		
<i>Hypocalymma xanthopetalum</i>		
<i>Hypolaena robusta</i>		
<i>Isopogon linearis</i>	1	0.4
<i>Jacksonia floribunda</i>		3.2
<i>Lyginia imberbis</i>	1	0.4
<i>Mesomelaena pseudostygia</i>	1	0.4
<i>Scholtzia involucrata</i>	2	0.6
<i>Stirlingia latifolia</i>	1	0.7
<i>Stylidium cygnorum</i>		
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		0.4
<i>Xanthorrhoea preissii</i>		6

Site: COR20
Described: CvdB & LD **Date:** 10/07/2014 **Type:** Relevé
MGA Zone: 50 404709mE; 6516428mN
Habitat: Consolidated dune, upper slope
Soil: Yellow brown coarse-grained sand
Rock Type: N/A
Vegetation: *Corymbia calophylla* mid Isolated trees over *Banksia attenuata* tall sparse shrubland over *Allocasuarina humilis* and *Xanthorrhoea preissii* mid sparse shrubland over *Eremaea pauciflora* var. *pauciflora*, *Calothamnus sanguineus* and *Stirlingia latifolia* low open shrubland over *Mesomelaena pseudostygia* low sparse sedgeland
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 5



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia sessilis</i>		
<i>Allocasuarina humilis</i>	2	1.8
<i>Banksia attenuata</i>	1	4
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		
<i>Banksia menziesii</i>	1	4.5
<i>Calothamnus sanguineus</i>	2	0.5
<i>Calytrix sylvana</i>		
<i>Conostephium pendulum</i>		
<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>		
<i>Corymbia calophylla</i>	1	14
<i>Daviesia physodes</i>		
<i>Drosera</i> ? <i>erythrorhiza</i>		
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	9	0.6
<i>Gladiolus caryophyllaceus</i>		
<i>Hakea ruscifolia</i>		
<i>Hibbertia hypericoides</i>		
<i>Hibbertia racemosa</i>		
<i>Hypocalymma xanthopetalum</i>		
<i>Leptospermum spinescens</i>		
<i>Lomandra purpurea</i>		
<i>Lomandra sericea</i>		
<i>Mesomelaena pseudostygia</i>	3	0.3
<i>Nuytsia floribunda</i>		
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		
<i>Stirlingia latifolia</i>	1	0.7
<i>Xanthorrhoea preissii</i>	1	2

Site: COR21
Described: CvdB & LD **Date:** 9/07/2014 **Type:** Releve
MGA Zone: 50 404111mE; 6515797mN
Habitat: Low consolidated dune
Soil: Grey white coarse sand
Rock Type: N/A
Vegetation: *Eucalyptus marginata* mid sparse woodland over *Xanthorrhoea preissii* mid sparse shrubland over *Hibbertia hypericoides*, *Calothamnus sanguineus* and *Conostephium pendulum* low sparse heath shrubland over *Lepidosperma pubisquameum* (flat form), *Lepidosperma squamatum* and *Mesomelaena pseudostygia* low sparse sedgeland
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 20



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia applanata</i>		
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		
<i>Bossiaea eriocarpa</i>		
<i>Burchardia congesta</i>		
<i>Calothamnus sanguineus</i>	1	0.5
<i>Calytrix sylvana</i>		
<i>Calytrix variabilis</i>		
<i>Cassytha pomiformis</i>		
<i>Conostephium pendulum</i>	1	0.4
<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>		
<i>Drosera</i> ? <i>erythrorhiza</i>		
<i>Eucalyptus marginata</i>	8	12
<i>Gompholobium marginatum</i>		
<i>Haemadorum</i> sp.		
<i>Hibbertia hypericoides</i>	8	0.3
<i>Hibbertia racemosa</i>		
<i>Isopogon linearis</i>		
<i>Lagenophora huegelii</i>		
<i>Lepidosperma pubisquameum</i> (flat form)	1	0.2
<i>Lepidosperma squamatum</i>	+	
<i>Leucopogon gracillimus</i>		
<i>Lomandra hermaphrodita</i>		
<i>Lomandra sericea</i>		
<i>Macrozamia riedlei</i>		
<i>Mesomelaena pseudostygia</i>	1	0.3
<i>Nuytsia floribunda</i>		
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		
<i>Stirlingia latifolia</i>		
<i>Styphelia tenuiflora</i>		
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		
<i>Xanthorrhoea preissii</i>	3	2
<i>Xanthosia huegelii</i>		

Site: COR22
Described: CvdB & LD **Date:** 10/07/2014 **Type:** Releve
MGA Zone: 50 403666mE; 6516114mN
Habitat: Consolidated dune, very gently sloping north
Soil: Brown white coarse-grained sand
Rock Type: N/A
Vegetation: *Eucalyptus todtiana* mid isolated mallee trees over *Banksia attenuata*, *B. menziesii* and *Adenanthos cygnorum* subsp. *cygnorum* tall sparse shrubland over *Allocasuarina humilis* and *Xanthorrhoea preissii* mid open shrubland over *Hibbertia hypericoides*, *Calothamnus sanguineus* and *Conostephium pendulum* low open shrubland
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%): 8



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	+	4
<i>Allocasuarina humilis</i>	2	1.6
<i>Banksia attenuata</i>	3	5
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		
<i>Banksia menziesii</i>	1	4.5
<i>Calothamnus sanguineus</i>	3	1
<i>Calytrix flavescens</i>		
<i>Calytrix variabilis</i>		
<i>Cassytha pomiformis</i>		
<i>Conostephium pendulum</i>	+	0.4
<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>		
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>		
<i>Daviesia physodes</i>		
<i>Drosera</i> ? <i>erythrorhiza</i>		
<i>Drosera pallida</i>		
<i>Eucalyptus todtiana</i>	1	8
<i>Gladiolus caryophyllaceus</i>		
<i>Hibbertia hypericoides</i>	10	0.4
<i>Hibbertia racemosa</i>		
<i>Hibbertia subvaginata</i>		
<i>Isopogon linearis</i>		
<i>Jacksonia floribunda</i>		
<i>Leucopogon conostephioides</i>		
<i>Lyginia imberbis</i>		
<i>Melaleuca systema</i>		
<i>Mesomelaena pseudostygia</i>		0.3
<i>Nuytsia floribunda</i>		
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		
<i>Scholtzia involucrata</i>		
<i>Stirlingia latifolia</i>	1	0.6
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		
<i>Xanthorrhoea preissii</i>	2	1.5

Site: COR23
Described: CvdB & LD **Date:** 10/07/2014 **Type:** Releve
MGA Zone: 50 403043mE; 6515985mN
Habitat: Upper consolidated dune
Soil: Yellow brown coarse-grained sand
Rock Type: N/A
Vegetation: *Eucalyptus todtiana* mid isolated mallee trees over *Nuytsia floribunda* low isolated trees over *Banksia attenuata* and *B. menziesii* tall sparse shrubland over *Allocasuarina humilis* and *Xanthorrhoea preissii* mid open shrubland over *Hibbertia hypericoides* and *Calothamnus sanguineus* low open shrubland over *Mesomelaena pseudostygia* low sparse sedgeland
Condition: Excellent
Fire Age: >5 years
Notes: Leaf Litter (%):



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia pulchella</i> var. <i>pulchella</i>		
<i>Acacia sessilis</i>		
<i>Allocasuarina humilis</i>	10	1.7
<i>Banksia attenuata</i>	3	7
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		
<i>Banksia menziesii</i>		5
<i>Calothamnus sanguineus</i>		
<i>Calytrix variabilis</i>		
<i>Cassytha pomiformis</i>		
<i>Conostephium pendulum</i>		
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>		
<i>Drosera</i> ? <i>erythrorhiza</i>		
<i>Drosera pallida</i>		
<i>Eucalyptus todtiana</i>	1	8
<i>Gladiolus caryophyllaceus</i>		
<i>Gompholobium marginatum</i>		
<i>Grevillea pilulifera</i>		
<i>Hakea lissocarpha</i> (forma)		
<i>Hakea ruscifolia</i>		
<i>Hibbertia hypericoides</i>	3	0.3
<i>Hibbertia racemosa</i>		
<i>Isopogon linearis</i>		
<i>Jacksonia floribunda</i>		
<i>Lomandra sericea</i>		
<i>Lyginia imberbis</i>		
<i>Lysinema pentapetalum</i>		
<i>Mesomelaena pseudostygia</i>	2	0.3
<i>Nuytsia floribunda</i>		6
<i>Petrophile macrostachya</i>		
<i>Pimelea imbricata</i> var. <i>piligera</i>		
<i>Xanthorrhoea preissii</i>	2	1.9

Site: COR24
Described: CvdB & LD **Date:** 17/07/2014 **Type:** Releve
MGA Zone: 50 402604mE; 6516405mN
Habitat: Consolidated dune
Soil: Black/grey coarse grained sand
Rock Type: N/A
Vegetation: *Eucalyptus todtiana* mid isolated mallee trees over *Banksia attenuata*, *B. menziesii* and *Adenanthos cygnorum* subsp. *cygnorum* tall open shrubland over *Beaufortia elegans* and *Jacksonia floribunda* mid sparse shrubland over *Scholtzia involucrata*, *Leucopogon conostephioides* and *Eremaea pauciflora* var. *pauciflora* low open shrubland over *Mesomelaena pseudostygia* low isolated sedges over *Lyginia imberbis* low isolated rushes
Condition: Excellent
Fire Age: >5 years
Notes: None



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Acacia pulchella</i> var. <i>glaberrima</i>		0.50
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	1	4
<i>Alexgeorgea nitens</i>		0.10
<i>Astroloma xerophyllum</i>		0.60
<i>Banksia attenuata</i>	8	5
<i>Banksia menziesii</i>	2	5
<i>Beaufortia elegans</i>	1	1.7
<i>Boronia ramosa</i> subsp. <i>ramosa</i>		0.40
<i>Calytrix flavescens</i>		.20
<i>Calytrix variabilis</i>		0.40
<i>Cassytha pomiformis</i>		Creeper
<i>Conospermum crassinervium</i>		1
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	1	0.80
<i>Eucalyptus todtiana</i>	1	6
<i>Gompholobium tomentosum</i>		0.20
<i>Hibbertia hypericoides</i>		0.30
<i>Hibbertia racemosa</i>		
<i>Hibbertia subvaginata</i>		0.20
<i>Isopogon linearis</i>		0.40
<i>Jacksonia floribunda</i>	+	2
<i>Leucopogon conostephioides</i>	2	0.50
<i>Lyginia imberbis</i>	1	0.50
<i>Mesomelaena pseudostygia</i>	+	0.30
<i>Nuytsia floribunda</i>		0.50
<i>Scholtzia involucrata</i>	7	0.50
<i>Stirlingia latifolia</i>		1.4
<i>Stylidium cygnorum</i>		0.10
<i>Xanthorrhoea preissii</i>		1.3

Site: COR25
Described: CvdB & LD **Date:** 17/07/2014 **Type:** Releve
MGA Zone: 50 405045mE; 6517238mN
Habitat: Consolidated dune. Upper crest
Soil: Grey/white coarse grain sand
Rock Type: N/A
Vegetation: *Eucalyptus marginata* mid woodland over *Banksia attenuata* and *B. menziesii* tall sparse shrubland over *Eremaea pauciflora* var. *pauciflora*, *Hibbertia hypericoides* and *Daviesia triflora* low open shrubland over *Mesomelaena pseudostygia* low isolated sedges over *Lyginia imberbis* low isolated rushes
Condition: Excellent
Fire Age: > 5 years
Notes: None



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Astroloma xerophyllum</i>		0.60
<i>Banksia attenuata</i>	5	4
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		0.10
<i>Banksia menziesii</i>	2	3.5
<i>Burchardia congesta</i>		0.40
<i>Calytrix flavescens</i>		0.30
<i>Conostephium pendulum</i>		0.40
<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>		0.10
<i>Daviesia physodes</i>		0.50
<i>Daviesia triflora</i>	2	0.40
<i>Drosera</i> ? <i>erythrorhiza</i>		Prostrate
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	5	0.60
<i>Eucalyptus marginata</i>	3	12
<i>Hibbertia hypericoides</i>	5	0.50
<i>Hibbertia hypericoides</i>		0.20
<i>Hibbertia racemosa</i>		0.20
<i>Hypolaena exsulca</i>		0.30
<i>Isopogon linearis</i>		0.50
<i>Jacksonia floribunda</i>		1.8
<i>Lyginia imberbis</i>	1	0.40
<i>Melaleuca systema</i>		0.40
<i>Mesomelaena pseudostygia</i>	1	0.40
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		0.30
<i>Stirlingia latifolia</i>		0.40
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		0.20
<i>Xanthorrhoea preissii</i>		1.5

Site: COR26
Described: CvdB & LD **Date:** 17/07/2014 **Type:** Releve
MGA Zone: 50 405772mE; 6517198mN
Habitat: Swale-consolidated dune. Low slope gently towards the south
Soil: Yellow/brown coarse grain sand
Rock Type: N/A

Vegetation: *Banksia attenuata*, *B. menziesii* and *Nuytsia floribunda* tall sparse shrubland over *Xanthorrhoea preissii* mid sparse shrubland over *Allocasuarina humilis*, *Eremaea pauciflora* var. *pauciflora* and *Melaleuca systema* low open shrubland over *Mesomelaena pseudostygia* and *Schoenus efoliatus* low sparse sedgeland

Condition: Excellent

Fire Age: >5 years

Notes: Dead Banksia - Dieback?



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Alexgeorgea nitens</i>		0.10
<i>Allocasuarina humilis</i>	12	1
<i>Austrodanthonia</i> sp.		0.50
<i>Banksia attenuata</i>	1	3
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		0.10
<i>Banksia menziesii</i>	+	3
<i>Bossiaea eriocarpa</i>		0.10
<i>Calectasia narragara</i>		0.20
<i>Caustis dioica</i>		0.30
<i>Conostephium pendulum</i>		0.30
<i>Daviesia physodes</i>		0.30
<i>Daviesia triflora</i>		0.40
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	10	0.60
<i>Gladiolus caryophyllaceus</i>		0.30
<i>Hibbertia hypericoides</i>		0.30
<i>Hovea trisperma</i> var. <i>trisperma</i>		0.20
<i>Isopogon linearis</i>		0.10
<i>Leptospermum spinescens</i>		0.40
<i>Lyginia imberbis</i>		0.30
<i>Melaleuca systema</i>	2	0.50
<i>Mesomelaena pseudostygia</i>	1	0.30
<i>Nuytsia floribunda</i>	+	4.5
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		0.30
<i>Pimelea imbricata</i> var. <i>piligera</i>		0.20
<i>Schoenus efoliatus</i>	2	0.40
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		0.20
<i>Xanthorrhoea preissii</i>	1	2

Site: COR27
Described: CvdB & LD **Date:** 17/07/2014 **Type:** Releve
MGA Zone: 50 406089mE; 6516591mN
Habitat: Consolidated dune, mid slope gently sloping to south-east
Soil: Black/grey coarse grain sand
Rock Type: N/A

Vegetation: *Allocasuarina humilis*, *Banksia attenuata* and *B. menziesii* tall sparse shrubland over *Allocasuarina humilis* and *Xanthorrhoea preissii* mid sparse shrubland over *Eremaea pauciflora* var. *pauciflora* and *Melaleuca systema* low open shrubland over *Mesomelaena pseudostygia* low sparse sedgeland

Condition: Excellent

Fire Age: > 5 years

Notes: Dieback?



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Allocasuarina humilis</i>	8	1.8
<i>Amphipogon turbinatus</i>		0.20
<i>Banksia attenuata</i>	1	4
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		0.10
<i>Banksia menziesii</i>	1	4
<i>Bossiaea eriocarpa</i>		0.40
<i>Conospermum stoechadis</i>		0.50
<i>Conostephium pendulum</i>		0.40
<i>Daviesia physodes</i>		0.50
<i>Daviesia triflora</i>		0.40
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	15	0.70
<i>Hibbertia racemosa</i>		0.30
<i>Hovea trisperma</i> var. <i>trisperma</i>		0.30
<i>Isopogon linearis</i>		0.20
<i>Jacksonia floribunda</i>		1.3
<i>Lepidosperma</i> sp. Inland Scabrid (R. Barrett)		0.60
<i>Leucopogon gracillimus</i>		0.40
<i>Lomandra sericea</i>		0.30
<i>Lyginia imberbis</i>		0.30
<i>Melaleuca systema</i>	2	0.40
<i>Mesomelaena pseudostygia</i>	2	0.30
<i>Nuytsia floribunda</i>	+	7
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		0.40
<i>Petrophile macrostachya</i>		0.80
<i>Stirlingia latifolia</i>		0.60
<i>Xanthorrhoea preissii</i>	3	2

Site: COR28
Described: CvdB & LD **Date:** 17/07/2014 **Type:** Releve
MGA Zone: 50 405613mE; 6515861mN
Habitat: Consolidated dune, upper to mid gentle slope to south - east
Soil: Yellow / brown coarse –grained sand
Rock Type: NIL
Vegetation: *Corymbia calophylla* mid isolated trees over *Eucalyptus todtiana* mid isolated mallee trees over *Banksia attenuata*, *B. menziesii* and *Daviesia divaricata* subsp. *divaricata* tall sparse shrubland over *Eremaea pauciflora* var. *pauciflora*, *Calothamnus sanguineus* and *Hibbertia hypericoides* low sparse heath shrubland over *Mesomelaena pseudostygia* low sparse sedgeland
Condition: Excellent
Fire Age: > 5 years
Notes: none



SPECIES LIST

Name	Cover	Height
<i>Allocasuarina humilis</i>		1.2
<i>Banksia attenuata</i>	+	3
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		0.20
<i>Banksia menziesii</i>	+	3
<i>Calothamnus sanguineus</i>	2	0.40
<i>Calytrix sylvana</i>		0.50
<i>Calytrix variabilis</i>		0.40
<i>Conospermum stoechadis</i>		0.50
<i>Conostephium pendulum</i>		0.50
<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>		0.10
<i>Corymbia calophylla</i>	+	11
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>	+	3
<i>Daviesia physodes</i>		0.80
<i>Daviesia triflora</i>		0.30
<i>Drosera</i> ? <i>erythrorhiza</i>		Prostrate
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	15	0.60
<i>Eucalyptus todtiana</i>	1	7
<i>Grevillea pilulifera</i>		0.20
<i>Hakea ruscifolia</i>		2
<i>Hibbertia hypericoides</i>	2	0.40
<i>Hibbertia racemosa</i>		0.30
<i>Isopogon linearis</i>		0.40
<i>Jacksonia floribunda</i>		1.8
<i>Leucopogon racemosus</i>		0.40
<i>Lomandra purpurea</i>		0.30
<i>Lyginia imberbis</i>		0.40
<i>Lysinema pentapetalum</i>		0.40
<i>Melaleuca systema</i>		0.30
<i>Mesomelaena pseudostygia</i>	2	0.30
<i>Nuytsia floribunda</i>		4
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		0.30
<i>Stirlingia latifolia</i>		0.70
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		0.50
<i>Xanthorrhoea preissii</i>		2

Site: COR29
Described: CvdB & LD **Date:** 17/07/2014 **Type:** Releve
MGA Zone: 50 404188mE; 6516321mN
Habitat: Consolidated dune. Upper slope to south-east
Soil: Yellow/brown coarse-grained sand
Rock Type: N/A
Vegetation: *Eucalyptus todtiana* mid isolated mallee trees over *Banksia attenuata*, *B. menziesii* and *Nuytsia floribunda* tall sparse shrubland over *Allocasuarina humilis*, *Xanthorrhoea preissii* and *Jacksonia floribunda* mid open shrubland over *Eremaea pauciflora* var. *pauciflora*, *Hibbertia hypericoides* and *Melaleuca systema* low sparse shrubland over *Mesomelaena pseudostygia* low sparse sedgeland.
Condition: Excellent
Fire Age: > 5 years
Notes: None



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Allocasuarina humilis</i>	20	1.8
<i>Amphipogon turbinatus</i>		0.40
<i>Anigozanthos</i> sp.		0.10
<i>Banksia attenuata</i>	1	6
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		0.20
<i>Banksia menziesii</i>	1	5
<i>Bossiaea eriocarpa</i>		0.20
<i>Calectasia narragara</i>		0.40
<i>Calytrix flavescens</i>		0.30
<i>Conospermum stoechadis</i>		0.60
<i>Conostephium pendulum</i>		0.40
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>		0.60
<i>Daviesia physodes</i>		0.50
<i>Daviesia preissii</i>		0.60
<i>Drosera</i> ? <i>erythrorhiza</i>		Pro
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	4	0.60
<i>Eucalyptus todtiana</i>	+	7
<i>Hakea ruscifolia</i>		1.1
<i>Hibbertia hypericoides</i>	2	0.30
<i>Hibbertia racemosa</i>		0.20
<i>Isopogon linearis</i>		0.30
<i>Jacksonia floribunda</i>	+	2
<i>Lomandra sericea</i>		0.20
<i>Melaleuca systema</i>	1	0.40
<i>Mesomelaena pseudostygia</i>	2	0.30
<i>Nuytsia floribunda</i>	1	6
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>		0.20
<i>Petrophile macrostachya</i>		0.60
<i>Stirlingia latifolia</i>		0.60
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		0.30
<i>Xanthorrhoea preissii</i>	1	1.8

Site: COR30
Described: CvdB & LD **Date:** 17/07/2014 **Type:** Releve
MGA Zone: 50 402497mE; 6517323mN
Habitat: Swale. Low swale, depression
Soil: Grey/brown coarse-grained organic sand
Rock Type: NIL
Vegetation: *Banksia attenuata* and *B. menziesii* low woodland over *Melaleuca preissiana* and *Adenanthos cygnorum* subsp. *cygnorum* tall sparse shrubland over *Calytrix angulata* and *Xanthorrhoea preissii* mid sparse shrubland over *Leucopogon conostephioides* and *Hibbertia subvaginata* low sparse shrubland
Condition: Excellent
Fire Age: > 5 years
Notes: None



SPECIES LIST

Name	Cover (%)	Height (m)
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	2	5
<i>Allocasuarina humilis</i>		1.8
<i>Banksia attenuata</i>	20	9
<i>Banksia menziesii</i>	1	6
<i>Bossiaea eriocarpa</i>		0.30
<i>Calytrix angulata</i>		1.4
<i>Calytrix angulata</i>	5	1.6
<i>Conospermum crassinervium</i>		1.1
<i>Conostephium pendulum</i>		0.50
<i>Drosera ? erythrorhiza</i>		Pros
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>		1.3
<i>Gladiolus caryophyllaceus</i>		0.30
<i>Hibbertia subvaginata</i>	+	0.30
<i>Isopogon linearis</i>		0.40
<i>Leucopogon conostephioides</i>	1	0.40
<i>Lyginia imberbis</i>		0.30
<i>Macrozamia riedlei</i>		1.4
<i>Melaleuca preissiana</i>	1	6
<i>Nuytsia floribunda</i>		0.50
<i>Phlebocarya ciliata</i>		0.30
<i>Phlebocarya ciliata</i>		0.50
<i>Scholtzia involucreta</i>		0.10
<i>Stylidium cygnorum</i>		1.5
<i>Xanthorrhoea preissii</i>	1	1.5



APPENDIX G

Vascular Plant Taxa Recorded



VASCULAR PLANT TAXA RECORDED

29 PTERIDACEAE

Cheilanthes austrotenuifolia

42 ZAMIACEAE

Macrozamia riedlei

80 LAURACEAE

Cassytha pomiformis

82 ARACEAE

* *Zantedeschia aethiopica* (Declared Pest)

109 COLCHICACEAE

Burchardia congesta

115 ORCHIDACEAE

Leporella fimbriata

Orchidaceae sp.

Pterostylis sanguinea

Pterostylis vittata

124 IRIDACEAE

* *Gladiolus caryophyllaceus*

Patersonia occidentalis var. *occidentalis*

126 XANTHORRHOEACEAE

Xanthorrhoea preissii

128 ASPARAGACEAE

Laxmannia sessiliflora

Lomandra hermaphrodita

Lomandra preissii

Lomandra purpurea

Lomandra sericea


130 HEMEROCALLIDACEAE

Dianella revoluta

138 HAEMODORACEAE

Anigozanthos humilis

Anigozanthos sp.



Conostylis aculeata subsp. *cygnorum*
Conostylis aurea
Conostylis teretifolia subsp. *teretifolia*
Haemodorum sp.
Phlebocarya ciliata

147 DASYPOGONACEAE

Calectasia narragara

156 CYPERACEAE

Caustis dioica
Lepidosperma pubisquameum (flat form)
Lepidosperma sp. Inland Scabrid (R. Barrett)
Lepidosperma sp. Northern Sandplains (R. Barrett)
Lepidosperma squamatum
Mesomelaena pseudostygia
Mesomelaena tetragona
Schoenus efoliatus

157 ANARTHRIACEAE

Lyginia imberbis

159 RESTIONACEAE


Alexgeorgea nitens
Desmocladius flexuosus
Hypolaena exsulca
Hypolaena robusta (Priority 4)
Lepidobolus preissianus

163 POACEAE

Amphipogon turbinatus
Austrodanthonia sp.
* *Briza maxima*

175 PROTEACEAE

Adenanthos cygnorum
Adenanthos cygnorum subsp. *cygnorum*
Banksia attenuata
Banksia bipinnatifida subsp. *multifida*
Banksia dallanneyi
Banksia dallanneyi var. *dallanneyi*
Banksia grandis
Banksia menziesii
Banksia sessilis var. *sessilis*
Conospermum crassinervium
Conospermum stoechadis
Grevillea pilulifera



Grevillea synapheae subsp. *synapheae*
Hakea amplexicaulis
Hakea costata
Hakea lissocarpha (forma)
Hakea prostrata
Hakea ruscifolia
Hakea stenocarpa
Hakea trifurcata
Isopogon linearis
Persoonia saccata
Petrophile divaricata
Petrophile macrostachya
Petrophile serruriae
Petrophile striata
Stirlingia latifolia
Synaphea spinulosa subsp. *spinulosa*

181 DILLENIACEAE


Hibbertia hibernioides
Hibbertia hypericoides
Hibbertia racemosa
Hibbertia subvaginata

196 HALORAGACEAE

Gonocarpus cordiger

201 FABACEAE

Acacia applanata
Acacia celastriifolia
Acacia drummondii subsp. *drummondii*
Acacia extensa
Acacia huegelii
Acacia nervosa
Acacia preissiana
Acacia pulchella var. *glaberrima*
Acacia pulchella var. *pulchella*
Acacia sessilis
Bossiaea eriocarpa
Daviesia divaricata subsp. *divaricata*
Daviesia incrassata subsp. *incrassata*
Daviesia nudiflora subsp. *nudiflora*
Daviesia physodes
Daviesia preissii
Daviesia triflora
Gompholobium marginatum
Gompholobium tomentosum
Hovea trisperma



Hovea trisperma var. *trisperma*

Jacksonia floribunda

Jacksonia sternbergiana

Kennedia prostrata

* *Lupinus* sp.

208 **RHAMNACEAE**

Cryptandra scoparia

217 **CASUARINACEAE**

Allocasuarina humilis

247 **PHYLLANTHACEAE**

Phyllanthus calycinus

261 **VIOLACEAE**

Hybanthus calycinus

281 **MYRTACEAE**

Babingtonia camphorosmae

Beaufortia elegans

Calothamnus sanguineus

Calytrix angulata

Calytrix flavescens

Calytrix sylvana

Calytrix variabilis

Chamelaucium sp. Gingin (N.G. Marchant 6) (**Threatened**)

Corymbia calophylla

Eremaea pauciflora var. *pauciflora*

Eucalyptus marginata

Eucalyptus todtiana

Hypocalymma xanthopetalum

Kunzea glabrescens

Leptospermum spinescens

Melaleuca preissiana

Melaleuca systema

Scholtzia involucrata

Verticordia nitens

300 **RUTACEAE**


Boronia ramosa subsp. *anethifolia*

Boronia ramosa subsp. *ramosa*

311 **THYMELAEACEAE**

Pimelea imbricata var. *piligera*

Pimelea sp. 1



Pimelea sp.2

332 BRASSICACEAE

* *Brassica tournefortii*

338 SANTALACEAE

Leptomeria cunninghamii

339 LORANTHACEAE

Amyema miquelii

Nuytsia floribunda

346 DROSERACEAE

Drosera ? erythrorhiza

Drosera pallida

403 ERICACEAE

Andersonia lehmanniana subsp. *lehmanniana*

Astroloma pallidum

Astroloma stomarrhena

Astroloma xerophyllum

Conostephium pendulum

Conostephium preissii

Leucopogon conostephioides

Leucopogon gracillimus

Leucopogon racemulosus

Lysinema ciliatum

Lysinema pentapetalum

Styphelia tenuiflora

452 STYLIDIACEAE

Stylidium cygnorum

Stylidium sp.

458 GOODENIACEAE

Lechenaultia biloba

460 ASTERACEAE

* *Hypochaeris glabra*

Lagenophora huegelii

Olearia lehmanniana

474 APIACEAE

Xanthosia huegelii






APPENDIX H

Fauna Habitat Assessment Data



Appendix H
Habitat Assessments

Site		HA1	HA2	HA3	HA4	HA5	HA6
Coordinates	Eastings	406165	405432	405160	405741	404966	405619
	Northings	6515785	6515940	6516520	6516293	6517284	6517059
Describer		JT	JT	JT	JT	JT	JT
Date		08-Jul-14	08-Jul-14	08-Jul-14	08-Jul-14	08-Jul-14	08-Jul-14
Seasonal Conditions		Raining weather conditions	Raining weather conditions	Raining weather conditions	Raining weather conditions	Raining weather conditions	Raining weather conditions
Habitat	Type	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland
	Quality	High habitat quality	High habitat quality	High habitat quality	High habitat quality	High habitat quality	High habitat quality
Tree Denisty		27 p/ha - Jarrah - DBH 500-100mm - Height 6-9 m	30 p/ha - Jarrah - DBH 600-1200mm - Height 6-9m	35 p/ha - Jarrah- DBH 600-1000mm - Height 7-9m	16 p/ha - Jarrah - DBH 500-1000mm - Height 7-10m	12 p/ha - Jarrah - DBH 500-900mm - Height 6-8m	15 p/ha - Jarrah - DBH 500-900mm - Height 6-9m
Litter Cover		> 50%	> 50%	> 50%	> 50%	> 50%	> 50%
Fire Age (years)		> 5	> 5	> 5	> 5	> 5	> 5
Disturbance Levels		low	low	low	low	low	low
Photo Number							


Site		HA7	HA8	HA9	HA10	HA11	HA12
Coordinates	Eastings	406105	404333	404335	404275	404658	404000
	Northings	6517107	6517198	6517202	6516847	6515703	6515715
Describer		JT	JT	JT	JT	JT	JT
Date		08-Jul-14	09-Jul-14	09-Jul-14	09-Jul-14	09-Jul-14	09-Jul-14
Seasonal Conditions		Raining weather conditions	Fine weather conditions	Fine weather conditions	Fine weather conditions	Fine weather conditions	Fine weather conditions
Habitat	Type	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland
	Quality	High habitat quality	High habitat quality	High habitat quality	High habitat quality	High habitat quality	High habitat quality
Tree Denisty		26 p/ha - Jarrah - DBH 500-1000mm - Height 6-9m	13 p/ha - Jarrah - DBH 600-1000mm - Height 7-10m	21 p/ha - Jarrah - DBH 500-900mm - Height 6-9m	22 p/ha - Jarrah /Marri - DBH 600-1400 - Height 7-12m	23 p/ha - Jarrha/Marri - DBH 600-1000mm - Height 7-9m	8 p/ha - Jarrah - DBH 500-900mm - Height 6-8m
Litter Cover		> 50%	> 50%	> 50%	> 50%	> 50%	> 50%
Fire Age (years)		> 5	> 5	> 5	> 5	> 5	> 5
Disturbance Levels		low	low	low	low	low	low
Photo Number							

Appendix H
Habitat Assessment

Site		HA13	HA14	HA15	HA16	HA17	HA18
Coordinates	Eastings	402784	402353	402517	403251	404433	403595
	Northings	651715	6516674	6516918	6517153	6515552	6515122
Describer		JT	JT	JT	JT	JT	JT
Date		09-Jul-14	09-Jul-14	09-Jul-14	09-Jul-14	10-Jul-14	10-Jul-14
Seasonal Conditions		Fine weather conditions	Fine weather conditions	Fine weather conditions	Fine weather conditions	Fine weather conditions	Fine weather conditions
Habitat	Type	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland
	Quality	High habitat quality	High habitat quality	High habitat quality	High habitat quality	High habitat quality	High habitat quality
Tree Denisty		22 p/ha - Jarrah/Marri - DBH 600-1000mm - Height 7-10m	11 p/ha - Marri/Jarrah - DBH 500-900mm - Height 7-9m	18 p/ha - Marri - DBH 500-1000mm - Height 7-10m	16 p/ha - Jarrah/Marri - DBH 500-900mm - Height 6-8m	20p/ha - Jarrah - DBH 500-900mm - Height 6-8m	11 p/ha - Jarrah/Marri - DBH 500-1000mm - Height 7-10m
Litter Cover		> 50%	> 50%	> 50%	> 50%	> 50%	> 50%
Fire Age (years)		> 5	> 5	> 5	> 5	> 5	> 5
Disturbance Levels		low	low	low	low	low	low
Photo Number							

Site		HA19	HA20	HA21	HA22	HA23	Dampland
Coordinates	Eastings	403088	403088	402649	402913	404778	402280
	Northings	6515273	6515275	6414895	6514657	6514842	6514574
Describer		JT	JT	JT	JT	JT	JT
Date		09-Jul-14	10-Jul-14	10-Jul-14	10-Jul-14	10-Jul-14	10-Jul-14
Seasonal Conditions		Fine weather conditions	Fine weather conditions	Fine weather conditions	Fine weather conditions	Fine weather conditions	Fine weather conditions
Habitat	Type	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland	Eucalypt Woodland	Damlands
	Quality	High habitat quality	High habitat quality	High habitat quality	High habitat quality	High habitat quality	Moderate quality
Tree Denisty		23 p/ha - Jarrah/Marri - DBH 600-1000mm - 8-10m	24 p/ha - Jarrah/Marri - DBH 500-1000mm - Height 7-9m	21p/ha - Jarrah/Marri - DBH 600-1100mm - Height 8-11m	10 p/ha - Marri - DBH 500-1000mm - 7-9m	16 p/ha - Jarrah - DBH 600-1000mm - Height 7-10m	N/A
Litter Cover		> 50%	> 50%	> 50%	> 50%	> 50%	> 50%
Fire Age (years)		> 5	> 5	> 5	> 5	> 5	> 5
Disturbance Levels		low	low	low	low	low	low
Photo Number							

Appendix H
Habitat Assessment

Site		BW1	BW2
Coordinates	Eastings	403327	402989
	Northings	6516329	6515567
Describer		JT	JT
Date		10-Jul-14	10-Jul-14
Seasonal Conditions		Fine weather conditions	Fine weather conditions
Habitat	Type	Banksia Woodland	Banksia Woodland
	Quality	Moderate habitat	Moderate habitat
Tree Denisty		N/A	N/A
Litter Cover		> 50%	> 50%
Fire Age (years)		> 5	> 5
Disturbance Levels		low	low
Photo Number			



APPENDIX I

Black Cockatoo Breeding Trees



APPENDIX J

Vertebrate Fauna Predicted to Occur within the Study Area

Appendix J
Previously recorded fauna

SPECIES	VERNACULAR	Conservation Status	EPBC Search	DPAW Search	NatureMap	Birddata	Tingay, 1994	Burbridge et al, 1996	ATA, 2007	GHD, 2014	Current Survey
Amphibians											
<i>Litoria adelaidensis</i>	Slender Tree Frog				X						
<i>Litoria moorei</i>	Motorbike Frog				X						
<i>Heleioporus eyrei</i>	Moaning Frog				X		X	X	X		
<i>Heleioporus psammophilus</i>	Sand Frog				X						
<i>Limnodynastes dorsalis</i>	Western Banjo Frog				X		X	X	X		
<i>Neobatrachus pelobatoides</i>	Humming Frog				X						
<i>Crinia georgiana</i>	Quacking Frog				X		X				X
<i>Crinia glauerti</i>	Clicking Frog				X		X				
<i>Crinia insignifera</i>	Squelching Froglet				X		X				
<i>Geocrinia leai</i>	Ticking Frog				X						
<i>Myobatrachus gouldii</i>	Turtle Frog							X	X	X	
<i>Pseudophryne guentheri</i>	Crawling Toadlet				X						
Reptiles											
<i>Ctenophorus adelaidensis</i>	Western Heath Dragon				X			X			
<i>Pogona minor</i>	Dwarf Bearded Dragon				X		X	X	X	X	
<i>Strophurus spinigerus</i>	Soft Spiny-tailed Gecko				X		X			X	
<i>Underwoodisaurus milii</i>	Southern Barking Gecko				X						
<i>Christinus marmoratus</i>	Marbled Gecko									X	
<i>Ctenadactylus ocellatus</i>								X			
<i>Gehyra variegata</i>					X						
<i>Hemidactylus frenatus</i>	Asian House Gecko	In	X								
<i>Aprasia pulchella</i>					X						
<i>Aprasia repens</i>	Sand-plain Worm Lizard				X			X		X	
<i>Delma fraseri</i>								X			
<i>Lialis burtonis</i>	Burton's Legless Lizard				X				X	X	
<i>Pygopus lepidopodus</i>	Common Scaly Foot				X			X			
<i>Pletholax gracilis</i>								X	X		
<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Sink				X					X	X
<i>Cryptoblepharus plagiocephalus</i>					X		X	X	X		
<i>Ctenotus australis</i>	West Coast Long-tailed Ctenotus				X				X	X	
<i>Ctenotus fallens</i>								X	X	X	X
<i>Egernia napoleonis</i>					X		X				
<i>Hemiernis initialis</i>									X		
<i>Hemiernis quadrilineata</i>					X		X		X	X	
<i>Lerista christinae</i>					X						
<i>Lerista distinguenda</i>								X		X	
<i>Lerista elegans</i>					X		X		X	X	
<i>Lerista lineopunctulata</i>					X						
<i>Lerista praepedita</i>					X		X	X		X	
<i>Menetia greyii</i>	Common Dwarf Skink				X		X		X	X	
<i>Morethia lineoocelatta</i>										X	
<i>Morethia obscura</i>	Dusky Morethia				X			X	X	X	
<i>Tiliqua occipitalis</i>	Western Bluetongue								X	X	
<i>Tiliqua rugosa</i>	Bobtail Skink							X	X	X	
<i>Varanus gouldii</i>	Bungarra or Sand Monitor								X	X	
<i>Ramphotyphlops australis</i>					X				X	X	
<i>Ramphotyphlops braminus</i>	Flowerpot Blind Snake	In	X								

Appendix J
Previously recorded fauna

SPECIES	VERNACULAR	Conservation Status	EPBC Search	DPAW Search	NatureMap	Birddata	Tingay, 1994	Burbridge et al, 1996	ATA, 2007	GHD, 2014	Current Survey
<i>Ramphotypholops pinguis</i>										X	
<i>Ramphotypholops waitii</i>										X	
<i>Antaresia stimsoni</i>	Stimson's Python				X						
<i>Morelia spilota imbricata</i>	Western Carpet Python	S4								X	
<i>Brachyuropsis semifasciatus</i>	Southern Shovel-nosed Snake				X			X		X	X
<i>Echiopsis curta</i>	Bardick				X				X		
<i>Elapognathus coronatus</i>	Crowned Snake				X						
<i>Neelaps bimaculatus</i>	Black-naped Snake							X			
<i>Neelaps calonotos</i>	Black-striped Snake	P3		X	X			X			
<i>Notechis scutatus</i>	Tiger Snake				X		X	X			
<i>Parasuta gouldii</i>					X				X		
<i>Pseudonaja affinis</i>	Dugite							X	X	X	
<i>Simoselaps bertholdi</i>	Jan's Banded Snake				X				X	X	
Birds											
<i>Dromaius novaehollandiae</i>	Emu				X	X	X	X	X	X	X
<i>Coturnix pectoralis</i>	Stubble Quail				X	X					
<i>Coturnix ypsilophora</i>	Brown Quail					X				X	
<i>Phasianus colchicus</i>	Common Pheasant (Domestic Pheasant)	In				X					
<i>Elanus caeruleus</i>	Black-shouldered Kite				X		X	X			
<i>Hamirostra isura</i>	Square-tailed Kite					X					
<i>Haliastur sphenurus</i>	Whistling Kite				X	X		X		X	
<i>Accipiter fasciatus</i>	Brown Goshawk				X	X			X	X	
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk				X	X		X	X		
<i>Aquila morphnoides</i>	Little Eagle				X	X					X
<i>Aquila audax</i>	Wedge-tailed Eagle					X	X	X		X	
<i>Circus assimilis</i>	Spotted Harrier					X					
<i>Circus approximans</i>	Swamp Harrier				X	X					
<i>Falco berigora</i>	Brown Falcon				X	X		X			
<i>Falco cenchroides</i>	Australian Kestrel				X	X		X			
<i>Falco longipennis</i>	Australian Hobby				X	X		X		X	
<i>Falco peregrinus</i>	Peregrine Falcon	S4		X	X	X			X		
<i>Turnix varia</i>	Painted Button-quail					X			X		
<i>Turnix velox</i>	Little Button-quail				X	X					
<i>Burhinus grallarius</i>	Bush Stone curlew	P4				X					
<i>Vanellus tricolor</i>	Banded Lapwing					X					
<i>Columba livia</i>	Domestic Pigeon	In	X			X				X	
<i>Streptopelia senegalensis</i>	Laughing Turtle-Dove	In	X		X	X	X		X		
<i>Streptopelia chinensis</i>	Spotted Turtle-Dove	In	X			X					
<i>Phaps chalcoptera</i>	Common Bronzewing				X	X		X	X	X	
<i>Phaps elegans</i>	Brush Bronzewing	P4				X					
<i>Ocyphaps lophotes</i>	Crested Pigeon				X	X		X	X	X	X
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black Cockatoo	Vu,S1			X	X					
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo	En, S1	X	X	X	X		X	X	X	
<i>Calyptorhynchus baudinii</i>	Baudin's Cockatoo	Vu,S1		X	X	X					
<i>Cacatua roseicapilla</i>	Galah					X	X	X	X	X	X
<i>Cacatua tenuirostris</i>	Eastern Long-billed Corella				X	X					
<i>Cacatua pastinator</i>	Western Long-billed Corella				X	X	X				
<i>Cacatua sanguinea</i>	Little Corella				X	X			X	X	

Appendix J
Previously recorded fauna

SPECIES	VERNACULAR	Conservation Status	EPBC Search	DPAW Search	NatureMap	Birddata	Tingay, 1994	Burbridge et al, 1996	ATA, 2007	GHD, 2014	Current Survey
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo				X	X					
<i>Nymphicus hollandicus</i>	Cockatiel					X					
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet					X				X	
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet				X	X		X		X	
<i>Polytelis anthopeplus</i>	Regent Parrot					X					
<i>Platycercus zonarius</i>	Australian Ringneck (Ring-necked Parrot)				X	X	X	X	X	X	X
<i>Platycercus spurius</i>	Red-capped Parrot				X	X		X	X	X	X
<i>Platycercus icterotis</i>	Western Rosella				X	X					
<i>Neophema elegans</i>	Elegant Parrot								X		
<i>Neophema petrophila</i>	Rock Parrot					X					
<i>Melopsittacus undulatus</i>	Budgerigar				X						
<i>Cuculus pallidus</i>	Pallid Cuckoo				X	X		X			X
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo				X	X	X	X		X	
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo										X
<i>Chrysococcyx basalis</i>	Horsfield's Bronze Cuckoo					X		X	X	X	X
<i>Chrysococcyx lucidus</i>	Shining Bronze Cuckoo				X	X	X	X			
<i>Ninox connivens</i>	Barking Owl	P2				X					
<i>Ninox novaeseelandiae</i>	Boobook Owl				X	X		X	X	X	X
<i>Tyto alba</i>	Barn Owl								X	X	
<i>Podargus strigoides</i>	Tawny Frogmouth				X	X		X	X	X	
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar				X			X		X	
<i>Apus pacificus</i>	Fork-tailed Swift	S3	X			X					
<i>Dacelo novaeguineae</i>	Laughing Kookaburra				X	X	X	X	X	X	X
<i>Todiramphus sanctus</i>	Sacred Kingfisher				X	X		X	X	X	
<i>Merops ornatus</i>	Rainbow Bee-eater	S3	X	X	X	X	X	X	X	X	
<i>Climacteris rufa</i>	Rufous Treecreeper					X					
<i>Malurus splendens</i>	Splendid Fairy-wren				X	X	X	X	X	X	X
<i>Malurus lamberti</i>	Variiegated Fairy-wren				X	X					
<i>Malurus pulcherrimus</i>	Blue-breasted Fairy-wren				X	X					
<i>Malurus elegans</i>	Red-winged Fairy-wren					X					
<i>Malurus leucopterus</i>	White-winged Fairy-wren				X	X		X			
<i>Stipiturus malachurus</i>	Southern Emu-wren					X					
<i>Pardalotus punctatus</i>	Spotted Pardalote				X	X					
<i>Pardalotus striatus</i>	Striated Pardalote				X	X		X	X	X	X
<i>Sericornis frontalis</i>	White-browed Scrubwren				X	X					
<i>Calamanthus campestris</i>	Rufous Fieldwren					X					
<i>Smicrornis brevirostris</i>	Weebill				X	X		X	X	X	
<i>Gerygone fusca</i>	Western Gerygone				X	X	X	X	X	X	X
<i>Acanthiza apicalis</i>	Broad-tailed Thornbill (Inland Thornbill)				X	X	X	X	X		X
<i>Acanthiza inornata</i>	Western Thornbill				X	X		X	X	X	
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill				X	X		X		X	
<i>Lichmera indistincta</i>	Brown Honeyeater				X	X	X	X	X	X	X
<i>Lichenostomus virescens</i>	Singing Honeyeater					X		X		X	X
<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater					X		X			
<i>Lichenostomus leucotis</i>	White-eared Honeyeater					X					
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater				X	X		X		X	
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater				X	X		X			
<i>Phylidonyris nigra</i>	White-cheeked Honeyeater					X	X		X	X	

Appendix J
Previously recorded fauna

SPECIES	VERNACULAR	Conservation Status	EPBC Search	DPAW Search	NatureMap	Birddata	Tingay, 1994	Burbridge et al, 1996	ATA, 2007	GHD, 2014	Current Survey
<i>Phylidonyris albifrons</i>	White-fronted Honeyeater					X					
<i>Phylidonyris melanops</i>	Tawny-crowned Honeyeater					X		X			
<i>Acanthorhynchus superciliosus</i>	Western Spinebill				X	X	X	X	X		X
<i>Manorina flavigula</i>	Yellow-throated Miner				X	X		X			
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater					X					
<i>Anthochaera lunulata</i>	Western Little Wattlebird				X	X		X		X	
<i>Anthochaera carunculata</i>	Red Wattlebird				X	X	X	X	X	X	X
<i>Epthianura albifrons</i>	White-fronted Chat				X	X		X			
<i>Epthianura tricolor</i>	Crimson Chat					X					
<i>Microeca fascinans</i>	Jacky Winter					X				X	
<i>Petroica multicolor</i>	Scarlet Robin					X		X	X	X	X
<i>Petroica goodenovii</i>	Red-capped Robin				X	X		X			X
<i>Petroica cucullata</i>	Hooded Robin					X		X			
<i>Eopsaltria australis</i>	Yellow Robin					X				X	
<i>Eopsaltria georgiana</i>	White-breasted Robin					X					
<i>Daphoenositta chrysoptera</i>	Varied Sittella				X	X		X	X	X	X
<i>Oreoica gutturalis</i>	Crested Bellbird					X					
<i>Pachycephala pectoralis</i>	Golden Whistler				X	X		X		X	
<i>Pachycephala rufiventris</i>	Rufous Whistler				X	X	X	X	X	X	X
<i>Colluricincla harmonica</i>	Grey Shrike-thrush				X	X	X	X	X	X	X
<i>Rhipidura fuliginosa</i>	Grey Fantail				X	X	X	X	X	X	X
<i>Rhipidura leucophrys</i>	Willie Wagtail				X	X	X	X	X	X	
<i>Grallina cyanoleuca</i>	Magpie-lark				X	X	X	X		X	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike				X	X	X		X	X	X
<i>Lalage tricolor</i>	White-winged Triller					X		X		X	
<i>Artamus personatus</i>	Masked Woodswallow					X					
<i>Artamus cinereus</i>	Black-faced Woodswallow				X	X		X			
<i>Artamus cyanopterus</i>	Dusky Woodswallow				X	X		X			X
<i>Cracticus torquatus</i>	Grey Butcherbird				X	X		X	X	X	X
<i>Cracticus nigrogularis</i>	Pied Butcherbird				X	X					
<i>Cracticus tibicen</i>	Australian Magpie				X	X		X	X	X	X
<i>Strepera versicolor</i>	Grey Currawong				X	X				X	
<i>Corvus coronoides</i>	Australian Raven				X	X		X	X	X	X
<i>Ptilonorhynchus maculatus</i>	Spotted Bowerbird					X					
<i>Sturnus vulgaris</i>	Common Starling	In	X								
<i>Acridotheres tristis</i>	Common Myna	In	X								
<i>Cheramoeca leucosternus</i>	White-backed Swallow					X		X			
<i>Hirundo neoxena</i>	Welcome Swallow				X	X		X		X	X
<i>Hirundo nigricans</i>	Tree Martin				X	X		X		X	
<i>Hirundo ariel</i>	Fairy Martin					X					X
<i>Zosterops lateralis</i>	Grey-breasted White-eye (Silvereye)				X	X	X	X	X	X	
<i>Acrocephalus australis</i>	Australian Reed Warbler				X	X	X				
<i>Megalurus gramineus</i>	Little Grassbird				X	X					
<i>Cincloramphus mathewsi</i>	Rufous Songlark				X	X		X			
<i>Cincloramphus cruralis</i>	Brown Songlark				X	X					
<i>Dicaeum hirundinaceum</i>	Mistletoebird				X			X		X	
<i>Passer domesticus</i>	House Sparrow	In	X								
<i>Passer montanus</i>	Eurasian Tree Sparrow	In	X								

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Previously recorded fauna

SPECIES	VERNACULAR	Conservation Status	EPBC Search	DPAW Search	NatureMap	Birdata	Tingay, 1994	Burbridge et al, 1996	ATA, 2007	GHD, 2014	Current Survey
<i>Stagonopleura oculata</i>	Red-eared Firetail					X					
<i>Lonchura castaneothorax</i>	Chestnut-breasted Mannikin					X					
<i>Anthus australis</i>	Australian Pipit					X					
<i>Carduelis carduelis</i>	Goldfinch (European Goldfinch)	In	X			X					
Mammals											
<i>Tachyglossus aculeatus</i>	Echidna				X			X		X	
<i>Dasyurus geoffroii</i>	Western Quoll, Chuditch	Vu,S1	X	X	X						
<i>Sminthopsis griseoventer</i>	Grey-bellied Dunnart							X			
<i>Isoodon obesulus fusciventer</i>	Southern Brown Bandicoot	P5		X	X		X			X	
<i>Macropus fuliginosus</i>	Western Grey Kangaroo				X		X	X		X	X
<i>Macropus irma</i>	Western Brush Wallaby	P4						X			X
<i>Macropus robustus</i>	Euro, Biggada				X						
<i>Trichosurus vulpecula</i>	Common Brushtail Possum									X	
<i>Cercartetus concinnus</i>	Western Pygmy-possum, Mundarda				X						
<i>Tarsipes rostratus</i>	Honey Possum, Noolbenger						X	X	X		
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat				X			X		X	
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat				X			X		X	
<i>Nyctophilus gouldi</i>	Gould's Long-eared Bat				X			X			
<i>Vespadelus regulus</i>	Southern Forest Bat							X			
<i>Tadarida australis</i>	White-striped Freetail-bat									X	
<i>Mus musculus</i>	House Mouse	In	X		X		X	X	X	X	
<i>Pseudomys albocinereus</i>	Ash-grey Mouse				X			X			
<i>Rattus norvegicus</i>	Brown Rat	In	X								
<i>Rattus rattus</i>	Black Rat	In	X		X		X			X	
<i>Funambulus pennanti</i>	Indian Palm Squirrel	In	X								
<i>Oryctolagus cuniculus</i>	Rabbit	In	X				X	X		X	
<i>Canis lupus</i>	Dog	In	X							X	
<i>Vulpes vulpes</i>	Red Fox	In	X				X	X		X	X
<i>Felis catus</i>	Cat	In	X		X			X		X	
<i>Sus scrofa</i>	Pig	In	X								
<i>Bos taurus</i>	European Cattle	In	X								
<i>Capra hircus</i>	Goat	In	X								
<i>Cervus elaphus</i>	Red Deer	In	X								

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