

# **Woolgoolga to Ballina Pacific Highway upgrade**

## **Phased Resource Reduction for Koala Laws Point – Phase 4**

October 2017





Woolgoolga to Ballina Pacific  
Highway Upgrade Phased  
Resource Reduction for Koala –  
Laws Point phase 4 report.



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Cover Photo: Adult koala, Munro Wharf Road control site.

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# Table of contents

<b>1. Introduction.....</b>	<b>1</b>
<b>2. Study area.....</b>	<b>2</b>
<b>3. Methods.....</b>	<b>1</b>
<b>3.1 Tree collaring .....</b>	<b>1</b>
<b>3.2 Ring-barking.....</b>	<b>2</b>
3.2.1 Dieback of ring-barked trees .....	3
<b>3.3 Koala population monitoring.....</b>	<b>3</b>
3.3.1 Koala surveys .....	3
3.3.2 Scat collection.....	4
<b>3.4 Camera monitoring.....</b>	<b>6</b>
<b>4. Results .....</b>	<b>7</b>
<b>4.1 Collaring .....</b>	<b>7</b>
<b>4.2 Ring-barking.....</b>	<b>8</b>
4.2.1 Tree dieback .....	8
<b>4.3 Camera monitoring.....</b>	<b>12</b>
<b>4.4 Koala population surveys.....</b>	<b>13</b>
4.4.1 Koala surveys .....	13
4.4.2 Scat Collection .....	16
<b>4.5 Koala specialist site inspection.....</b>	<b>16</b>
<b>5. Discussion .....</b>	<b>19</b>
<b>5.1 Collaring.....</b>	<b>19</b>
<b>5.2 Ring-barking.....</b>	<b>19</b>
<b>5.3 Koala use of the study area.....</b>	<b>19</b>
<b>5.4 Effect of PRR on koalas .....</b>	<b>20</b>
<b>6. References .....</b>	<b>21</b>
<b>Appendix A – Field data .....</b>	<b>23</b>

# List of tables

Table 1: The Phased Resource Reduction schedule applied at the Laws Point koala hotspot.....	2
Table 2: Number of trees and stems collared during Phase 2 and 3 of the PRR program at Laws Point.	7
Table 3: Number of trees marked during Phase 1 of the PRR program at Laws Point.....	8
Table 4: Proportion of canopy dieback recorded in seven species of tree at the Laws Point hotspot. ...	8
Table 5: Koala records obtained during Phase 1 to 4 koala surveys at Laws Point. pr = probable identification; po = possible identification. ....	15

# List of figures

Figure 1: Location of Laws Point koala hotspot in relation to Wardell Road koala hotspot and the Tucki Tucki scat collection control site. ....	1
Figure 2: Location of scat sample sites within the Tucki Tucki Control site. ....	5
Figure 3: Distribution and status of all trees (DBH >300mm) within the Laws Point site following Phase 4 of the PRR program. ....	9
Figure 4: Distribution and status of all trees (DBH >300mm) within the Laws Point site following Phase 4 of the PRR program. ....	10
Figure 5: Distribution and status of all trees (DBH >300mm) within the Laws Point site following Phase 4 of the PRR program. ....	11
Figure 6: Number of koala visits to six collared tallowwoods monitored with infra-red cameras at Laws Point. Each visit to a tree >60mins apart was scored separately even if by same individual. Duplicate video (by both cameras) of the same visit was scored as one visit. ....	12
Figure 7: Visits by koala to collared feed trees over the 11 week monitoring period. Data represent individual visits not individual koalas and visits were scored separately if they occurred >60 minutes apart. ....	12
Figure 8: Number of koalas recorded during paired day and night surveys during Phase 1 (surveys 1-3), 2 (survey 4), 3 (survey 5) and 4 (survey 6 & 7) at Laws Point. ....	14
Figure 9: Number of koalas recorded at night on the east (Transects 7-12) and west (Transects 1-6) sides of the Laws Point study area. ....	14
Figure 10: Average number of koalas recorded at transects 1-6 and 7-12 in each of three time periods. ....	14
Figure 11: Average number of koalas recorded at night at transects 1/2, 3/4, 5/6 during Phase 1, 2/3 and 4 at Laws Point.....	15

Figure 12: Distribution of koala records following Phase 4 of the PRR program at the Laws Point hotspot site.....17

Figure 13: Distribution of koala records following Phase 4 of the PRR program at the Laws Point hotspot site.....18

## List of plates

Plate 1: Procedure used to install collars during the Phased Resource Reduction for koalas. ....1

Plate 2: Example of a loosely fitted collar with a gap around the trunk to reduce a koalas grip on the collar and allow small scansorial fauna to access trees.....2

Plate 3: A ring-barked and collared continuous canopy tree at Laws Point.....3

Plate 4: Scats being collected at the Tucki Tucki control site. ....6

Plate 5: Camera installed at a collared feed tree to record koala activity. ....7

Plate 6: Dieback of blackbutt (*E. pilularis*) (left) and tallowwood (right) 13 days after being ring-barked.....8

# 1. Introduction

The Woolgoolga to Ballina (W2B) Pacific Highway Upgrade Koala Management Plan (RMS 2016) proposed a staged approach to clearing in two koala hotspots in Section 10 of the upgrade. Koala hotspots are situated at Laws Point and Wardell Road. The staged approach is referred to as ‘phased resource reduction’ (PRR) and involves the gradual reduction of food resources by ring-barking and collaring trees to facilitate the voluntary movement of koalas by replicating the effects of a severe drought. The PRR method aims to reduce stress-induced impacts associated with clearing activities by encouraging koalas to move from the clearing area into adjacent habitat. In addition to collaring and ring-barking trees, the project also involves population surveys to monitor koala numbers throughout the PRR process.

The purpose of the population monitoring is to monitor and assess the impact of the process on resident koalas and enable implementation of adaptive clearing procedures such that the project-wide goal of zero koala mortalities is achieved (RMS 2016). Other components added to the project include camera monitoring of collared feed trees to record koala response to collaring, inspections of collars for scratch marks, collection and analysis of koala scats collected at hot spots and control sites to monitor cortisol levels, and an additional population survey (Laws Point only).

Due to logistical issues, the PRR program has been staged with work commencing at Laws Point in March 2017 and at Wardell Road in May 2017. Staging provided the opportunity to apply lessons learnt at Laws Point to Wardell Road. Sandpiper Ecological (Sandpiper) was contracted by Pacific Complete to implement the PRR program.

The program includes five phases (Table 1):

- Phase 1 (Wks 1-3): Tag and map all trees to be collared/ring-barked and undertake six population surveys.
- Phase 2 (Wks 4-5): Collar 40%, ring-bark 20% of trees with continuous canopy to feed trees, ring-bark non-collared trees (DBH 100-300mm), and conduct two population surveys.
- Phase 3 (Wks 6-7): Collar a further 40% of trees, continue ring-barking non-collared trees (DBH 100-300mm), and conduct two population surveys.
- Phase 4 (Wks 8-10): Collar the remaining 20% of trees, finalise ring-barking, and conduct two population surveys.
- Phase 5 (Wks 11-17): Following clearing of the hotspot site undertake eight population surveys.

The following report details the results of Phase 4 of the PRR program at the Laws Point hotspot site. Phase 4 was undertaken between 26 June and 7 July 2017, with an additional population survey (phase 4b) on 16/17 August (Table 1). Results of Phases 1, 2, and 3 at Laws Point have been reported on previously (see Sandpiper Ecological 2017a, b & c). The following report is penultimate in the PRR program and consequently does not include comment on the success of the program or recommendations for future phased resource reduction programs. These will be addressed in the Phase 5 report at completion of the PRR program.



**Table 1:** The Phased Resource Reduction schedule applied at the Laws Point koala hotspot.

Phase	Duration	Dates	Tasks completed
1	65 days	22 February to 28 April 2017	<ol style="list-style-type: none"> <li>1. Survey &amp; mark project boundary.</li> <li>2. Tag and map all trees to be collared &amp; ring-barked.</li> <li>3. Conduct 3 diurnal and 3 nocturnal population surveys.</li> </ol>
2	14 days	22 May to 4 June 2017	<ol style="list-style-type: none"> <li>1. Collar 40% of trees.</li> <li>2. Ring-bark 100-300mm DBH trees.</li> <li>3. Ring-bark continuous canopy trees.</li> <li>4. Conduct 1 diurnal and 1 nocturnal population survey.</li> </ol>
3	19 days	5 – 23 June 2017	<ol style="list-style-type: none"> <li>1. Collar a further 40% of trees.</li> <li>2. Conduct 1 diurnal and 1 nocturnal population survey.</li> </ol>
4	12 days	26 June to 7 July 2017	<ol style="list-style-type: none"> <li>1. Collar remaining 20% of trees.</li> <li>2. Conduct 1 diurnal and 1 nocturnal population survey.</li> <li>3. Inspect site to assess dieback of ring-barked trees.</li> <li>4. Download images &amp; inspect collars for scratches.</li> </ol>
4b	2	16-17 August	<ol style="list-style-type: none"> <li>1. Conduct 1 diurnal and 1 nocturnal population survey.</li> </ol>
5	Not commenced		

## 2. Study area

The PRR study area was comprised of three sample sites - Laws Point koala hotspot, Wardell Road koala hotspot and Tucki Tucki scat collection control site (Figure 1). Wardell Road and Laws Point are situated in Section 10 of the Woolgoolga to Ballina (W2B) Pacific Highway Upgrade and are approximately 4km apart. The Section 10 alignment traverses a relatively flat to undulating agricultural valley, which begins north of the Richmond River at Laws Point and runs to the west of the township of Wardell before connecting with the existing highway alignment at Coolgardie Road.

Wardell Road koala hotspot is located approximately three kilometres west north west of Wardell on the New South Wales north coast. Access to the site is via Wardell Road through RMS acquired land, adjoining private properties and Hillside Lane. The study site stretches for 1.3 kilometres and encompasses chainages 152200 to 153500 of the W2B. The survey area includes the subject site – section of W2B alignment between the abovementioned chainages, and study area – vegetation adjoining the subject site that contains eight, 1.3 km long koala survey transects.

Laws Point is located approximately five kilometres south west of the town of Wardell on the New South Wales north coast. Access to the site is via Back Channel Road following the northern bank of the Richmond River. The study site stretches north from the Richmond River for one kilometre and encompasses chainages 146 000 to 147 000. Habitat at Laws Point consists of grassy blackbutt forest on ridges, paperbark swamp forest and lowland eucalypt forest. Both the blackbutt and lowland eucalypt forest has been subject to selective logging.

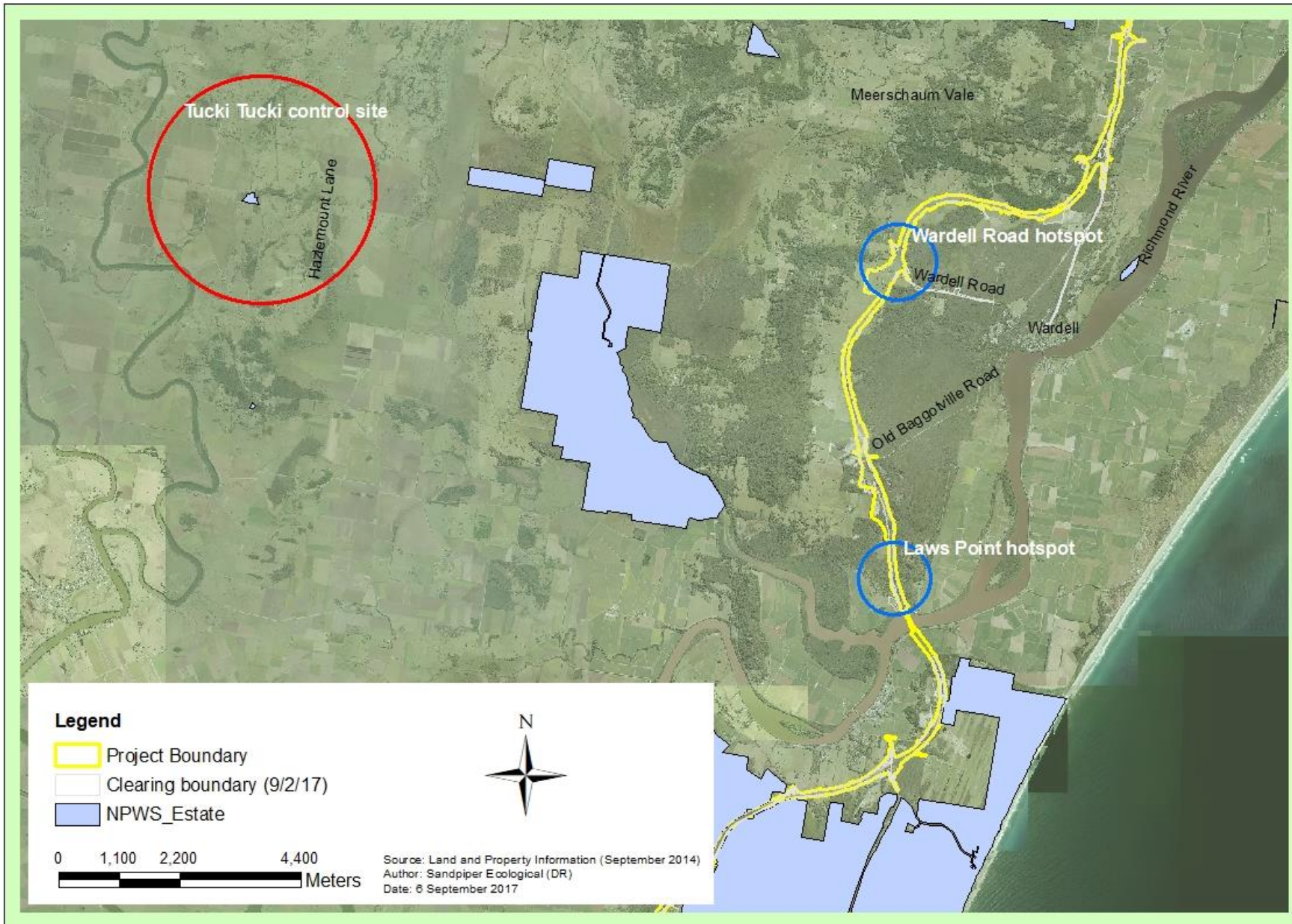


Figure 1: Location of Laws Point koala hotspot in relation to Wardell Road koala hotspot and the Tucki Tucki scat collection control site.

Tucki Tucki is used as a control site for collection of fresh koala scats. Scat collection has occurred at two primary locations, Munro Wharf/Tucki Tucki Road and Hazlemount Lane. Tucki Tucki includes a mix of low ridges and floodplain that supports numerous koalas. The area includes numerous feed trees planted within local road corridors adjoining farmland.

## 3. Methods

### 3.1 Tree collaring

Phase 4 required that all remaining trees with a Diameter at Breast Height (DBH) of >300mm have 600mm wide collars installed between one and two meters above ground. Seventy-six percent (76%) of trees were collared in Phases 2 and 3 at Laws Point, leaving 24%, or 153 trees to collar in Phase 4. Collars were made of 1.5mm thick High Density Polyethylene (HDPE). HDPE was used as it is lightweight, has a slippery surface, can withstand punctures, is UV stabilised, and is easy to cut and handle in a field situation. Collar size was determined for each tree by measuring the circumference at 1m (hollow-bearing trees) or 2m (non-hollow-bearing trees) above ground. A three-step ladder was used to install collars at 2m (Plate 1). An additional 100mm was added to each circumference to allow for imperfections in the trunk and to provide a loose fit (Plate 2). Collars were attached using three or four 50-60mm screws. Each tree was inspected for koalas prior to collar installation. Collars were installed loosely around trunks to provide an unstable surface for koalas and enable small scansorial fauna to move up and down trunks. Phase 4 collaring was undertaken on 26 and 27 June 2017.



**Plate 1:** Procedure used to install collars during the Phased Resource Reduction for koalas.



**Plate 2:** Example of a loosely fitted collar with a gap around the trunk to reduce a koalas grip on the collar and allow small scansorial fauna to access trees.

### 3.2 Ring-barking

The Koala Management Plan specified that 20% of trees that had a continuous canopy to primary and secondary koala feed trees shall be ring-barked in Phase 2 (RMS 2016). Sandpiper Ecological (2017a) recommended that the proportion be increased to 50% to account for the fragmented nature of forest at Laws Point. Due to the proximity of most feed trees to retained vegetation or the LoC boundary only three additional continuous canopy trees were added to the 10 trees (20%) identified in the Phase 1 report. During Phase 2, 13 trees that had a continuous canopy to primary and secondary koala feed trees and trees with a DBH between 100 and 300mm were ring-barked.

Ring-barking was undertaken by Blue Knob Tree Fellas and Sandpiper Ecological and was undertaken using a chainsaw and axe. Trees were ring-barked by making two parallel cuts, approximately 100mm apart in the trunk. Bark and sapwood was then removed with an axe. The depth of chainsaw cuts varied depending on trunk diameter. Trees with a DBH between 100 and 150mm had bark only removed, with the sapwood left intact. This was done due to concern about the stability of small trees if sapwood was removed. An aggressive approach was adopted to ring-barking trees between 150 and 300mm DBH and continuous canopy trees to maximise the likelihood of defoliation within the 6-week period between Phase 2 and clearing (Plate 3). Ring-barking was undertaken between 22 and 26 May 2017.



**Plate 3:** A ring-barked and collared continuous canopy tree at Laws Point.

### 3.2.1 Dieback of ring-barked trees

Following completion of Phase 4, dieback of ring-barked trees was assessed by randomly sampling 65 ring-barked trees, 10 *Leptospermum* spp., 10 hard corkwood (*Endiandra sieberi*), 10 *Lophostemon* spp., 10 broad-leaved paperbark (*Melaleuca quinquervia*), 10 *Corymbia* spp., 10 grey ironbark (*Eucalyptus siderophloia*), and five tallowwood (*E. microcorys*). The proportion of the canopy showing evidence of dieback (brown or partially brown leaves), and the degree of ring-barking (sapwood removed or bark only removed) was assessed visually. The survey was undertaken on 7 September 2017.

## 3.3 Koala population monitoring

### 3.3.1 Koala surveys

Two paired (diurnal & nocturnal) koala population monitoring surveys were conducted in Phase 4 and follow on from the three diurnal, and three nocturnal koala population monitoring surveys conducted in Phase 1 (Sandpiper Ecological 2017a) and the paired samples conducted in Phase 2 and Phase 3 (Sandpiper Ecological 2017b & c). The second paired population survey in Phase 4 was additional to the KMP and was initiated due to the longer gap between Phases 4 and 5.

Surveys were completed by two teams of three with one team sampling transects 1-6 and the other transects 7-12 during the night and subsequent day survey. Each team consisted of one person walking the transect centre line flanked by a person 20m away on each side. Nocturnal surveys were conducted with handheld spotlights (Led Lenser P14) and all personnel were equipped with binoculars for both nocturnal and diurnal surveys. Each 1km transect took between 45 and 60

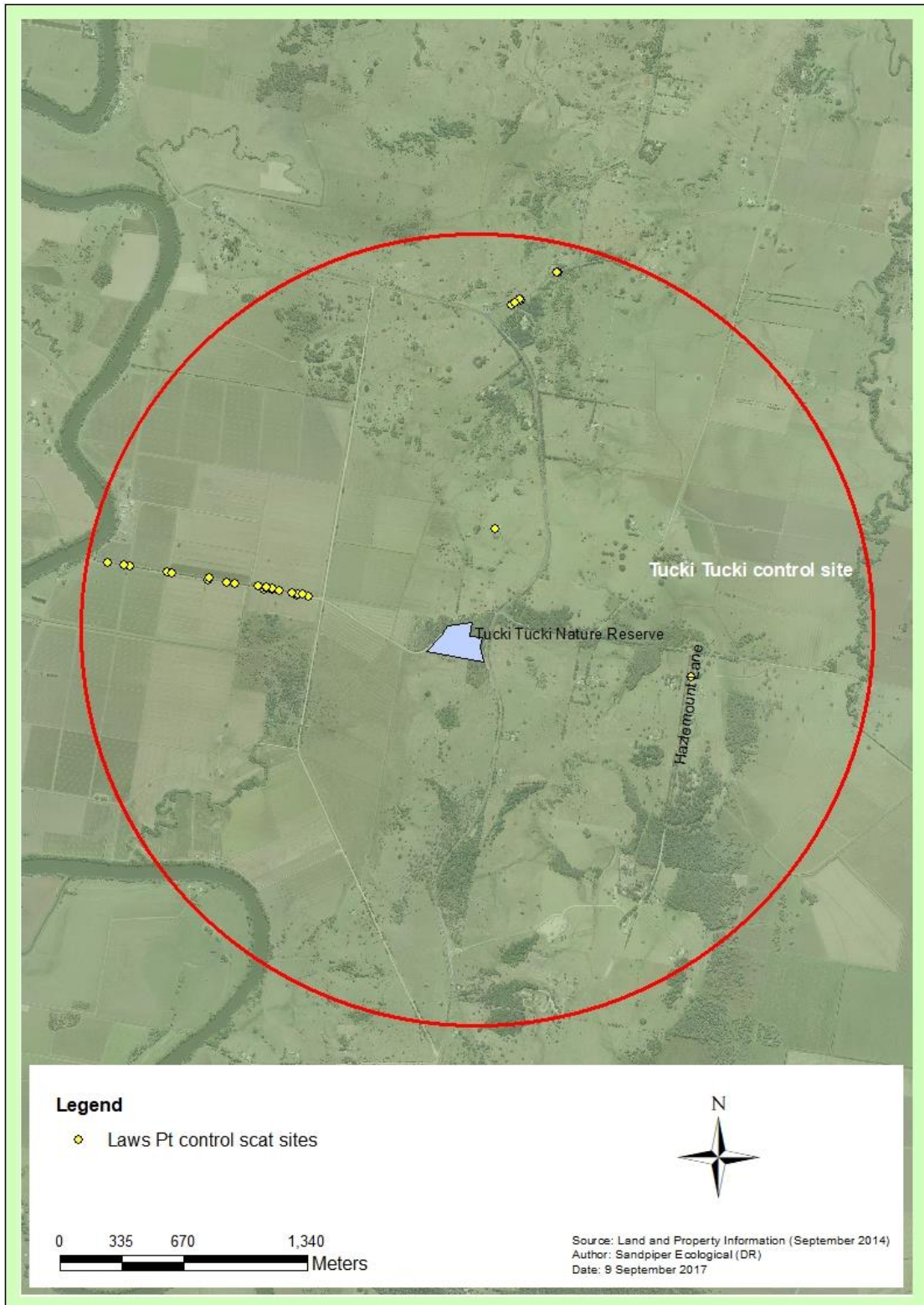
minutes to complete. The Phase 4 population surveys were conducted on 10/11 July and 16/17 August 2017. Phase 1 population surveys were conducted on 23/24 March, 18/19 April, and 26/27 April 2017. Phase 2 on 31 May and 1 June 2017 and phase 3 on 21/22 June 2017. All transects were accessible for their entire length throughout the monitoring period.

Data recorded during each survey included; date, survey number, observer names, start and end time, temperature range, cloud cover, wind, rain and moon phase. Data collected on each koala observed included: date, time, transect number, coordinates (easting & northing GDA 94), tree species including DBH, temperature, weather, sex, breeding status, and health (i.e. signs of conjunctivitis or cystitis). Each tree with a koala was marked with red and white tape so it could be re-located the following day.

### **3.3.2 Scat collection**

To support a study being undertaken by Roads and Maritime Services and Sydney University on cortisol levels in koalas fresh koala scats were collected at Laws Point (impact site) and Tucki Tucki (control site) following each diurnal survey. At Laws Point, each tree containing a koala, or where a koala was recorded the previous night, was revisited and a search conducted for fresh koala scats. Fresh scats were identified by their colour (paler green) and presence of a moist coating. Scats were subsequently collected from the same number, and if possible same sex ratio, of koalas at Tucki Tucki (Figure 2). The Tucki Tucki site was visited on the afternoon following the diurnal koala survey and trees containing suitable koalas were marked. These trees were revisited the following morning and fresh scats collected. Where possible between five and six scats were collected from each tree and scat collection was conducted during dry weather. The age of scats (i.e. fresh or >1 day old) was noted on the datasheet. Control site scats for the Laws Point sample were collected primarily from Munro Wharf Road, Tucki Tucki Road and, on one occasion, Grennans Road (Figure 2).

Data collected at each scat collection site included; location (easting & northing GDA 94), tree species, weather (temperature, cloud cover, rainfall), time since last sunny day, tree size, koala behaviour, koala health, date, and observer. Scats were collected with a toothpick and placed immediately into a Styrofoam block positioned in a plastic container (Plate 4). Scats were then stored in a cool dry location. If scats were housed for more than four weeks they were placed in a freezer.



**Figure 2:** Location of scat sample sites within the Tucki Tucki Control site.



**Plate 4:** Scats being collected at the Tucki Tucki control site.

### **3.4 Camera monitoring**

To obtain data on how koalas respond to collars motion-activated infra-red cameras were installed at collared primary feed trees, two cameras per tree. Koalas were recorded in some of the monitored feed trees during population monitoring surveys. Initially six cameras were installed at three trees (#1, 2 & 3) on 22 June 2017, with an additional four cameras installed at two trees (#4 & 5) on 5 July and two cameras at one tree (#6) on 12 July 2017. Image download and battery swaps have occurred on five occasions, 5 July, 12 July, 4 August, 25 August and 7 September 2017. Cameras were installed on star pickets or strapped to a small nearby tree and placed on either side of a target tree (i.e. 2 cameras / tree). Cameras were set to record 20 seconds of video with a 10 second quiet-period (Plate 5). The base of each collar on a feed tree was painted to assist in identifying scratch marks. Each collar was inspected for koala scratch marks when downloading images.





**Plate 5:** Camera installed at a collared feed tree to record koala activity.

## 4. Results

### 4.1 Collaring

A total of 160 trees with 177 stems, equating to 25% of total trees, were collared in Phase 4 (Tables 2 & 3, Figures 3, 4, & 5). In addition, 238 and 241 trees were collared in Phases 2 and 3 respectively (Table 2, Tables A1 & A2, Appendix A). A koala was recorded in tree number C549 on 7 and 8 June during Phase 3 and subsequently that tree was not collared until Phase 4. In Phase 4 collaring occurred on the outside of the central band of trees collared in Phase 2 and 3 (Figures 3 & 4). The total number of trees collared at Laws Point was 639, including 588 non-habitat trees and 51 habitat trees.

**Table 2:** Number of trees and stems collared during Phase 2 and 3 of the PRR program at Laws Point.

Phase	Total trees collared	Total Stems collared	Non HBT collared	HBT collared
Two	238 (37%)	264	224	14
Three	241 (38%)	268	224	17
Four	160 (25%)	177	140	20

**Table 3:** Number of trees marked during Phase 1 of the PRR program at Laws Point.

Phase	Total trees to be collared	Total Stems to be collared	Non HBT	HBT
Phase 1	639	709	588	51

## 4.2 Ring-barking

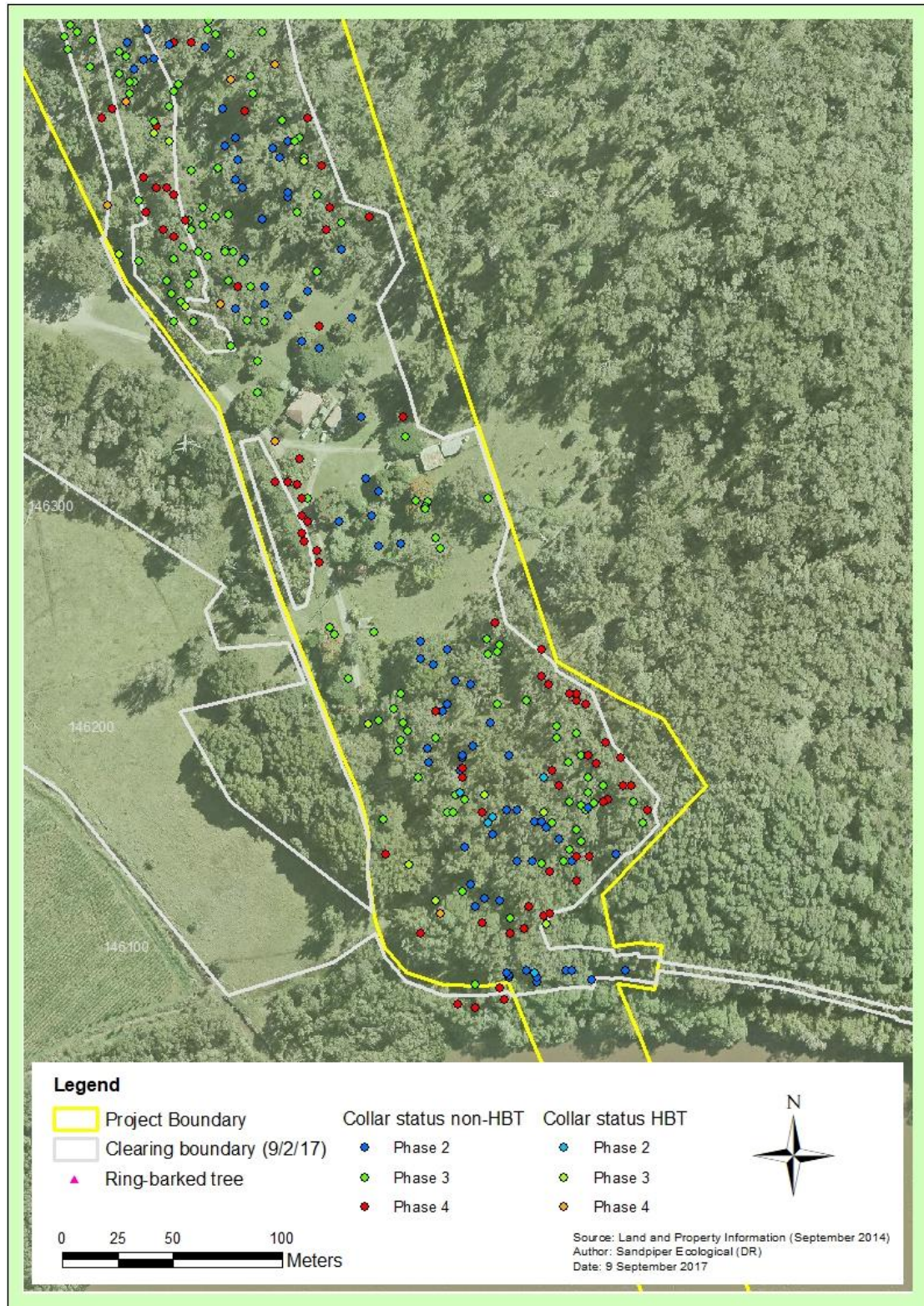
### 4.2.1 Tree dieback

There is considerable variation in the extent of foliage dieback between species of tree ring-barked (Table 4; Table A3, Appendix A). Dieback of *Eucalyptus* spp. (tallowwood & ironbark) and *Corymbia* spp. (bloodwood) has been almost complete with 80-100% of trees sampled showing 91-100% dieback (Plate 6). Seventy percent (70%) of *Melaleuca* spp. (paperbark) displayed 50-100% dieback in 70% of trees sampled, and 70% of *Lophostemon* spp (brush & swamp box) had 91-100% dieback. *Endiandra sieberi* (hard corkwood), a rainforest species, displayed minimal evidence of dieback, with 90% of trees sampled showing no evidence of dieback.

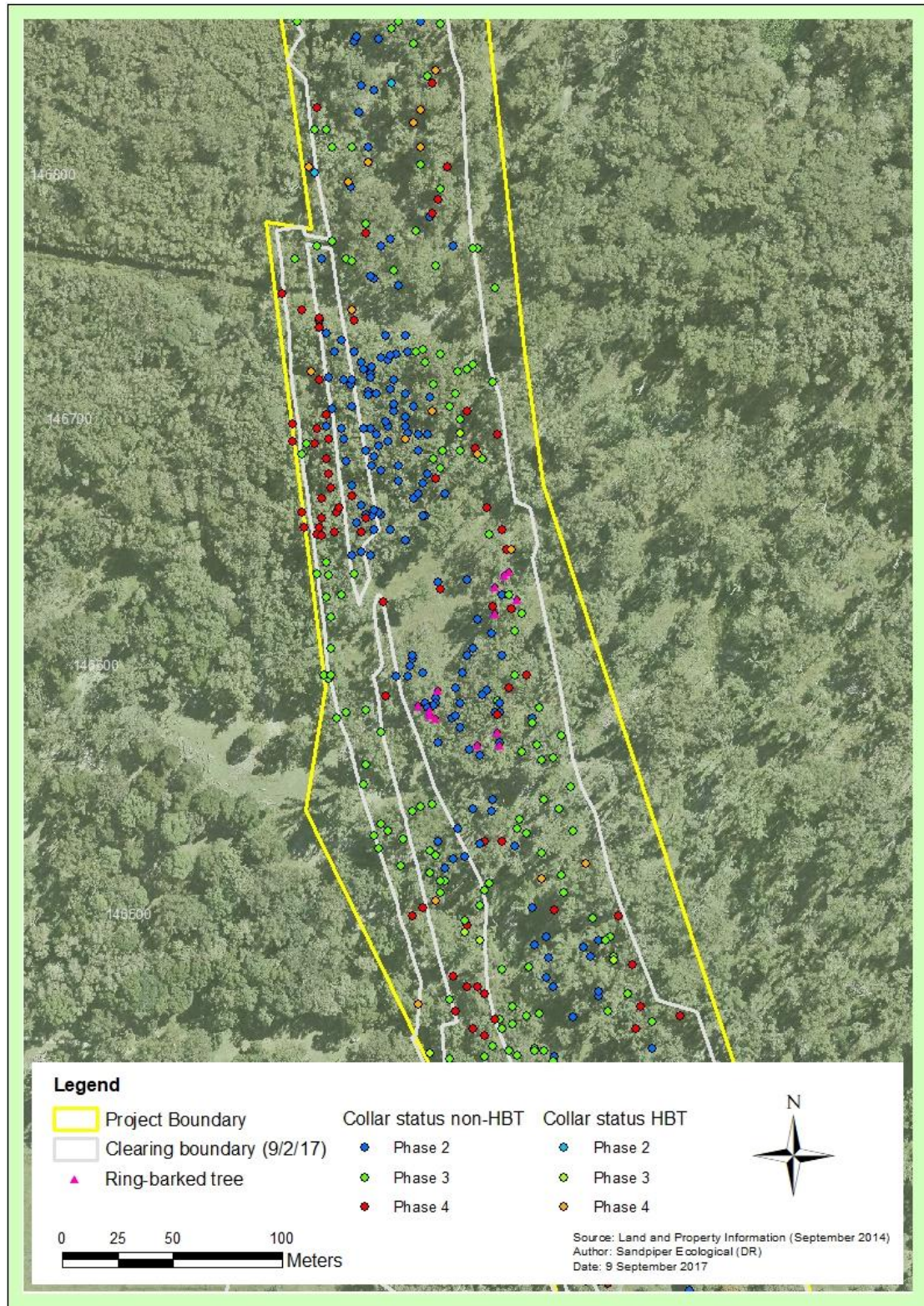
**Table 4:** Proportion of canopy dieback recorded in seven species of tree at the Laws Point hotspot.

Tree species	% of ring-barked trees showing evidence of dieback				
	0	<10	11-50	51-90	91-100
<i>Leptospermum</i> spp.		40	40		20
<i>Melaleuca</i> spp.		10	20	10	60
<i>Endiandra sieberi</i>	90	10			
<i>Lophostemon</i> spp.	10	20			70
<i>Corymbia</i> spp.			10		90
<i>Eucalyptus microcorys</i> *					100
<i>E. siderophloia</i>			20		80

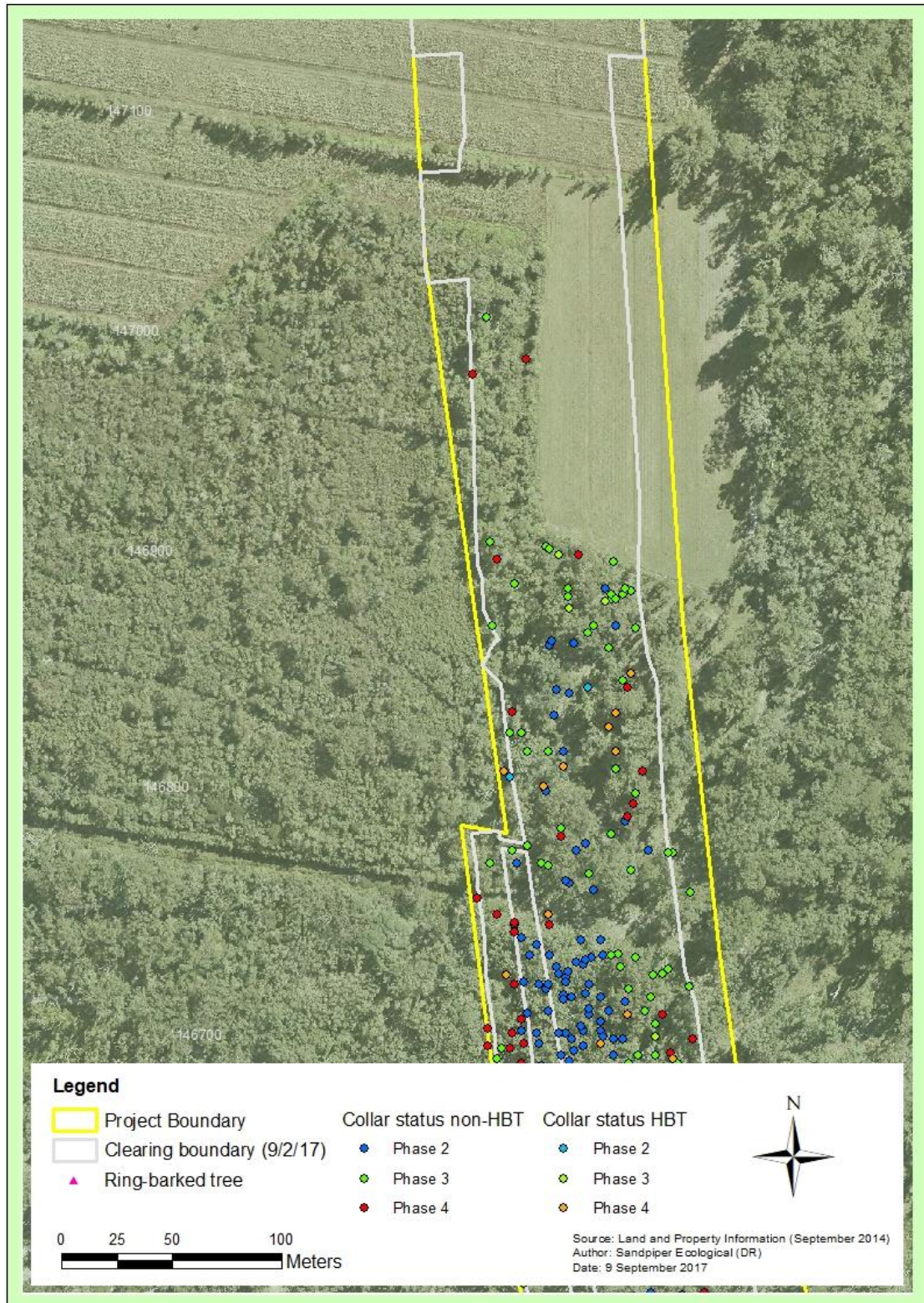
**Plate 6:** Dieback of blackbutt (*E. pilularis*) (left) and tallowwood (right) 13 days after being ring-barked.



**Figure 3:** Distribution and status of all trees (DBH >300mm) within the Laws Point site following Phase 4 of the PRR program.



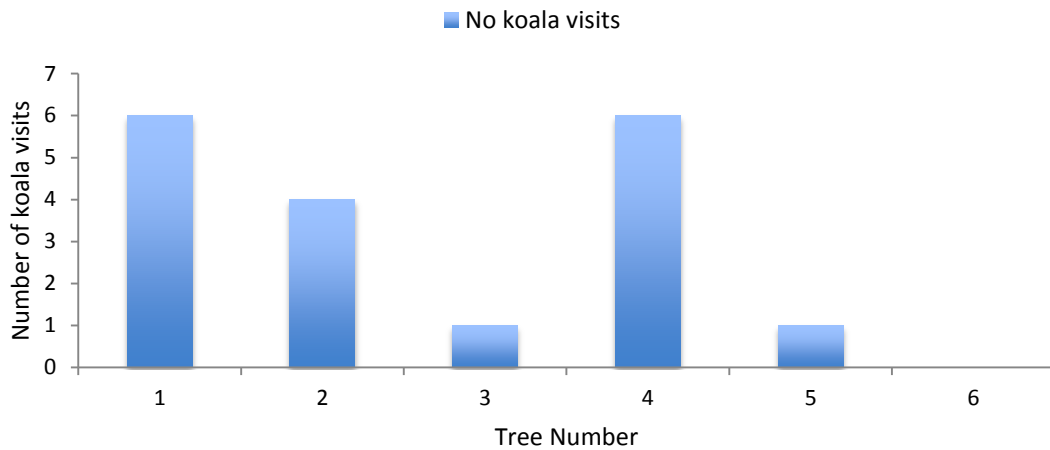
**Figure 4:** Distribution and status of all trees (DBH >300mm) within the Laws Point site following Phase 4 of the PRR program.



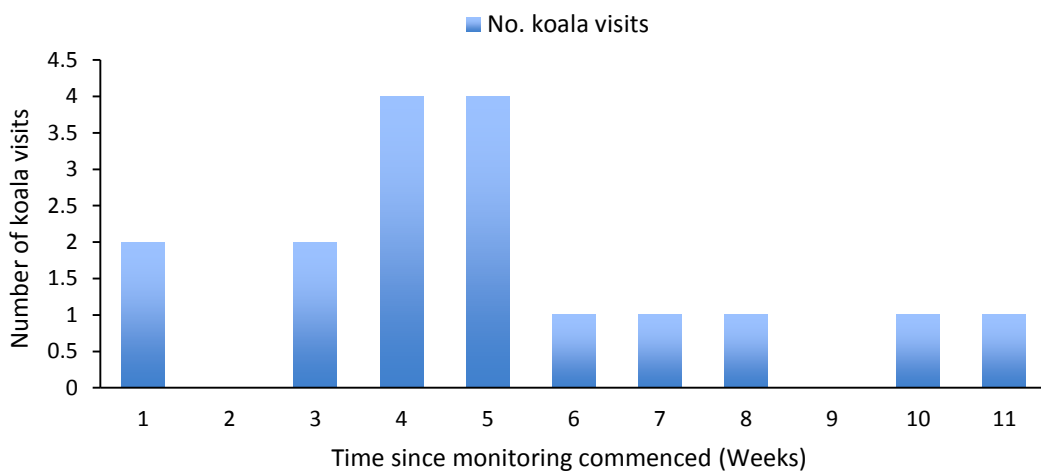
**Figure 5:** Distribution and status of all trees (DBH >300mm) within the Laws Point site following phase 4 of the PRR program.

### 4.3 Camera monitoring

Twenty-two visits by koala have been recorded at the six feed trees over the 77 days of monitoring (Table A4, Appendix A). Separate visits were deemed to be 60 minutes apart. A visit was classified as any image of a koala either at the base of a tree, climbing a tree, or resting on the trunk. Several image sequences included repeated attempts by the same individual to climb a tree over periods of five to 10 minutes (Table A4). Multiple images <10 minutes apart were also obtained of koalas moving around trees and up and down trees. Most visits have been to tree numbers one (6 visits), four (6 visits) and two (4 visits; Figure 6). Koalas were recorded in tree numbers one and four during population surveys prior to collaring. Of the 22 visits recorded most appear to be a possible adult female with a brown bottom, although individual identification is difficult. A second female, with a possible back young, was recorded on one occasion at tree one. Koala visitation over time peaked in weeks 4 (13-20 July) and five (21-27 July; Figure 7). At least one koala continues to visit collared trees 7-8 weeks after they were collared.



**Figure 6:** Number of koala visits to six collared tallowwoods monitored with infra-red cameras at Laws Point. Each visit to a tree >60mins apart was scored separately even if by same individual. Duplicate video (by both cameras) of the same visit was scored as one visit.



**Figure 7:** Visits by koala to collared feed trees over the 11 week monitoring period. Data represent individual visits not individual koalas and visits were scored separately if they occurred >60 minutes apart.

## 4.4 Koala population surveys

### 4.4.1 Koala surveys

Phase 4 koala population surveys were conducted on 10/11 July and 16/17 August 2017. Eight koala records were obtained during the first survey, six at night and two at day, and four records were obtained during the second survey, three at night, and one at day (Table 5). The number of koalas recorded at Laws Point over the sample period has ranged from three to eight at night, and one to four during the day (Figure 8). Comparison of koala numbers at night between the eastern (Transects 7-12) and western (Transects 1-6) transects suggests a possible decrease in numbers on the western transects (1-6) from survey four to survey seven (Figure 9). No trend is apparent at the eastern transects.

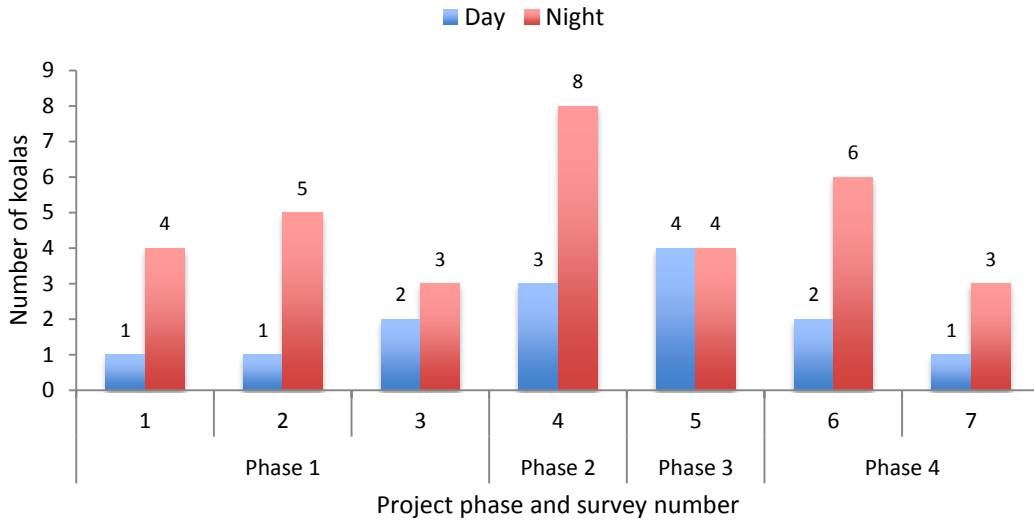
Comparison of the average number of koalas recorded at night in Phases 1, 2/3, and 4 at transects 1-6 shows a substantial increase from Phase 1 to Phase 2/3 and then a decline to Phase 4 (Figure 10). The opposite, but less distinct trend was evident at transects 7-12. Separation of transects 1-6 into pairs (i.e. 1/2, 2/3, and 3/4) shows the same trend as Figure 10, with a peak in numbers in Phase 2/3 (Figure 11). Of the six eastern transects most records have occurred on transects 3 and 4 on the western side of the alignment (Figure 11).

In Phase 4, koalas were recorded in the south-eastern corner of the study area, between transects 9 and 12, and in the central part of the study area, between transects 3 and 7 (Figures 12 & 13). An adult male koala was recorded on two occasions outside the Limit of Clearing (LoC) between transects 6 and 7, between chainages 146500 and 146600. Both were different individuals based on pelage colour. In the second Phase 4 survey an adult female was recorded in a dead ring-barked ironbark (DBH<300mm) on transect five, inside the LoC. That individual had a noticeably wet and dirty bottom and is suspected to be the same individual responsible for most visits to camera monitored trees. A collard tallowwood was situated close to the ring-barked ironbark.

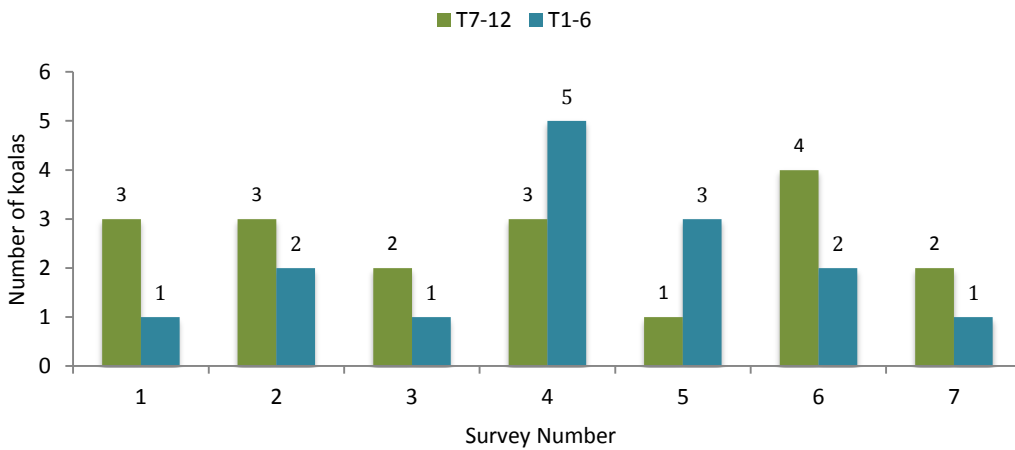
Over the monitoring period koalas have been recorded inside the project boundary on 10 occasions, with four records inside of the LoC boundary, including one in Phase 4 (Figures 12 & 13). Five koalas are consistently recorded in the study area: an adult female, sub-adult (sex unknown), and an adult male in the south-eastern corner; an adult male, and (sick) adult female on the western edge of the alignment near chainage 146500. Two other individuals, an adult female (often on the west side of the alignment near chainage 146500), and adult male (often on the eastern side of the alignment north from chainage 146600). Two-three additional koalas occasionally move into the study area from west of chainage 146700 and from the north east.

The total number of koalas utilising the 57ha study area during the PRR program is tentatively put at 9-10, with four individuals utilising habitat within, or on the immediate edge of the alignment. These include:

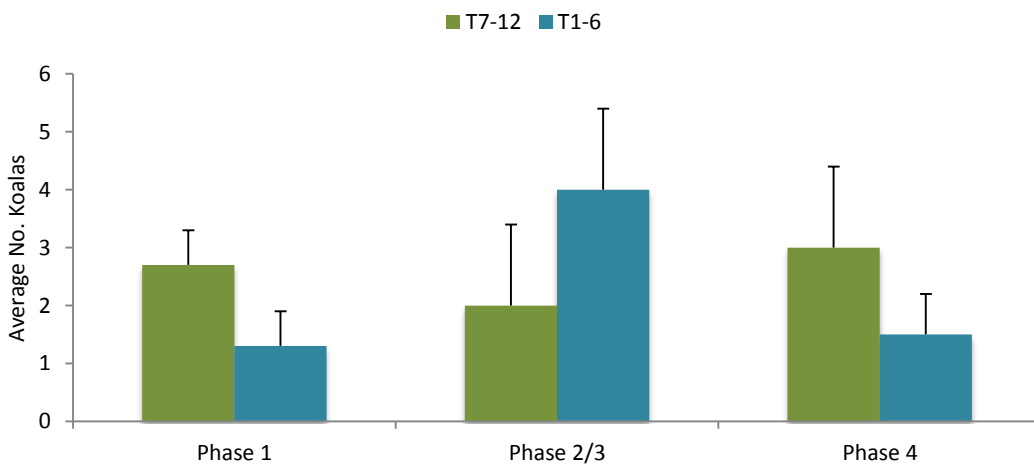
- Adult male (distinct brown belly) north of chainage 146600 using habitat east and west of the alignment;
- Adult female (unhealthy) predominantly on western side of alignment around chainage 146500 but recorded in central part of alignment in Phase 4;
- Adult female (healthy) western side of alignment around chainage 146500, predominantly outside LoC;
- Adult male western side of the alignment around chainage 146500, possibly recorded on east side of alignment near chainage 146550 in Phase 4.



**Figure 8:** Number of koalas recorded during paired day and night surveys during Phase 1 (surveys 1-3), 2 (survey 4), 3 (survey 5) and 4 (survey 6 & 7) at Laws Point.

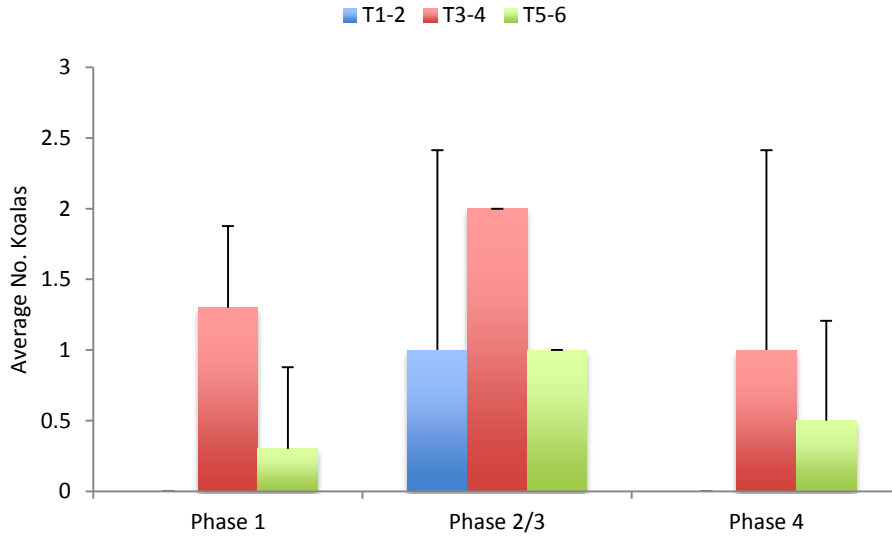


**Figure 9:** Number of koalas recorded at night on the east (Transects 7-12) and west (Transects 1-6) sides of the Laws Point study area.



**Figure 10:** Average number of koalas recorded at transects 1-6 and 7-12 in each of three time periods.





**Figure 11:** Average number of koalas recorded at night at transects 1/2, 3/4, 5/6 during Phase 1, 2/3 and 4 at Laws Point.

**Table 5:** Koala records obtained during Phase 1 to 4 koala surveys at Laws Point. pr = probable identification; po = possible identification.

Date	Record No.	Same individual as	D/N	Time	Phase	Transect	Easting	Northing	Tree sp.
23/3/2017	K1	K6?	N	2050	One	11	542987	6792428	Forest red gum
23/3/2017	K2	K8?	N	2115	One	10	542960	6792322	Forest red gum
23/3/2017	K3		N	2234	One	9	542798	6792683	Tallowwood
23/3/2017	K4		N	2128	One	4	542542	6792770	Tallowwood
24/3/2017	K5	K2	D	1240	One	10	542978	6792310	Forest red gum
18/4/2017	K6		N	1805	One	11	542989	6792420	Forest red gum
18/4/2017	K8		N	1805	One	11	542989	6792420	Forest red gum
18/4/2017	K10		N	2230	One	8	542660	6793281	Small-fruited grey gum
18/4/2017	K7		N	2114	One	3	542509	6792709	Swamp Mahogany
18/4/2017	K9		N	2118	One	4	542571	6792695	Forest red gum
19/4/2017	K12	K8	D	1020	One	11	542989	6792420	Forest red gum
26/4/2017	K14	K8	N	1750	One	11	543002	6792421	Forest red gum
26/4/2017	K11		N	1907	One	5	542563	6792703	Tallowwood
26/4/2017	K13		N	2000	One	4	542519	6792753	Pink bloodwood
27/4/2017	K11.1	K11	D	1144	One	5	542563	6792703	Tallowwood
27/4/2017	K13.1	K13	D	2000	One	4	542519	6792753	Pink bloodwood
31/5/17	K16	K6	N	1744	Two	11	542985	6792436	Forest red gum
31/5/17	K18	K8	N	1744	Two	11	542985	6792440	Forest red gum
31/5/17	K20		N	2053	Two	9	542929	6792353	Forest red gum
31/5/17	K22		N	2207	Two	6	542619	6792929	<i>E. patentinervis</i>
31/5/17	K15		N	1841	Two	4	542534	6792751	Tallowwood

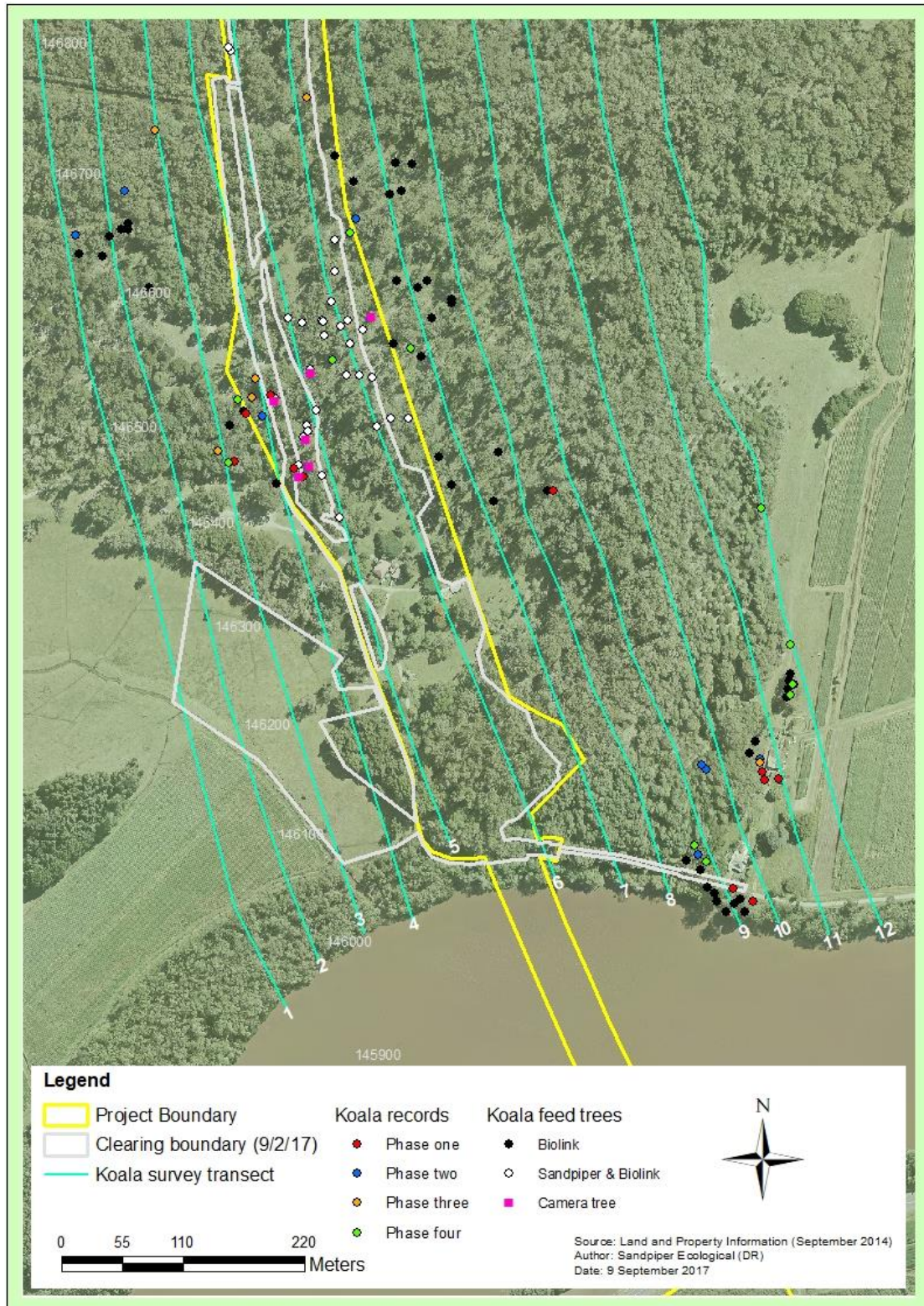
Date	Record No.	Same individual as	D/N	Time	Phase	Transect	Easting	Northing	Tree sp.
31/5/17	K17		N	2011	Two	3	542503	6792708	Swamp Mahogany
31/5/17	K19		N	2105	Two	2	542409	6792955	Red Mahogany
31/5/17	K21		N	2144	Two	1	542365	6792915	Swamp Mahogany
1/6/17	K16	K6	D	1115	Two	11	542936	6792430	Blackbutt
1/6/17	K18.1	K8	D	1115	Two	11	542932	6792434	Blackbutt
1/6/17	K17.1	K17	D	1301	Two	3	542503	6792708	Swamp Mahogany
21/6/17	K24	K8	N	1737	Three	11	542985	6792436	Forest red gum
22/6/17	K26	K8	D	1202	Three	10	542985	6792436	Callitris columellaris
21/6/17	K23	K22	N	1803	Three	6	542574	6793039	Scribbly Gum
21/6/17	K25	K15	N	1917	Three	4	542525	6792767	<i>E. patentinervis</i>
21/6/17	K27		N	2021	Three	3	542503	6792708	<i>E. patentinervis</i>
22/6/17	K29	K25/K15	D	1156	Three	3	542528	6792784	P. Bloodwood
22/6/17	K31	K22	D	1234	Three	3	542437	6793010	Swamp Mahogany
22/6/17	K33	K27	D	1251	Three	3	542494	6792719	Brushbox
10/7/17	K28		N	1740	Four	12	543015	6792507	Forest Red Gum
10/7/17	K30	K8?	N	1738	Four	12	543012	6792543	Brushbox
10/7/16	K32		N	2113	Four	9	542936	6792346	Forest Red Gum
10/7/17	K34		N	2222	Four	7	542613	6792917	Swamp Box
11/7/17	K36	K28	D	850	Four	12	543012	6792498	Forest red gum
11/7/17	K38	K8; K30	D	850	Four	12	543014	6792507	Forest red gum
10/7/17	K35		N	1932	Four	3	542512	6792765	<i>E. patentinervis</i>
10/7/17	K37		N	2045	Four	3	542503	6792708	<i>E. patentinervis</i>
16/8/17	K39		N	1906	Four	5	542598	6792801	Grey ironbark
16/8/17	K40		N	1815	Four b	12	542986	6792667	Brushbox
16/8/17	K42		N	2220	Four b	7	542669	6792812	Tallowwood
17/8/17	K44		D	1310	Four b	9	542926	6792361	Camphor Laurel

#### 4.4.2 Scat Collection

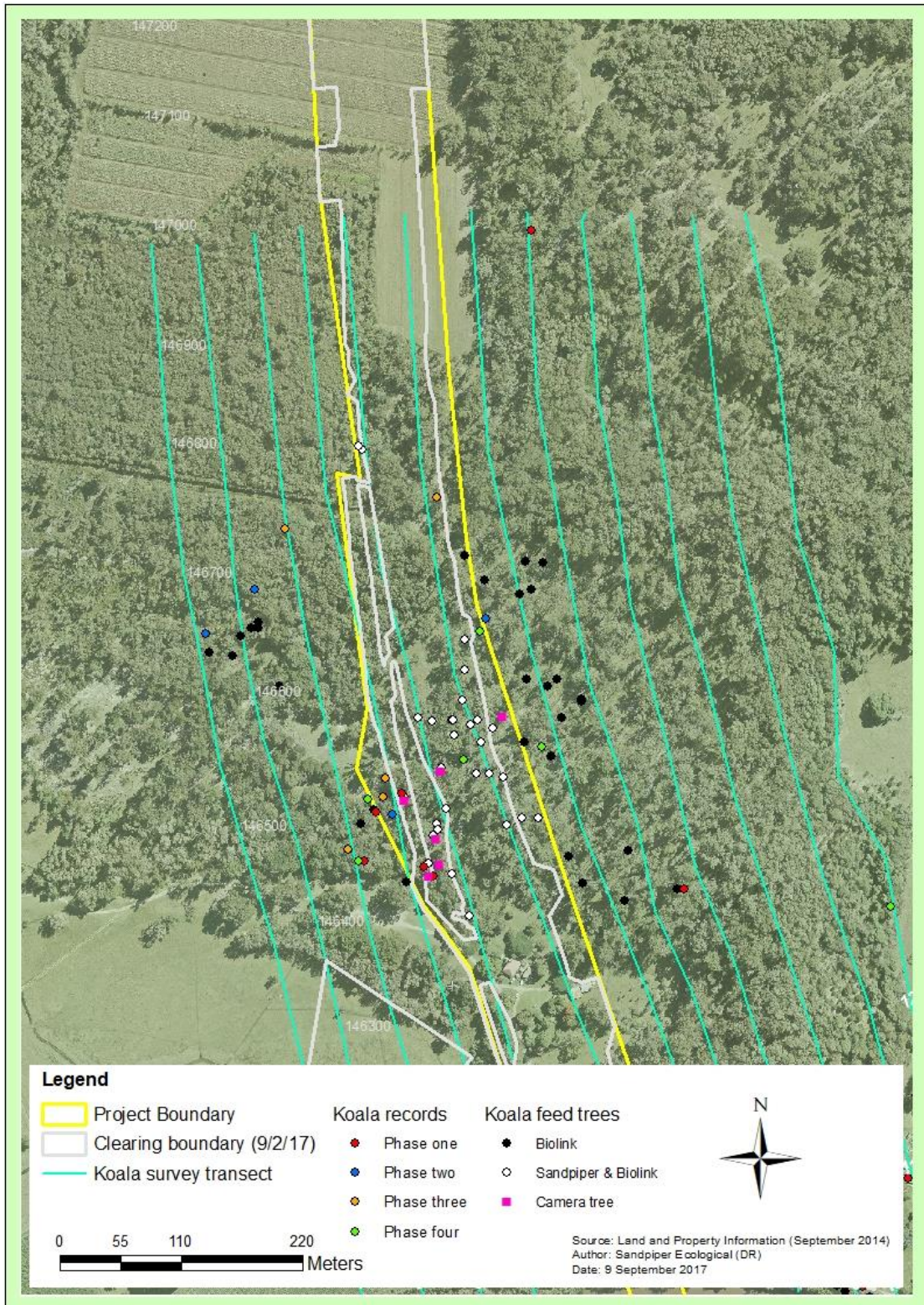
Scats were collected from each koala sighted at the Laws Point site, with equivalent samples collected from the Tucki Tucki control site (Tables A7, Appendix A). Between 3 and 6 scats have been collected for each sample and no rainfall was recorded 24hrs prior to scat collection on all occasions except the first sample.

#### 4.5 Koala specialist site inspection

Dr Sean Fitzgibbon inspected the Laws Point hotspot site on Wednesday 26 July, and participated in a population survey on 18 April 2017. The inspection involved a foot-based traverse of the site looking at tree collars and ring-barked trees and discussing relevant issues. The koala specialist confirmed that the PRR process was being implemented in accordance with the Koala Management Plan.



**Figure 12:** Distribution of koala records following Phase 4 of the PRR program at the Laws Point hotspot site.



**Figure 13:** Distribution of koala records following Phase 4 of the PRR program at the Laws Point hotspot site.

## 5. Discussion

### 5.1 Collaring

A total of 639 trees were collared at the Laws Point hotspot. Camera monitoring of feed trees shows that collaring is an effective means of excluding koalas from climbing trees but does not stop koalas from attempting to climb trees. The HDPE used to collar trees is a suitable material for the required task as it easily resists puncture by koalas.

### 5.2 Ring-barking

Ring-barking has proven to be an effective means of causing rapid dieback and simulating the effects of a severe drought. The effectiveness of ring-barking has varied between tree species and success is influenced by whether both bark and sapwood are removed. Trees with a trunk diameter <200mm that have bark and sapwood removed are more likely to fall over during moderate to strong wind. Indeed some ring-barked trees fell over in the week following ring-barking.

*Eucalyptus* spp. displayed the fastest and most consistent response to ring-barking, followed by *Melaleuca* spp. and *Lophostemon* spp. Some *Eucalyptus* spp. displayed noticeable leaf wilt two days after ring-barking. Given that *Eucalyptus* spp. represents the primary dietary component for koalas (see Melzer *et al.* 2014) the effect of ring-barking on foliage dieback is encouraging for future resource reduction programs.

If all tree species within the Laws Point hotspot are considered collectively then ring-barking has been effective in causing foliage dieback on a majority of trees. Of those species sampled, only hard corkwood showed obvious resilience to ring-barking. Hard corkwood is a rainforest species that was restricted to the swamp sclerophyll forest. Rainforest species have thicker sapwood than *Eucalyptus* species and may store more moisture in their trunks thereby enabling them to withstand some ring-barking. Hard corkwood may not show signs of ring-barking for several months. Effectiveness of ring-barking may have also been influenced by high soil moisture throughout the PRR program, particularly in floodplain areas. High soil moisture means that trees are less water stressed, particularly smaller trees that rely more on soil moisture (Dawson 1996).

### 5.3 Koala use of the study area

Koala population monitoring results indicate that the Laws Point study area is used by 9-10 koalas, and regularly by seven individuals. Over the sample period four individuals have occurred inside the project boundary, two males and two females. Three individuals (two adult females and one adult male) were consistently recorded around the central western edge of the alignment and another adult male was occasionally recorded to the north. These individuals were responsible for koala records inside the project boundary. During population monitoring, koalas were recorded inside the project boundary on 10 occasions, with four records inside the LoC boundary. None of these individuals were recorded in collared trees. Phase 4 surveys show that one female koala continues to visit trees inside the project boundary. That individual has been photographed unsuccessfully attempting to climb collared trees.

The small proportion of koala records inside the project boundary (21% of total records), and inside the LoC boundary (8.5% of total records) and the restricted distribution of these records provides further evidence that the Section 10 alignment is situated between areas of important koala habitat

(Ecosure 2014). The distribution of records correlates closely with the koala activity model developed by Ecosure and Biolink (2015), with two distinct clusters at the southeastern corner and central western edge of the alignment. The estimate, by Ecosure and Biolink (2015), of 4-6 koalas impacted by the upgrade is also consistent with our findings of four individuals.

The western cluster of koala records occurs predominantly in retained vegetation (between chainages 146450 and 146550), west of the main alignment. Clearing west of retained vegetation is limited to a local road/access track and the project will not affect feed trees situated inside retained vegetation. Feed trees are not evenly distributed in the alignment at Laws Point. The cluster of koala records near chainage 146600 correlates closely with a group of primary koala feed trees (tallowwoods on floodplain) inside the project boundary. Those trees adjoin several *Eucalyptus patentinervis* and forest red gum immediately west of the alignment, and swamp mahogany in the floodplain swale further west. The distribution of these trees is closely aligned with koala records. *E. patentinervis* west of the alignment are favoured browse trees (Sandpiper Ecological 2017c).

The majority of koalas recorded in the study area are healthy. Exceptions include: one female showing obvious signs of chlamydia infection (i.e. brown wet bottom & obstructed eyes); and one male with minor brown staining around its backside. These are two of the four individuals regularly recorded inside or near the alignment. These unhealthy individuals pose a risk to other koalas in the population (OEH 2011). Ecosure *et al.* (2016) state that “chronic clinical expression of disease appeared to be primarily restricted to localities between Meerschaum Vale and Lynwood”. Visual health observations at Laws Point support this conclusion. Sandpiper Ecological (2017g) suggested that the southern limit of the abovementioned area should be extended to include the Wardell Road hotspot.

#### 5.4 Effect of PRR on koalas

The intent of the PRR program was to simulate severe drought conditions by reducing the foraging resource available in the impact zone. The reduction in food would subsequently force koalas to move elsewhere. Severe, long-term, droughts have been shown to negatively affect koala populations and force individuals to move to critical habitats, such as riparian zones and permanent waterholes (Seabrook *et al.* 2011; Gordon *et al.* 1988). The notable effect of severe drought is substantial population decline. It is unlikely that the PRR program would have a similar effect on the local koala population as impacts are localised, and likely to affect only part of a koala’s home range. This is contrary to severe droughts, which cover extensive areas and entire populations. In the PRR context koalas should respond to reduced food availability by using other unaffected parts of their home range.

Ring-barking seems to be an effective means of reducing food availability and when uniformly applied to a designated area could cause a drought like response by koalas. In contrast, collaring does not simulate drought conditions as foliage remains alive. The cues used by koalas to select feed trees include a combination of vision, smell, and experience. Tree selection is known to change between seasons (Ellis *et al.* 1995) and several studies have shown that koalas select individual trees within a stand, repeatedly visiting these in preference to neighboring conspecifics (Hindell 1985). The strong tree fidelity displayed by individuals is associated with tree size and foliar chemistry, specifically avoidance of plant secondary metabolites (Moore & Foley 2005; Moore *et al.* 2005). Variable visitation to the six feed trees monitored with cameras is evidence of trees selection in the Laws Point study area.

Ring-barking, causing foliage dieback, is likely to elicit a more distinct response by koalas than collaring as foliage in collared trees remains alive. Even though koalas cannot climb collared trees they can still see and smell foliage. Repeated attempts by at least one koala to access collared feed trees is evidence that collaring alone is insufficient to change behaviour, at least in the short-term (i.e. 2 months). If collared feed trees remain attractive to koalas then the effect of collaring on an individual's health should be considered. The PRR program has focused on collaring larger trees that are more likely to support koalas, and ring-barking smaller (<300mm diameter) trees that would be used less frequently. Better results are likely if ring-barking was expanded to include all feed trees. The broad-scale application of ring-barking at Laws Point was constrained by retained vegetation, which at that site contained most of the feed trees within the alignment.

Large tallwoods displayed noticeable leaf wilt 3-4 days after being ring-barked, resulting in a rapid loss of foraging resource. The speed of dieback following ring-barking would exceed that caused by a severe drought, which may take months. Staged ring-barking over a period of 5-6 weeks would buffer the immediate impact of foliage wilt but would still cause dieback at a faster rate than a drought. In drought conditions leaf wilt would vary between trees depending on landscape position, age and water retention. In contrast, ring-barking as applied, resulted in a more uniform response.

At completion of Phase 4 the PRR program had successfully restricted access to collared trees with a DBH >300mm, including feed trees, but had not forced koalas to avoid the alignment. Due to the absence of accessible feed trees (inside the project boundary) it is unlikely that koalas reside in the project corridor for any length of time, however, at least one individual continues to visit the project corridor. These visits are likely to be brief and focused solely on the small number of collared primary feed trees. The PRR program has been successful in ensuring that koalas do not remain in the PRR area but brief visitation was continuing as at 7 September 2017. The frequency of koala visitation, as determined by camera monitoring, seems to be decreasing and habituation to the collars may therefore be occurring.

The koala responsible for most visits to feed trees was suspected to be a sick female mentioned in previous reports. The Phase 3 report for Laws Point recommended that the subject individual be captured and assessed by Friends of the Koala. A concerted effort to locate and capture sick koalas at Laws Point occurred between 18 and 25 September and involved diurnal visual searches of habitat frequented by sick individuals and, if a sick koala was identified, pen trapping. A sick koala was captured on 20 September and immediately transferred to Friends of the Koala for assessment. That individual was subsequently transferred to Currumbin Wildlife Sanctuary where it was assessed again and unfortunately euthanized, due to poor health, on 22 September 2017.

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# Appendix A – Field data

Table A1: Collared trees identified in the Laws Point study area.

Date	Observer	Tree number	Species	Easting	Northing	DBH (mm)	Circumference (mm)	Co-dominant trunks	Collar Status
10/3/17	NP/SR	2	Blackbutt	0542549	6793168	610	1.90		P2
10/3/17	NP/SR	3	Blackbutt	052542	6793175	605	1.89		P2
10/3/17	NP/SR	22	Blackbutt	0542558	6793062	456	1.44		P2
10/3/17	NP/SR	23	Blackbutt	542569	6793049	390	1.23		P2
13/3/17	DR/SR	29	Red mahogany	542540	6793052	415	1.3		P2
13/3/17	DR/SR	30	Blackbutt	542533	6793034	350	1.1		P2
13/3/17	DR/SR	31	Blackbutt	542531	6793035	395	1.25		P2
13/3/17	DR/SR	32	Pink bloodwood	542544	6793031	385	1.2		P2
13/3/17	DR/SR	40	Red mahogany	542565	6792936	775	2.43		P2
13/3/17	DR/SR	50	Swamp box	542591	6792890	368	1.15	x2	P2
13/3/17	DR/SR	51	Swamp Box	542580	6792879	520	1.63		P2
13/3/17	DR/SR	52	Blackbutt	542586	6792873	633	1.98		P2
13/3/17	DR/SR	53	Pink bloodwood	542591	6792863	380	1.20		P2
13/3/17	DR/SR	54	Pink Bloodwood	542578	6792866	495	1.55		P2
13/3/17	DR/SR	55	Blackbutt	542575	6792863	649	2.04		P2
13/3/17	DR/SR	56	Pink Bloodwood	542573	6792855	456	1.43		P2
13/3/17	DR/SR	57	Pink Bloodwood	542570	6792848	360	1.13		P2
13/3/17	DR/SR	58	Swamp box	542572	6792841	358	1.12		P2
13/3/17	DR/SR	59	Pink Bloodwood	542572	6792830	362	1.14		P2
13/3/17	DR/SR	60	Tallowwood	542570	6792835	794	2.49		P2
13/3/17	DR/SR	61	Swamp Box	542568	6792834	375	1.18		P2
13/3/17	DR/SR	62	Pink bloodwood	542561	6792841	370	1.15		P2
13/3/17	DR/SR	63	Pink bloodwood	542556	6792841	328	1.02		P2
13/3/17	DR/SR	64	Tallowwood	542557	6792839	583	1.83		P2
13/3/17	DR/SR	65	Red mahogany	542560	6792840	545	1.72		P2
13/3/17	DR/SR	66	Pink bloodwood	542561	6792841	345	1.09		P2
13/3/17	DR/SR	67	Blackbutt	542561	6792843	985	3.09	x2	P2
13/3/17	DR/SR	68	Pink bloodwood	542555	6792855	350	1.1		P2
13/3/17	DR/SR	69	Pink bloodwood	542548	6792853	441	1.39		P2
13/3/17	DR/SR	70	Pink bloodwood	542543	6792853	433	1.36		P2
13/3/17	DR/SR	71	Blackbutt	542549	6792858	992	3.12		P2
13/3/17	DR/SR	72	Pink bloodwood	542550	6792861	380	1.2		P2
13/3/17	DR/SR	73	Swamp box	542550	6792863	540	1.7		P2
13/3/17	DR/SR	74	Red mahogany	542575	6792897	590	1.85		P2
13/3/17	DR/SR	75	Red mahogany	542562	6792896	562	1.76		P2
17/3/17	GM/SR	82	Swamp box	542584	6792847	399	1.26		P2
17/3/17	GM/SR	83	Swamp box	542582	6792845	353	1.11		P2
17/3/17	GM/SR	84	Tallowwood	542588	6792837	952	2.98		P2
17/3/17	GM/SR	85	Pink bloodwood	542590	6792841	416	1.31		P2
17/3/17	GM/SR	87	Grey Ironbark	542590	6792837	365	1.15		P2
17/3/17	GM/SR	93	Pink bloodwood	542605	6792834	302	0.95	x2	P2
17/3/17	GM/SR	96	Tallowwood	542590	6792823	732	2.3		P2
17/3/17	GM/SR	97	Blackbutt	542581	6792817	737	2.32	x2	P2
17/3/17	GM/SR	98	Pink bloodwood	542576	6792820	365	1.15		P2
17/3/17	GM/SR	99	Camphor Laurel	542562	6792823	367	1.16		P2
17/3/17	GM/SR	100	Tallowwood	542578	6792793	540	1.7		P2
17/3/17	GM/SR	101	Blackbutt	542587	6792797	828	2.6		P2
17/3/17	GM/SR	107	Grey Ironbark	542597	6792776	435	1.37		P2
17/3/17	GM/SR	110	Pink bloodwood	542581	6792777	395	1.25		P2
17/3/17	GM/SR	111	Blackbutt	542569	6792770	657	2.07		P2
17/3/17	GM/SR	112	Pink bloodwood	542586	6792792	463	1.46		P2

Date	Observer	Tree number	Species	Easting	Northing	DBH (mm)	Circumference (mm)	Co-dominant trunks	Collar Status
17/3/17	GM/SR	126	Grey Ironbark	542605	6792748	455	1.43		P2
17/3/17	GM/SR	130	Pink bloodwood	542606	6792731	390	1.22		P2
17/3/17	GM/SR	131	Pink bloodwood	542612	6792725	441	1.38		P2
17/3/17	GM/SR	132	Grey Ironbark	542611	6792735	445	1.4		P2
17/3/17	GM/SR	133	Grey Ironbark	542635	6792733	424	1.33		P2
17/3/17	GM/SR	134	Blackbutt	542628	6792730	721	2.27		P2
17/3/17	GM/SR	135	Pink bloodwood	542631	6792726	325	1.02		P2
17/3/17	GM/SR	136	Pink bloodwood	542614	6792712	510	1.61		P2
17/3/17	GM/SR	137	Swamp box	542611	6792716	330	1.04		P2
17/3/17	GM/SR	143	Pink bloodwood	542635	6792708	476	1.5		P2
17/3/17	GM/SR	145	Pink bloodwood	542635	6792710	400	1.26		P2
17/3/17	GM/SR	151	Swamp box	542659	6792684	516	1.62		P2
17/3/17	GM/SR	152	Swamp box	542623	6792698	603	1.9		P2
17/3/17	GM/SR	159	Swamp box	542611	6792657	432	1.36		P2
17/3/17	GM/SR	162	Swamp box	542624	6792667	615	1.93		P2
17/3/17	GM/SR	163	Swamp box	542624	6792659	550	1.73		P2
17/3/17	GM/SR	165	Swamp box	542635	6792654	620	1.94		P2
17/3/17	GM/SR	166	Mango tree	542641	6792642	471	1.49		P2
17/3/17	GM/SR	167	Swamp box	542615	6792680	462	1.45		P2
17/3/17	GM/SR	170	Mango tree	542644	6792665	315	1		P2
17/3/17	GM/SR	174	Poinciana	542649	6792639	504	1.58	x3	P2
17/3/17	GM/SR	175	African tulip	542664	6792653	465	1.46	x2	P2
27/3/17	GM/SR	178	Melaleuca spp.	542668	6792608	673	2.11		P2
27/3/17	GM/SR	179	African tulip	542670	6792580	420	1.32		P2
27/3/17	GM/SR	180	Mango tree	542676	6792574	465	1.48		P2
27/3/17	GM/SR	181	Fire wheel tree	542673	6792563	689	2.16		P2
27/3/17	GM/SR	182	Silky oak	542676	6792549	714	2.25		P2
27/3/17	GM/SR	183	Silky oak	542686	6792550	564	1.77		P2
27/3/17	GM/SR	218	Blackbutt	542727	6792469	1181	3.71		P2
27/3/17	GM/SR	221	Grey Ironbark	542727	679246	718	2.25		P2
27/3/17	GM/SR	222	Grey Ironbark	542718	6792486	610	1.92		P2
27/3/17	GM/SR	223	Pink bloodwood	542711	6792488	423	1.33		P2
27/3/17	GM/SR	224	Camphor Laurel	542701	6792495	1500	4.71	x4	P2
27/3/17	GM/SR	225	Camphor Laurel	542695	6792498	950	2.98	x3	P2
27/3/17	GM/SR	226	Pink bloodwood	542695	6792506	658	2.06	x3	P2
27/3/17	GM/SR	227	Stag	542707	6792502	395	1.24	x3	P2
27/3/17	GM/SR	228	Grey Ironbark	542707	6792477	780	2.45		P2
27/3/17	GM/SR	229	Grey Ironbark	542705	6792474	559	1.76		P2
27/3/17	GM/SR	237	Grey Ironbark	542698	6792457	486	1.53		P2
27/3/17	GM/SR	238	Pink bloodwood	542699	6792451	377	1.18		P2
27/3/17	GM/SR	239	Pink bloodwood	542699	6792451	454	1.43		P2
27/3/17	GM/SR	241	Pink bloodwood	542714	6792454	395	1.24		P2
27/3/17	GM/SR	242	Grey Ironbark	542714	6792453	631	1.98		P2
27/3/17	GM/SR	244	Brushbox	542713	6792447	389	1.22		P2
27/3/17	GM/SR	245	Pink bloodwood	542719	6792458	328	1.03		P2
27/3/17	GM/SR	246	Grey Ironbark	542735	6792454	312	0.98		P2
27/3/17	GM/SR	256	Pink bloodwood	542771	6792430	285	0.9		P2
27/3/17	GM/SR	262	Pink bloodwood	542750	6792424	437	1.37		P2
27/3/17	GM/SR	263	Grey Ironbark	542739	6792429	578	1.82		P2
27/3/17	GM/SR	264	Blackbutt	542734	6792429	300	0.96		P2
28/3/17	GM/SR	273	Grey Ironbark	542715	6792412	542	1.7		P2
28/3/17	GM/SR	274	Blackbutt	542728	6792418	768	2.41		P2
28/3/17	GM/SR	275	Blackbutt	542747	6792424	440	1.38		P2
28/3/17	GM/SR	276	Brushbox	542752	6792421	494	1.55		P2
28/3/17	GM/SR	277	Brushbox	542758	6792416	332	1.05		P2
28/3/17	GM/SR	290	Pink bloodwood	542784	6792409	368	1.15		P2
28/3/17	GM/SR	294	Brushbox	542764	6792406	446	1.4		P2

Date	Observer	Tree number	Species	Easting	Northing	DBH (mm)	Circumference (mm)	Co-dominant trunks	Collar Status
28/3/17	GM/SR	298	Brushbox	542746	6792406	473	1.49		P2
28/3/17	GM/SR	301	Brushbox	542739	6792406	896	2.82		P2
28/3/17	GM/SR	308	Brushbox	542731	6792388	665	2.09		P2
28/3/17	GM/SR	309	Brushbox	542724	6792389	632	1.98		P2
28/3/17	GM/SR	310	Brushbox	542718	6792395	583	1.83		P2
28/3/17	GM/SR	312	Blackbutt	542720	6792385	890	2.8	x2	P2
20/4/17	GM/MJ	322	Camphor Laurel	5422739	6792346	452	1.42	x3	P2
20/4/17	GM/MJ	323	Brushbox	542735	6792353	350	1.09		P2
20/4/17	GM/MJ	324	Brushbox	542735	6792354	675	2.13		P2
20/4/17	GM/MJ	327	Camphor Laurel	542743	6792356	687	2.16		P2
20/4/17	GM/MJ	328	Camphor Laurel	542734	6792355	450	1.42	x2	P2
20/4/17	GM/MJ	329	Brushbox	542748	6792353	300	0.92		P2
20/4/17	GM/MJ	330	Brown Kurrajong	542748	6792351	365	1.16		P2
20/4/17	GM/MJ	331	Brushbox	542761	6792356	702	2.20		P2
20/4/17	GM/MJ	332	Brushbox	542764	6792356	482	1.51		P2
20/4/17	GM/MJ	333	Brushbox	542764	6792356	448	1.41		P2
20/4/17	GM/MJ	334	Brushbox	542773	6792352	428	1.34		P2
20/4/17	GM/MJ	335	Brushbox	542788	6792356	526	1.66		P2
20/4/17	GM/MJ	336	Pink bloodwood	542531	6792908	440	1.38		P2
20/4/17	GM/MJ	337	Pink bloodwood	542540	6792920	327	1.03		P2
20/4/17	GM/MJ	338	Red mahogany	542523	6792908	780	2.45		P2
20/4/17	GM/MJ	339	Red mahogany	542527	6792910	579	1.82		P2
20/4/17	GM/MJ	341	Red mahogany	542533	6792920	383	1.20		P2
20/4/17	GM/MJ	342	Endiandra sieberi	542532	6792926	337	1.07		P2
20/4/17	GM/MJ	343	Pink bloodwood	542536	6792927	408	1.28		P2
20/4/17	GM/MJ	344	Pink bloodwood	542547	6792915	325	1.03		P2
20/4/17	GM/MJ	345	Red mahogany	542556	6792926	705	2.21		P2
20/4/17	GM/MJ	346	Red mahogany	542555	6792926	474	1.49		P2
20/4/17	GM/MJ	347	Pink bloodwood	542551	67927	404	1.27		P2
20/4/17	GM/MJ	348	Cypress	542551	6792934	335	1.05		P2
20/4/17	GM/MJ	349	Red mahogany	542553	6792936	515	1.62		P2
20/4/17	GM/MJ	350	Red mahogany	542555	6792941	356	1.12		P2
20/4/17	GM/MJ	351	Red mahogany	542557	6792945	345	1.08		P2
20/4/17	GM/MJ	356	Swamp box	542544	6792942	357	1.12		P2
20/4/17	GM/MJ	357	Melaleuca sieberi	542544	6792949	310	0.98		P2
20/4/17	GM/MJ	358	Red mahogany	542536	6792947	433	1.36		P2
20/4/17	GM/MJ	359	M. quinquenervia	542553	6792956	375	1.18		P2
20/4/17	GM/MJ	360	Red mahogany	542535	6792958	730	2.29		P2
20/4/17	GM/MJ	361	Endiandra sieberi	542534	6792963	307	0.97		P2
20/4/17	GM/MJ	362	Endiandra sieberi	542539	6792960	319	1.00		P2
20/4/17	GM/MJ	363	Red mahogany	542548	6792964	386	1.21		P2
20/4/17	GM/MJ	364	Red mahogany	542557	6792963	452	1.42		P2
20/4/17	GM/MJ	365	Red mahogany	542553	6792963	385	1.20		P2
20/4/17	GM/MJ	366	Endiandra sieberi	542558	6792980	425	1.34		P2
20/4/17	GM/MJ	378	Endiandra sieberi			341	1.08	x2	P2
20/4/17	GM/MJ	379	Endiandra sieberi	542543	6793000	345	1.10		P2
20/4/17	GM/MJ	380	Red mahogany	542548	6793001	450	1.40		P2
20/4/17	GM/MJ	381	Endiandra sieberi	542542	6792988	390	1.23		P2
20/4/17	GM/MJ	382	Endiandra sieberi	542551	6792976	392	1.23		P2
20/4/17	GM/MJ	383	Melaleuca sieberi	542547	6792967	388	1.22		P2
20/4/17	GM/MJ	384	Callistemon salignus	542539	6792967	367	1.15		P2
20/4/17	GM/MJ	385	Stag	542538	6792969	391	1.24		P2
20/4/17	GM/MJ	386	Red mahogany	542542	6792977	380	1.19		P2
20/4/17	GM/MJ	387	Endiandra sieberi	542547	6792971	347	1.10		P2
20/4/17	GM/MJ	388	Callistemon salignus	542547	6792982	390	1.23		P2

Date	Observer	Tree number	Species	Easting	Northing	DBH (mm)	Circumference (mm)	Co-dominant trunks	Collar Status
20/4/17	GM/MJ	389	Stag	542540	6792984	484	1.51		P2
20/4/17	GM/MJ	390	Cabbage tree palm	542542	6792974	386	1.21		P2
20/4/17	GM/MJ	391	Red mahogany	542531	6792966	495	1.56		P2
20/4/17	GM/MJ	392	Red mahogany	542533	6792953	507	1.60		P2
20/4/17	GM/MJ	393	Red mahogany	542529	6792956	385	1.21		P2
20/4/17	GM/MJ	394	Red mahogany	542528	6792966	556	1.77		P2
21/4/17	GM/MJ	396	Endiandra sieberi	542527	6792931	365	1.15		P2
21/4/17	GM/MJ	397	Stag	542525	6792923	320	1.00		P2
21/4/17	GM/MJ	398	Pink bloodwood	542535	6792928	350	1.10		P2
21/4/17	GM/MJ	399	Pink bloodwood	542533	6792929	325	1.34		P2
21/4/17	GM/MJ	400	Endiandra sieberi	542529	6792927	430	1.36		P2
21/4/17	GM/MJ	401	Blackbutt	542523	6792940	785	2.47		P2
21/4/17	GM/MJ	402	Stag	542532	6792949	482	1.50		P2
21/4/17	GM/MJ	403	Swamp box	542520	6792951	428	1.02		P2
21/4/17	GM/MJ	404	Swamp box	542519	6792961	315	1.00		P2
21/4/17	GM/MJ	405	Endiandra sieberi	542511	6792967	440	1.39		P2
21/4/17	GM/MJ	406	Red mahogany	542518	6792966	479	1.50		P2
21/4/17	GM/MJ	407	Endiandra sieberi	542523	6792976	301	0.95		P2
21/4/17	GM/MJ	408	Red mahogany	542523	6792976	478	1.50		P2
21/4/17	GM/MJ	409	Endiandra sieberi	542514	6792975	415	1.30		P2
21/4/17	GM/MJ	410	Red mahogany	542522	6792986	605	1.89		P2
21/4/17	GM/MJ	411	Endiandra sieberi	542530	6792983	445	1.40		P2
21/4/17	GM/MJ	412	Endiandra sieberi	542534	6792982	325	1.02	x2	P2
21/4/17	GM/MJ	413	Endiandra sieberi	542530	6792981	345	1.08		P2
21/4/17	GM/MJ	414	Red mahogany	542531	6792989	439	1.38		P2
21/4/17	GM/MJ	415	Endiandra sieberi	542531	6792991	335	1.06	x3	P2
21/4/17	GM/MJ	416	Red mahogany	542532	6792994	509	1.60		P2
21/4/17	GM/MJ	417	Endiandra sieberi	542539	6792997	310	0.97		P2
21/4/17	GM/MJ	418	Red mahogany	542540	6792999	488	1.56		P2
21/4/17	GM/MJ	419	Endiandra sieberi	542536	6792998	350	1.10		P2
21/4/17	GM/MJ	420	Stag	542538	6793008	395	1.25		P2
21/4/17	GM/MJ	421	Red mahogany	542519	6792988	532	1.67		P2
21/4/17	GM/MJ	422	Stag	542523	6792988	315	0.90		P2
21/4/17	GM/MJ	423	Red mahogany	542528	6792993	390	1.22		P2
21/4/17	GM/MJ	424	Red mahogany	542527	6792996	688	2.16		P2
21/4/17	GM/MJ	425	Blackbutt	542524	6793001	626	1.98		P2
21/4/17	GM/MJ	426	Callistemon salignus	542512	6792989	397	1.26		P2
21/4/17	GM/MJ	427	Endiandra sieberi	542515	6793001	459	1.44		P2
21/4/17	GM/MJ	428	Endiandra sieberi	542518	6793006	453	1.42		P2
21/4/17	GM/MJ	429	Endiandra sieberi	542511	6793009	393	1.23	x2	P2
21/4/17	GM/MJ	430	Endiandra sieberi	542508	6793015	326	1.03	x2	P2
21/4/17	GM/MJ	431	Stag	542509	6793043	711	2.23		P2
21/4/17	GM/MJ	436	Blackbutt	542536	6793049	932	2.93		P2
21/4/17	GM/MJ	439	Red mahogany	542522	6793076	380	1.20		P2
21/4/17	GM/MJ	444	Swamp box	542530	6793094	310	0.97		P2
21/4/17	GM/MJ	445	Blackbutt	542526	6793110	375	1.18		P2
21/4/17	GM/MJ	447	Blackbutt	542527	6793122	510	1.60		P2
21/4/17	GM/MJ	448	Blackbutt	542533	6793120	440	1.38		P2
21/4/17	GM/MJ	449	Red mahogany	542524	6793142	875	2.75		P2
21/4/17	GM/MJ	450	Stag	542525	6793144	770	2.40		P2
21/4/17	GM/MJ	451	Red mahogany	542535	6793143	495	1.56		P2
21/4/17	GM/MJ	462	Endiandra sieberi	542554	6793151	306	0.97		P2
5/5/17	GM/SR/NP	522	Grey ironbark	542571	6792784	390	1.22		P2
5/5/17	GM/SR/NP	523	Swamp box	542562	6792778	330	1.04		P2
5/5/17	GM/SR/NP	524	Pink bloodwood	542574	6792771	360	1.23		P2
5/5/17	GM/SR/NP	532	Pink bloodwood	542565	6792766	620	1.94		P2

Date	Observer	Tree number	Species	Easting	Northing	DBH (mm)	Circumference (mm)	Co-dominant trunks	Collar Status
10/5/17	NP/SR	578	African tulip	542658	6792560	311	0.97		P2
10/5/17	NP/SR	580	Endiandra sieberi	542547	6793008	315	0.99		P2
23/5/17	DR/SR	583	Stag			NR	NR		P2
23/5/17	DR/SR	584	M. quinquenervia			NR	NR		P2
23/5/17	DR/SR	585	Red Mahogany			380	NR		P2
10/3/17	NP/SR	1	Red Mahogany	0542553	6793180	390	1.23	x3	P3
10/3/17	NP/SR	4	Blackbutt	0542552	6793163	474	1.49		P3
10/3/17	NP/SR	5	Blackbutt	0542552	6793165	450	1.42		P3
10/3/17	NP/SR	6	Blackbutt	0542557	6793165	435	1.37		P3
10/3/17	NP/SR	7	Blackbutt	0542554	6793163	520	1.57		P3
10/3/17	NP/SR	8	M. quinquenervia	0542561	6793167	437	1.39		P3
10/3/17	NP/SR	9	M. quinquenervia	0542558	6793168	450	1.28		P3
10/3/17	NP/SR	10	Blackbutt	0542563	6793150	397	1.25		P3
10/3/17	NP/SR	11	Blackbutt	0542544	6793151	740	2.32		P3
10/3/17	NP/SR	12	Blackbutt	0542541	6793148	370	1.16		P3
10/3/17	NP/SR	13	Red Mahogany	0542551	6793141	990	3.11		P3
10/3/17	NP/SR	15	Blackbutt	0542557	6793126	480	1.28		P3
10/3/17	NP/SR	17	Blackbutt	0542554	6793086	418	1.32		P3
10/3/17	NP/SR	18	Blackbutt	0542563	6793075	364	1.14		P3
13/3/17	DR/SR	24	Pink bloodwood	542580	6793048	385	1.24		P3
13/3/17	DR/SR	25	Pink bloodwood	542578	6793048	320	1.10		P3
13/3/17	DR/SR	26	Red mahogany	542561	6793040	990	3.1		P3
13/3/17	DR/SR	27	Blackbutt	542542	6793038	497	1.55		P3
13/3/17	DR/SR	28	Blackbutt	542552	6793056	427	1.35		P3
13/3/17	DR/SR	33	Pink bloodwood	542587	6792987	350	1.11		P3
13/3/17	DR/SR	34	Red mahogany	542572	6792970	446	1.4		P3
13/3/17	DR/SR	38	Red mahogany	542582	6792952	530	1.67		P3
13/3/17	DR/SR	43	E. patentinervis	542585	6792918	547	1.72		P3
13/3/17	DR/SR	46	Tallowwood	542600	6792882	635	2		P3
13/3/17	DR/SR	49	Swamp box	542594	6792890	510	1.6		P3
13/3/17	DR/SR	78	Coastal cypress	542518	6792890	593	1.86		P3
17/3/17	GM/SR	80	Tallowwood	542597	6792854	677	2.12		P3
17/3/17	GM/SR	86	Blackbutt	542589	6792842	326	1.03		P3
17/3/17	GM/SR	88	Blackbutt	542618	6792826	437	1.37		P3
17/3/17	GM/SR	89	Tallowwood	542614	6792816	635	2		P3
17/3/17	GM/SR	90	Grey Ironbark	542608	6792839	488	1.54		P3
17/3/17	GM/SR	91	Blackbutt	542607	6792822	565	1.77		P3
17/3/17	GM/SR	92	Tallowwood	542605	6792832	554	1.74		P3
17/3/17	GM/SR	95	Grey Ironbark	542600	6792819	538	1.69		P3
17/3/17	GM/SR	102	Grey Ironbark	542610	6792797	580	1.83		P3
17/3/17	GM/SR	103	Pink bloodwood	542609	6792815	420	1.32		P3
17/3/17	GM/SR	104	Pink bloodwood	542622	6792803	374	1.18		P3
17/3/17	GM/SR	105	Grey Ironbark	542617	6792793	572	1.8		P3
17/3/17	GM/SR	106	Pink bloodwood	542598	6792784	413	1.3		P3
17/3/17	GM/SR	113	Cypress	542585	6792759	380	1.19		P3
17/3/17	GM/SR	114	Pink bloodwood	542602	6792782	236	0.73	x2	P3
17/3/17	GM/SR	115	Blackbutt	542599	6792788	633	1.99		P3
17/3/17	GM/SR	116	Grey Ironbark	542609	6792773	500	1.57		P3
17/3/17	GM/SR	117	Blackbutt	542623	6792783	623	1.96		P3
17/3/17	GM/SR	118	Blackbutt	542618	6792763	600	1.89		P3
17/3/17	GM/SR	119	Grey Ironbark	542619	6792755	385	1.2		P3
17/3/17	GM/SR	120	Blackbutt	542640	6792735	780	2.45		P3
17/3/17	GM/SR	122	Pink bloodwood	542642	6792726	308	0.98		P3
17/3/17	GM/SR	123	Grey Ironbark	542638	6792733	350	1.1		P3
17/3/17	GM/SR	124	Pink bloodwood	542632	6792743	375	1.18		P3
17/3/17	GM/SR	127	Stag	542590	679277	1090	3.42		P3
17/3/17	GM/SR	128	White mahogany	542591	6792720	1600	3.64		P3

Date	Observer	Tree number	Species	Easting	Northing	DBH (mm)	Circumference (mm)	Co-dominant trunks	Collar Status
17/3/17	GM/SR	129	Pink bloodwood	542603	6792721	390	1.23	x2	P3
17/3/17	GM/SR	138	Pink bloodwood	542602	6792699	486	1.53		P3
17/3/17	GM/SR	139	Swamp box	542596	6792703	880	2.78		P3
17/3/17	GM/SR	140	M. quinquenervia	542591	6792693	467	1.47		P3
17/3/17	GM/SR	141	Swamp box	542596	6792695	460	1.45		P3
17/3/17	GM/SR	142	Swamp box	542608	6792700	588	1.85		P3
17/3/17	GM/SR	146	Brushbox	542648	6792709	680	2.14		P3
17/3/17	GM/SR	147	Blackbutt	542639	6792701	772	2.43		P3
17/3/17	GM/SR	150	Blackbutt	542659	6792696	452	1.43		P3
17/3/17	GM/SR	153	Swamp box	542610	6792683	370	1.16		P3
17/3/17	GM/SR	154	Swamp box	542606	6792684	475	1.5		P3
17/3/17	GM/SR	155	Swamp box	542598	6792681	519	1.63		P3
17/3/17	GM/SR	156	Swamp box	542606	6792683	408	1.28		P3
17/3/17	GM/SR	158	M. quinquenervia	542608	6792670	605	1.9		P3
17/3/17	GM/SR	160	Swamp box	542616	6792652	724	2.28		P3
17/3/17	GM/SR	161	Swamp box	542618	6792667	403	1.27		P3
17/3/17	GM/SR	164	Swamp box	542624	6792651	634	1.99		P3
17/3/17	GM/SR	168	Swamp box	542614	6792678	846	2.66		P3
17/3/17	GM/SR	169	Swamp box	542648	6792674	593	1.86		P3
17/3/17	GM/SR	171	Mango tree	542621	6792633	359	1.13		P3
17/3/17	GM/SR	172	Jacaranda	542621	6792619	945	2.57		P3
27/3/17	GM/SR	177	Poinciana	542688	6792599	455	1.43	x6	P3
27/3/17	GM/SR	184	African tulip	542693	6792570	730	2.29		P3
27/3/17	GM/SR	185	African tulip	542698	6792569	378	1.19		P3
27/3/17	GM/SR	186	African tulip	542697	6792567	424	1.33		P3
27/3/17	GM/SR	187	African tulip	542697	6792566	806	2.53		P3
27/3/17	GM/SR	188	Red Cedar	542702	6792553	446	1.4		P3
27/3/17	GM/SR	189	Red Cedar	542704	6792548	395	1.24		P3
27/3/17	GM/SR	191	Pink bloodwood	542726	6792571	527	1.66		P3
27/3/17	GM/SR	192	African tulip	542644	6792571	896	2.81	x4	P3
27/3/17	GM/SR	196	Silky oak	542674	6792510	960	3.01		P3
27/3/17	GM/SR	197	Silky oak	542654	6792512	496	1.56		P3
27/3/17	GM/SR	198	Unidentified spp	542656	6792509	525	1.65		P3
27/3/17	GM/SR	200	Poinciana	542662	6792489	499	1.56		P3
27/3/17	GM/SR	202	Pink bloodwood	542725	6792507	495	1.56		P3
27/3/17	GM/SR	203	Grey Ironbark	542731	6792504	691	2.17		P3
27/3/17	GM/SR	204	Grey Ironbark	542726	6792500	486	1.53		P3
27/3/17	GM/SR	205	Blackbutt	542730	6792501	730	2.29		P3
27/3/17	GM/SR	216	Stag	542757	6792467	321	1.01		P3
27/3/17	GM/SR	217	White Mahogany	542757	6792462	351	1.1		P3
27/3/17	GM/SR	219	Blackbutt	542730	6792477	985	3.09		P3
27/3/17	GM/SR	220	Pink bloodwood	542743	6792479	328	1.03		P3
27/3/17	GM/SR	231	Bluckbutt	542687	6792469	407	1.28		P3
27/3/17	GM/SR	232	Brushbox	542683	6792475	386	1.22		P3
27/3/17	GM/SR	233	Bluckbutt	542689	6792465	472	1.48		P3
27/3/17	GM/SR	234	Bluckbutt	542686	6792461	323	1		P3
27/3/17	GM/SR	235	Bluckbutt	542685	6792456	369	1.16		P3
27/3/17	GM/SR	236	Pink bloodwood	542702	6792462	379	1.19		P3
27/3/17	GM/SR	240	Unidentified rainforest	542694	6792444	323	1.01		P3
27/3/17	GM/SR	248	White Mahogany	542762	6792451	523	1.64		P3
27/3/17	GM/SR	249	Blackbutt	542768	6792454	640	2		P3
27/3/17	GM/SR	250	White Mahogany	542766	6792464	289	0.91		P3
27/3/17	GM/SR	252	Blackbutt	542771	6792444	549	1.72		P3
27/3/17	GM/SR	253	Pink bloodwood	542778	6792440	334	1.05		P3
27/3/17	GM/SR	254	Blackbutt	542771	6792437	607	1.91		P3
27/3/17	GM/SR	255	Blackbutt	542774	6792432	535	1.68	x2	P3

Date	Observer	Tree number	Species	Easting	Northing	DBH (mm)	Circumference (mm)	Co-dominant trunks	Collar Status
27/3/17	GM/SR	257	Blackbutt	542768	6792431	468	1.46		P3
27/3/17	GM/SR	258	Brushbox	542770	6792429	529	1.66		P3
27/3/17	GM/SR	259	Bluckbutt	542763	6792433	573	1.8		P3
27/3/17	GM/SR	261	Pink bloodwood	542755	6792423	503	1.58		P3
28/3/17	GM/SR	267	Blackbutt	542711	6792436	785	2.46		P3
28/3/17	GM/SR	268	Pink bloodwood	542710	6792428	414	1.3		P3
28/3/17	GM/SR	269	Stag	542715	6792434	432	1.35		P3
28/3/17	GM/SR	270	Blackbutt	542707	6792428	382	1.2		P3
28/3/17	GM/SR	271	Blackbutt	5427689	6792436	437	1.38		P3
28/3/17	GM/SR	272	Brushbox	542678	6792425	815	2.56		P3
28/3/17	GM/SR	278	Pink bloodwood	542766	6792420	300	0.94		P3
28/3/17	GM/SR	284	Brushbox	542792	6792433	468	1.47		P3
28/3/17	GM/SR	286	Brushbox	542796	6792423	353	1.11		P3
28/3/17	GM/SR	292	Brushbox	542768	6792415	468	1.47		P3
28/3/17	GM/SR	293	Brushbox	542763	6792411	361	1.14		P3
28/3/17	GM/SR	295	Brushbox	542760	6792406	323	1.02		P3
28/3/17	GM/SR	299	Brushbox	542750	6792405	600	1.88		P3
28/3/17	GM/SR	305	Brushbox	542736	6792380	382	1.2		P3
28/3/17	GM/SR	311	Brushbox	542714	6792392	695	2.18		P3
20/4/17	GM/MJ	318	Brushbox	542720	6792350	935	2.94		P3
20/4/17	GM/MJ	352	Red mahogany	542563	6792948	430	1.35		P3
20/4/17	GM/MJ	353	Red mahogany	542560	6792952	465	1.46		P3
20/4/17	GM/MJ	354	Red mahogany	542572	6792956	344	1.08		P3
20/4/17	GM/MJ	355	Red mahogany	542564	6792956	475	1.50		P3
20/4/17	GM/MJ	367	Blackbutt	542570	6792982	700	2.20		P3
20/4/17	GM/MJ	368	Blackbutt	542560	6792986	630	1.97		P3
20/4/17	GM/MJ	369	Endiandra sieberi	542556	6792996	378	1.19		P3
20/4/17	GM/MJ	370	Blackbutt	542567	6792976	470	1.47		P3
20/4/17	GM/MJ	371	Blackbutt	542578	6792995	1060	3.23		P3
20/4/17	GM/MJ	372	Endiandra sieberi	542575	6792993	325	1.02		P3
20/4/17	GM/MJ	373	Blackbutt	542571	6792992	465	1.46	x2	P3
20/4/17	GM/MJ	374	Pink bloodwood	5422568	6792998	550	1.72		P3
20/4/17	GM/MJ	375	Red mahogany	542563	6793000	418	1.31		P3
20/4/17	GM/MJ	376	Endiandra sieberi	542555	6793002	344	1.08		P3
20/4/17	GM/MJ	377	Endiandra sieberi	542552	6793001	304	0.96		P3
21/4/17	GM/MJ	432	Blackbutt	542507	6793049	370	1.20		P3
21/4/17	GM/MJ	433	Scribbly gum	542514	6793051	720	2.26		P3
21/4/17	GM/MJ	434	Endiandra sieberi	542520	6793043	301	0.95	x2	P3
21/4/17	GM/MJ	435	Red bloodwood	542523	6793042	403	1.27		P3
21/4/17	GM/MJ	437	Blackbutt	542529	6793059	460	1.45	x2	P3
		438							P3
21/4/17	GM/MJ	440	Red mahogany	542506	6793102	340	1.06		P3
21/4/17	GM/MJ	441	Stag	542511	6793102	604	1.90		P3
21/4/17	GM/MJ	442	Stag	542514	6793094	530	1.65	x2	P3
21/4/17	GM/MJ	443	Stag	542523	6793094	540	1.70		P3
21/4/17	GM/MJ	452	Red mahogany	542498	6793151	427	1.34		P3
21/4/17	GM/MJ	453	Red mahogany	542508	6793170	690	2.18		P3
21/4/17	GM/MJ	455	Red mahogany	542497	6793189	814	2.56		P3
21/4/17	GM/MJ	456	Red mahogany	542522	6793187	345	1.05		P3
21/4/17	GM/MJ	457	Red mahogany	542524	6793186	304	0.95		P3
21/4/17	GM/MJ	459	Red mahogany	542532	6793164	655	2.06		P3
21/4/17	GM/MJ	460	Red mahogany	542532	6793168	850	2.67		P3
28/4/17	GM/NP	463	Red mahogany	529985	6800085	440	1.37	x3	P3
28/4/17	GM/NP	464	Blueberry ash	52995	6800085	350	1.10		P3
28/4/17	GM/NP	467	Callistemon salignus	542495	6793291	380	1.20		P3
5/5/17	GM/SR	468	Blackbutt	542497	6793043	823	2.59		P3

Date	Observer	Tree number	Species	Easting	Northing	DBH (mm)	Circumference (mm)	Co-dominant trunks	Collar Status
5/5/17	GM/SR	481	Stag	542500	6792954	338	1.06		P3
5/5/17	GM/SR	482	Allocasuarina turulosa	542502	6792959	312	0.98		P3
5/5/17	GM/SR/NP	497	Red mahogany	542512	6792899	330	1.04		P3
5/5/17	GM/SR/NP	498	Red mahogany	542511	6792905	580	1.82		P3
5/5/17	GM/SR/NP	499	Red mahogany	542507	6792900	445	1.40		P3
5/5/17	GM/SR/NP	500	Red mahogany	542524	6792900	820	2.58		P3
5/5/17	GM/SR/NP	501	Red mahogany	542511	6792889	600	1.91		P3
5/5/17	GM/SR/NP	502	Swamp box	542513	6792880	330	1.04		P3
5/5/17	GM/SR/NP	503	Swamp box	542512	6792852	340	1.07		P3
5/5/17	GM/SR/NP	504	Red mahogany	542513	6792866	965	3.03		P3
5/5/17	GM/SR/NP	505	Swamp box	542510	6792854	440	1.38		P3
5/5/17	GM/SR/NP	506	Swamp box	542513	6792854	305	0.92		P3
5/5/17	GM/SR/NP	507	Pink bloodwood	542520	6792837	885	2.78		P3
5/5/17	GM/SR/NP	508	Red mahogany	542516	6792834	555	1.74		P3
5/5/17	GM/SR/NP	509	Eucalyptus spp.	542529	6792838	460	1.45		P3
5/5/17	GM/SR/NP	512	Blackbutt	542536	6792828	1350	4.10		P3
5/5/17	GM/SR/NP	513	Coastal cypress	542529	6792813	385	1.21		P3
5/5/17	GM/SR/NP	514	Eucalyptus spp.	542528	6792804	330	1.04		P3
5/5/17	GM/SR/NP	515	Swamp box	5422542	6792814	460	1.45		P3
5/5/17	GM/SR/NP	516	Pink bloodwood	5422536	6792794	460	1.45		P3
5/5/17	GM/SR/NP	517	Blackbutt	542539	6792783	895	2.82		P3
5/5/17	GM/SR/NP	518	Blackbutt	542550	6792792	1020	3.20		P3
5/5/17	GM/SR/NP	519	Blackbutt	542550	6792792	745	2.35		P3
5/5/17	GM/SR/NP	520	Blackbutt	542554	6792794	990	3.11		P3
5/5/17	GM/SR/NP	521	Swamp box	542559	6792795	395	1.24		P3
5/5/17	GM/SR/NP	525	Eucalyptus spp.	542558	6792774	400	1.25	x2	P3
5/5/17	GM/SR/NP	526	Pink bloodwood	542546	6792779	300	0.95	x2	P3
5/5/17	GM/SR/NP	527	Endiandra sieberi	542536	6792786	760	2.40	x2	P3
5/5/17	GM/SR/NP	528	Swamp box	542533	6792781	415	1.30	x2	P3
5/5/17	GM/SR/NP	529	Unidentified spp.	542535	6792775	405	1.27	x2	P3
5/5/17	GM/SR/NP	530	Tallowwood	542545	6792767	840	2.65	x2	P3
5/5/17	GM/SR/NP	531	Pink bloodwood	542561	6792772	425	1.34		P3
5/5/17	GM/SR/NP	533	Pink bloodwood	542558	6792764	490	1.54	x2	P3
5/5/17	GM/SR/NP	534	Stag	542563	6792760	300	0.95		P3
5/5/17	GM/SR/NP	535	Camphor Laurel	542565	6792760	370	1.16		P3
5/5/17	GM/SR/NP	536	Pink bloodwood	542565	6792760	570	1.78		P3
5/5/17	GM/SR/NP	537	Pink bloodwood	542563	6792755	400	1.25		P3
5/5/17	GM/SR/NP	540	Tallowwood	542583	6792756	495	1.56		P3
5/5/17	GM/SR/NP	541	Tallowwood	542574	6792742	500	1.57		P3
5/5/17	GM/SR/NP	545	Coastal cypress	542581	6792749	330	1.04		P3
5/5/17	GM/SR/NP	550	M. quinquenervia	542590	6792697	495	1.56		P3
5/5/17	GM/SR/NP	551	Pink bloodwood	542587	6792685	450	1.42		P3
5/5/17	GM/SR/NP	552	Tallowwood	542567	6792706	860	2.70		P3
5/5/17	GM/SR/NP	555	Swamp box	542594	6792683	610	1.92		P3
5/5/17	GM/SR/NP	556	Swamp box	542583	6792680	450	1.42		P3
5/5/17	GM/SR/NP	557	Camphor Laurel	542567	6792679	1235	3.87		P3
5/5/17	GM/SR/NP	558	Chinese rain tree	542580	6792670	300	0.94		P3
5/5/17	GM/SR/NP	559	M. quinquenervia	542592	6792673	510	1.60		P3
5/5/17	GM/SR/NP	560	Swamp box	542590	6792668	570	1.80		P3
5/5/17	GM/SR/NP	561	Swamp box	542582	6792664	610	1.92		P3
5/5/17	GM/SR/NP	562	Unidentified spp.	542586	6792660	305	0.98		P3
5/5/17	GM/SR/NP	563	Chinese rain tree	542583	6792651	450	1.42		P3
5/5/17	GM/SR/NP	564	Chinese rain tree	542592	6792651	540	1.71		P3
5/5/17	GM/SR/NP	565	Poinciana	542609	6792640	485	1.53	x2	P3
10/05/17	DR/SR	574	Swamp Box	542598	67928878	337	1.06		P3
10/05/17	DR/SR	575	Pink Bloodwood	542597	6792874	413	1.3		P3



Date	Observer	Tree number	Species	Easting	Northing	DBH (mm)	Circumference (mm)	Co-dominant trunks	Collar Status
10/5/17	NP/SR	576	Ironbark	542686	6792482	315	0.99		P3
10/5/17	NP/SR	577	Brushbox	542676	6792470	300	0.96		P3
10/5/17	NP/SR	581	Scribbly Gum	542588	6793030	401	1.26		P3
		586					1		P3
28/3/17	GM/SR	287	Brushbox	542802	6792424	347	1.09		P4
28/3/17	GM/SR	288	Brushbox	542792	6792419	403	1.26		P4
28/3/17	GM/SR	289	Brushbox	542790	6792409	406	1.28		P4
10/3/17	NP/SR	14	Blackbutt	0542559	6793123	630	1.97		Phase 4
10/3/17	NP/SR	16	Blackbutt	0542566	6793085	385	1.22		Phase 4
10/3/17	NP/SR	19	Blackbutt	054569	6793075	610	1.90		Phase 4
10/3/17	NP/SR	20	Acacia sp.	0542562	6793070	320	1.01		Phase 4
10/3/17	NP/SR	21	Blackbutt	0542559	6793064	365	1.14		Phase 4
13/3/17	DR/SR	35	Swamp box	542575	6792974	735	2.31		Phase 4
13/3/17	DR/SR	36	Eucalyptus spp	542589	6792963	547	1.71		Phase 4
13/3/17	DR/SR	37	Swamp Box	542579	6792957	950	2.98		Phase 4
13/3/17	DR/SR	39	Red mahogany	542561	6792943	445	1.40		Phase 4
13/3/17	DR/SR	41	Swamp box	542584	6792930	463	1.46		Phase 4
13/3/17	DR/SR	42	Pink Bloodwood	542591	6792920	660	2.06		Phase 4
13/3/17	DR/SR	44	Swamp box	542593	6792911	525	1.65		Phase 4
13/3/17	DR/SR	45	M. quinquenervia	542599	679299	405	1.28		Phase 4
13/3/17	DR/SR	47	Blackbutt	542587	6792885	548	1.72		Phase 4
13/3/17	DR/SR	48	Blackbutt	542595	6792884	565	1.78		Phase 4
13/3/17	DR/SR	76	Swamp box	542563	6792893	515	1.62		Phase 4
13/3/17	DR/SR	77	Red Mahogany	542537	6792887	647	2.03		Phase 4
17/3/17	GM/SR	79	Pink bloodwood	542602	6792854	429	1.35		Phase 4
17/3/17	GM/SR	81	Swamp box	542594	6792848	430	1.35		Phase 4
17/3/17	GM/SR	94	Tallowwood	542589	6792836	683	2.15		Phase 4
17/3/17	GM/SR	108	Blackbutt	542591	6792778	1023	3.21		Phase 4
17/3/17	GM/SR	109	Grey Ironbark	542583	6792778	352	1.11		Phase 4
17/3/17	GM/SR	121	Pink bloodwood	542644	6792744	310	0.98		Phase 4
17/3/17	GM/SR	125	Grey Ironbark	542615	6792747	345	1.08		Phase 4
17/3/17	GM/SR	144	Blackbutt	542650	6792722	850	2.67		Phase 4
17/3/17	GM/SR	148	Pink Bloodwood	542654	6792703	475	1.5		Phase 4
17/3/17	GM/SR	149	Blackbutt	542652	6792693	620	1.95		Phase 4
17/3/17	GM/SR	157	Swamp box	542612	6792667	505	1.59		Phase 4
17/3/17	GM/SR	173	Mango tree	542640	6792589	953	2.98		Phase 4
27/3/17	GM/SR	176	Norfolk Pine	542687	6792608	390	1.23		Phase 4
27/3/17	GM/SR	190	Grey Ironbark	542718	679255	752	2.36		Phase 4
27/3/17	GM/SR	193	Pinus spp.	542648	6792547	443	1.39		Phase 4
27/3/17	GM/SR	194	Pinus spp.	542649	6792542	415	1.3		Phase 4
27/3/17	GM/SR	195	Jacaranda	542702	679256	448	1.4		Phase 4
27/3/17	GM/SR	199	Norfolk Pine	542649	6792649	593	1.86		Phase 4
27/3/17	GM/SR	201	Pink bloodwood	542729	6792514	640	2		Phase 4
27/3/17	GM/SR	206	Pink bloodwood	542750	6792502	397	1.25		Phase 4
27/3/17	GM/SR	207	Grey Ironbark	542750	6792490	335	1.05		Phase 4
27/3/17	GM/SR	208	Pink bloodwood	542753	6792486	429	1.34		Phase 4
27/3/17	GM/SR	209	Pink bloodwood	542763	6792482	311	0.98		Phase 4
27/3/17	GM/SR	210	Blackbutt	542766	6792479	534	1.68		Phase 4
27/3/17	GM/SR	211	Blackbutt	542766	6792482	672	2.11		Phase 4
27/3/17	GM/SR	212	Grey Ironbark	542770	6792477	411	1.3		Phase 4
27/3/17	GM/SR	213	Pink bloodwood	542771	692468	317	1		Phase 4
27/3/17	GM/SR	214	Blackbutt	542779	6792460	690	2.17		Phase 4
27/3/17	GM/SR	215	White Mahogany	542771	6792454	320	1.01		Phase 4
27/3/17	GM/SR	230	Pink bloodwood	542702	6792474	333	1.05		Phase 4
27/3/17	GM/SR	243	Grey Ironbark	542714	6792448	335	1.06		Phase 4
27/3/17	GM/SR	247	Blackbutt	542755	6792447	842	2.64		Phase 4
27/3/17	GM/SR	251	Blackbutt	542775	6792450	707	2.22		Phase 4

Date	Observer	Tree number	Species	Easting	Northing	DBH (mm)	Circumference (mm)	Co-dominant trunks	Collar Status
27/3/17	GM/SR	260	Pink bloodwood	542758	6792440	325	1.02		Phase 4
27/3/17	GM/SR	265	Blackbutt	542723	6792428	490	1.54		Phase 4
27/3/17	GM/SR	266	Brushbox	542714	6792444	350	1.1		Phase 4
28/3/17	GM/SR	279	White Mahogany	542778	6792433	595	1.87		Phase 4
28/3/17	GM/SR	280	Pink bloodwood	542780	6792434	350	1.1		Phase 4
28/3/17	GM/SR	281	White Mahogany	542787	6792440	300	0.94		Phase 4
28/3/17	GM/SR	282	White Mahogany	542786	6792453	362	1.13		Phase 4
28/3/17	GM/SR	283	Grey Ironbark	542791	6792440	379	1.19		Phase 4
28/3/17	GM/SR	285	Brushbox	542798	6792429	314	0.99		Phase 4
28/3/17	GM/SR	291	Pink bloodwood	542772	6792408	428	1.35	x2	Phase 4
28/3/17	GM/SR	296	Brushbox	542766	6792408	372	1.17	x3	Phase 4
28/3/17	GM/SR	297	Brushbox	542766	6792397	583	1.83		Phase 4
28/3/17	GM/SR	300	Brushbox	542754	6792401	853	2.68		Phase 4
28/3/17	GM/SR	302	Brushbox	542751	6792381	475	1.49		Phase 4
28/3/17	GM/SR	303	Brushbox	542754	6792382	355	1.12		Phase 4
28/3/17	GM/SR	304	Brushbox	542744	6792385	863	2.72		Phase 4
28/3/17	GM/SR	306	Pink bloodwood	542742	6792375	456	1.43		Phase 4
28/3/17	GM/SR	307	Brushbox	542736	6792373	368	1.16		Phase 4
28/3/17	GM/SR	313	Brushbox	542723	6792378	585	1.84		Phase 4
28/3/17	GM/SR	314	Blackbutt	542679	6792409	1157	3.63		Phase 4
28/3/17	GM/SR	315	Brushbox	542695	6792373	787	2.47		Phase 4
20/4/17	GM/MJ	316	Brushbox	542712	6792341	474	1.49		Phase 4
20/4/17	GM/MJ	317	Camphor Laurel	542720	6792339	655	2.07	x3	Phase 4
20/4/17	GM/MJ	319	Camphor Laurel	542731	6792348	355	1.11		Phase 4
20/4/17	GM/MJ	320	Brushbox	542731	6792348	927	2.92		Phase 4
20/4/17	GM/MJ	321	Camphor Laurel	542733	6792343	337	1.05	x4	Phase 4
20/4/17	GM/MJ	325	Brown Kurrajong	5422731	6792351	480	1.50	x2	Phase 4
20/4/17	GM/MJ	326	Brown Kurrajong	5422731	6792351	440	1.38		Phase 4
20/4/17	GM/MJ	340	Red mahogany	542527	6792919	505	1.59		Phase 4
21/4/17	GM/MJ	395	Pink bloodwood	542529	6792925	666	2.09		Phase 4
21/4/17	GM/MJ	446	Red mahogany	542507	6793112	360	1.13		Phase 4
21/4/17	GM/MJ	454	Red mahogany	542500	6793181	315	0.99		Phase 4
21/4/17	GM/MJ	458	Blackbutt	542537	6793183	390	1.20		Phase 4
21/4/17	GM/MJ	461	Endiandra sieberi	5422534	6793176	382	1.20		Phase 4
28/4/17	GM/NP	465	Red mahogany	542489	6793265	560	1.76		Phase 4
28/4/17	GM/NP	466	Red mahogany	542489	6793265	555	1.76		Phase 4
5/5/17	GM/SR	469	Stag	542491	6793027	487	1.53		Phase 4
5/5/17	GM/SR	470	Endiandra sieberi	542500	6793020	510	1.60	x2	Phase 4
5/5/17	GM/SR	471	Endiandra sieberi	542508	6793016	317	1.00	x2	Phase 4
5/5/17	GM/SR	472	Endiandra sieberi	542508	6793012	410	1.29	x2	Phase 4
5/5/17	GM/SR	473	Endiandra sieberi	542512	67929996	465	1.46	x4	Phase 4
5/5/17	GM/SR	474	Stag	542508	6792988	413	1.30		Phase 4
5/5/17	GM/SR	475	Red mahogany	542511	6792972	382	1.20		Phase 4
5/5/17	GM/SR	476	Red mahogany	542512	6792961	557	1.75		Phase 4
5/5/17	GM/SR	477	M. quinquenervia	542496	6792968	505	1.59		Phase 4
5/5/17	GM/SR	478	Red mahogany	542507	6792966	726	2.28		Phase 4
5/5/17	GM/SR	479	Stag	542506	6792959	675	2.12		Phase 4
5/5/17	GM/SR	480	Endiandra sieberi	542496	6792960	445	1.39		Phase 4
5/5/17	GM/SR	483	Red mahogany	542511	6792952	480	1.51		Phase 4
5/5/17	GM/SR	484	Swamp box	542512	6792945	461	1.45		Phase 4
5/5/17	GM/SR	485	Swamp box	542513	6792939	400	1.25		Phase 4
5/5/17	GM/SR/NP	486	Red mahogany	542509	6792934	660	2.80		Phase 4
5/5/17	GM/SR/NP	487	Endiandra sieberi	542523	6792935	410	1.30		Phase 4
5/5/17	GM/SR/NP	488	Red mahogany	542516	6792928	460	1.45		Phase 4
5/5/17	GM/SR/NP	489	Red mahogany	542517	6792930	405	1.27		Phase 4
5/5/17	GM/SR/NP	490	Red mahogany	542509	6792925	485	1.52		Phase 4
5/5/17	GM/SR/NP	491	Red mahogany	542500	6792928	830	2.60		Phase 4

Date	Observer	Tree number	Species	Easting	Northing	DBH (mm)	Circumference (mm)	Co-dominant trunks	Collar Status
5/5/17	GM/SR/NP	492	Red mahogany	542508	6792921	690	2.17		Phase 4
5/5/17	GM/SR/NP	493	Red mahogany	542501	6792921	610	1.92		Phase 4
5/5/17	GM/SR/NP	494	Red mahogany	542515	6792919	315	0.97		Phase 4
5/5/17	GM/SR/NP	495	Red mahogany	542507	6792918	350	1.10		Phase 4
5/5/17	GM/SR/NP	496	Red mahogany	542509	6792917	420	1.32		Phase 4
5/5/17	GM/SR/NP	510	Swamp box	542538	6792844	300	0.90		Phase 4
5/5/17	GM/SR/NP	511	Pink bloodwood	542538	6792844	375	1.18		Phase 4
5/5/17	GM/SR/NP	538	Pink bloodwood	542550	6792744	590	1.85		Phase 4
5/5/17	GM/SR/NP	539	Endiandra sieberi	542555	6792748	520	1.63		Phase 4
5/5/17	GM/SR/NP	542	Pink bloodwood	542575	6792740	385	1.21		Phase 4
5/5/17	GM/SR/NP	543	Eucalyptus spp	542583	6792709	355	1.12		Phase 4
5/5/17	GM/SR/NP	544	Swamp box	542575	6792712	410	1.28		Phase 4
5/5/17	GM/SR/NP	546	Swamp box	542580	6792712	495	1.56		Phase 4
5/5/17	GM/SR/NP	547	Swamp box	542570	6792701	405	1.28		Phase 4
5/5/17	GM/SR/NP	548	Pink bloodwood	542569	6792717	620	1.94		Phase 4
5/5/17	GM/SR/NP	549	Tallowwood	542588	6792697	665	2.09		Phase 4
5/5/17	GM/SR/NP	553	Swamp box	542583	6792690	500	1.57		Phase 4
5/5/17	GM/SR/NP	554	Swamp box	542578	6792693	495	1.54		Phase 4
5/5/17	GM/SR/NP	566	Pinus spp.	542629	6792578	685	2.15		Phase 4
5/5/17	GM/SR/NP	567	Pinus spp.	542639	6792577	475	1.49		Phase 4
5/5/17	GM/SR/NP	568	Pinus spp.	542635	6792578	635	2.00		Phase 4
5/5/17	GM/SR/NP	569	Pinus spp.	542641	6792571	415	1.31		Phase 4
5/5/17	GM/SR/NP	570	Pinus spp.	542641	6792563	625	1.97		Phase 4
5/5/17	GM/SR/NP	570	Pinus spp.	542644	6792560	490	1.54		Phase 4
5/5/17	GM/SR/NP	572	Pinus spp.	542641	6792555	438	1.38		Phase 4
5/5/17	GM/SR/NP	573	Norfolk pine	542642	6792551	465	1.46		Phase 4
21/4/17	GM/MJ	574	Endiandra sieberi	542524	6793015	400	1.25	x2	Phase 4
10/5/17	NP/SR	579	Pink Bloodwood	542672	6792699	605	1.9		Phase 4
10/5/17	NP/SR	582	Camphor Laurel	542513	6793272	498	1.57		Phase 4
21/4/17	GM/MJ	438a	Blackbutt	542529	6793055	416	1.31	x2	Phase 4

**Table A2:** Habitat trees identified in the Laws Point study area. s = small (10-50mm); m = medium (51-150mm); l = large (151-300mm); vl = very large (>300mm).

Observer (initials)	Date	Tree no.	Tree Species	Easting	Northing	DBH (mm)	Circum (m)	Br	Tr	Sp	Collar status
NP	10/3/17	H10	Blackbutt	542704	6792382	1100	3.45	1m		1m	Phase 4
NP	10/3/17	H15	Blackbutt	542609	6792761	1340	4.2	2l, 2m		1l	Phase 4
NP	10/3/17	H16	Blackbutt	542629	6792768	1290	4.05	1l, 4m			Phase 4
NP	10/3/17	H22	Blackbutt	542521	6793078	1145	3.6			2m	Phase 4
NP	10/3/17	H32	Blackbutt	542554	6793111	1350	4.25	5l			Phase 4
NP/GM	5/05/17	H37	Blackbutt	542561	6792751	1080	3.4	2s			Phase 4
NP	10/3/17	H14	Forest Red Gum	542604	6792659	930	2.9	1l			Phase 4
NP	10/3/17	H25	Forest Red Gum	542503	6793085	775	2.43				Phase 4
NP/GM	5/05/17	H36	Melaleuca sieberi	542504	6792992	290	0.9		1s		Phase 4
NP/GM	5/05/17	H43	Poinciana	542629	6792597	557	1.78		2m		Phase 4
NP	10/3/17	H23	Red Mahogany	542530	6793087	1100	3.18			1vl, 1l	Phase 4
NP	10/3/17	H29	Red Mahogany	542561	6793129	680	2.13		1l		Phase 4
NP	10/3/17	H31	Red Mahogany	542551	6793105	610	1.9		1m		Phase 4
NP	10/3/17	H33	Red Mahogany	542554	6793094	910	2.73	2m	1l		Phase 4
NP	10/3/17	H20	Red Mahogany	542547	6792961	1225	3.85			1vl	Phase 4
NP	10/3/17	H19	Scribbly Gum	542523	6793020	1000	3.15	1l, 1m			Phase 4
NP	10/3/17	H21	Swamp Box	542559	6792974	680	2.13			1l	Phase 4
DR	13/3/17	H34	swamp Box	542580	6792954	917	2.88	1L	2m		Phase 4
DR	10/3/17	H35	Swamp box	542595	6792911	700	2.2	1m	1s		Phase 4
NP/GM	5/05/17	H40	Swamp box	542553	6792704	1520	4.78	2m			Phase 4
NP	10/3/17	H1	Blackbutt	542751	6792444	650	2.2	2s	1m	1m	Phase 2
NP	10/3/17	H3	Blackbutt	542756	672401	700	2.26			1l	Phase 2
NP	10/3/17	H4	Blackbutt	542728	6792426	730	2.3			2m	Phase 2
NP	10/3/17	H6	Blackbutt	542713	6792437	625	1.95			1l	Phase 2
NP	10/3/17	H7	Blackbutt	542726	6792423	550	1.73	1m			Phase 2
NP	10/3/17	H9	Brushbox	542747	6792355	790	2.5		1m		Phase 2
NP	10/3/17	H24	Forest Red Gum	542506	6793082	1350	3.25			1l	Phase 2
NP	10/3/17	H30	Red Mahogany	542541	6793123	835	2.63	2m			Phase 2
DR/SR	24/5/17	Add	Blackbutt								Phase 2
DR/SR	24/5/17	Add									Phase 2
DR/SR	24/5/17	Add	Scribbly gum								Phase 2
DR/SR	24/5/17	H172									Phase 2
DR/SR	24/5/17	Add									Phase 2
DR/SR	24/5/17	H9 add									Phase 2
NP	10/3/17	H2	Blackbutt	542751	6792428	700	2.05	1m		1m	Phase 3
NP	10/3/17	H5	Blackbutt	542724	6792436	890	2.8	1m			Phase 3
NP	10/3/17	H8	Blackbutt	542752	6792377	981	3.1	2m			Phase 3
NP	10/3/17	H11	Blackbutt	542702	6792388	1350	4.25	1l, 2m			Phase 3
NP	10/3/17	H12	Blackbutt	542690	6792404	1250	3.9	1m			Phase 3
NP	10/3/17	H13	Blackbutt	542671	6792468	1370	4.3		1l		Phase 3
NP	10/3/17	H17	Blackbutt	542642	6792724	1400	4.4	2m			Phase 3
NP	10/3/17	H28	Blackbutt	542549	6793162	1130	3.55	1l	1l		Phase 3

Observer (initials)	Date	Tree no.	Tree Species	Easting	Northing	DBH (mm)	Circum (m)	Br	Tr	Sp	Collar status
NP/GM	5/05/17	H42	Melaleuca quinquenervia	542588	6792658	530	1.68	1m			Phase 3
NP	10/3/17	H18	Red Bloodwood	542572	6792964	1100	3.34			2I	Phase 3
NP	10/3/17	H26	Red Mahogany	542533	6793159	950	3	1I			Phase 3
NP	10/3/17	H27	Red Mahogany	542528	6793183	945	2.97			1I	Phase 3
NP/GM	5/05/17	H41	Stag	542558	6792682	725	2.28	3m, 1I			Phase 3
NP/GM	5/05/17	H38	Tallowwood	542581	6792733	725	2.28	3m			Phase 3
NP/GM	5/05/17	H39	Tallowwood	542574	6792737	650	2.04			1I	Phase 3
		H167	Blackbutt								Phase 3
		Add									Phase 3

**Table A3:** Proportion of canopy dieback recorded in 65 trees sampled at the Laws Point study area. Co-dominant trunks are shaded grey.

Tree sp.	Easting	Northing	DBH	Ring bark extent	Proportion canopy dead %
Leptospermum spp.	542525	6793177	125	BS	5-10
Leptospermum spp.	542512	6793198	186	BS	15-20
Leptospermum spp.	542513	6793227	185	BO	15-20
Leptospermum spp.			129	BO	15-20
Leptospermum spp.	542509	6793235	189	BS	100
Leptospermum spp.	542509	6793235	355	BS	5-10
Leptospermum spp.	542503	6793245	264	BS	0-5
Leptospermum spp.			172	BS	0-5
Leptospermum spp.	542518	6793163	162	BS	50
Leptospermum spp.			135	BS	50
Leptospermum spp.	542522	6793160	107	BS	100
Leptospermum spp.	542517	6793152	206	BS	0-5
Leptospermum spp.	542517	6793122	192	BS	45-50
Mel quinquenervia	542518	6793183	163	BS	100
Mel quinquenervia	542516	6793161	173	BS	100
Mel quinquenervia	542521	6793156	218	BS	100
Mel quinquenervia	542518	6793149	182	BS	0-5
Mel quinquenervia	542515	6793105	252	BS	40
Mel quinquenervia	542517	6793109	209	BS	85-90
Mel quinquenervia	542539	6793042	160	BS	100
Mel quinquenervia	542593	6792882	197	BS	100
Mel quinquenervia	542517	6793108	214	BS	20-25
Mel quinquenervia	542551	6793056	280	BS	100
Endiandra sieberi	542535	6793000	170	BS	0
Endiandra sieberi	542539	6793006	160	BS	0
Endiandra sieberi	542563	6792990	155	BS	5
Endiandra sieberi	542563	6792986	132	BO	0
Endiandra sieberi	542550	6792987	184	BS	0
Endiandra sieberi	542552	6792980	292	BS	0
Endiandra sieberi	542551	6792971	244	BS	0
Endiandra sieberi	542542	6792979	295	BS	0
Endiandra sieberi	542538	6792981	290	BS	0
Endiandra sieberi	542539	6792980	270	BS	0
Swampbox	542598	6792898	690	BS	100
Swampbox	542592	6792883	490	BS	0-5
Swampbox	542593	6792872	210	BS	100
Brushbox	542710	6792448	295	BS	100
Brushbox	542710	6792448	260	BS	0
Brushbox	542766	6792407	292	BS	100
Brushbox	542768	6792405	132	BS	100
Brushbox	542772	6792409	250	BS	100
Brushbox			260	BS	100
Brushbox	542683	6792483	212	BS	5-10

Tree sp.	Easting	Northing	DBH	Ring bark extent	Proportion canopy dead %
Brushbox	542686	6792483	195	BS	100
Pink bloodwood	542564	6792855	243	BS	100
Pink bloodwood	542561	6792843	318	BS	100
Pink bloodwood	542561	6792833	295	BS	100
Pink bloodwood	542561	6792833	344	BS	100
Pink bloodwood	542608	6792841	242	BS	100
Pink bloodwood	542590	6792808	208	BS	100
Pink bloodwood	542627	6792774	277	BS	50
Pink bloodwood	542711	6792467	244	BS	100
Pink bloodwood	542711	6792457	290	BS	100
Pink bloodwood	542707	6792448	193	BS	100
Tallowwood	542594	6792837	685	BS	100
Tallowwood	542602	6792816	255	BS	100
Tallowwood	542614	6792789	259	BS	100
Tallowwood	542603	6792813	206	BS	100
Tallowwood	542615	6792821	214	BS	100
Grey Ironbark	542605	6792847	361	BS	40
Grey Ironbark	542585	6792802	243	BS	15-20
Grey Ironbark	542730	6792442	272	BS	100
Grey Ironbark	542730	6792442	238	BO	100
Grey Ironbark	542731	6792444	237	BS	100
Grey Ironbark	542741	6792455	207	BS	100
Grey Ironbark	542742	6792459	280	BS	100
Grey Ironbark	542747	6792463	177	BS	100
Grey Ironbark	542759	6792468	282	BS	100
Grey Ironbark	542759	6792473	170	BO	100

**Table A4:** Koala visitation to six collared tallowwoods monitored with infra-red cameras at Laws Point.

Tree no	Cam position	Date	Time	Movement description	Record No.	Comments
1	South	22/06/17	1849	TCR	7	
1	South	28/06/17	0431	AT	90-92	
4	South	9/07/17	0047	SOT, CTAC, Retreats	21-23	
4	South	17/07/17	2135	SOT, WABT	94-96	
4	South	17/07/17	2148	WABT	97	Same individual as record 94-96
4	South	22/07/17	0152	TCR	162-163	
4	South	24/07/17	0809	TCR	247	
4	South	28/07/17	0751	SOT	269	
1	South	17/07/17	0154	TCR	151	Possibly touches collar
1	South	17/07/17	1246	SOT, retreats	155-156	Grasping to base of tree. Raised fur on back of neck. Po Joey? 2 attempts to climb tree
3	South	17/07/17	2132	CTAC, retreats	62	
3	South	17/07/17	2139	CTAC, retreats	63	Same individual as record 62
5	North	24/07/17	0132	WABT, PB	263	
2	South	9/07/17	0842	TCR	11-12	2 x attempt at climbing collar.
2	South	25/07/17	0348	TCR	108	
2	North	9/07/17	842	TCR	4	
4	South	10/08/17	2050	NDM	456	
1	North	16/08/17	0702	CTAC	163	
1	South	16/08/17	0657	TCR	163	
1	South	16/08/17	0701	TCR	164	Same individual as record 163; moves around trunk.
2	South	16/08/17	0747	TCR	52	Pr same individual as record 163-164.
1	South	31/08/17	0518	NDM	137	Approaches & sits at base of tree
2	North	7/09/17	0010	TCR	29	

Key	
TCR	Touches Collar Retreats
AT	Approaches Tree
PB	Pass in Background
PF	Pass in Foreground
SOT	Still on tree
WABT	Walks Around Base of Tree
CTAC	Climbs Tree Avoids Collar
Po	Possible
Pr	Probable



**Table A5:** Weather conditions during koala population surveys at the Laws Point hotspot. N = night; D = day; Mlb = moves large branch; Msb = moves small branch.

Date	Survey No.	Observers (T'sects)	Start	end	Temp Range	Cloud %	Wind	Rain	Moon	Comments
23/3/2017	1-N	DR,GM,MJ =1-6; BT,NP,SR =7-12	1919	2420	22	100	still	<2hr	3/4	
24/3/2017	1-D	DR,GM,MJ =1-6; BT,NP, SR =7-12	1137	1610	24	90	Mlb	<24hr	3/4	rain prior to survey, cloudy, mod wind
18/4/2017	2-N	NP,SR,MJ =1-6; BT,GM, SF =7-12	1759	2315	18-20	10	Still	Fine	2/4	Shower during surveys
19/4/2017	2-D	NP,SR,GM =1-6; BT,MJ, ZE =7-12	1010	1440	22-24	10-60	Msb	Fine	2/4	
26/4/2017	3-N	BT, GM. ZE=1-6; NP, MJ,SR=7-12	1745	2242	18-21	10	Msb	Fine; <24hr	4/4	Fine
27/4/2017	3-D	BT, GM. ZE=1-6; NP, MJ,SR=7-12	1030	1455	19-22	10	Msb	Fine; <24hr	4/4	Fine
30/5/2017	1-N	BT,NP, SR	1730	2056	14-17	10	Stil	Fine	1/4	Fine
31/5/2017	1-D	NP, SR, MJ	1202	1530	16-19	nil	Mlb	fine	1/4	fine
31/5/2017	4-N	BT,DR, ZE=7-12; NP,SR, MJ=1-6	1730	2215	13-17	10	Msb	Fine	1/4	fine
1/6/2017	4-D	BT,DR, ZE=7-12; NP,SR, MJ=1-6	1030	1515	17-19	10	Mlb	Fine/ windy	1/4	fine/windy
5/6/2017	2-N	BT, GM, SR	1722	2059	12-16	15	Msb	Fine, cool	2/4	Fine, cool
6/6/2017	2-D	BT, GM, DR	0927	1308	17-20	10	Msb	Fine	2/4	Fine
19/6/2017	3N	NP, ZE, MJ	1730	2030	Abandoned, paddock flooded			Showers		
21/6/2017	5N	BT,MJ, ZE=7-12; NP,SR, GM=1-6	1730	2145	18-21	80	Msb	Showers	0/4	
22/6/2017	5D	BT,MJ, ZE=7-12; NP,SR, GM=1-6	1025	1455	18-21	30	MLB	Fine	0/4	fine, warm, mod breeze
3/7/17	3N	NP, GM, SR	1725	2115	17-19	10-80	MLB	Fine, LS	2/4	Fine, then light shower, warm
4/7/17	3D	GM, SR, ZE	945	1330	21-22	0	Nil	Fine	N/A	Fine
10/7/17	6N	BT,GM, ZE=1-6; NP,SR, DR=7-12	1736	2207	11-14	80	Nil	Fine	2/4	
11/7/17	6D	BT,GM, ZE=1-6; NP,SR, DR=7-12	0840 & 0950	1310 & 1338	17-21	60	Msb	Fine	2/4	fine; mild
26/7/17	4N	BT MJ SJ	1730	2055	14-17	0	Msb	Fine	2/4	
27/7/17	4D	BT MJ SJ	941	1248	28-20	0	Msb	Fine	2/4	
9/8/17	5N	NP, GM, ZE	1800	2139	7-14	0	Msb	Fine	4/4	
10/8/17	5D	NP, GM, ZE	900	1245	1-12	0	Nil	Fine	0	
16/8/17	7N	BT,SR, MJ=1-6; NP,ZE, DR=7-12	1803	2150/ 2245	14-22	0	Mlb	Fine	3/4	
17/8/17	7D	BT,SR, MJ=1-6; NP,ZE, DR=7-12	1030	1405/ 1440	26-29	0	MLB	Fine	3/4	
23/8/17	6N	DR, MJ, SR	1800	2200	21-19	0	MSBsw	Fine		Fine, smoky
24/8/17	6D	DR, MJ, ZE	845	1230	18-25	60	MSB	Fine		Rain forecast

**Table A6:** Koala scat collection location data. HZMT = Hazlemount Lane.

Collection Date	Record No.	Impact/ Control	Time	T'sect/ Location	Easting	Northing	Tree sp.
24/3/2017	K5 (S1)	I	1240	9	542798	6792683	Tallowood
24/3/2017	K4(po)	I	1240	3	542499	6792712	Red Mahogany
25/3/2017	K1	I	1240	10	542961	6792316	Forest red gum
25/3/2017	C1 (S2)	C	1746	Tucki Rd	531203	6801690	Forest red gum
25/3/2017	C2 (S3)	C	1801	Monroe wharf Rd	529810	6800118	Forest red gum
25/3/2017	C3 (S4)	C	1907	Monroe wharf Rd	528958	6800262	Forest red gum
19/4/17	K7	I	1500	T3	542509	6792709	Swamp mahogany
19/4/17	K9	I	1500	T4	542571	6792695	Forest red gum
19/4/17	K6 & K8	I	1510	T11	542989	6792420	Forest red gum
19/4/17	C4	C	1610	Tucki Rd	531194	6801698	Forest red gum
19/4/17	C5	C	1622	Monroe wharf Rd	531062	6800449	Swamp Oak
19/4/17	C6	C	1632	Monroe wharf Rd	529080	6800242	Forest red gum
27/4/2017	K11	I	1442	T5	542563	6792703	Tallowood
27/4/2017	K13	I	1450	T4	542519	6792753	Pink bloodwood
27/4/2017	K14	I	1510	T11	543002	6792421	Forest red gum
27/4/2017	C7	C	1631	Monroe wharf Rd	529991	6800090	Swamp mahogany
27/4/2017	C8	C	1649	Monroe wharf	529045	6800250	Forest red gum
27/4/2017	C9	C	1655	Monroe wharf	529280	6800210	Forest red gum
1/6/2017	K20	I	1540	T9	542929	6792353	Forest red gum
1/6/2017	K16	I	1545	T11	542985	6792436	Forest red gum
1/6/2017	K18	I	1545	T11	542985	6792436	Forest red gum
1/6/2017	K15	I	1504	T4	542534	6792751	Tallow
1/6/2017	K17	I	1506	T3	542503	6792708	Swamp Mahogany
1/6/2017	K19	I	1510	T2	542409	6792955	Red Mahogany
1/6/2017	K21	I	1514	T1	542365	6792915	Swamp Mahogany
2/6/17	C10	C	810	Munro Wharf	530051	6800077	Forest red gum
2/6/17	C11	C	815	Munro Wharf	529854	6800116	Forest red gum
2/6/17	C12	C	820	Munro Wharf	529819	6800125	Forest red gum
2/6/17	C13	C	828	Munro Wharf	529604	6800156	Forest red gum
2/6/17	C14	C	834	Munro Wharf	529501	6800171	Forest red gum
2/6/17	C15	C	800	Tucki	531155	6801668	Forest red gum
2/6/17	C16	C	857	Hazlemount	532131	6799640	Swamp Mahogany
2/6/17	C17	C	954	Graham Rd	535101	6804385	Flooded Gum
22/6/17	K26	I	1455	T10	542985	6792436	Callitris columellaris
22/6/17	K23	I	1500	T6	542574	6793039	Scribbly Gum
22/6/17	K25	I	1500	T4	542525	6792767	E. patentinervis
22/6/17	K27	I	1500	T3	542503	6792708	E. patentinervis
23/6/17	C18	C	905	Tucki Rd	531404	6801846	Tallowood
23/6/17	C19	C	920	Munro Wharf Rd	529959	6800096	Forest red gum
23/6/17	C20	C	929	Munro Wharf Rd	529890	6800110	Forest red gum
23/6/17	C21	C	935	Munro Wharf Rd	529853	6800122	Forest red gum
11/7/17	K35	I	1340	T3	542512	6792765	E patentinervis
11/7/17	K34	I	1429	T7	542604	6792914	Swamp box
11/7/17	K37	I	1437	T3	542509	6792715	E patentinervis

11/7/17	K32	I	1451	T9	542928	6792341	Forest red gum
11/7/17	K28	I	1507	T12	543012	6792505	Forest red gum
11/7/17	K30	I	1510	T12	543012	6792505	Forest red gum
12/7/17	C22	C	728	Monroe wharf	529778	6800137	Forest red gum
12/7/17	C23	C	737	Monroe wharf	529506	6800178	Forest red gum
12/7/17	C24	C	755	Monroe wharf	529304	6800207	Forest red gum
12/7/17	C25	C	807	Monroe wharf	529822	6800130	Swamp mahogany
12/7/17	C26	C	818	Tucki Rd	531173	6801680	Forest red gum
12/7/17	C27	C	828	Tucki Rd	531402	6801843	Tallowood
17/8/17	K39	I	1346	T5	542598	6792801	Grey ironbark
17/8/17	K42	I	1349	T7	542669	6792812	Tallowood
17/8/17	K40	I	1418	T12	542986	6792667	Brushbox
18/08/17	C39	C	800	Munro Wharf	530019	6800092	Forest red gum
18/08/17	C42	C	815	Munro Wharf	529778	6800134	Forest red gum
18/08/17	C40	C	830	Munro Wharf	529646	6800151	Forest red gum

**Table A7:** Koala scat collection weather and health data. M = male; F = female; po = possible.

Collection Date	DBH	Temp at collection	Weather at collection	Rainfall (collection period)	Sex	Breeding	Health	Comments (activity; ear tag?)
24/3/2017	180	22.4	fine. Rain<2hr	F(pr)		No	dry bottom ; robust, healthy	Sit; mid canopy
24/3/2017	nr	24.2	fine, cloudy	10mm over night		No		Koala not present at time of survey
25/3/2017	nr	22	cloudy	10mm over night	F	No	good	Sleeping high in canopy; been in tree for 2 days
25/3/2017	390	21	fine, cloudy	10mm over night	F	No	dry bottom ; clear eyes	Sit; mid canopy
25/3/2017	380	21	fine, cloudy	10mm over night	M(pr)	No	Obstructed view	Sit; upr canopy
25/3/2017		21	fine, cloudy	10mm over night	M(pr)	No	Good	Sleeping
19/4/17	750	23	Fine and windy	5mm O/N	?	NA	Dry bottom	
19/4/17	700	23	Fine and windy	5mm O/N	F?	No	Dry bottom	
19/4/17	850	23	Fine and windy	5mm O/N	F(ad); F (sub)	no	both looked robust, healthy	sit mid canopy & upr canopy
19/4/17	350	23	Fine and windy	5mm on	F?	No	Dry	Sit, low
19/4/17	380	22	Fine and windy	5mm on	?	No	Dry	Sitting mid, climbed to very top
19/4/17	400	22	Fine and windy	5mm O/N	F?	No	Dry	Sitting mid, climbed to top
27/4/2017	900	19	Fine	Nil	M.	No	Dry bum, injured L eye	
27/4/2017	750	19	Fine	Nil	F	No	Dry bum	
27/4/2017	850	19	Overcast	Nil	F	No	Healthy; dry bum	
27/4/2017	350	16	Fine, cloudy	Nil	F?	No	Dry	
27/4/2017	450	16	Fine, cloudy	Nil	?	No	Dry	
27/4/2017	350	17	Fine, cloudy	Nil	F?	No	Dry	
1/6/2017	600	18.1	Fine, windy	Nil	M	No	Healthy, robust	
1/6/2017	800	18.1	Fine, windy	Nil	F(ad)	No	Dry bum	Both in same tree; adult=red tag R ear)
1/6/2017	800	18.1	Fine, windy	Nil	F(sub)	Sub-adult	Dry bum	
1/6/2017	1200	18.4	Fine and windy	Nil	?	No	Very brown bum	Sitting 3/4 up, still.
1/6/2017	750	18.4	Fine and windy	Nil	F?	No	Clean, dry bum	Climbing. Tree looks to be depleted of leaves, stripped. Excessive scat at base.
1/6/2017	900	18.4	Fine and windy	Nil	?	No	Healthy?	Obscured by veg/foliage.
1/6/2017	600	18.4	Fine and windy	Nil	?	No	Dry bum	Out on small branchlets, feeding.
2/6/17	250	10	Fine, slight wind	Nil	M	No	Conjunctivitis in both eyes. Brown belly, bum slight brown	
2/6/17	300	10	Fine, slight wind	Nil	F	No	Dry bum, eyes clear	
2/6/17	450	10	Fine, slight wind	Nil	F	No	Healthy, eyes clear, feeding	
2/6/17	300	10	Fine, slight wind	Nil	F	No	Healthy, eyes clear	

2/6/17	350	10	Fine, slight wind	Nil	?	No	Dry bum	
2/6/17	500	10	Fine	Nil	?	No	Clean, dry bum	
2/6/17	500	12	Fine	Nil	M	No	Minor conjunctivitis, slight brown bum	
2/6/17	800	15	Fine	Nil	F?	No	Healthy, dry bum	
22/6/17	150	20	fine	nil	F	NO	Clean, dry bum: red ear tag R ear	
22/6/17	200	20	Fine	Nil	M?	No	Dry bum, brown belly	
22/6/17	700	20	Fine	nil	F?	No	Very unhealthy koala	
22/6/17	700	20	Fine	nil	F?	No	Clean, dry bum	
23/6/17	550	12	Fine	Nil	F?	No	Healthy ind.	
23/6/17	350	12	Fine	Nil	F?	No	Healthy looking	
23/6/17	300	12	Fine	Nil	M	No	Slightly brown bum	
23/6/17	200	13	Fine	Nil	F	No	Slightly brown bum	
11/7/17	700	18	Fine	Nil	F	No	Dirty bum	
11/7/17	600	18	Fine	Nil	M	No	Brown on thighs	
11/7/17	500	18	Fine	Nil	M?	No	Healthy	
11/7/17	1000	18	Fine	Nil	M?	No	Healthy	
11/7/17	500	18	Fine	Nil	F	No	Healthy	
11/7/17	500	18	Fine	Nil	F (sub)	No	Healthy	
12/7/17	700	12	Fine	Nil	M?	No	Healthy	
12/7/17	300	13	Fine	Nil	F?	No	Dry brown bum	
12/7/17	350	13	Fine	Nil	F?	No	Healthy	
12/7/17	200	12	Fine	Nil	M	No	Dry brown bum	Pos. same koala in adjacent tree morning of collection eyes look diseased.
12/7/17	170	12	Fine	Nil	F?	No	Slight brown bum	Moved o/night to adjacent tree. Sleeping.
12/7/17	400	11	Fine	Nil	F?	No	Healthy	Moved o/night?
17/8/17	180	26	Fine	Nil	F?	No	Dirty, wet bum	
17/8/17	250	26	Fine	Nil	M?	No	Brown bum	
17/8/17	650	26	Fine	Nil	SubF?	No	Clean, healthy	
18/08/17	350	16	Fine	Nil	F	No?	Clean healthy	With joey (out of pouch)
18/08/17	500, 400	18	Nil	Nil	M	No	Dirty rump, eyes closed w/ crust	Sick individual
18/08/17	300	20	Fine	Nil	M	No	Very slight stained rump	Looks healthy