

Woolgoolga to Ballina (W2B) Pacific Highway Upgrade

Koala Monitoring Program - Year 2 (2018/19) Annual Report



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Cover Photo: Koala (*Phascolarctos cinereus*) completing a crossing of culvert K5 in section 1 of the W2B upgrade.

Disclaimer:

This report has been prepared in accordance with the scope of services described in the contract or agreement between Sandpiper Ecological Surveys (ABN 82 084 096 828) and Roads and Maritime Services (RMS) NSW. The report relies upon data, surveys and measurement obtained at the times and locations specified herein. The report has been prepared solely for RMS and Sandpiper Ecological Surveys accepts no responsibility for its use by other parties. Sandpiper Ecological Surveys accepts no responsibility or liability for changes in context, meaning, conclusions or omissions caused by cutting, pasting or editing the report.

Executive Summary

Sandpiper Ecological Surveys (SES) was contracted by NSW Roads and Maritime Services (RMS) to implement the Woolgoolga to Ballina (W2B) Pacific Highway upgrade koala monitoring program in accordance with section 8 of the approved Koala Management Plan (KMP) (RMS version 4.4, July 2016), excluding phased resource reduction. The broad aim of the monitoring program is to determine the effectiveness of mitigation measures implemented in Sections 1-11 of the upgrade for koalas. The following report presents results of year two (2018/19) of the monitoring program and builds upon results of year one monitoring (Sandpiper Ecological 2019a).

The three main mitigation measures requiring monitoring are koala-proof fencing along the length of the upgrade (Sections 1-11), koala connectivity structures along the length of the highway upgrade (Sections 1-11) and koala food tree plantings (focus mainly in Section 10). Integral to these programs is the need to monitor trends in overall koala population size, particularly the two larger populations along the alignment at Broadwater (Sections 8/9) and Coolgardie-Bagotville (Section 10; hereafter referred to as Bagotville). Both are described as focal populations which could be adversely affected by the highway upgrade (RMS 2016).

Baseline data for the two focal populations were sourced from several population surveys conducted between 2013 and 2015. Bagotville baseline data were also used to inform the preparation of a Population Viability Analysis (PVA) in accordance with the Commonwealth Conditions of Approval (CoA 5 and CoA 7). The PVA for the Bagotville population indicated that this population is projected to decline significantly over the next 50 years unless key threatening processes are controlled (Kavanagh 2016). Monitoring of this population is considered critical for determining whether mitigation actions have been effective in slowing population decline. As such, the Bagotville focal population will be assessed against the PVA predictions at years 5, 10 and 15. The Broadwater population, which was not subjected to a PVA, will be assessed against a statistically significant decline at year 15 compared with baseline survey values (RMS 2016).

Year two population surveys were completed at 100 sites – 50 each in Broadwater and Bagotville – during spring 2018 and autumn 2019. Bayesian estimation analyses of survey data suggest a negligible decline in density estimates at Bagotville and a weak decline at Broadwater compared to baseline levels albeit more years of population data will be required to robustly determine population trends. Further, the focal koala populations may be affected by other impacts outside the control of the project, such as local land development, clearing activities and the 23.5% below average rainfall and above average mean temperatures experienced in the study area during the reporting period.

A prospective power analysis demonstrated that the koala population monitoring program at Bagotville was above the target level of statistical power (>0.7) whereas Broadwater was slightly below. The modelling exercises confirmed the challenge of sampling a population at very low densities and drawing conclusions from sparse counts. Subsequent monitoring years should improve the precision of density estimates.

In working towards achieving the key mitigation measure of the PVA for section 10 to reduce koala mortality by 4-8 individuals per year, RMS have implemented a predator control program, installed six vehicle-activated signs at road mortality hot-spots across the broader section 10 study area, fenced Wardell Road and the existing Pacific Highway and installed crossing structures on Wardell Road. Since installation of fencing, no vehicle strikes have been reported on these two stretches of road compared to 10 in 2016/17 (FOK, unpublished data). However, two koala vehicle strikes were reported within the focal population areas during the monitoring year – one was struck on the Pacific Highway 1500m north of the Coolgardie interchange and a second was struck on Bagotville Road to the west of the project area. No other koala vehicle strikes were detected during spring 2018 road mortality surveys conducted on the old Pacific Highway between Wardell

Road and Coolgardie interchange, Wardell Road to Thurgates Lane or adjacent koala culverts within sections 1 and 2.

Camera monitoring of 12 dedicated koala culverts in sections 1 and 2 of the upgrade between Woolgoolga and Glenugie during spring-summer 2018 detected a crossing by a koala on one occasion. Other threatened species, including the brush-tailed phascogale (*Phascogale tapoatafa*), rufous bettong (*Aepyprymnus rufescens*), long-nosed potoroo (*Potorous tridactylus*) and Stephens banded snake (*Haplocephalus stephensii*), were also recorded using these culverts. Dog and fox use of the culverts was very low yet use by cats was relatively frequent at several culverts. No incidents of predation were detected by culvert cameras and no evidence of predation was observed during searches of culverts and adjoining habitat. No evidence of koalas (i.e. scats or scratches) was recorded in habitat adjoining culverts.

Acknowledgements

We wish to thank the landholders who approved access to their properties to conduct the population surveys. Numerous monitoring sites are on private property, so landholder support is critical to achieving the goals of the monitoring program. We also extend appreciation to the Jali Aboriginal Land Council for their approval and support for conducting surveys on Jali lands.

We wish to thank members of the Koala Interest Group for continued input and constructive comments about aspects of the monitoring program. Ros Irwin and Maria Mathers from Friends of the Koala (FOK) deserve special mention for their tireless work in supporting the persistence of koalas in the region.

The final report was improved by comments from Simon Wilson, Julie Ravallion and Scott Lawrence.

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1. Introduction

1.1 Background

Sandpiper Ecological Surveys (Sandpiper) was contracted by NSW Roads and Maritime Services (RMS) to implement the Woolgoolga to Ballina (W2B) Pacific Highway upgrade koala monitoring program in accordance with section 8 of the approved Koala Management Plan (KMP) (RMS version 4.4, July 2016), excluding phased resource reduction. The broad aim of the monitoring program is to determine the effectiveness of mitigation measures implemented in Sections 1-11 of the upgrade for koalas (*Phascolarctos cinereus*).

The three main mitigation measures requiring monitoring are koala-proof fencing along the length of the upgrade; connectivity structures along the length of the upgrade; and koala food tree plantings (focus mainly in Section 10). There is also a requirement to monitor trends in the size of koala populations surrounding the alignment at Broadwater (Sections 8 & 9) and Coolgardie-Bagotville (Section 10; hereafter referred to as Bagotville). Both are described as focal populations which could be adversely affected by the highway upgrade (RMS 2016). The two focal areas featured the highest density of koala records along the W2B alignment during environmental assessment population surveys (RMS 2016).

Baseline data on the focal koala populations have come from a variety of sources. Population surveys of the Broadwater focal area were conducted during 2014 and 2015 (Ecosure 2014, 2015). The Bagotville koala focal population has been the subject of detailed field and laboratory studies (see Phillips and Chang 2013; Phillips *et al.* 2015), which informed the preparation of a Population Viability Analysis (PVA) (Kavanagh 2016). The PVA was conducted in accordance with the Commonwealth Conditions of Approval (CoA 5 and CoA 7) and its outcomes have been used to guide management of koalas within this area.

The PVA for the Bagotville key population indicated that this population is projected to decline significantly over the next 50 years (Kavanagh 2016) unless key threatening processes are controlled. Monitoring of this population is considered important to assist in determining whether mitigation actions have been effective in slowing population decline. As such, the Bagotville focal population will be assessed against the PVA predictions. The Broadwater population, which was not subjected to a PVA, will be assessed against a statistically significant decline at year 15 compared with baseline survey values (KMP).

1.2 Scope of works, program objectives and performance indicators

The monitoring program is designed to provide reliable information with which to inform management of koalas along the highway upgrade. The objectives of the monitoring program for Sections 1-11 of the highway upgrade as stated in the KMP and expanded upon in the Ecological Services Brief (RMS 2017) are described below. Those applicable to year 2 are labelled in parenthesis.

1. Evaluate the success of mitigation measures against the performance measures and corrective actions (year 2).
2. Assess the effectiveness of the fauna crossing structures and fauna exclusion fencing to facilitate movement of koalas across the upgraded highway (year 2).
3. Determine whether there is a statistically significant decline at year 15 compared with no decline in section 9.
4. Determine whether the corrective actions of the KMP have been triggered by estimated population trends in accordance with predictions of the Population Viability Analysis.
5. Provide information which supports a program review by RMS at years 5 and 10 in accordance with the KMP.

6. Assess effectiveness of the revegetation program in providing additional habitat for koalas.
7. Support a chronic stress response study being undertaken by RMS and Sydney University (NB. This item is separate to the KMP monitoring program) (year 2).

Based on the above objectives, the success or otherwise of the monitoring program shall be determined by program performance against relevant performance indicators (PI). In addition, scat sampling will be conducted every three years in section 10 for the purposes of genetic analysis. These analyses aim to provide information on distribution and relatedness of individuals across the study area.

Table 8-4 in the KMP details eight performance indicators and their corresponding thresholds, corrective actions and agency responsible. The performance indicators and corrective actions relevant to the current year 2 report are described in Table 1.

Table 1: KMP performance indicators and corrective actions relevant to current report.

Performance indicator	Performance threshold	Corrective actions
1. Road mortality	<ul style="list-style-type: none"> • No injury to an individual koala as a result of vehicle strike across all upgraded sections. • Section 10: no koala road mortality within the fenced areas of the upgrade, on existing Pacific Highway or Wardell Road. 	<ul style="list-style-type: none"> • Examine fencing for breach or obstruction within 3 days of report & repair. • Retrofit exclusion fencing, or part there-of, with additional measures to deter koalas. • Section 10: RMS would consider erecting koala-proof fencing on Bruxner Hwy (a known koala roadkill black spot), in an effort to reduce koala mortality across the region.
2. Fauna crossing structures	<ul style="list-style-type: none"> • Evidence of at least one completed crossing by koalas at targeted fauna crossing structures. • Evidence of individual koalas using structures and/or breeding on either side of the highway, via scat analysis. • No evidence of high visitation/usage rates by exotic predators. 	<ul style="list-style-type: none"> • Review monitoring methods. Consider increasing frequency, intensity and duration, to ensure individuals are identified. • Check fauna furniture associated with underpass for damage and rectify. • Investigate habitat adjoining underpass. Consider improving habitat condition and connectivity.
3. Fauna exclusion fence	<ul style="list-style-type: none"> • No breaches in fauna exclusion fence. 	<ul style="list-style-type: none"> • Check fauna exclusion fencing and fauna crossing structures for damage/blockage and rectify.
4. Predator attack near fauna crossing structures	<ul style="list-style-type: none"> • No koala deaths or injuries due to predator attack in the vicinity of fauna crossing structures. 	<ul style="list-style-type: none"> • Where monitoring indicates that predators are a threat to koala movement through crossing structures, RMS will engage with North Coast LLS, NSW NPWS (Grafton), RLP Board (North East) & adjacent landowners to identify and implement strategies to reduce this predation risk.

As per the scope of works (RMS 2017), the following report documents the methods and results of the year 2 (2018/19) monitoring period and includes an assessment of statistical power of population surveys going forward. It represents year 2 of population monitoring and (construction phase) and year 1 of the crossing structure monitoring (operation phase in sections 1 & 2). It also represents year 2 road mortality/exclusion fence monitoring in section 10 on Wardell Road and existing Pacific Highway and year 1 road mortality/exclusion fence monitoring adjacent crossing structures in sections 1 and 2. Further, it addresses the monitoring objectives and assesses monitoring outcomes against the relevant performance indicators and whether thresholds have been breached and require corrective actions. The year 2 report builds upon year 1 results and is regarded as a brief report. It will be used to inform a year 2 methods review (in prep.) and a

comprehensive program review at year 5. Monitoring of structures is limited to sections 1 and 2 as these were the only completed upgrade sections in the 2018/19 sample period.

1.3 Approach to population data analysis

As noted in the year 1 report (Sandpiper 2019a), a Bayesian estimation analysis approach was applied to the raw population data for all survey periods (i.e. baseline, year 1, year 2). In so doing, the Bagotville population data differ from that cited in the KMP which was derived using a Frequentist approach. Further, a correction factor accounting for the unsampled 0-1 age cohort has not been applied to these data. Importantly, the same analysis method has been applied to all survey periods enabling direct and robust comparison. Moreover, comparison between density estimates rather than population estimates is less prone to biases (Rhodes et al. 2015). Density estimates are also more reliable because the extrapolated area of preferred koala habitat differs between baseline and post-clearing/construction phase and its quality and extent will likely change during the 15 year-long monitoring program.

2. Study area

The broader study area includes sections 1-11 of the W2B Pacific Highway upgrade alignment and adjoining habitat. The 155 km-long upgrade stretches from Woolgoolga in the south to Ballina in the north. It is wholly located within the NSW North Coast Bioregion, one of the most diverse in NSW (W2B Planning Alliance 2012). The project boundary is located within a landscape which has been either fragmented or cleared for agriculture and rural development although substantial areas of forest habitat persist across the broader study area (W2B Planning Alliance 2012).

For the purposes of the current year 2 report, monitoring activities were conducted in sections 1 and 2 (crossing structure and road mortality monitoring) and sections 8, 9 and 10 (population monitoring and road mortality monitoring) (Figure 1 & 2). In sections 8 and 9, the Broadwater focal population area extends 3-5 km either side of an 11 km portion of the highway upgrade from Lang Hill (northern part of Section 8) north to the Richmond River (including all of Section 9). The Richmond River forms a major movement barrier to the west and north. Within section 10, the Bagotville koala focal population area extends 13.5 km north of the Richmond River and includes the localities of Bagotville and Coolgardie west of Wardell (Figure 2).

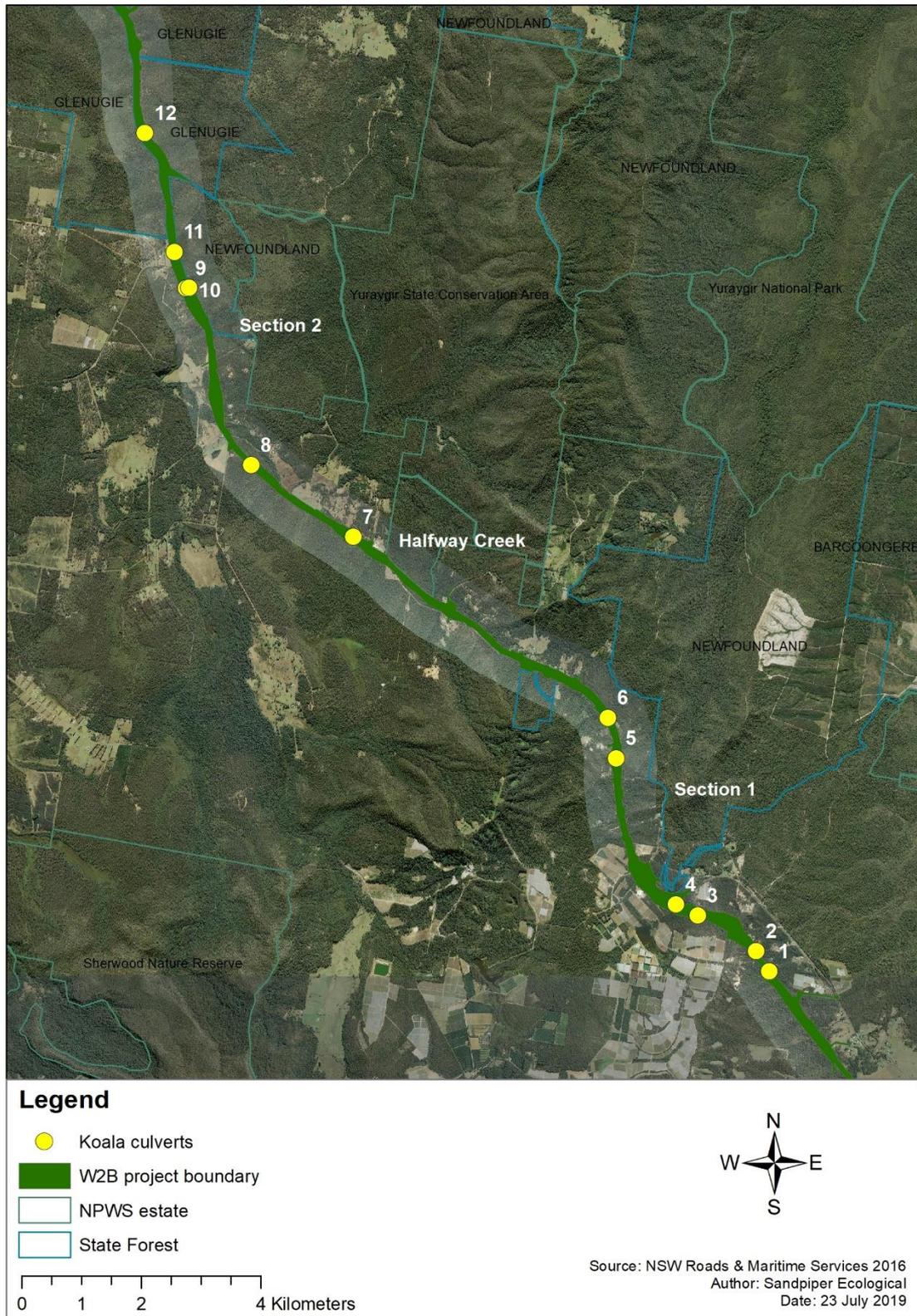


Figure 1: Sections 1-2 of the W2B Pacific Highway Upgrade.

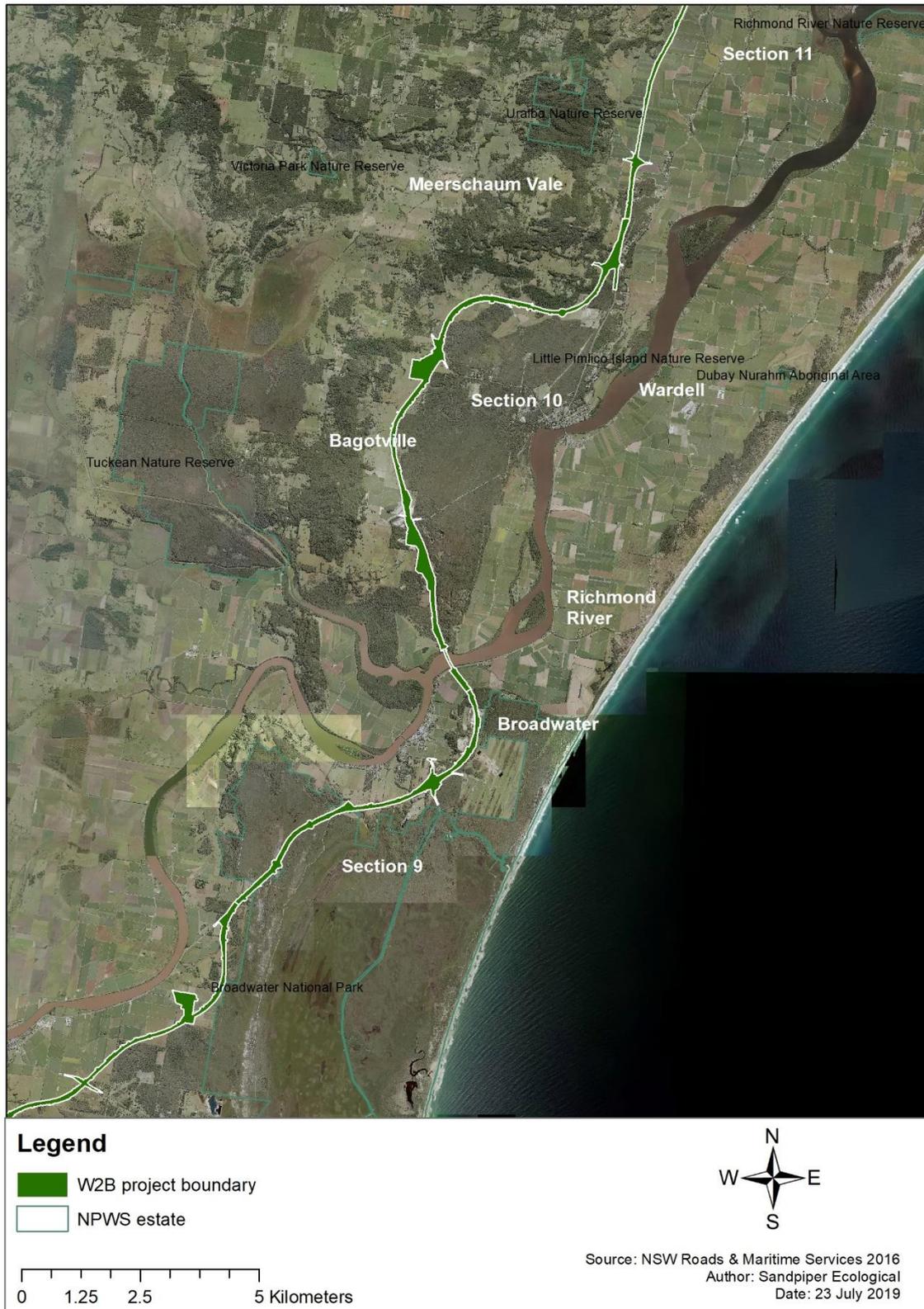


Figure 2: Sections 9-11 of the W2B Pacific Highway Upgrade.

3. Methods

3.1 Population surveys

Diurnal and nocturnal population surveys were conducted during spring 2018 and autumn 2019 as per year 1 surveys (refer Sandpiper 2019a). Surveys covered 100 sites (50 each in Broadwater and Bagotville) and were completed by teams of three ecologists experienced in koala surveys (Figure 3 and 4). At each site two direct count methods were used:

1. Transect searches

Direct counts on 250 m x 40 m transect (approximately 1 ha) involved three observers walking 20m apart – one on the center line and one either side. Observers were equipped with binoculars and searched trees for koalas.

2. Radial searches

Direct counts within a radial area involved three observers slowly searching all trees within a 25m radius of the mid-point of the belt transect (approximately 0.196 ha). Radial areas and transects were conducted concurrently.

Diurnal followed by nocturnal surveys were conducted at each site. Handheld spotlights were used to assist with nocturnal surveys. All koala observations were recorded with a handheld GPS unit and data collected on tree species, diameter at breast height of tree and individual characteristics of each koala (e.g. sex, age class, health status, behaviour, identifying features).

Spring 2018 surveys were conducted between 22 October and 9 November 2018. Diurnal surveys were generally completed between 1400 hours and 1830 hours. Nocturnal surveys were completed on the same day as diurnal surveys for all sample sites between approximately 1930 hours and 2300 hours. Weather conditions were mostly fine or overcast during surveys and several surveys were completed during light showers. Temperatures ranged from 19°C to 31°C during the survey period and winds were variable.

Autumn 2019 population surveys were conducted between 6 - 16 May 2019. Diurnal surveys were generally completed between 1300 hours and 1700 hours. Nocturnal surveys were completed on the same day as diurnal surveys for all sample sites between approximately 1730 hours and 2200 hours. Weather conditions were mostly fine or overcast during the monitoring surveys with several surveys completed during light showers. Temperatures ranged from 16°C to 24°C during the survey period and winds were mostly calm to moderate.

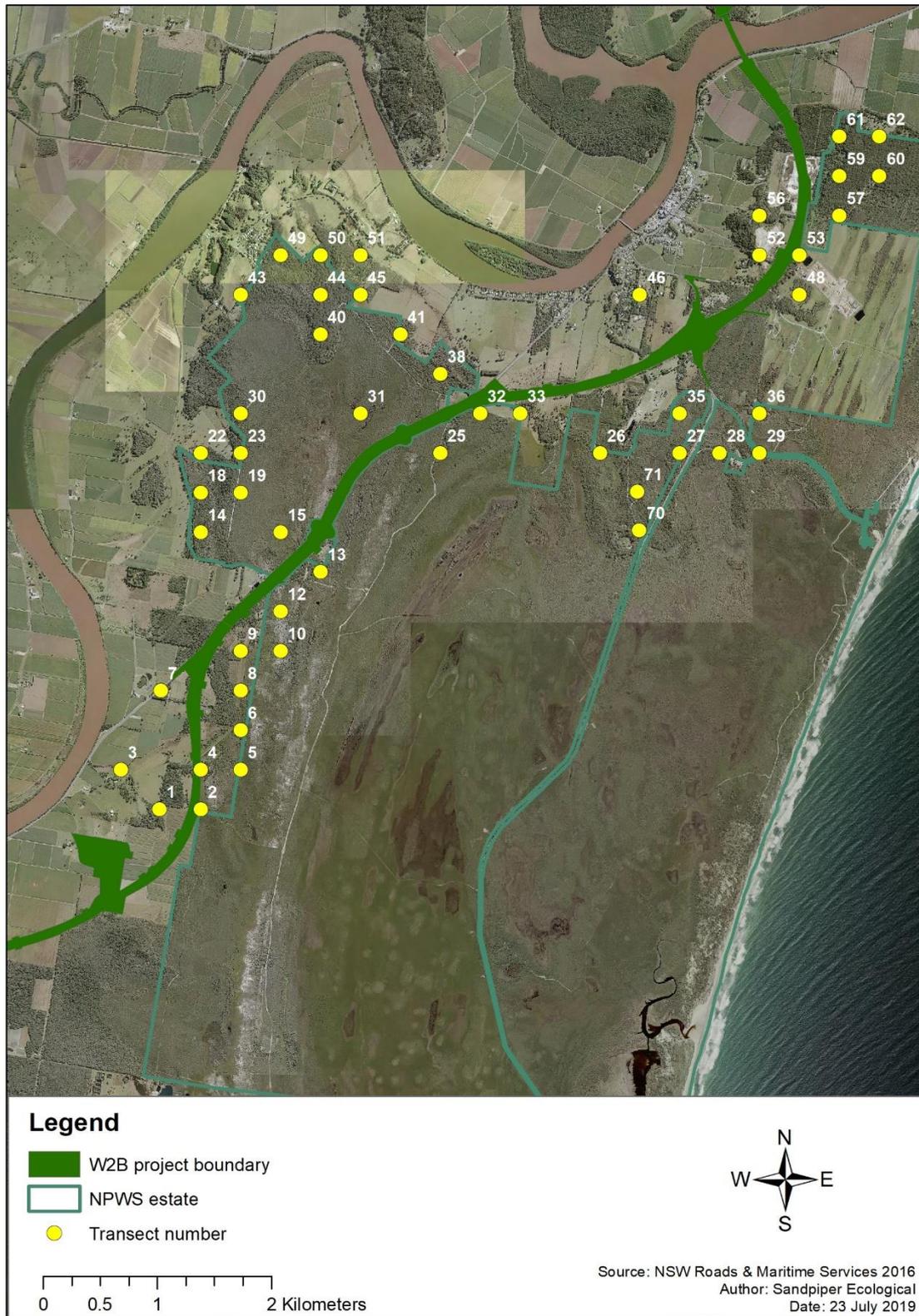


Figure 3: Broadwater (section 8/9) sample sites.

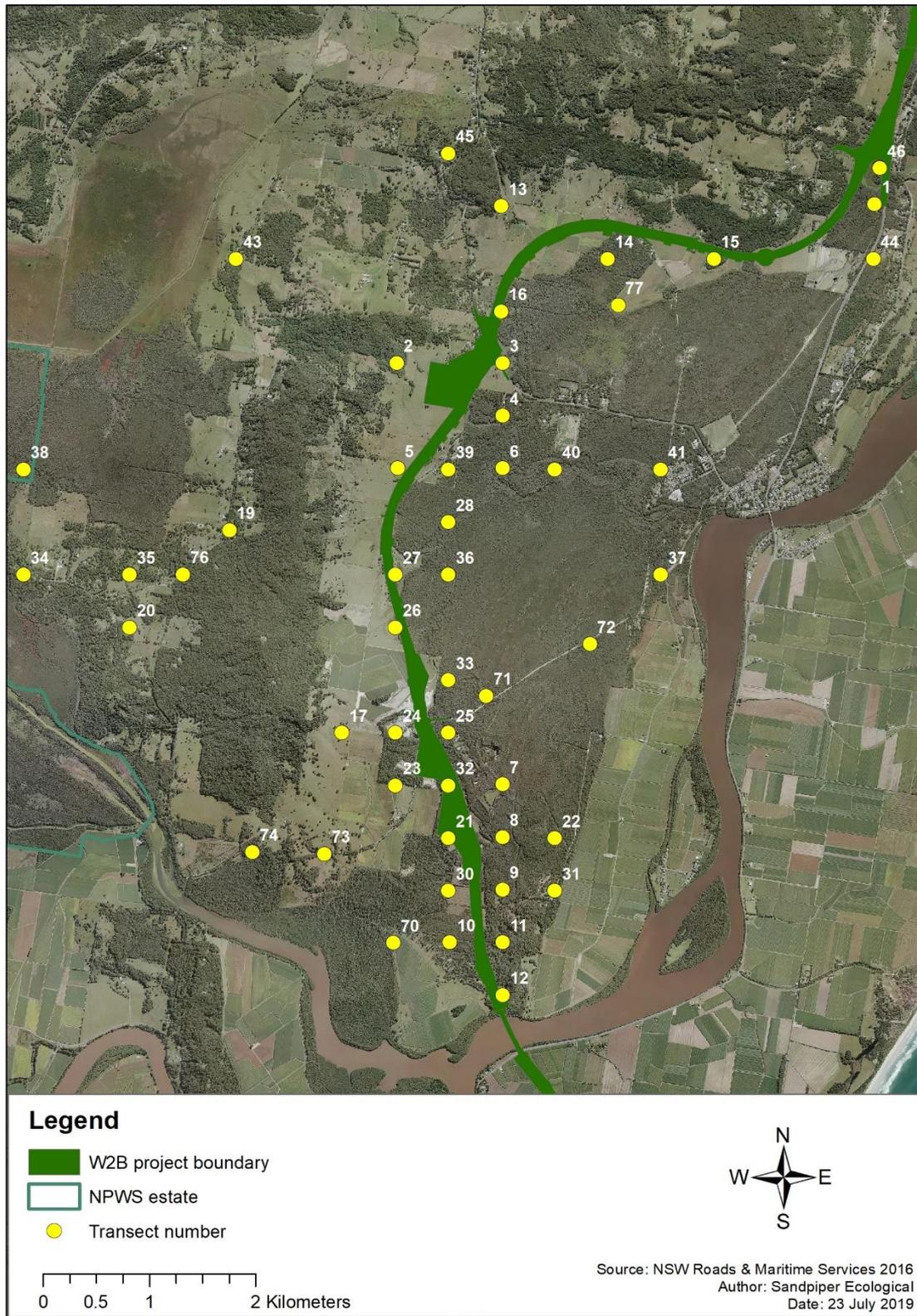


Figure 4: Bagotville (section 10) sample sites.

3.2 Koala density and population size estimates

A Bayesian estimation exercise was used to estimate densities at Broadwater and Bagotville for year 2 spring and autumn, year 2 as a whole and to update year 1 and baseline estimates. The procedure included multi-model uncertainty for effects such as: night-time vs day-time effect, a radial- vs linear-transect effect; a seasonal effect; and log-linear annual-variation vs year-as-a-categorical annual-variation. Each of these core specifications was repeated five times for five different Negative Binomial overdispersion priors (which broadly represented a spectrum of high-to-low overdispersion, the latter being equivalent to a Poisson). For this exercise, there were a total of 80 models. To acknowledge multi-model uncertainty, these models were model-averaged using posterior probabilities derived from the Watanabe-Akaike Information Criterion (Watanabe 2010, Gelman et al. 2014), as in the year 1 report (Sandpiper 2019).

Density values were then extrapolated across the total area of preferred koala habitat prior to clearing for baseline surveys (i.e. 1,624.7 ha in Broadwater; 2,152 ha in Bagotville) and post-clearing for year 1 and year 2 (current period) surveys (i.e. 1,616 ha in Broadwater; 2,124 ha in Bagotville) to derive a population size estimate for each period. The same method of density estimation derived from the Bayesian modelling was applied to baseline, overall year 1 and overall year 2. This approach controls for differences in the method used to derive the baseline population estimates.

Koala population values presented are based on the Bayesian model and are referred to “revised population estimate”. Use of the term revised reflects changes in the baseline estimate as additional data are collected, and estimation models are refined. This is consistent with the method used in the year 1 report (Sandpiper 2019).

3.3 Prospective power analysis

The KMP includes background information on use of a Power Analysis (PA) to determine minimum survey effort to reliably detect a decline in focal koala populations. It states that survey effort which achieved 70% power (or confidence) to detect a 30% decline in the Bagotville population was acceptable (RMS 2016). Using baseline data for each focal population and a diurnal search detection probability of 1.0/observer, the KMP PA determined that to achieve the 70%/30% target 50 survey sites within each focal area would need to be double sampled (i.e. two surveys/session) every six months (J. Rhodes unpub. data).

A subsequent prospective PA, which included current density data, would then be completed at the end of each reporting period to determine the minimum survey effort required going forward. Whereas the PA used to inform the KMP was based on a frequentist/null hypothesis testing approach, the prospective PA used in the current reporting period and year 1 was based on a Bayesian estimation analysis.

The current prospective analysis used the same Monte Carlo simulation procedure as in the year 1 report. The goal of the power analyses was to estimate the rate of Type-II errors (falsely rejecting the hypothesis of a trend, $H_a: \beta_t \neq 0$) while detecting a -30% decline from baseline levels at Broadwater and Bagotville between years 2015 and 2031. The error rates were conditional on:

1. a negative trend of -30% from baseline levels until Year 15 of monitoring;
2. a cap on the rate of Type-I errors at $\alpha \leq 0.3$;
3. a monitoring effort of 400 transects per year each at Broadwater and Bagotville (i.e. 50 sites double-surveyed twice/season and two seasons/year at each area);

4. marginal effects for survey-design factors (day-time/night-time, spring/autumn, and line-transect/radial-search transects) empirically derived from the Bayesian analysis;
5. baseline koala densities in 2015 derived from the Bayesian estimation analysis.

The prospective analyses were conducted in the same manner as in the year 1 report, with no supplements. Because the prospective analysis assumed the (simulated) existence of 15 years of data, it was considered less sensitive to prior distributions and issues of small sample-sizes. However, because the analysis is conditional on some empirically estimated features, the results are still somewhat sensitive to the estimated baseline conditions and the models used to estimate those conditions.

3.4 Faecal pellet (scat) collection

Faecal pellets (i.e. scats) were collected from koalas observed in the Bagotville area during autumn 2019 surveys for cortisol analysis. When a koala was observed, the base of its tree was searched for fresh scats. If fresh scats were found, they were placed in a paper bag in an esky, and immediately transferred to a freezer once field surveys were complete.

Data collected during scat collection included location, tree species and diameter at breast height (DBH), koala sex/health (if possible) and weather at time of collection. Scats were also collected concurrently from 10 individuals at the Tucki Tucki control site (approx. 11km west of the alignment). The separate cortisol study being conducted by RMS will be analysed and reported on by University of Sydney.

3.5 Crossing structure monitoring

3.5.1 Camera traps

Twelve connectivity structures (box culverts) in sections 1 and 2 were monitored for three months during spring/summer 2018. Structures selected were in accordance with those described in Table 8-2 of the KMP except a box culvert at chainage 7280 was substituted for the same at chainage 29300 (Table 2). The substitution was required because the latter is in the Glenugie section of the highway upgrade and was monitored at completion of that section in 2013-2016 (see Sandpiper 2017).

All box culverts featured timber post-and-rail (fauna) furniture through their length (Plate 1). Floor substrate included concrete (K2), concrete and raised gravel path (K1, K8-K11), timber mulch on concrete floor (K3-K6, K12) and a combination of gravel and loose soil (K7). Culvert lengths ranged from 16m at the split northern median (K10) to 72.8m at Dirty Creek range (K2).

Table 2: Location of koala dedicated box culverts monitored in sections 1 & 2. All culverts featured wooden post-and-rail structures. Regrade refers to the % of underpass entrance visible from the horizontal level of the surrounding natural ground which is indicative of the perspective of an approaching terrestrial mammal.

Site No.	Chainage	Sctn	Easting	Northing	Dimensions H x W (m)	Length (m)	Floor substrate	Regrade (% east/west)
K1	6890	1	515767	6681254	3 x 3	44.0	Raised gravel path & concrete	0/100
K2	7280	1	515549	6681596	3 x 3	72.8	Concrete	100/60
K3	8470	1	514567	6682196	3 x 3	49.8	Mulch on concrete	25/0
K4	8800	1	514201	6682384	3 x 3	47.2	Mulch on concrete	100/100
K5	11710	1	513204	6684852	3 x 3	54.4	Mulch on concrete	55/80
K6	12420	1	513062	6685536	3 x 3	49.0	Mulch on concrete	95/70
K7	17710	1	508804	6688587	3 x 3	50.5	Gravel and dirt	0/50
K8	19880	2	507098	6689798	3 x 3	52.4	Raised gravel path & concrete	100/15
K9	23110 (west)	2	506010	6692784	3 x 2.4	19.0	Raised gravel path & mulch on concrete	90/40
K10	23110 (east)	2	506057	6692791	3 x 2.4	16.0	Raised gravel path & mulch on concrete	0/60
K11	23750	2	505811	6693395	3 x 2.4	21.4	Raised gravel path & mulch on concrete	50/50
K12	25850	2	505317	6695401	3 x 3	26.0	Mulch on concrete	100/95



Plate 1: All monitored box culverts contained fauna furniture and some featured mulch spread over the concrete floor (left). Cameras were installed on the center post within each culvert – one viewing along the rail and the other along the floor (right).

Culverts were monitored with either Swift 3C or Swift Enduro cameras (*Outdoor Cameras Australia*) for three months during spring/summer 2018. Two cameras were mounted on the central post of the fauna furniture – one positioned to capture animals moving along the furniture and the other positioned approximately 400mm above ground level to capture animals moving along the floor (Plate 1). Both cameras were oriented east. All cameras were contained in security cases with padlocks.

Cameras were installed on 18-19/9/2018 and retrieved on 17/12/2018. Cameras were set on medium sensitivity and programmed to take 10 seconds of video on activation. They were scheduled to turn on at

1700hr and turn off at 0600hr. Cameras were inspected during the middle of the session to change batteries and SD cards. Cameras affected by false triggers were assessed and, if necessary re-oriented to reduce false triggers. All cameras were active for the full duration of the monitoring session except two cameras (K7 & K10) experienced early battery fatigue during the first half of the session (Table 3).

Camera monitoring targeting threatened mammals was also undertaken at all koala box culverts except K4 and K7 during the periods 13/6 - 3/9/2018 and 17/1 - 18/3/2019 (Sandpiper 2019b). Any koalas detected during threatened mammal monitoring are reported on separately in the results section.

Table 3: Culvert camera monitoring effort.

Site No.	Chainage	Section	No. of videos (floor/rail)	Days active (floor/rail)	% of period active (floor/rail)
K1	6890	1	69/66	92/92	100/100
K2	7280	1	98/245	92/92	100/100
K3	8470	1	18/22	92/92	100/100
K4	8800	1	136/397	92/92	100/100
K5	11710	1	118/220	92/92	100/100
K6	12420	1	209/50	92/92	100/100
K7	17710	1	51/87	92/87	100/95
K8	19880	2	58/52	92/92	100/100
K9	23110 (west)	2	85/146	92/92	100/100
K10	23110 (east)	2	475/118	51/92	55/100
K11	23750	2	73/108	92/92	100/100
K12	25850	2	99/160	92/92	100/100

3.5.2 Camera image analysis

Camera images were uploaded to a desk top computer and viewed using Windows Photo Viewer. Data recorded included: site, date, time, species, number of images and image numbers. An ecologist reviewed all images, with reference to standard field guides (i.e. Menkhorst & Knight 2010; Menkhorst et al. 2017; Swan et al. 2004) and senior staff. A hierarchical approach was adopted for species identification which included: species, genus or group. Identification accuracy was scored as either definite (90%+ certainty), probable (75-90% certainty) or possible (60-75% certainty).

To determine the likelihood of a culvert crossing, footage was scored according to the following criteria:

- *Complete crossing* - animal demonstrates directional movement along floor/furniture and does not return within 10 minutes.
- *Incomplete crossing* – animal demonstrates directional movement along floor/furniture but returns within 10 minutes or animal exhibits no directional movement along floor/furniture or shows only exploratory movement.

According to these definitions, a ‘complete crossing’ is inferred from display of strong directional movement and no evidence of return movement. These definitions are consistent with other underpass investigations (see Goldingay *et al.* 2019), including other Pacific Highway upgrade sites (see Sandpiper 2017, 2019b, 2019c, 2019d).

3.5.3 Scat and scratch searches

On the three occasions koala culverts were visited to install/check/retrieve cameras, culvert floors and the area within 50m of culvert entrances were searched for koala scats, predator scats and scratches on trees. Search effort was equivalent to 15 person-minutes/side. Any predator scats collected were sent to a recognised hair analysis practitioner (R. Carter) for analysis.

3.6 Road mortality surveys and fauna fence inspections

Koala road mortality surveys were undertaken along the fenced section of Wardell Road and the existing Pacific Highway and adjacent monitored koala culverts during spring/summer 2018. Surveys involved a walking traverse of both sides of the road edge on two occasions between September and December. At koala culverts, each transect extended 250m either side of the culvert (500m in total). At Wardell Road, the transect extended from Lumleys Lane to Thurgates Lane (1.54 km) and at the existing Pacific Highway from Carlyle Street, Wardell to the Coolgardie interchange (3.3 km). The fauna fence along transect sections was inspected for breaches during road mortality surveys.

Road mortality surveys were conducted during the periods 20-28/9/2018 and 5-6/12/2018. Wardell Road and existing Pacific Highway surveys were completed on 3/10/2018 and 30/11/2018. Surveys were completed during fine weather conditions.

Road mortality results were supplemented by other data sources including incidental observations from Sandpiper staff while traveling focal roads, RMS staff, construction personnel and road mortality reports from Lismore-based Friends of the Koala (FOK). It is intended that these data are captured on the W2B Project Wide Koala Observations database curated by Pacific Complete.

4. Results

4.1 Population survey koala observations

4.1.1 Broadwater focal area

One koala was observed during spring 2018 surveys. The individual was observed on the same transect during diurnal and nocturnal surveys (Table 4; Figure 5). No individuals were observed within radial search areas. A further eleven koalas were observed incidentally off-transect while moving between sites, including two females with semi-independent back-young (Table 4).

During autumn 2019 surveys, one koala was observed during diurnal transect surveys and two during nocturnal surveys (Table 4). One of the individuals was observed on the same transect during diurnal and nocturnal surveys. No individuals were observed within radial search areas (Table 4). A further three koalas were observed incidentally off-transect while moving between sites, including a female with semi-independent back-young.

Full details of Broadwater koala observations are provided in Table A1, Appendix A.

Table 4: Broadwater focal area koala observations for spring 2018 and autumn 2019 population surveys (*and values for baseline and year 1 observations*).

Survey session (no. of transects surveyed)	Diurnal transect	Nocturnal transect	Diurnal radial	Nocturnal radial	Total individuals	Incidental individuals
<i>Baseline (54)</i>	7	NA	1*	NA	7	1
<i>Yr.1 spring (52)</i>	1	2	0	0	2	2
<i>Yr.1 autumn (50)</i>	4	4	1*	1*	4	8
<i>Yr.2 spring (50)</i>	1	1	0	0	1	11
<i>Yr.2 autumn (50)</i>	1	2	0	0	2	3

* Individual observed on transect and radial search area.

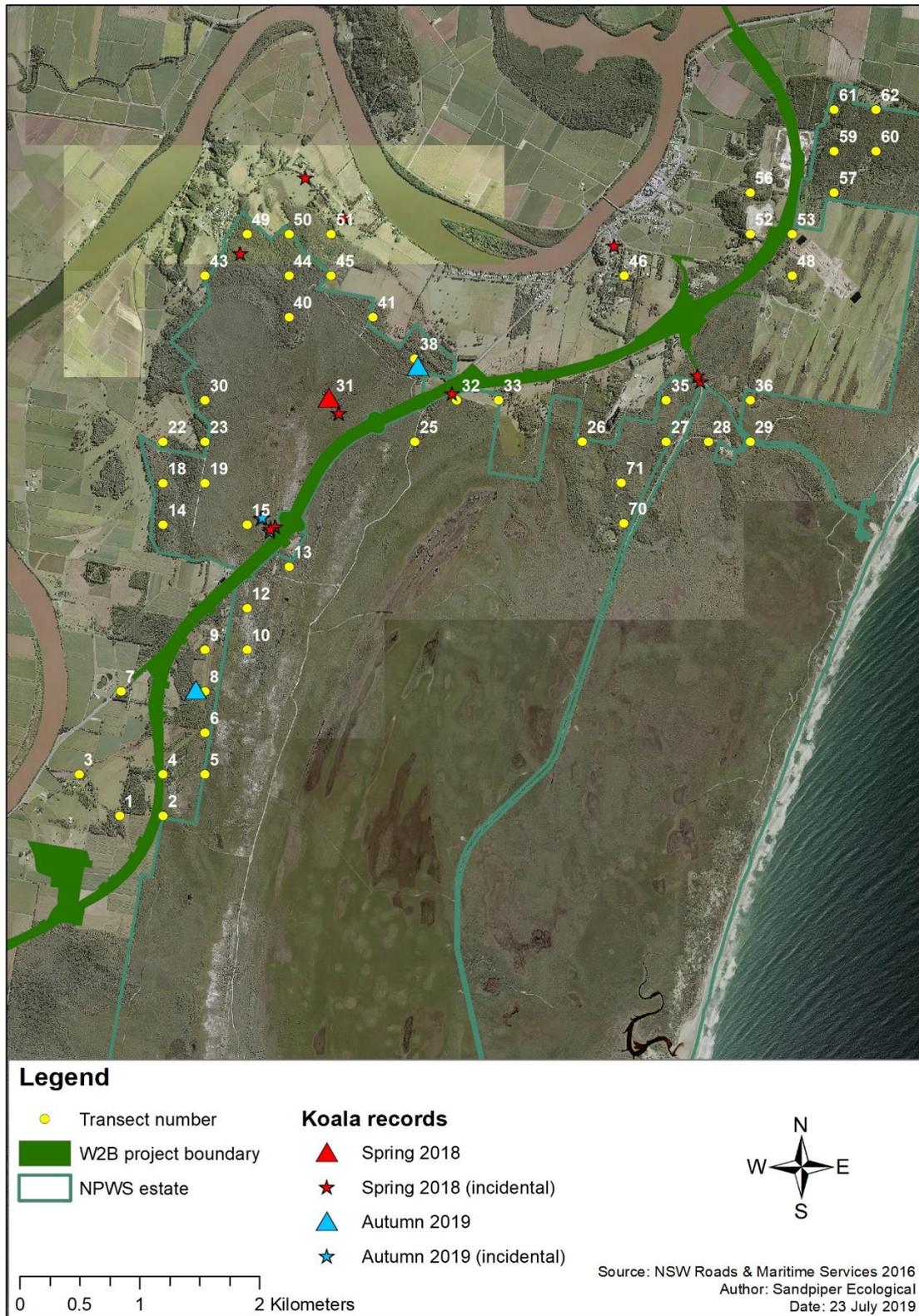


Figure 5: Broadwater survey sites and location of koalas observed during spring 2018 and autumn 2019 surveys.

4.1.2 Bagotville focal area

Three koalas were observed during diurnal transect surveys and five during nocturnal surveys during spring 2018 surveys (Table 5; Figure 6). Three of the individuals were observed on the same transects during diurnal and nocturnal surveys. Radial searches recorded one individual during diurnal surveys and two during nocturnal surveys. One of the individuals was observed within the same radial area during diurnal and nocturnal searches. A further four koalas were observed incidentally off-transect while moving between sites (Table 5).

During autumn 2019 surveys, three koalas were observed during both diurnal and nocturnal transect surveys (Table 5; Figure 6). Two of the individuals were observed on the same transects during diurnal and nocturnal surveys. No individuals were observed within radial search areas. A further three koalas were observed incidentally off-transect while moving between sites.

Full details of Bagotville koala observations are provided in Table A2, Appendix A.

Table 5: Bagotville focal area koala observations for spring 2018 and autumn 2019 surveys (*and values for baseline and year 1 observations*).

Survey session (no. of transects surveyed)	Diurnal transect	Nocturnal transect	Diurnal radial	Nocturnal radial	Total individuals	Incidental individuals
<i>Baseline (46)</i>	3	NA	NA	NA	3	5
<i>Yr.1 spring (43)</i>	2	3	0	0	2	5
<i>Yr.1 autumn (50)</i>	5	5	1*	1*	5	8
<i>Yr.2 spring (50)</i>	3	5	1	2	5	4
<i>Yr.2 autumn (50)</i>	3	3	0	0	5	3

* Individual observed on transect and radial search area.

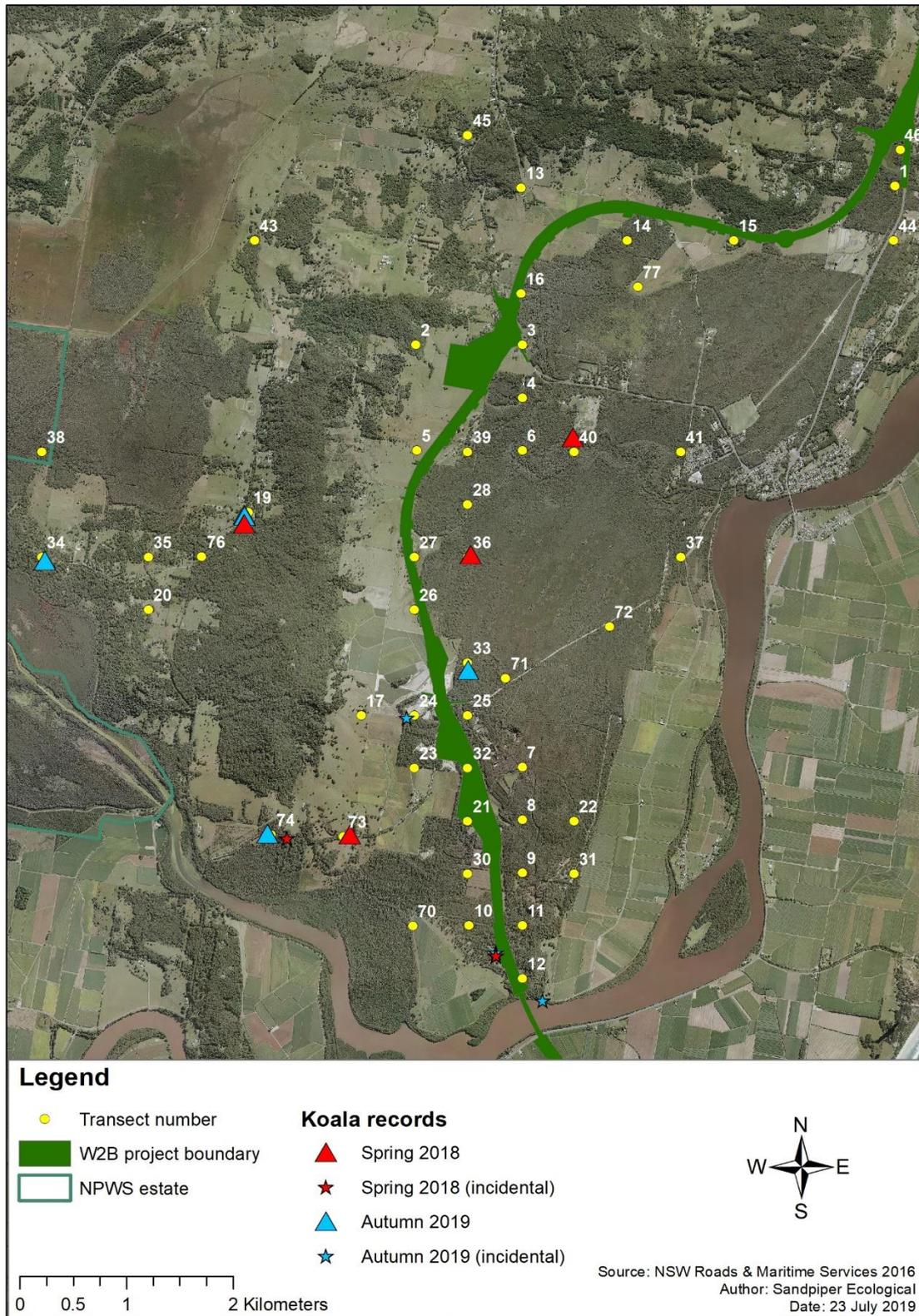


Figure 6: Bagotville survey sites and location of koalas observed during spring 2018 and autumn 2019 surveys.

4.2 Koala density and population size estimate

4.2.1 Broadwater

Based on the Bayesian estimation analysis, the density estimate for spring was 0.051 koalas ha⁻¹ (95%CI: 0.032-0.075) and autumn was 0.052 koalas ha⁻¹ (95%CI: 0.032-0.079). Overall, the Year 2 density estimate for Broadwater was 0.051 koalas ha⁻¹ (95%CI: 0.032-0.075). This compares to a revised baseline density estimate of 0.057 (95%CI: 0.037-0.084) koalas ha⁻¹ (Figure 7).

Extrapolated population size estimate across 1,616 ha of preferred koala habitat for year 2 overall was 82 koalas (95%CI: 52-121). This compares to a revised extrapolated baseline population estimate of 93 koalas (95%CI: 60-136) across 1,624.7 ha.

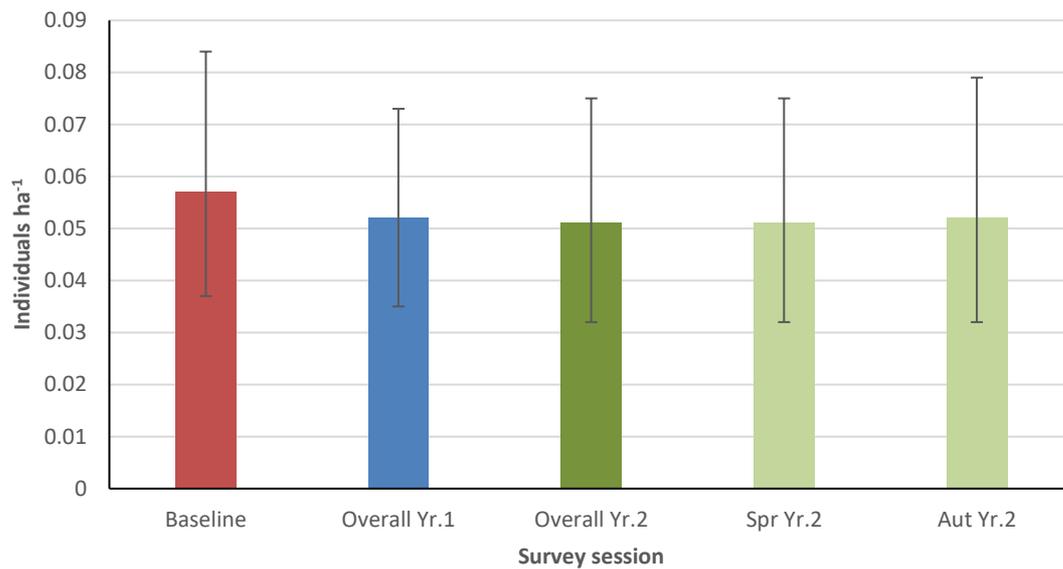


Figure 7: Comparison of Broadwater focal area density estimates (\pm 95%CI) for baseline year (2015), year 1 overall, year 2 overall, year 2 spring and year 2 autumn.

4.2.2 Bagotville

Based on the Bayesian estimation analysis, the density estimate at Bagotville for spring was 0.075 koalas ha⁻¹ (95%CI: 0.049-0.107) and for autumn was 0.076 koalas ha⁻¹ (95%CI: 0.051-0.109). The overall Year 2 density estimate was 0.075 koalas ha⁻¹ (95%CI: 0.051-0.106). This compares to a revised baseline density estimate of 0.076 (95%CI: 0.052-0.106) koalas ha⁻¹ (Figure 8).

Extrapolated population size estimate for year 2 overall was 159 koalas (95%CI: 108-225) across 2,124 ha of preferred koala habitat. This compares to a revised extrapolated baseline population estimate of 164 koalas (95%CI: 110-228) across 2,152 ha.

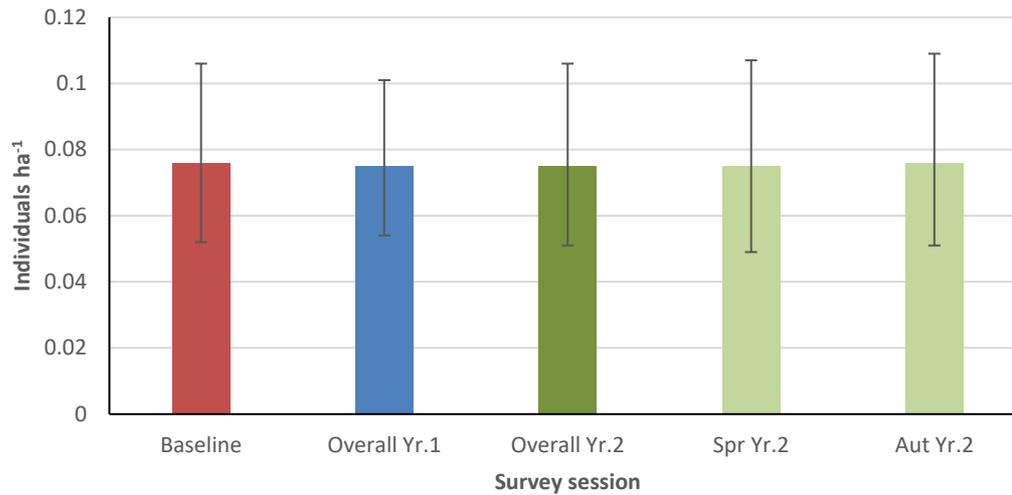


Figure 8: Comparison of Bagotville focal area density estimates (\pm 95%CI) for baseline year (2015), year 1 overall, year 2 overall, year 2 spring and year 2 autumn.

4.3 Power analysis

For a maximum Type-I error rate of 0.3, the estimated power at Bagotville and Broadwater were 0.713 and 0.649 respectively (Figure 9). For a maximum Type-I error rate of 0.35, the estimated power for Bagotville and Broadwater were 0.748 and 0.690 respectively.

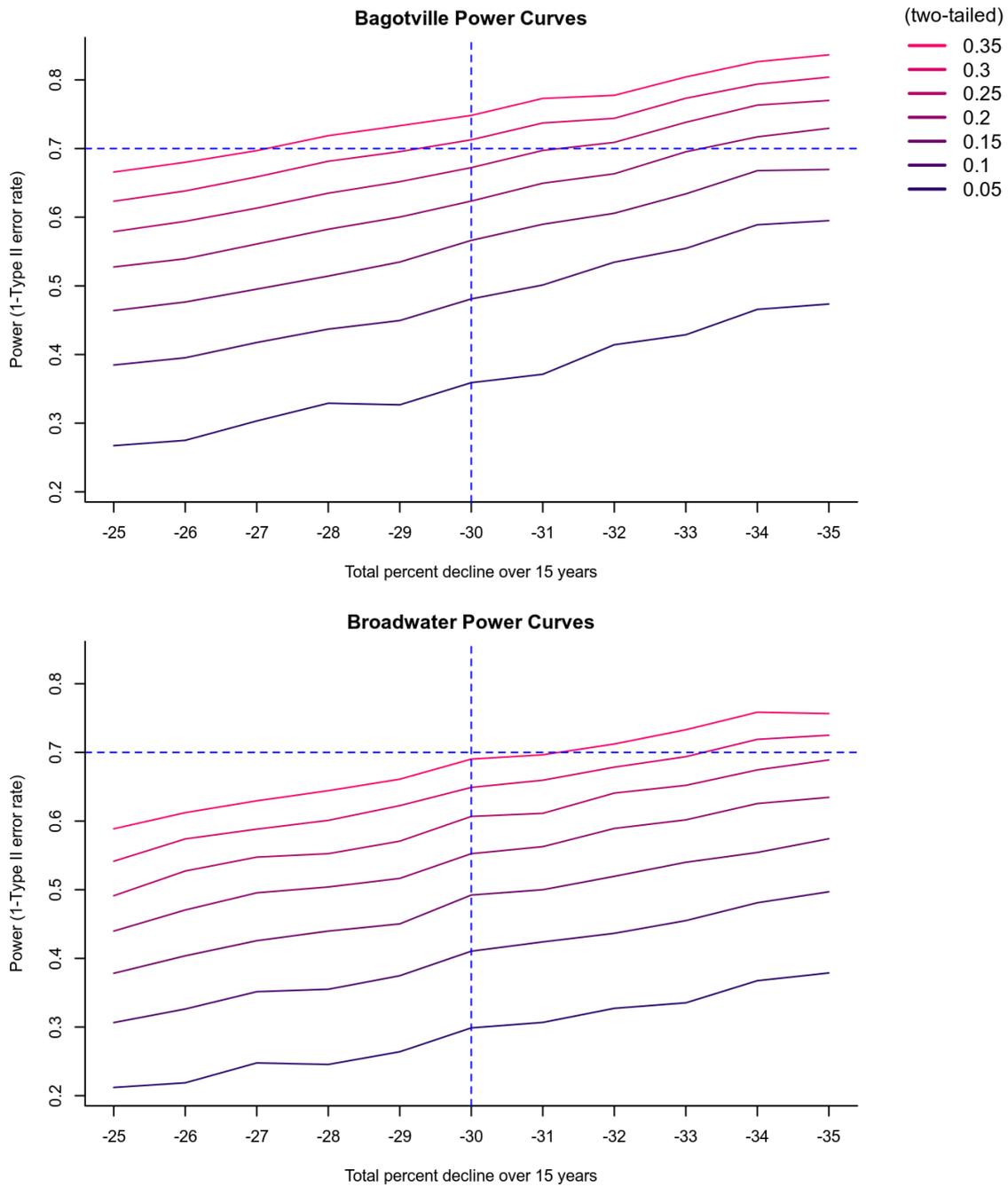


Figure 9: Statistical power to detect a -30% drop in baseline densities versus Year 15 of the monitoring program for different maximum levels of Type-I errors (lines).

4.4 Crossings structure monitoring

4.4.1 Camera traps

Fauna detections

Camera monitoring of koala culverts during spring/summer 2018 yielded 1149 fauna detections (i.e. sum of complete and incomplete crossings) at an overall rate of 7.6 ± 6.6 detections/underpass/week (Table 6). The majority of detections (91.6%) were complete crossings. Twenty species and five fauna groups were detected

ranging in size from house mouse (*Mus musculus*) to eastern grey kangaroo (*Macropus giganteus*). *Antechinus* spp. was the most frequently detected species/fauna group (n = 660 detections) and was the taxa recorded in the most underpasses (i.e. 11 of 12). K4 featured the highest number of detections (n = 332; 25.3 detections/week) and K3 the least (n = 13; 1.0 detection/week). More detections were made on furniture (57.4%) compared to the floor (42.6%), largely attributed to rodent sp. and *Antechinus* spp.

Of the detections that could be assigned to native or exotic taxa (i.e. ignoring rodent sp., small mammal, and medium mammal records because they could represent native and/or exotic species), most were of native species (92%) compared with exotic species (8%). The highest native fauna diversity was at K4 (11 species/groups) and the least diverse was K2 (2 species/group).

A koala was recorded making a complete crossing of K5 on 26/10/2018 (Plate 2). The view of the individual was from the rear so sex could not be determined. However, the size of the individual suggests it was an adult and its bottom did not show obvious signs of cystitis (i.e. wet/stained). Other threatened species including the brush-tailed phascogale (*Phascogale tapoatafa*), rufous bettong (*Aepyprymnus rufescens*), long-nosed potoroo (*Potorous tridactylus*) and Stephens banded snake (*Haplocephalus stephensii*) were recorded during the monitoring period (Plate 3; Table 6).

Brush-tailed phascogale was recorded making two complete crossings of K12 in a westward (29/11/2018) and eastward (16/12/2018) direction along the fauna furniture. Long-nosed potoroo was recorded making one incomplete crossing of K4 on 16/11/2018. Rufous bettong was recorded making 12 complete crossings (11 east, 1 west) and one incomplete crossing at K9 and 37 complete crossings (23 east, 14 west) and one incomplete crossing at K10 between 1-17/12/2018. Many of the crossings of the K9/K10 split culvert, which links across the vegetated median, would have represented complete crossings of the road corridor. Stephens banded snake was recorded making a single eastward crossing along the fauna furniture at K5 on 15/12/2018. The video footage appeared to show the individual in slow pursuit of an *Antechinus* spp.

Full details of camera detections are provided in Table B1, Appendix B.

Table 6: Species and groups of fauna recorded by camera traps at 12 koala culverts during spring/summer monitoring. Floor and fauna furniture detections have been pooled. C = complete crossing; IC = incomplete crossing; * = exotic species; P = microbats present within culvert.

Species/group	Site and crossing type																							
	K1		K2		K3		K4		K5		K6		K7		K8		K9		K10		K11		K12	
	C	IC	C	IC	C	IC	C	IC	C	IC	C	IC	C	IC	C	IC	C	IC	C	IC	C	IC	C	IC
Short-beaked echidna							1				1													
Antechinus spp.			124	15	5		176	21	94	3	3		15		20	1	53	5	34	4	34	5	37	11
Brush-tailed phascogale																								2
Northern brown bandicoot							13				6	1	1		1						2			
Long-nosed bandicoot							2																	
Bandicoot spp.	9						43		6		57		2	1	16		6				9			
Koala									1															
Short-eared brushtail possum							39	2	2															
Common brushtail possum					1		1		2															
Trichosurus spp.							1		1						1									
Long-nosed potoroo							1																	
Rufous bettong																	12	1	36	1				
Swamp wallaby							1																	
Wallaby sp.																	1							
Eastern grey kangaroo	26	2	1				3		1				2						1					
Microbat sp.					P		P				P		P		P				P					P
House mouse*											1													
Black rat*	9			5	6							1	1				2	1						
Rodent sp.	6						2		1		1		1		1		2		2					
Small mammal							3				4	1	1			1	1							
Medium mammal							2																	
Dog*															1						1			
Fox*			1																					1
Cat*	4		18	4			4	1	11	2	3	2	1				3				5			
European hare*							2																	
Eastern water dragon																	1	1		1				
Lace monitor	2				1		14		1		2			4		3		9		9			3	
Stephens banded snake									1															



Plate 2: Koala detected making a complete eastward crossing at K5 on 26 October 2018.



Plate 3: Several other threatened mammal species and a threatened reptile were detected using culverts during the monitoring period including brush-tailed phascogale (top left), rufous bettong (top right), long-nosed potoroo (bottom left) and Stephen's banded snake (bottom right), observed in possible pursuit of an *Antechinus* sp.

Exotic predator activity

Exotic predators were detected at 10 of the 12 culverts but only accounted for 5.4% of all fauna detections (Table 6; Figure 10). Cats (*Felis catus*) accounted for 93.5% of all predator detections and were detected at eight culvert sites – K1, K2, K4-K7, K9, K11. Dog (*Canis lupus familiaris*) and fox (*Vulpes vulpes*) were each detected on two occasions at K8 and K11 and K2 and K12, respectively. Detection frequency ranged between no detections (K3, K10) and 1.76 detections/week at K2, mostly by cats (Figure 10). No footage showed evidence of predation and no evidence of predation was observed during scat and scratch searches.

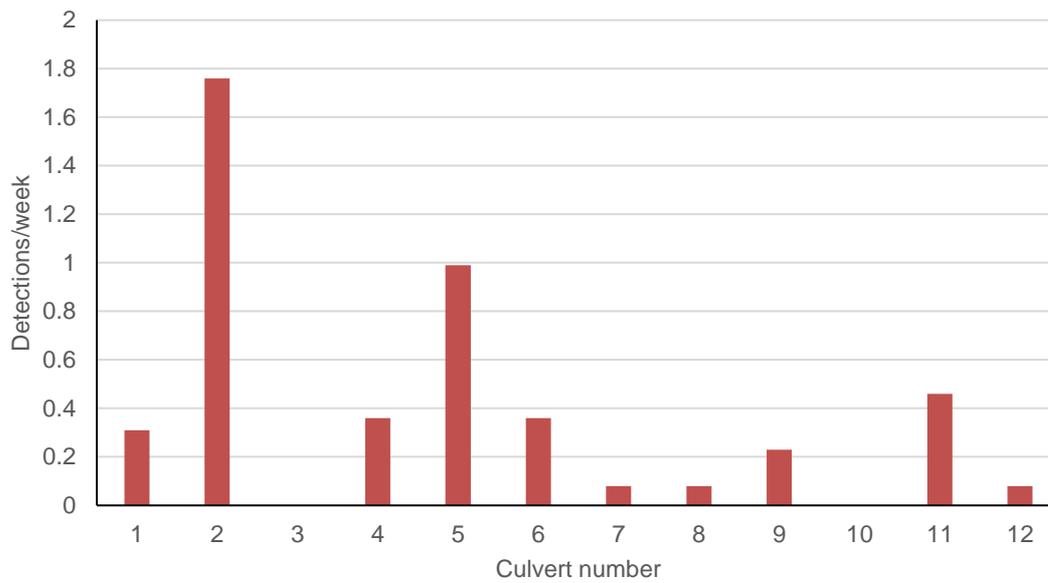


Figure 10: Exotic predator (i.e. cat, dog, fox) detections by culvert site. Detections = sum of complete and incomplete crossings.

4.4.2 Scat and scratch searches

No koala scats or tree scratches were found during searches (Table 7). Scratches and scats of brushtail possum (*Trichosurus spp.*) were evident at several sites. Dog tracks were evident in K9.

Table 7: Scat and scratch records from three searches during the period of camera monitoring.

Site No.	Scat	Scratch	Comment
K1	Nil	Nil	Brushtail possum scats (east). Fox scat (west).
K2	Nil	Nil	Scratches on rough-bark Angophora (east) of small koala or brushtail possum; no koala scats under tree.
K3	Nil	Nil	Scratches on rough-bark Angophora (west) from small koala or possum; no koala scats under tree. Fresh brushtail possum scats.
K4	Nil	Nil	Macropod scats (east). Small scratches on small-fruited grey gum from small arboreal mammal or reptile, unlikely koala (west); no scats under tree.
K5	Nil	Nil	
K6	Nil	Nil	
K7	Nil	Nil	
K8	Nil	Nil	Small scratches on scribbly gum from small arboreal mammal or reptile, unlikely koala (east).
K9	Nil	Nil	Dog tracks in culvert.
K10	Nil	Nil	
K11	Nil	Nil	
K12	Nil	Nil	Small scratches on spotted gum from small arboreal mammal or reptile, unlikely koala (east).

4.5 Road mortality surveys and fauna fence condition

4.5.1 Road mortality

Forty-nine individuals representing 22 species/taxa groups were identified during spring/summer road mortality surveys (Table 8). Mammals were the most frequently recorded taxa (n = 23), followed by reptiles (n = 13), birds (n = 10) and amphibians (n = 3 cane toad). Swamp wallaby (*Wallabia bicolor*) was the most commonly encountered species recorded (n = 7). The highest carcass count (n = 17) was recorded on the Old Pacific Highway although it is 3.3 km in length compared to culvert transects (500m) and Wardell Road (1.54 km). Amongst culvert sites, K7 and K9/K10 featured the highest number of mammal carcasses (n = 4). The overall rate of road mortality for the two surveys was 2.36 kills/km for culvert transects and 2.38 kills/km for Wardell Road/Old Pacific Highway.

No carcasses of koalas or other threatened species were recorded during surveys. Three fatal koala vehicle strikes were reported in the W2B Project Wide Koala Observations Register curated by Pacific Complete for the reporting year (Pacific Complete, unpub. data). All occurred outside of the monitoring survey sections. Friends of the Koala also reported another road fatality within the section 10 population monitoring focal area during the reporting period. Fatalities are described below:

- 11 February 2019 – chainage 159100 on Pacific Highway southbound lane, approximately 1500m north of Coolgardie interchange. An open fauna fence gate approximately 100m north of the strike location that appeared to be left open as a result of vandalism was cited as the most likely access point. (K. Metcalfe, LLE, pers. comm.).
- 1 November 2018 – chainage 99290 on existing section of the Pacific Highway, approximately 900m north of Mororo Road.
- 9 August 2018 – chainage 127000 on existing highway section, New Italy.
- 28 September 2018 – juvenile male struck on Bagotville Road (FOK, unpub. data).

Full details of road mortality surveys are provided in Table C1, Appendix C.

Table 8: Details of fauna detected on road/roadside during walking road mortality surveys. Culvert transects = 500m; Wardell Road = 1.54 km; Old Pacific Highway = 3.3 km);

Site No.	Date	Species/Taxa
K1	24/9/2018	Swamp wallaby
	6/12/2018	Nil
K2	24/9/2018	Macropod spp.; medium bird
	6/12/2018	Nil
K3	20/9/2018	Carpet python x2
	6/12/2018	Nil
K4	28/9/2018	Swamp wallaby; unid. medium mammal; carpet python
	6/12/2018	Carpet python
K5	28/9/2018	Kookaburra x2
	6/12/2018	Swamp wallaby
K6	20/9/2018	Bearded dragon x2
	6/12/2018	Nil
K7	20/9/2018	Macropod spp.; unid. mammal; black-shouldered kite; medium bird
	6/12/2018	Swamp wallaby; swamp wallaby (prob)
K8	20/9/2018	Nil
	6/12/2018	Nil
K9/K10	20/9/2018	Northern brown bandicoot (prob); blue-tongue skink
	5/12/2018	Swamp wallaby (prob) x2; eastern grey kangaroo
K11	20/9/2018	Small snake
	5/12/2018	Nil
K12	19/9/2018	Nil
	5/12/2018	Nil
Wardell Road	3/10/2018	Brown tree snake; cane toad x2
	30/11/2018	Fox x2; cane toad
Old Pac Hwy	3/10/2018	Echidna; unid. mammal; black flying fox x2; hare; dragon sp.; kookaburra; grey fantail; chicken
	30/11/2018	Black rat; unid. medium mammal; unid. small mammal; lace monitor x2; water dragon; collared sparrowhawk; unid. medium bird

4.5.2 Fauna fence

No detectable breaches were observed in fauna fence adjoining culverts although sediment build up on the southern wing-wall of the eastern entrance to K10 has caused sagging in the fence. This has effectively reduced the height of the fence and could enable medium to large macropods to jump over and should be cleaned out and re-aligned. It is unlikely a koala would breach it. No detectable breaches were observed in fauna fence on Wardell Road or the Old Pacific Highway.

5. Discussion

5.1 Koala population surveys

5.1.1 Koala counts, density estimates and preliminary trends

Counts of koalas during year two survey seasons were largely similar at both sites. At Bagotville, counts were similar across the three periods (i.e. baseline, year 1, year 2) whilst at Broadwater year two counts were lower than baseline and year 1 albeit survey effort was greater during the baseline year. Interestingly, incidental observations at Broadwater during spring year 2 (i.e. $n = 11$) were the highest of any period although incidental observations are not controlled for survey effort and can, therefore, be somewhat misleading.

Bayesian estimations of density, which largely controls for differences in survey effort between the survey years, described a year 2 density estimate for Broadwater of 0.051 koalas ha^{-1} (95%CI: 0.032-0.075) compared to a revised baseline density estimate of 0.057 (95%CI: 0.037-0.084) koalas ha^{-1} which suggests a weak downward trend. At Bagotville, the Bayesian density estimate for year 2 was 0.075 koalas ha^{-1} (95%CI: 0.051-0.106) compared to a revised baseline density estimate of 0.076 (95%CI: 0.052-0.106) koalas ha^{-1} which suggests a negligible trend.

It is likely that the issue of data-sparsity will continue for another few years of data collection unless there is a considerable change in population size. Data-sparsity is especially problematic during early years of a monitoring program when there are few completed surveys. Importantly, as more survey data are acquired, model precision will improve, particularly by the time of the year five review. Moreover, wildlife populations can vary over time for many reasons (Krebs 2009) and require long time frames to detect meaningful trends. This is apparent at Bagotville where baseline koala density estimates derived from 2013 and 2015 sampling varied by 42% (Phillips and Chang 2013; Phillips *et al.* 2015).

5.1.2 Power analysis

There was some erosion in power from the year 1 report. Despite this, Bagotville remained above the 0.7 power goal (i.e. 0.713) but Broadwater dropped slightly below (i.e. 0.649). The erosion may be due to changes in the revised baseline density: the estimation exercise provided a revised baseline density that was much lower than in the year 1 report. This low initial density (which fed into the power analysis as a parameter) may be creating problems for the prospective power analysis. It could be that low-initial densities compound the uncertainties in detecting precipitous trends; i.e., even steep trends are difficult to detect if the densities of koalas are very low.

The slight erosion in power emphasises the importance of having a reliable estimation framework (whether for estimating densities or estimating trends), especially for one that is robust to low sample-sizes and data-sparsity, in order to get reliable baseline conditions and features that feed into the prospective power simulation exercise. This will be further considered in subsequent monitoring periods and reviewed at year 5.

5.1.3 Survey method

The current method of population surveys in Bagotville and Broadwater utilises both diurnal and nocturnal monitoring, whereas baseline surveys conducted diurnal monitoring only. The current method of diurnal followed by nocturnal surveys and concurrent transect and radial searches conducted by the same team may compromise independence. Further, current and baseline surveys assume zero detection error although a recent study reported higher detectability using spotlighting compared to day searches (Wilmott *et al.* 2018)

although the current report found weak evidence for this. Survey methodology and detectability will be considered in the end of year two review.

During the reporting period, a predator control program has been operating within lands surrounding section 10. The program instigated by RMS has resulted in removal of 22 wild dogs and foxes which should reduce the predation risk for koalas residing within and near section 10 (Australia Feral Pest Management Service, 2019). It should also be noted that the focal koala populations may be affected by other impacts outside the control of the project, such as local land development, clearing activities and the 23.5% below average rainfall and above average mean temperatures experienced in the study area during the reporting period (BOM: Meerschaum Vale Station No. 58171 (rainfall), Ballina Airport AWS (temperature)).

5.2 Use of crossing structures

5.2.1 Use by koalas and other fauna

The record of a complete crossing of culvert K5 by a koala on one occasion (26/10/2018) is an encouraging start to crossing structure monitoring particularly as koalas are in low abundance in sections 1 and 2. Indeed, no koalas were observed during the clearing phase in the section one area (Sandpiper 2016). Further, no scats or scratches were detected in habitat surrounding underpass entrances. Koalas were not detected during concurrent winter and late summer threatened mammal monitoring of 10 of the 12 koala culverts (Sandpiper 2019b).

While not the focus of the koala monitoring program, detections of underpass crossings by the threatened brush-tailed phascogale, rufous bettong, long-nosed potoroo, and Stephens banded snake were significant records. Use of the fauna furniture by brush-tailed phascogale and Stephens banded snake were informative detections. Whereas koalas have been recorded using fauna furniture in a culvert at the Bonville section of the Pacific Highway upgrade, most records of koalas using culverts with furniture have occurred via the culvert floor (e.g. Sandpiper 2017, 2019c; Goldingay *et al.* 2019).

The overall diversity of fauna identified using the monitored culverts (i.e. 25 species/fauna groups) was the same as that recorded during winter and late summer threatened mammal monitoring of 14 underpasses, including 10 of the 12 koala culverts (Sandpiper 2019b). This level of fauna diversity is comparable to that recorded at other Pacific Highway upgrade underpass monitoring sites, such as Nambucca Heads to Urunga (n = 16; Sandpiper 2019d), Warrell Creek to Nambucca Heads (n = 24; Sandpiper 2019c) and Glenugie (n = 31; Sandpiper 2017). The predominant use by native species (i.e. 92%) is also comparable with other Pacific Highway monitoring sites. Similarly, high use of fauna furniture (57.4% of all detections), particularly by rodents and *Antechinus* spp., has also been reported for underpass monitoring on the Oxley Highway (Goldingay *et al.* 2019).

5.2.2 Use by exotic predators

Exotic predators were detected at most sites (i.e. 10 of the 12 culverts) albeit at relatively low intensity (i.e. 5.4% of all fauna detections). Further, the majority of these records (i.e. 93.5%) were of cats with few records attributed to canids. No footage showed evidence of predation and no evidence was observed at culvert sites. It is likely that cats pose a very low koala predation risk and we are not aware of any reports of koala predation by cats. Notwithstanding, a large feral cat could conceivably take a small back-young.

Similarly, we are not aware of instances of koala predation by fox although there is an unverified report of the same (M. Matthes, Friends of the Koala, pers. comm.). Dogs, which are known predators of koalas, were only recorded on three occasions – once each in K8, K9 and K11. Such low incidence does not warrant Corrective Action.

5.2.3 Performance indicators

1. Fauna crossing structures.

- a. Evidence of at least one completed crossing by koalas at targeted fauna crossing structures.
 - i. *One koala completed eastward crossing at K5.*
- b. Evidence of individual koalas using structures and/or breeding on either side of the highway, via scat analysis.
 - i. *No scats detected in culverts or in habitat adjoining entrances.*
- c. No evidence of high visitation/usage by exotic predators.
 - i. *Frequent visitation by cats at several culverts and very low visitation by dogs and foxes.*

2. Predator attack near fauna crossing structures.

- a. No koala deaths or injuries due to predator attack in the vicinity of fauna crossing structures.
 - i. *No evidence of koala deaths/injuries due to predator attack.*

5.3 Road mortality and fauna fence

5.3.1 Road mortality

Whereas no koala vehicle strikes were recorded during current road mortality surveys, the incidental fatalities recorded near the Coolgardie interchange and to the west of the alignment on Bagotville Road both occurred within the broader section 10 population monitoring area. The section of highway where the Coolgardie fatality occurred was fully fenced and in good repair but near to a vandalized, open gate. Gates along the section 10 alignment have since been padlocked. Bagotville Road, a minor local road, is not fenced.

Although the majority of road mortality victims detected during the surveys were small enough to pass through chain mesh fencing (i.e. snakes, amphibians, small reptiles, rodents), 19 medium to large terrestrial mammals (i.e. size of bandicoot up to eastern grey kangaroo) were recorded during the monitoring period. Presumably, these individuals gained access to the fenced alignment either at fence ends or road interchanges or, in the case of swamp wallabies and eastern grey kangaroos, managed to clear the fence by jumping. Despite this, the rate of occurrence of mammals in this size class was low during the period (i.e. 0.6 road strikes/km).

5.3.2 Fauna fence

Fauna fence was generally in good repair and no breaches were detected. Corrective action is required to clear sediment build-up against fence adjacent southern wing-wall of east entrance to K10. Action should include rectifying associated fence slouching.

5.3.3 Performance indicators

1. Road mortality

- a. No injury to an individual koala as a result of vehicle strike across all upgraded sections.
 - i. *No koala vehicle strike observed or reported on sections one and two.*
- b. Section 10: no koala road mortality within the fenced areas of the upgrade, on existing Pacific Highway or Wardell Road.
 - i. *One koala vehicle strike reported on 11/2/2019 at Old Pacific Highway, 900m north of Coolgardie interchange.*
 - ii. ***Corrective Action:*** *Fence inspection conducted in vicinity of koala vehicle strike. A nearby unlocked gate was identified as the likely access source. Gate subsequently closed and padlocked.*

2. **Fauna exclusion fence.**

a. No breaches in fauna exclusion.

i. *No observable breaches detected but sediment build-up causing slouching of fence adjacent southern wing-wall of K10 may enable medium-large macropods to hop over.*

ii. **Corrective Action:** *Clear sediment and rectify fence integrity.*

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Appendix A: Population survey koala detections

Table A1: Details of individual koalas observed during the Broadwater population monitoring.

Site	Date	Koalas	Koala Easting	Koala Nthing	Tran/Rad or Incidental	Tree sp.	DBH	Sex	Condition/Notes
Spring 2018									
s15a	5/11/2018	1	539093	6787779	Incidental	Acacia sp.	26 & 39	Male	Healthy looking. Good eye shine and good view of rump. 2m off ground. NO tags in ears
s15b	5/11/2018	1	539052	6787758	Incidental	E. robusta	42 & 38	Male	Healthy looking, good eye shine and and good views of rump. Had a very slight sternal gland. No tags in ears
S31	5/11/2018	1	539540	6788866	Transect	B serrata	22	male	Looks healthy. No tags. Young koala.
s31a	5/11/2018	1	539624	6788733	Incedental	E. robusta	24	Female	Likely mother of the joey in the adjacent tree (record number s31b). Looked healthy, no tags. Rump dry and good eye shine.
s31b	5/11/2018	1	539627	6788734	Incedental	E. robusta	16	Unknown	Likely joey of the female in the adjacent tree (record number s31a). Looked healthy, no tags.
s32a	6/11/2018	1	540568	6788902	Incedental	E. robusta	23	Male	Left eye ok. Right eye slightly opaque, Rump ok. No tags.
S49a	5/11/2018	1	538799	6790080	Incedental	E. racemosa		Male	Male, eyes and rump clear.
S51a	22/10/2018	1	539664	6790386	Incedental	E. tereticornis		Male	Right eye crusty/infected. Rump clear, not tags; FOK called
Off-tran	26/10/2018	2	542643	6789005	Incidental	E. robusta	40	F & joey	Healthy looking koalas, rump and eyes ok,
Off-tran	8/11/2018	1	542617	6789054	Incidental	E. robusta	45	Unknown	obscured
Off-tran	22/10/2018	1	541925	6790145	Incidental	E. tereticornis	52	Male	Eyes and rump ok. No tags
Off-tran	5/11/2018	1	539344	6790718	Incidental	E. tereticornis	77	Male	Large male. rump and both eyes clear. sternal gland active major
Autumn 2019									
S08	7/05/2019	1	538432	6786405	Transect	E. robusta	28	Unknown	Obscured view; Rump clean. Generally look healthy; eyes??.
s15a	8/05/2019	1	539050	6787738	Incidental	E. robusta	55	F	Clear rump and eyes, no obvious ear tags or pouch young
s15b	8/05/2019	1	538975	6787848	Incidental	E. robusta	31	M	small male, eyes and rump clear, no ear tags
s15c	8/05/2019	1	538987	6787858	Incidental	E. robusta	21	F	clear eyes and rump, no ear tags, prob mum of small male as only 12m apart
S38	7/05/2019	1	540285	6789133	Tran	E. racemosa	52	F	very stained rump. eyes clear. no sign of ear tags or pouch young. 15m off centre line

Table A2: Details of individual koalas observed during the Bagotville population monitoring.

Site	Date	Koalas	Koala Easting	Koala Nthing	Tran/Rad or Incidental	Tree sp.	DBH	Sex	Condition/Notes
Spring 2018									
N10a	25/10/2018	2	542517	6792731	Incidental	E. patentinervis	55	F & joey	Joey a few meters off mum, both koala look healthy, Good eye shine and clean rumps.
N10b	25/10/2018	1	542517	6792731	Incidental	E. patentinervis	65	Male	Looks healthy, good eye shine and clean rumps. We think this is the hybrid tree found in the area
N19	8/11/2018	1	540156	6796825	Transect	L. conferus	37	Female	No tags. eyes ok. Some mild staining on rump
N36	25/10/2018	1	542280	6796533	Rad/Tran	E. robusta	22	Unknown	Rump looks clean, cannot get a good look at eyes or sex
N40	24/10/2018	1	543241	6797644	Transect	Corkwood		Male	Clear eyes and rump. No tags
N73	7/11/2018	1	541145	6793879	Transect	E. robusta	68	Female	healthy. no tags
N74	7/11/2018	1	540376	673883	Rad/Tran	E. tereticornis	63	Male	healthy. no tags. eyes and rump ok
N74a	7/11/2018	1	540558	6793843	Incidental	C. camphora	20,16	Unknown	Healthy, young. Eyes and rump ok
Autumn 2019									
N10a	23/05/2019	1	542960	6792306	Incidental	E. tereticornis	55	F	Female with large pouch young. No ear tag. healthy. Off-tran near yards
N12a	23/05/2019	1	542520	6792765	Incidental	E. patentinervis		F?	Looked like a female. looked healthy. Eyes ok. Fresh scats.
N19	9/05/2019	1	540156	6796915	Transect	E. grandis	64	M	No tags. Looks healthy, eyes and rump ok. 532 Baggotville Rd. driveway.
N19	9/05/2019	1	540161	6796898	Transect	M. quinquenervia	28	F	Near driveway of 532 Baggotville rd. No tags. Looks good, eyes and rump ok. Different koala
N19a	9/05/2019	1	540156	6796926	Incidental	E. microcorys	21	M	Presume it is the same koala as day survey.
N24a	21/05/2019	1	541683	6794988	Incidental	E. microcorys	62	M?	Clean rump, right eye good eye shine. generally healthy looking.
N33	21/05/2019	1	542258	6795440	Transect	White mahogany	49	F?	Obscured. right eye ok. rump prob ok. Scats found.
N34	9/05/2019	1	538283	6796477	Transect	E. microcorys	54	Female	Red right ear tag, Left eye good. right eye not visible. rump ok. No fresh scat on day survey.
N74	20/05/2019	1	540373	6793888	Transect	E. tereticornis	48	M	Eyes clear, rump stained. 15m off centre line; Fresh scats

Appendix B: Culvert camera detections

Table B1: Details of camera detections at 12 koala culverts monitored on W2B sections 1 & 2. **FF = fauna furniture.**

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
1	Floor	22/09/2018	2036	Cat	D	Complete	East	142	
1	Floor	26/09/2018	0119	EG kangaroo	Pr	Complete	West	144	
1	Floor	26/09/2018	1917	Rodent spp	Pr	Complete	East	145	
1	Floor	26/09/2018	2148	Bandicoot spp	Pr	Complete	East	147	
1	Floor	28/09/2018	0713	EG kangaroo	Pr	Complete	East	148	
1	Floor	28/09/2018	1900	Rodent spp	D	Complete	East	149	
1	Floor	29/09/2018	1911	Black rat	D	Complete	East	150	
1	Floor	29/09/2018	2055	Black rat	Pr	Complete	West	151	
1	Floor	2/10/2018	1743	EG kangaroo	D	Complete	East	153	
1	Floor	2/10/2018	1806	EG kangaroo x 3	D	Complete	West	154,155	
1	Floor	2/10/2018	2140	Rodent spp	D	Complete	East	156	
1	Floor	3/10/2018	2145	Rodent spp	D	Complete	East	157	
1	Floor	5/10/2018	2122	Rodent spp	D	Complete	East	159	
1	Floor	7/10/2018	1946	Cat	D	Complete	West	160	
1	Floor	8/10/2018	0810	EG kangaroo	Pr	Complete	East	161,162	
1	Floor	9/10/2018	0851	Lace monitor	D	Complete	East	163	
1	Floor	9/10/2018	1815	EG kangaroo	D	Complete	East	164,165	
1	Floor	10/10/2018	2005	Rodent spp	D	Complete	East	166	
1	Floor	11/10/2018	2306	Black rat	Pr	Complete	East	167	
1	Floor	12/10/2018	1845	Cat	D	Complete	East	168	
1	Floor	14/10/2018	1517	EG kangaroo	D	Complete	East	169	
1	Floor	14/10/2018	1722	EG kangaroo	D	Complete	West	170	
1	Floor	17/10/2018	2308	Bandicoot spp	D	Complete	West	171	
1	Floor	18/10/2018	0125	Bandicoot spp	Pr	Complete	East	172	
1	Floor	20/10/2018	0156	EG kangaroo	D	Complete	West	173, 174	
1	Floor	22/10/2018	0615	EG kangaroo	D	Complete	East	175, 176	
1	Floor	22/10/2018	0624	EG kangaroo	D	Complete	East	177	
1	Floor	23/10/2018	1526	Lace monitor	D	Complete	West	178	
1	Floor	24/10/2018	2219	Bandicoot spp	D	Complete	West	179	
1	Floor	25/10/2018	0211	Bandicoot spp	Pr	Complete	East	180	
1	Floor	25/10/2018	1939	Bandicoot spp	D	Complete	West	181	
1	Floor	25/10/2018	2350	Bandicoot spp	Pr	Complete	East	182	
1	Floor	26/10/2018	1841	Cat	D	Complete	East	183	
1	Floor	26/10/2018	1918	Bandicoot spp	D	Complete	West	184	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
1	Floor	27/10/2018	0506	EG kangaroo	D	Complete	East	185	
1	Floor	27/10/2018	1810	EG kangaroo	D	Complete	West	186	
1	Floor	28/10/2018	2139	Bandicoot spp	Pr	Complete	East	187	
1	Floor	29/10/2018	0550	EG kangaroo	D	Complete	East	188	
1	FF	nil							
1	FF	30/10/2018	2247	Black rat	D	Complete	East	3	
1	FF	1/11/2018	2140	Black rat	D	Complete	East	10	
1	FF	3/11/2018	0506	EG kangaroo	Pr	Complete	East	12	on ground
1	FF	3/11/2018	1858	Black rat	Pr	Complete	West	15	
1	FF	4/11/2018	1501	EG kangaroo	D	Incomplete	NDM	16	on ground
1	FF	17/11/2018	0429	EG kangaroo	D	Complete	East	27	on ground
1	FF	21/11/2018	0722	EG kangaroo	D	Complete	East	29	on ground
1	FF	21/11/2018	0846	EG kangaroo	D	Complete	East	30	on ground
1	FF	23/11/2018	1506	EG kangaroo	D	Complete	East	32	on ground
1	FF	23/11/2018	1520	EG kangaroo	D	Complete	East	33	on ground
1	FF	29/11/2018	0526	EG kangaroo	D	Complete	East	37	on ground
1	FF	30/11/2018	1716	EG kangaroo	D	Complete	East	41	on ground
1	FF	3/12/2018	2253	Black rat	D	Complete	East	42-43	
1	FF	6/12/2018	0045	Black rat	D	Complete	East	44	
1	FF	6/12/2018	0454	EG kangaroo x 2	D	Complete	East	45	on ground
1	FF	10/12/2018	1622	EG kangaroo	D	Complete	East	51	on ground
1	FF	11/12/2018	0019	Black rat	D	Complete	East	53-60	
1	FF	11/12/2018	1810	EG kangaroo	D	Complete	East	61	on ground
1	FF	13/12/2018	0835	EG kangaroo	D	Complete	East	64	on ground
1	FF	15/12/2018	1909	EG kangaroo	D	Incomplete	NDM	65	on ground
2	Floor	29/10/2018	0240	Cat	D	Complete	East	53	
2	Floor	27/10/2018	2251	Cat	D	Complete	East	51-52	
2	Floor	27/10/2018	2237	Cat	D	Complete	West	47-50	
2	Floor	22/10/2018	0308	Black rat	Pr	Incomplete	Ndm	46	Interferes with cam
2	Floor	17/10/2018	0847	Cat	D	Complete	East	43	
2	Floor	17/10/2018	0630	Cat	D	Incomplete	NDM	37-41	
2	Floor	17/10/2018	0436	Cat	D	Complete	East	35	
2	Floor	17/10/2018	0327	Cat	D	Incomplete	Ndm	34	
2	Floor	17/10/2018	0049	Cat	D	Complete	West	33	
2	Floor	16/10/2018	0444	Cat	D	Complete	East	31	
2	Floor	16/10/2018	0107	Cat	D	Complete	East	29	
2	Floor	13/10/2018	2033	Cat	D	Complete	West	28	
2	Floor	13/10/2018	1714	Fox	D	Complete	East	27	
2	Floor	13/10/2018	1650	Cat	D	Complete	E-W	25-26	
2	Floor	13/10/2018	0631	Cat	D	Complete	East	21-23	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
2	Floor	13/10/2018	0605	Cat	D	Complete	West	20	
2	Floor	13/10/2018	0553	Cat	D	Complete	West	18-19	
2	Floor	12/10/2018	2103	Cat	D	Complete	East	16-17	
2	Floor	12/10/2018	2059	Cat	D	Complete	West	15	
2	Floor	28/09/2018	252	Black rat	D	Incomplete	EXM	5-7	
2	Floor	26/09/2018	1936	Black rat	D	Incomplete	EXM	2-4	
2	Floor	29/10/2018	1824	Antechinus spp	Pr	Complete	East	4	
2	Floor	31/10/2018	0011	Cat	D	Incomplete	NDM	6	Checks out camera
2	Floor	31/10/2018	2029	Antechinus spp	Pr	Incomplete	E-W	10	
2	Floor	2/11/2018	0003	Cat	D	Complete	East	11	ginger
2	Floor	15/11/2018	2151	Cat	D	Complete	West	13	ginger
2	Floor	27/11/2018	2051	Antechinus spp	Pr	Complete	East	14	
2	Floor	27/11/2018	2109	Antechinus spp	Pr	Complete	East	19-20	
2	Floor	5/12/2018	2050	Cat	D	Incomplete	W-E	21-22	ginger
2	Floor	8/12/2018	2118	Cat	D	Complete	West	23	ginger
2	Floor	11/12/2018	0718	EG kangaroo	Pr	Complete	West	24	
2	FF								
2	FF	18/09/2018	2042	Antechinus spp	D	Complete	East	1	Climbs on camera
2	FF	20/09/2018	2202	Antechinus spp	D	Complete	W	2	
2	FF	22/09/2018	0205	Antechinus spp	D	Complete	E	3	
2	FF	25/09/2018	0335	Antechinus spp	D	Complete	W	5	
2	FF	25/09/2018	1918	Antechinus spp	D	Complete	E	6	
2	FF	26/09/2018	1933	Antechinus spp	D	Complete	W-E	7-9	
2	FF	28/09/2018	0244	Antechinus spp	D	Incomplete	E-W	13-14	
2	FF	28/09/2018	1845	Antechinus spp	D	Complete	E	15	
2	FF	29/09/2018	1903	Antechinus spp	D	Incomplete	W-E	16-17	
2	FF	29/09/2018	1921	Antechinus spp	D	Complete	W	18	
2	FF	29/09/2018	2024	Antechinus spp	D	Complete	W	19	
2	FF	30/09/2018	0314	Antechinus spp	D	Complete	E	20	
2	FF	30/09/2018	1840	Antechinus spp	D	Complete	E	22	
2	FF	2/10/2018	0309	Antechinus spp	D	Complete	E	23	
2	FF	3/10/2018	2309	Antechinus spp	Pr	Incomplete	NDM	24	
2	FF	5/10/2018	1916	Antechinus spp	D	Incomplete	W-E	25	
2	FF	7/10/2018	0350	Antechinus spp	D	Complete	E	27	
2	FF	7/10/2018	1913	Antechinus spp	D	Complete	E	28	
2	FF	10/10/2018	0230	Antechinus spp	D	Complete	E	29	
2	FF	10/10/2018	1850	Antechinus spp	D	Complete	E	31	
2	FF	11/10/2018	0210	Antechinus spp	D	Complete	E	34	
2	FF	13/10/2018	2026	Antechinus spp	D	Complete	E	36	
2	FF	13/10/2018	2233	Antechinus spp	D	Complete	W	37	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
2	FF	14/10/2018	0009	Antechinus spp	D	Complete	E	38	
2	FF	14/10/2018	0256	Antechinus spp	D	Complete	E	39	
2	FF	14/10/2018	0434	Antechinus spp	D	Complete	E	40	
2	FF	14/10/2018	1919	Antechinus spp	D	Complete	W	41	
2	FF	14/10/2018	2016	Antechinus spp	D	Complete	E	42	
2	FF	15/10/2018	0238	Antechinus spp	D	Complete	E	43	
2	FF	15/10/2018	0349	Antechinus spp	D	Complete	E	44	
2	FF	15/10/2018	1942	Antechinus spp	D	Complete	E	46	
2	FF	15/10/2018	2234	Antechinus spp	D	Complete	W	47	
2	FF	15/10/2018	2355	Antechinus spp	D	Complete	E	48	
2	FF	16/10/2018	0251	Antechinus spp	D	Complete	E	50	
2	FF	16/10/2018	2014	Antechinus spp	D	Complete	E	52	
2	FF	16/10/2018	2225	Antechinus spp	D	Complete	W	53	
2	FF	17/10/2018	0156	Antechinus spp	D	Complete	E	54	
2	FF	17/10/2018	0421	Antechinus spp	D	Complete	E	56	
2	FF	17/10/2018	2312	Black rat	D	Incomplete	E-W	58-59	
2	FF	18/10/2018	0030	Antechinus spp	D	Complete	E	61	
2	FF	18/10/2018	0414	Antechinus spp	D	Complete	E	63	
2	FF	18/10/2018	1932	Antechinus spp	D	Complete	E	64	
2	FF	19/10/2018	0019	Antechinus spp	D	Complete	E	65	
2	FF	19/10/2018	0307	Antechinus spp	D	Complete	E	66	
2	FF	19/10/2018	0431	Antechinus spp	D	Complete	E	68	
2	FF	19/10/2018	1839	Antechinus spp	Pr	Complete	W	69	
2	FF	19/10/2018	1930	Antechinus spp	D	Complete	E	70	
2	FF	19/10/2018	2320	Antechinus spp	D	Complete	E	71	
2	FF	20/10/2018	0251	Antechinus spp	D	Complete	E	73	
2	FF	20/10/2018	2258	Antechinus spp	D	Complete	E	77	
2	FF	21/10/2018	0008	Antechinus spp	D	Complete	E	79	
2	FF	21/10/2018	0219	Antechinus spp	D	Complete	E	80	
2	FF	21/10/2018	0336	Antechinus spp	D	Complete	E	82	
2	FF	21/10/2018	1837	Antechinus spp	Pr	Complete	W	84	
2	FF	21/10/2018	1904	Antechinus spp	D	Complete	E	85	
2	FF	22/10/2018	0113	Antechinus spp	D	Complete	E	86	
2	FF	22/10/2018	0306	Antechinus spp	D	Incomplete	NDM	87,89	Climbs on camera
2	FF	22/10/2018	0346	Antechinus spp	D	Complete	E	90	
2	FF	22/10/2018	1847	Antechinus spp	D	Complete	E	91	
2	FF	22/10/2018	2247	Antechinus spp	Pr	Complete	W	93-94	
2	FF	22/10/2018	2303	Antechinus spp	D	Complete	E	95	
2	FF	23/10/2018	0252	Antechinus spp	D	Complete	E	97	
2	FF	23/10/2018	0337	Antechinus spp	D	Complete	W	98	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
2	FF	23/10/2018	0430	Antechinus spp	D	Complete	E	99	
2	FF	23/10/2018	1857	Antechinus spp	D	Complete	E	101	
2	FF	23/10/2018	1955	Antechinus spp	D	Complete	E	103	
2	FF	23/10/2018	2220	Antechinus spp	D	Complete	E	105	
2	FF	24/10/2018	0123	Antechinus spp	D	Complete	E	106	
2	FF	24/10/2018	0228	Antechinus spp	Pr	Complete	W	107	
2	FF	24/10/2018	0352	Antechinus spp	D	Complete	E	108	
2	FF	24/10/2018	1902	Antechinus spp	D	Complete	E	110	
2	FF	24/10/2018	2251	Antechinus spp	D	Complete	E	112	
2	FF	25/10/2018	0224	Antechinus spp	D	Complete	E	114	
2	FF	25/10/2018	0434	Antechinus spp	D	Complete	E	116	
2	FF	25/10/2018	1907	Antechinus spp	D	Complete	E	118	
2	FF	25/10/2018	2251	Antechinus spp	D	Complete	W	119	
2	FF	26/10/2018	0030	Antechinus spp	D	Complete	W	120	
2	FF	26/10/2018	0107	Antechinus spp	D	Complete	E	121	
2	FF	26/10/2018	0333	Antechinus spp	D	Complete	E	123	
2	FF	26/10/2018	1905	Antechinus spp	D	Complete	E	125	
2	FF	26/10/2018	2032	Antechinus spp	D	Complete	W	126	
2	FF	26/10/2018	2149	Antechinus spp	D	Complete	E	127	
2	FF	26/10/2018	2217	Antechinus spp	D	Complete	E	128	
2	FF	26/10/2018	2327	Antechinus spp	D	Complete	E	130	
2	FF	27/10/2018	0117	Antechinus spp	D	Complete	E	132	
2	FF	27/10/2018	1903	Antechinus spp	D	Complete	E	135	
2	FF	27/10/2018	2020	Antechinus spp	D	Complete	E	137	
2	FF	27/10/2018	2138	Antechinus spp	D	Incomplete	E-W	139-140	
2	FF	27/10/2018	2236	Antechinus spp	D	Complete	E	141	
2	FF	28/10/2018	0149	Antechinus spp	D	Complete	E	144	
2	FF	28/10/2018	1832	Antechinus spp	D	Complete	E	146	
2	FF	28/10/2018	1950	Antechinus spp	D	Complete	E	148	
2	FF	29/10/2018	0207	Antechinus spp	D	Complete	E	150	
2	FF	29/10/2018	2019	Antechinus spp	D	Complete	E	3	
2	FF	29/10/2018	2135	Antechinus spp	D	Complete	E	5	
2	FF	29/10/2018	2310	Antechinus spp	D	Complete	E	7	
2	FF	30/10/2018	0155	Antechinus spp	D	Complete	E	9	
2	FF	30/10/2018	1823	Antechinus spp	D	Complete	E	10	
2	FF	30/10/2018	1957	Antechinus spp	D	Complete	E	13	
2	FF	30/10/2018	2121	Antechinus spp	D	Complete	E	14	
2	FF	30/10/2018	2139	Antechinus spp	Pr	Complete	W	15	Can just see end of tail
2	FF	31/10/2018	1811	Antechinus spp	D	Complete	W	18-19	
2	FF	31/10/2018	2205	Antechinus spp	D	Complete	E	20	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
2	FF	31/10/2018	2334	Antechinus spp	D	Complete	E	21	
2	FF	1/11/2018	1827	Antechinus spp	D	Complete	E	23	
2	FF	1/11/2018	1941	Antechinus spp	D	Complete	E	25	
2	FF	1/11/2018	2032	Antechinus spp	D	Incomplete	E-W	27-28	
2	FF	1/11/2018	2334	Antechinus spp	D	Complete	E	29	
2	FF	2/11/2018	1836	Antechinus spp	D	Complete	E	30	
2	FF	2/11/2018	1953	Antechinus spp	D	Complete	E	32	
2	FF	2/11/2018	2033	Antechinus spp	D	Complete	E	34	
2	FF	2/11/2018	2115	Antechinus spp	D	Complete	E	36	
2	FF	2/11/2018	2207	Antechinus spp	D	Complete	E	38	
2	FF	2/11/2018	2323	Antechinus spp	D	Complete	E	39	
2	FF	3/11/2018	1819	Antechinus spp	D	Complete	E	41	
2	FF	3/11/2018	2032	Antechinus spp	D	Incomplete	E-W	43-44	
2	FF	3/11/2018	2207	Antechinus spp	D	Complete	E	45	
2	FF	3/11/2018	2255	Antechinus spp	D	Complete	E	46	
2	FF	4/11/2018	0015	Antechinus spp	D	Complete	E	48	
2	FF	4/11/2018	0125	Antechinus spp	D	Complete	E	50	
2	FF	4/11/2018	1829	Antechinus spp	D	Complete	W	52	
2	FF	4/11/2018	1843	Antechinus spp	D	Complete	W	54	
2	FF	6/11/2018	2326	Antechinus spp	D	Complete	E	56	Carrying young
2	FF	7/11/2018	2314	Antechinus spp	D	Incomplete	W-E	57-58	
2	FF	7/11/2018	2319	Black rat	D	Incomplete	E-W	59-63	
2	FF	12/11/2018	0030	Antechinus spp	D	Incomplete	E-W	64-65	
2	FF	15/11/2018	0407	Antechinus spp	D	Incomplete	W-E	66-67	
2	FF	25/11/2018	0405	Antechinus spp	D	Incomplete	W-E	70-71	
2	FF	27/11/2018	0310	Antechinus spp	D	Incomplete	W-E	72-73	
2	FF	2/12/2018	1911	Antechinus spp	D	Complete	E	76	
2	FF	3/12/2018	1905	Antechinus spp	D	Incomplete	W-E	77-78	
2	FF	4/12/2018	1924	Antechinus spp	D	Complete	E	80	
2	FF	4/12/2018	2102	Antechinus spp	D	Complete	W	81	
2	FF	4/12/2018	2151	Antechinus spp	D	Complete	E	82	
2	FF	5/12/2018	0309	Antechinus spp	D	Complete	E	84	
2	FF	5/12/2018	1913	Antechinus spp	D	Complete	E	86	
2	FF	10/12/2018	1910	Antechinus spp	D	Complete	E	89	
3	FF	21/09/2018	0326	Antechinus spp	Pr	Complete	East	1	
3	FF	23/09/2018	1957	Antechinus spp	Pr	Complete	East	2	
3	FF	6/10/2018	2204	Black rat	D	Complete	West	3	
3	FF	6/10/2018	2241	Black rat	Pr	Complete	East	4	
3	FF	10/10/2018	2220	Black rat	D	Complete	West	7	
3	FF	14/10/2018	1944	Black rat	D	Complete	East	8	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
3	FF	21/10/2018	0341	Antechinus spp	D	Complete	East	9-11	
3	FF	8/11/2018	2244	Black rat	D	Complete	West	1	
3	FF	8/11/2018	2310	Black rat	D	Complete	East	2	
3	FF	18/11/2018	1954	Microbat spp	D	Incomplete	NDM	3	
3	FF	24/11/2018	2309	CBtP	D	Complete	East	5	
3	FF	11/12/2018	2247	Antechinus spp	D	Complete	West	9	
3	FF	11/12/2018	2306	Antechinus spp	D	Complete	East	10	
3	Floor	nil							
3	Floor	NA	0559	Lace monitor	D	Complete	East	13	
4	Floor	19/09/2018	2106	Micro bat	D	Incomplete	EXM	1	
4	Floor	19/09/2018	2321	Echidna	D	Complete	West	2	
4	Floor	19/09/2018	2358	Rodent spp	Pr	Complete	East	3	
4	Floor	22/09/2018	0038	Cat	D	Complete	East	4	
4	Floor	22/09/2018	0243	Cat	D	Complete	West	5	
4	Floor	23/09/2018	0016	SEBtP	D	Incomplete	E-W	6-7	
4	Floor	23/09/2018	0337	SEBtP	D	Complete	West	9	
4	Floor	23/09/2018	2032	SEBtP	D	Complete	West	11	
4	Floor	23/09/2018	2107	SEBtP	D	Complete	East	12	
4	Floor	24/09/2018	2358	Rodent spp	D	Complete	East	13	
4	Floor	28/09/2018	2029	Antechinus spp	D	Complete	East	15	
4	Floor	30/09/2018	1841	SEBtP	D	Complete	East	17	
4	Floor	30/09/2018	2013	Bandicoot spp	D	Complete	East	18	
4	Floor	30/09/2018	2158	SEBtP	D	Complete	West	19	
4	Floor	30/09/2018	2251	Unidentified medium mammal	D	Complete	West	20	Moving too fast/blurry
4	Floor	1/10/2018	0312	SEBtP	D	Complete	West	21	
4	Floor	1/10/2018	0334	SEBtP	D	Complete	East	22	
4	Floor	1/10/2018	0521	EG kangaroo x 2	D	Complete	East	23	
4	Floor	1/10/2018	1746	Antechinus spp	D	Complete	East	24	
4	Floor	2/10/2018	2146	SEBtP	D	Complete	East	25	
4	Floor	2/10/2018	2235	SEBtP	D	Complete	West	26	
4	Floor	3/10/2018	1923	Bandicoot spp	D	Complete	East	27	
4	Floor	3/10/2018	2126	Bandicoot spp	D	Complete	East	28	
4	Floor	4/10/2018	1826	Unidentified small mammal	D	Complete	East	30	
4	Floor	5/10/2018	1915	SEBtP	D	Complete	West	32	
4	Floor	5/10/2018	2309	SEBtP	D	Incomplete	E-W	33-34	
4	Floor	5/10/2018	2312	SEBtP	D	Complete	East	35	
4	Floor	5/10/2018	2321	Antechinus spp	D	Complete	West	36	
4	Floor	8/10/2018	0057	SEBtP	Pr	Complete	E	38	
4	Floor	8/10/2018	0212	Small mammal spp	D	Complete	West	39	
4	Floor	8/10/2018	2242	SEBtP	D	Complete	E	40	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
4	Floor	9/10/2018	1753	Antechinus spp	D	Complete	E	43	
4	Floor	9/10/2018	2143	SEBtP	D	Complete	E	44	
4	Floor	10/10/2018	0142	SEBtP	D	Complete	West	45	
4	Floor	11/10/2018	1944	Northern brown bandicoot	D	Complete	West	47	
4	Floor	12/10/2018	0028	Medium mammal spp	D	Complete	E	48	
4	Floor	12/10/2018	0256	Cat	D	Incomplete	W-E	49-50	
4	Floor	12/10/2018	0548	Cat	D	Complete	E	51-53	
4	Floor	12/10/2018	2349	Bandicoot spp	D	Complete	E	54	
4	Floor	13/10/2018	2339	Northern brown bandicoot	D	Complete	W	55-56	
4	Floor	14/10/2018	156	Bandicoot spp	D	Complete	E	58	
4	Floor	14/10/2018	1956	SEBtP	D	Complete	E	59	
4	Floor	14/10/2018	2132	Bandicoot spp	D	Complete	E	61	
4	Floor	15/10/2018	342	Bandicoot spp	D	Complete	E	63	
4	Floor	16/10/2018	207	Northern brown bandicoot	D	Complete	W	64	
4	Floor	17/10/2018	2224	Bandicoot spp	D	Complete	E	68	
4	Floor	17/10/2018	2335	Cat	D	Complete	E	69	
4	Floor	19/10/2018	1937	SEBtP	D	Complete	W	71	
4	Floor	19/10/2018	2032	SEBtP	D	Complete	E	72	
4	Floor	20/10/2018	0303	Northern brown bandicoot	Pr	Complete	W	74	
4	Floor	21/10/2018	0203	Bandicoot spp	D	Complete	E	75	
4	Floor	21/10/2018	0336	Northern brown bandicoot	D	Complete	W	77	
4	Floor	21/10/2018	2150	Bandicoot spp	D	Complete	E	79	
4	Floor	22/10/2018	0351	Northern brown bandicoot	Pr	Complete	W	80	
4	Floor	22/10/2018	2214	Bandicoot spp	D	Complete	E	81	
4	Floor	23/10/2018	0307	Bandicoot spp	D	Complete	W	81	
4	Floor	23/10/2018	1839	Antechinus spp	D	Incomplete	EXM	83	
4	Floor	24/10/2018	0500	Antechinus spp	Pr	Complete	E	84	
4	Floor	24/10/2018	1845	Bandicoot spp	D	Complete	E	86	
4	Floor	24/10/2018	2144	Bandicoot spp	D	Complete	E	87	
4	Floor	25/10/2018	221	Northern brown bandicoot	D	Complete	W	88	
4	Floor	25/10/2018	1821	Bandicoot spp	D	Complete	E	89	
4	Floor	26/10/2018	0008	Northern brown bandicoot	D	Complete	W	90	
4	Floor	26/10/2018	1553	Lace monitor	D	Complete	W	92	
4	Floor	27/10/2018	0456	Antechinus spp	Pr	Complete	W	93	
4	Floor	28/10/2018	2300	SEBtP	D	Complete	E	95	
4	Floor	29/10/2018	0115	SEBtP	D	Complete	W	96	
4	Floor	29/10/2018	0403	Bandicoot spp	D	Complete	E	97	
4	Floor	30/10/2018	2211	Bandicoot spp	D	Complete	E	98	
4	Floor	31/10/2018	2151	SEBtP	D	Complete	E	6	
4	Floor	31/10/2018	2233	SEBtP	D	Complete	W	7	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
4	Floor	1/11/2018	0722	Lace monitor	D	Complete	W	8	
4	Floor	1/11/2018	1704	Lace monitor	D	Complete	E	9	
4	Floor	2/11/2018	1931	Antechinus spp	D	Complete	E	10	
4	Floor	2/11/2018	2149	Bandicoot spp	D	Complete	W	11	
4	Floor	3/11/2018	0040	Northern brown bandicoot	D	Complete	W	12	
4	Floor	3/11/2018	0227	Bandicoot spp	D	Complete	W	13	
4	Floor	3/11/2018	1529	Lace monitor	D	Complete	W	14	
4	Floor	3/11/2018	2258	Antechinus spp	D	Complete	W	15-17	
4	Floor	4/11/2018	0001	Antechinus spp	D	Complete	W	18	
4	Floor	7/11/2018	0000	Bandicoot spp	D	Complete	E	21	
4	Floor	8/11/2018	2154	SEBtP	Pr	Complete	E	23	
4	Floor	8/11/2018	2157	Bandicoot spp	D	Complete	E	24	
4	Floor	8/11/2018	2308	SEBtP	D	Complete	W	26	
4	Floor	10/11/2018	0856	Lace monitor	D	Complete	E	28	
4	Floor	12/11/2018	0439	Antechinus spp	Pr	Incomplete	NDM	30	
4	Floor	12/11/2018	2149	Bandicoot spp	D	Complete	E	31	
4	Floor	12/11/2018	2235	SEBtP	D	Complete	E	32	
4	Floor	12/11/2018	2341	SEBtP	D	Complete	W	33	
4	Floor	14/11/2018	0850	Lace monitor	D	Complete	W	34	
4	Floor	15/11/2018	2356	Bandicoot spp	Pr	Complete	E	35	
4	Floor	16/11/2018	0021	Long-nosed potoroo	D	Incomplete	E-W	36-37	
4	Floor	16/11/2018	0123	Bandicoot spp	D	Complete	E	38	
4	Floor	16/11/2018	0156	Long-nosed bandicoot	Pr	Complete	W	40	
4	Floor	18/11/2018	2235	Bandicoot spp	D	Complete	E	44	
4	Floor	22/11/2018	0249	Northern brown bandicoot	D	Complete	W	48	
4	Floor	23/11/2018	0005	SEBtP	D	Complete	E	50	
4	Floor	23/11/2018	0237	SEBtP	D	Complete	W	51	
4	Floor	24/11/2018	2313	SEBtP	D	Complete	E	55	
4	Floor	25/11/2018	0220	SEBtP	D	Complete	W	56	
4	Floor	25/11/2018	1619	Lace monitor	D	Complete	E	57	
4	Floor	25/11/2018	1951	Bandicoot spp	D	Complete	E	58	
4	Floor	26/11/2018	0745	Lace monitor	D	Complete	W	59	
4	Floor	26/11/2018	2219	Northern brown bandicoot	Pr	Complete	E	60	
4	Floor	27/11/2018	0032	Antechinus spp	Pr	Complete	E	61	
4	Floor	27/11/2018	1533	Lace monitor	D	Complete	E	62	
4	Floor	28/11/2018	0354	Antechinus spp	Pr	Complete	E	64	
4	Floor	28/11/2018	2115	SEBtP	D	Complete	E	65	
4	Floor	28/11/2018	2229	Bandicoot spp	D	Complete	E	66	
4	Floor	29/11/2018	0224	BtPoss spp	D	Complete	W	67	
4	Floor	29/11/2018	1547	Lace monitor	D	Complete	E	69	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
4	Floor	29/11/2018	1605	Lace monitor	D	Complete	E	70	
4	Floor	29/11/2018	2213	Bandicoot spp	D	Complete	E	71	
4	Floor	30/11/2018	0118	Bandicoot spp	D	Complete	W	72	
4	Floor	30/11/2018	0125	Bandicoot spp	D	Complete	W	73	
4	Floor	30/11/2018	0159	SEBtP	D	Complete	E	74	
4	Floor	30/11/2018	0232	Bandicoot spp	D	Complete	W	75	
4	Floor	30/11/2018	0317	SEBtP	D	Complete	W	76	
4	Floor	30/11/2018	0427	Antechinus spp	D	Complete	E	77	
4	Floor	30/11/2018	2006	SEBtP	D	Complete	E	78	
4	Floor	1/12/2018	0053	Small mammal spp	D	Complete	E	80	
4	Floor	1/12/2018	0138	SEBtP	D	Complete	W	81	
4	Floor	1/12/2018	2054	Bandicoot spp	D	Complete	E	82	
4	Floor	1/12/2018	2118	SEBtP	D	Complete	E	83	
4	Floor	2/12/2018	0135	Bandicoot spp	D	Complete	W	85	
4	Floor	2/12/2018	0151	SEBtP	Pr	Complete	W	86	
4	Floor	2/12/2018	0441	Antechinus spp	D	Complete	W	87	
4	Floor	2/12/2018	0803	Lace monitor	D	Complete	W	88	
4	Floor	2/12/2018	2018	Bandicoot spp	D	Complete	W	89	
4	Floor	3/12/2018	2209	Bandicoot spp	D	Complete	E	90	
4	Floor	3/12/2018	2246	Bandicoot spp	D	Complete	E	91	
4	Floor	4/12/2018	0001	Bandicoot spp	Pr	Complete	E	92	
4	Floor	5/12/2018	0807	Lace monitor	D	Complete	W	93	
4	Floor	5/12/2018	2314	Bandicoot spp	D	Complete	W	94	
4	Floor	6/12/2018	0746	Lace monitor	D	Complete	W	95	
4	Floor	6/12/2018	2200	Bandicoot spp	D	Complete	E	96	
4	Floor	6/12/2018	2314	Northern brown bandicoot	Pr	Complete	W	97	
4	Floor	7/12/2018	2032	Bandicoot spp	D	Complete	W	98	
4	Floor	8/12/2018	0037	Bandicoot spp	D	Complete	E	99	
4	Floor	8/12/2018	2007	Northern brown bandicoot	Pr	Complete	E	100	
4	Floor	8/12/2018	2022	Bandicoot spp	D	Complete	W	101	
4	Floor	9/12/2018	0325	Swamp wallaby	Pr	Complete	W	102	
4	Floor	9/12/2018	0432	Antechinus spp	D	Complete	W	103	
4	Floor	9/12/2018	0504	EG kangaroo	D	Complete	W	104	
4	Floor	9/12/2018	1833	EG kangaroo x 2	D	Complete	E	105	
4	Floor	10/12/2018	0440	European hare	D	Complete	E	106	
4	Floor	10/12/2018	0521	European hare	D	Complete	W	107	
4	Floor	11/12/2018	2123	SEBtP	D	Complete	E	108	
4	Floor	12/12/2018	0021	SEBtP	D	Complete	W	109	
4	Floor	12/12/2018	2328	Bandicoot spp	D	Complete	E	111	
4	Floor	13/12/2018	2345	Long-nosed bandicoot	Pr	Complete	W	112	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
4	Furniture	23/09/2018	0322	Antechinus spp	D	Complete	E	3	
4	Furniture	23/09/2018	336	Antechinus spp	D	Complete	E	4-5	
4	Furniture	26/09/2018	1900	Antechinus spp	D	Complete	E	6	
4	Furniture	26/09/2018	1912	Antechinus spp	D	Incomplete	E-W	7-10	
4	Furniture	26/09/2018	1930	Antechinus spp	D	Complete	E	11	
4	Furniture	26/09/2018	1952	Antechinus spp	D	Complete	E	12	
4	Furniture	27/09/2018	1912	Antechinus spp	D	Complete	E	13	
4	Furniture	27/09/2018	2204	Antechinus spp	D	Complete	E	14-24	Runs back and fourth
4	Furniture	28/09/2018	1836	Antechinus spp	D	Complete	E	25-27	
4	Furniture	28/09/2018	1906	Antechinus spp	D	Complete	W	28	
4	Furniture	28/09/2018	1918	Antechinus spp	D	Incomplete	W-E	29-30	
4	Furniture	28/09/2018	2004	Antechinus spp	D	Complete	E	32	
4	Furniture	29/09/2018	444	Antechinus spp	D	Complete	E	37	
4	Furniture	29/09/2018	508	Antechinus spp	D	Complete	E	40	
4	Furniture	29/09/2018	1845	Antechinus spp	D	Incomplete	W-E	43-44	
4	Furniture	29/09/2018	1911	Antechinus spp	D	Incomplete	W-E	45-48	
4	Furniture	29/09/2018	2127	Antechinus spp	D	Complete	E	51	
4	Furniture	30/09/2018	1847	Antechinus spp	D	Complete	E	52	
4	Furniture	30/09/2018	1858	Antechinus spp	D	Complete	E	54	
4	Furniture	1/10/2018	1740	Antechinus spp	D	Incomplete	E-W	56-58	
4	Furniture	1/10/2018	1802	Antechinus spp	D	Incomplete	W-E	59-60	
4	Furniture	1/10/2018	1824	Antechinus spp	D	Complete	E	62	
4	Furniture	1/10/2018	1846	Antechinus spp	D	Complete	E	63	
4	Furniture	2/10/2018	0411	Antechinus spp	D	Complete	E	64	
4	Furniture	2/10/2018	0424	Antechinus spp	D	Incomplete	NDM	65	
4	Furniture	2/10/2018	1928	Antechinus spp	D	Complete	E	66	
4	Furniture	3/10/2018	1752	Antechinus spp	D	Complete	E	68	
4	Furniture	4/10/2018	1731	Antechinus spp	D	Complete	E	71	
4	Furniture	4/10/2018	1743	Antechinus spp	D	Complete	E	74	
4	Furniture	5/10/2018	2306	Antechinus spp	D	Complete	E	77	
4	Furniture	6/10/2018	0239	Antechinus spp	D	Complete	E	79	
4	Furniture	6/10/2018	0258	Antechinus spp	D	Complete	E	81	
4	Furniture	6/10/2018	0335	Antechinus spp	D	Complete	E	82	
4	Furniture	6/10/2018	1745	Antechinus spp	D	Complete	E	84	
4	Furniture	6/10/2018	1832	Antechinus spp	D	Complete	E	86	
4	Furniture	6/10/2018	2003	Antechinus spp	D	Complete	E	88	
4	Furniture	9/10/2018	1915	Antechinus spp	D	Complete	E	91	
4	Furniture	9/10/2018	1946	Antechinus spp	D	Complete	E	92	
4	Furniture	12/10/2018	0223	Antechinus spp	D	Complete	E	93	
4	Furniture	14/10/2018	1923	Antechinus spp	D	Complete	E	94	
4	Furniture	14/10/2018	2007	Antechinus spp	D	Complete	E	96	
4	Furniture	14/10/2018	2112	Antechinus spp	D	Complete	E	97	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
4	Furniture	14/10/2018	2135	Antechinus spp	D	Complete	E	98	
4	Furniture	16/10/2018	0144	Antechinus spp	D	Complete	E	100	
4	Furniture	16/10/2018	0217	Antechinus spp	D	Complete	E	102	
4	Furniture	16/10/2018	1756	Antechinus spp	D	Complete	E	104	
4	Furniture	16/10/2018	1804	Antechinus spp	D	Incomplete	E-W	107-109	
4	Furniture	16/10/2018	1841	Antechinus spp	D	Complete	E	110	
4	Furniture	16/10/2018	1949	Antechinus spp	D	Complete	E	112	
4	Furniture	18/10/2018	2204	Antechinus spp	D	Complete	E	113-117	
4	Furniture	18/10/2018	2249	Antechinus spp	D	Complete	E	119-121	
4	Furniture	18/10/2018	2310	Antechinus spp	D	Complete	E	123	
4	Furniture	18/10/2018	2315	Antechinus spp	D	Complete	E	124-131	
4	Furniture	18/10/2018	2355	Antechinus spp	D	Complete	E	134	
4	Furniture	19/10/2018	0007	Antechinus spp	D	Complete	E	135-138	Collecting and transporting bark
4	Furniture	19/10/2018	0028	Antechinus spp	D	Complete	E	139-140	
4	Furniture	19/10/2018	0042	Antechinus spp	D	Complete	E	141-142	
4	Furniture	19/10/2018	0052	Antechinus spp	Pr	Complete	W	144	
4	Furniture	19/10/2018	1837	Antechinus spp	D	Complete	E	147	
4	Furniture	19/10/2018	1922	Antechinus spp	D	Complete	E	149	
4	Furniture	19/10/2018	1941	Antechinus spp	D	Complete	E	151	
4	Furniture	19/10/2018	1952	Antechinus spp	D	Complete	E	152	
4	Furniture	20/10/2018	1817	Antechinus spp	D	Complete	E	154	
4	Furniture	20/10/2018	1829	Antechinus spp	D	Incomplete	w-e	155-156	
4	Furniture	20/10/2018	1907	Antechinus spp	D	Complete	E	157-158	
4	Furniture	20/10/2018	1940	Antechinus spp	D	Complete	E	160	
4	Furniture	21/10/2018	0216	Antechinus spp	D	Complete	E	161	
4	Furniture	21/10/2018	0228	Antechinus spp	D	Complete	E	162	
4	Furniture	21/10/2018	1654	Antechinus spp	D	Complete	E	165	
4	Furniture	21/10/2018	1753	Antechinus spp	D	Complete	E	168-169	
4	Furniture	22/10/2018	1841	Antechinus spp	D	Incomplete	E-W	172	
4	Furniture	23/10/2018	0121	Antechinus spp	D	Complete	E	173	
4	Furniture	23/10/2018	0138	Antechinus spp	D	Complete	E	175	
4	Furniture	23/10/2018	0407	Antechinus spp	D	Complete	E	177	
4	Furniture	23/10/2018	0441	Antechinus spp	D	Complete	E	178	
4	Furniture	23/10/2018	1741	Antechinus spp	D	Complete	E	184	
4	Furniture	23/10/2018	1840	Antechinus spp	D	Complete	E	186-192	Back and fourth with bark
4	Furniture	24/10/2018	0249	Antechinus spp	D	Complete	E	194	
4	Furniture	24/10/2018	0305	Antechinus spp	D	Complete	E	195-196	
4	Furniture	24/10/2018	0343	Antechinus spp	D	Complete	E	198-199	
4	Furniture	24/10/2018	0501	Antechinus spp	D	Complete	E	200	
4	Furniture	24/10/2018	1757	Antechinus spp	D	Complete	E	204	
4	Furniture	24/10/2018	2206	CBtP	D	Complete	E	207	
4	Furniture	26/10/2018	1739	Antechinus spp	D	Complete	E	208	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
4	Furniture	27/10/2018	1913	Antechinus spp	D	Complete	E	211	
4	Furniture	28/10/2018	1855	Antechinus spp	D	Complete	E	213	
4	Furniture	28/10/2018	1911	Antechinus spp	D	Complete	E	215	
4	Furniture	29/10/2018	1912	Antechinus spp	D	Complete	E	217	
4	Furniture	30/10/2018	1810	Antechinus spp	D	Complete	E	218	
4	Furniture	31/10/2018	1908	Antechinus spp	D	Complete	E	1	
4	Furniture	31/10/2018	1938	Antechinus spp	D	Complete	E	2	
4	Furniture	31/10/2018	1952	Antechinus spp	D	Complete	W	3	
4	Furniture	31/10/2018	2038	Antechinus spp	D	Complete	E	4	
4	Furniture	2/11/2018	1917	Antechinus spp	D	Complete	E	5	
4	Furniture	3/11/2018	2213	Antechinus spp	D	Complete	E	8-9	
4	Furniture	3/11/2018	2221	Antechinus spp	D	Incomplete	W-E	10-13	
4	Furniture	3/11/2018	2317	Antechinus spp	D	Complete	E	14	
4	Furniture	4/11/2018	1906	Antechinus spp	D	Complete	E	15	
4	Furniture	4/11/2018	1928	Antechinus spp	D	Complete	E	16	
4	Furniture	5/11/2018	0412	Antechinus spp	D	Complete	E	18	
4	Furniture	5/11/2018	0425	Antechinus spp	D	Incomplete	W-E	19-20	
4	Furniture	5/11/2018	1846	Antechinus spp	D	Complete	W	21	
4	Furniture	6/11/2018	2118	Antechinus spp	D	Complete	E	22	
4	Furniture	7/11/2018	0349	Antechinus spp	D	Complete	W	26	
4	Furniture	7/11/2018	1813	Antechinus spp	D	Complete	E	27	
4	Furniture	9/11/2018	1925	Antechinus spp	D	Complete	W-E	32-33	
4	Furniture	9/11/2018	2039	Antechinus spp	D	Complete	E	34	
4	Furniture	10/11/2018	1840	Antechinus spp	D	Complete	E	36	
4	Furniture	10/11/2018	2213	Antechinus spp	D	Incomplete	W-E	38-39	
4	Furniture	10/11/2018	2249	Antechinus spp	D	Complete	E	40,42	
4	Furniture	11/11/2018	0513	Antechinus spp	D	Complete	E	43	
4	Furniture	11/11/2018	1921	Antechinus spp	D	Complete	E	44	
4	Furniture	11/11/2018	1944	Antechinus spp	D	Complete	E	45	
4	Furniture	11/11/2018	2001	Antechinus spp	D	Incomplete	W-E	47-48	
4	Furniture	11/11/2018	0435	Antechinus spp	D	Complete	E	49	
4	Furniture	12/11/2018	1820	Antechinus spp	D	Complete	E	51	
4	Furniture	13/11/2018	0309	Antechinus spp	D	Complete	E	53	
4	Furniture	14/11/2018	1823	Antechinus spp	D	Complete	E	55	
4	Furniture	17/11/2018	2018	Antechinus spp	D	Complete	E	58	
4	Furniture	19/11/2018	0242	Antechinus spp	D	Complete	E	60	
4	Furniture	20/11/2018	0435	Antechinus spp	D	Complete	E	62	
4	Furniture	20/11/2018	1834	Antechinus spp	D	Complete	E	64	
4	Furniture	20/11/2018	1854	Antechinus spp	D	Complete	E	67	
4	Furniture	23/11/2018	0040	Antechinus spp	D	Complete	E	68	
4	Furniture	23/11/2018	1914	Antechinus spp	D	Complete	E	71	
4	Furniture	24/11/2018	0249	Antechinus spp	D	Complete	E	75	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
4	Furniture	25/11/2018	0404	Antechinus spp	D	Complete	E	76	
4	Furniture	25/11/2018	2116	Antechinus spp	D	Complete	E	78,80,81	with young
4	Furniture	26/11/2018	1842	Antechinus spp	D	Complete	E	86	
4	Furniture	26/11/2018	2057	Antechinus spp	D	Complete	E	88	
4	Furniture	26/11/2018	2315	Antechinus spp	D	Complete	E	89	
4	Furniture	27/11/2018	0035	Antechinus spp	D	Complete	E	91	
4	Furniture	27/11/2018	0333	Antechinus spp	D	Complete	E	93,95,97	
4	Furniture	27/11/2018	1842	Antechinus spp	D	Complete	E	98	
4	Furniture	27/11/2018	2219	Antechinus spp	D	Complete	E	100	
4	Furniture	27/11/2018	2347	Antechinus spp	D	Complete	E	101	
4	Furniture	28/11/2018	0126	Antechinus spp	D	Complete	E	102	
4	Furniture	28/11/2018	2032	Antechinus spp	D	Complete	E	104	
4	Furniture	29/11/2018	0107	Antechinus spp	D	Complete	E	105	
4	Furniture	29/11/2018	0227	Antechinus spp	D	Incomplete	E-W	107-108	carrying bark
4	Furniture	29/11/2018	0400	Antechinus spp	D	Complete	E	109-113	carrying bark
4	Furniture	29/11/2018	1856	Antechinus spp	D	Complete	E	115	
4	Furniture	29/11/2018	2130	Antechinus spp	D	Complete	E	117	
4	Furniture	30/11/2018	2110	Antechinus spp	D	Complete	E	119	
4	Furniture	30/11/2018	2341	Antechinus spp	D	Complete	E	121	
4	Furniture	1/12/2018	1201	Antechinus spp	D	Complete	E	123	
4	Furniture	1/12/2018	2238	Antechinus spp	D	Complete	E	125	
4	Furniture	2/12/2018	0438	Antechinus spp	D	Complete	E	126	
4	Furniture	2/12/2018	1953	Antechinus spp	D	Complete	E	127	
4	Furniture	3/12/2018	0432	Antechinus spp	D	Complete	E	130	
4	Furniture	3/12/2018	2128	Antechinus spp	D	Complete	E	131	
4	Furniture	3/12/2018	2252	Antechinus spp	D	Incomplete	W-E	133-134	
4	Furniture	4/12/2018	0150	Antechinus spp	D	Complete	E	135	
4	Furniture	4/12/2018	2036	Antechinus spp	D	Complete	E	136	
4	Furniture	4/12/2018	2131	Antechinus spp	D	Complete	E	138	
4	Furniture	4/12/2018	2338	Antechinus spp	D	Complete	E	140	
4	Furniture	6/12/2018	0018	Antechinus spp	D	Complete	E	142	
4	Furniture	6/12/2018	2038	Antechinus spp	D	Complete	E	144	
4	Furniture	6/12/2018	2238	Antechinus spp	D	Complete	E	146	
4	Furniture	7/12/2018	1854	Antechinus spp	D	Incomplete	NDM	147	
4	Furniture	8/12/2018	0141	Antechinus spp	D	Complete	E	148	
4	Furniture	8/12/2018	1912	Antechinus spp	D	Complete	E	149	
4	Furniture	8/12/2018	2336	Antechinus spp	D	Complete	E	151	
4	Furniture	9/12/2018	0425	Antechinus spp	D	Complete	E	153	
4	Furniture	9/12/2018	1914	Antechinus spp	D	Complete	E	155	
4	Furniture	9/12/2018	2323	Antechinus spp	D	Complete	E	157	
4	Furniture	10/12/2018	0153	Antechinus spp	D	Complete	E	158	
4	Furniture	10/12/2018	0430	Antechinus spp	D	Complete	E	159	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
4	Furniture	10/12/2018	2045	Antechinus spp	D	Complete	E	160	
4	Furniture	11/12/2018	0009	Antechinus spp	D	Complete	E	161	
4	Furniture	11/12/2018	1944	Antechinus spp	D	Complete	E	162	
4	Furniture	11/12/2018	2028	Antechinus spp	D	Complete	E	163	
4	Furniture	12/12/2018	2006	Antechinus spp	D	Complete	E	165	
4	Furniture	12/12/2018	2204	Antechinus spp	D	Complete	E	166	
4	Furniture	13/12/2018	0439	Antechinus spp	D	Complete	E	168	
4	Furniture	14/12/2018	0007	Antechinus spp	D	Complete	E	169	
4	Furniture	14/12/2018	1856	Antechinus spp	D	Complete	E	170	
4	Furniture	15/12/2018	0028	Antechinus spp	D	Complete	E	172	
4	Furniture	15/12/2018	1940	Antechinus spp	D	Complete	E	173	
4	Furniture	15/12/2018	2246	Antechinus spp	D	Complete	E	174	
4	Furniture	15/12/2018	2305	Antechinus spp	D	Incomplete	W-E	175-177	
4	Furniture	16/12/2018	0317	Antechinus spp	D	Incomplete	W-E	178-179	
5	Floor	1/10/2018	0022	Cat	D	Complete	E	35	tabby
5	Floor	1/10/2018	0058	Cat	D	Incomplete	W-E	36-37	tabby
5	Floor	1/10/2018	0556	EG kangaroo	D	Incomplete	W-E	38-39	
5	Floor	1/10/2018	2315	CBtP	Pr	Complete	E	40	
5	Floor	6/10/2018	0042	CBtP	Pr	Complete	W	41	
5	Floor	10/10/2018	0044	Bandicoot spp	D	Complete	E	43	
5	Floor	10/10/2018	0423	Cat	D	Complete	E	44	tabby
5	Floor	10/10/2018	0447	Cat	D	Complete	E	45	tabby
5	Floor	10/10/2018	1804	Cat	D	Complete	E	46	tabby
5	Floor	13/10/2019	2258	Bandicoot spp	D	Complete	E	47	
5	Floor	17/10/2019	2307	Bandicoot spp	D	Complete	E	48	
5	Floor	18/10/2019	1940	cat	D	Complete	E	50	tabby
5	Floor	18/10/2019	2002	BtPoss spp	D	Complete	E	51	
5	Floor	18/10/2019	2034	cat	D	Complete	W	52-53	ginger
5	Floor	21/10/2018	0139	Rodent spp	D	Complete	E	55	
5	Floor	24/10/2018	2212	Bandicoot spp	Pr	Complete	E	57	
5	Floor	26/10/2018	2142	Koala	D	Complete	E	59	
5	Floor	28/10/2018	2319	Bandicoot spp	Pr	Complete	E	60	
5	Floor	3/11/2018	2135	SEBtP	D	Complete	E	6	
5	Floor	26/11/2018	0234	SEBtP	D	Complete	E	11	
5	Floor	2/12/2018	1731	Lace monitor	D	Complete	W	15	
5	Floor	13/12/2018	2347	Bandicoot spp	D	Complete	E	20	
5	Furniture	19/09/2018	0442	Antechinus spp		Complete	E	19	
5	Furniture	20/09/2018	0241	Antechinus spp		Complete	E	21	
5	Furniture	23/09/2018	0416	Antechinus spp		Complete	E	23	
5	Furniture	28/09/2018	1845	Antechinus spp		Complete	E	26	
5	Furniture	2/10/2018	2104	Antechinus spp		Complete	E	28	
5	Furniture	4/10/2018	2110	Antechinus spp		Complete	E	30	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
5	Furniture	8/10/2018	0406	cat		Complete	W	31	tabby
5	Furniture	9/10/2018	2321	Antechinus spp	D	Complete	E	32	
5	Furniture	10/10/2018	0351	cat	D	Complete	W	34	tabby
5	Furniture	10/10/2018	0451	cat	D	Complete	W	35	tabby
5	Furniture	10/10/2018	0508	cat	D	Complete	E	36	tabby
5	Furniture	10/10/2018	0522	cat	D	Complete	W	37	tabby
5	Furniture	10/10/2018	1836	Antechinus spp	D	Complete	E	38	
5	Furniture	10/10/2018	1840	cat	D	incomplete	W-E	40-41	tabby
5	Furniture	10/10/2018	1950	Antechinus spp	D	Complete	E	42	
5	Furniture	11/10/2018	2111	Antechinus spp	D	Complete	E	44	
5	Furniture	13/10/2018	2015	Antechinus spp	D	Complete	E	46	
5	Furniture	14/10/2018	2235	Antechinus spp	D	Complete	E	48	
5	Furniture	16/10/2018	0116	Antechinus spp	D	Complete	E	50	
5	Furniture	16/10/2018	2009	Antechinus spp	D	Complete	E	53	
5	Furniture	17/10/2018	0219	Antechinus spp	D	Complete	E	55	
5	Furniture	18/10/2018	0135	Antechinus spp	D	Complete	E	57-60	
5	Furniture	18/10/2018	0332	Antechinus spp	D	Complete	E	61	
5	Furniture	18/10/2018	0349	Antechinus spp	D	Complete	E	63	
5	Furniture	18/10/2018	1924	Antechinus spp	D	Complete	E	65	
5	Furniture	18/10/2018	2352	Antechinus spp	D	Complete	E	67	
5	Furniture	19/10/2018	2215	Antechinus spp	D	Complete	E	69	
5	Furniture	19/10/2018	2240	Antechinus spp	D	Complete	E	71	
5	Furniture	20/10/2018	0204	Antechinus spp	D	Incomplete	E-W	72-73	
5	Furniture	20/10/2018	2105	Antechinus spp	D	Complete	E	75	
5	Furniture	21/10/2018	0013	Antechinus spp	D	complete	W	76	
5	Furniture	21/10/2018	0146	Antechinus spp	D	complete	E	77	
5	Furniture	22/10/2018	0113	Antechinus spp	D	complete	E	79	
5	Furniture	23/10/2018	0107	Antechinus spp	D	complete	E	80	
5	Furniture	24/10/2018	0442	Antechinus spp	D	complete	E	82	
5	Furniture	24/10/2018	1834	Antechinus spp	Pr	complete	W	83	
5	Furniture	25/10/2018	0443	Antechinus spp	D	complete	E	84	
5	Furniture	26/10/2018	0214	Antechinus spp	D	complete	E	86	
5	Furniture	26/10/2018	0443	Antechinus spp	D	complete	E	88	
5	Furniture	27/10/2018	2132	Antechinus spp	D	complete	E	90	
5	Furniture	29/10/2018	0439	Antechinus spp	D	complete	E	92	
5	Furniture	30/10/2018	0056	Antechinus spp	D	complete	E	94	
5	Furniture	30/10/2018	0436	Antechinus spp	D	complete	E	96	
5	Furniture	30/10/2018	2216	Antechinus spp	D	complete	E	98	
5	Furniture	31/10/2018	0426	Antechinus spp	D	complete	E	100	
5	Furniture	1/11/2018	2310	Antechinus spp	D	complete	E	5	
5	Furniture	2/11/2018	0356	Antechinus spp	D	complete	E	7	
5	Furniture	2/11/2018	2243	Antechinus spp	D	complete	E	9	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
5	Furniture	3/11/2018	0411	Antechinus spp	D	complete	E	11	
5	Furniture	5/11/2018	2037	Antechinus spp	D	complete	E	13	
5	Furniture	5/11/2018	2153	Antechinus spp	D	Incomplete	E-W	14-15	
5	Furniture	6/11/2018	0055	Antechinus spp	D	Complete	E	17	
5	Furniture	6/11/2018	2111	Antechinus spp	D	Complete	E	19	
5	Furniture	8/11/2018	0305	Antechinus spp	D	Complete	E	21	
5	Furniture	8/11/2018	2102	Antechinus spp	D	Complete	E	23	
5	Furniture	9/11/2018	2051	Antechinus spp	D	Complete	E	25	
5	Furniture	11/11/2018	2036	Antechinus spp	D	Complete	E	27	
5	Furniture	12/11/2018	0041	Antechinus spp	D	Complete	E	29	
5	Furniture	12/11/2018	2054	Antechinus spp	D	Complete	E	31	
5	Furniture	19/11/2018	0112	Antechinus spp	D	Complete	E	33	
5	Furniture	19/11/2018	0258	Antechinus spp	D	Complete	E	35	
5	Furniture	23/11/2018	0227	Antechinus spp	D	Complete	E	37	
5	Furniture	26/11/2018	0322	Antechinus spp	D	Incomplete	E-W	41	
5	Furniture	29/11/2018	2250	Antechinus spp	D	Complete	E	42	
5	Furniture	8/12/2018	2113	Antechinus spp	D	Complete	E	47	Young on back
5	Furniture	8/12/2018	2153	Antechinus spp	D	Complete	E	49	
5	Furniture	8/12/2018	2254	Antechinus spp	D	Complete	E	51	
5	Furniture	9/12/2018	0031	Antechinus spp	D	Complete	E	53	
5	Furniture	9/12/2018	0207	Antechinus spp	D	Complete	E	55	
5	Furniture	9/12/2018	0522	Antechinus spp	D	Complete	E	57	
5	Furniture	9/12/2018	1951	Antechinus spp	D	Complete	E	59	
5	Furniture	9/12/2018	2128	Antechinus spp	D	Complete	E	61	
5	Furniture	9/12/2018	2240	Antechinus spp	D	Complete	E	63	
5	Furniture	9/12/2018	2352	Antechinus spp	D	Complete	E	65	
5	Furniture	10/12/2018	0103	Antechinus spp	D	Complete	E	67	
5	Furniture	10/12/2018	0156	Antechinus spp	D	Complete	E	69	
5	Furniture	10/12/2018	0531	Antechinus spp	D	Complete	E	71	
5	Furniture	10/12/2018	1956	Antechinus spp	D	Complete	E	73	
5	Furniture	10/12/2018	2103	Antechinus spp	D	Complete	E	75	
5	Furniture	10/12/2018	2201	Antechinus spp	D	Complete	E	76	
5	Furniture	10/12/2018	2308	Antechinus spp	D	Complete	E	77	
5	Furniture	11/12/2018	0046	Antechinus spp	D	Complete	E	79	
5	Furniture	11/12/2018	0218	Antechinus spp	D	Complete	E	81	
5	Furniture	11/12/2018	0433	Antechinus spp	D	Complete	E	83	
5	Furniture	11/12/2018	1945	Antechinus spp	D	Complete	E	85	
5	Furniture	11/12/2018	2040	Antechinus spp	D	Complete	E	87	
5	Furniture	11/12/2018	2146	Antechinus spp	D	Complete	E	89	
5	Furniture	11/12/2018	2231	Antechinus spp	D	Complete	E	90	
5	Furniture	12/12/2018	0113	Antechinus spp	D	Complete	E	93	
5	Furniture	12/12/2018	0427	Antechinus spp	D	Complete	E	95	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
5	Furniture	12/12/2018	1945	Antechinus spp	D	Complete	E	97	
5	Furniture	12/12/2018	2102	Antechinus spp	D	Complete	E	99	
5	Furniture	12/12/2018	2247	Antechinus spp	D	Complete	W	101	
5	Furniture	12/12/2018	2307	Antechinus spp	D	Complete	E	102	
5	Furniture	12/12/2018	2312	Antechinus spp	D	Complete	W	103	Young on back
5	Furniture	12/12/2018	2337	Antechinus spp	D	complete	E	104	
5	Furniture	14/12/2018	2140	Antechinus spp	D	complete	E	105	Young on back
5	Furniture	14/12/2018	2200	Antechinus spp	D	complete	E	107	
5	Furniture	14/12/2018	2224	Antechinus spp	D	complete	E	109	
5	Furniture	14/12/2018	2309	Antechinus spp	D	complete	E	111	
5	Furniture	14/12/2018	2350	Antechinus spp	D	complete	E	113-114	
5	Furniture	15/12/2018	0109	Stephens banded snake & antechinus spp	D	Complete	E	117	
5	Furniture	15/12/2018	0233	Antechinus spp	D	Complete	E	118	
6	Floor	18/09/2018	1923	Bandicoot spp	Pr	Complete	E	15	
6	Floor	18/09/2018	2246	Microbat spp	D	Incomplete	NDM	16	
6	Floor	19/09/2018	0323	Bandicoot spp	Pr	complete	E	18	
6	Floor	19/09/2018	0420	Bandicoot spp	D	complete	W	19	
6	Floor	20/09/2018	2010	Bandicoot spp	D	Complete	E	22	
6	Floor	22/09/2018	2317	Small mammal spp	D	Complete	E	25	
6	Floor	22/09/2018	2342	Bandicoot spp	D	Complete	E	26	
6	Floor	22/09/2018	2305	Bandicoot spp	D	Complete	E	29	
6	Floor	24/09/2018	0425	Bandicoot spp	D	Complete	E	31	
6	Floor	24/09/2018	1856	Small mammal spp	D	Complete	E	32	
6	Floor	24/09/2018	1903	Northern brown bandicoot	D	Incomplete	NDM	33	
6	Floor	24/09/2018	2055	Bandicoot spp	D	Complete	E	34	
6	Floor	24/09/2018	2111	Northern brown bandicoot	Pr	Complete	E	36	
6	Floor	25/09/2018	0446	Bandicoot spp	D	Complete	W	37	
6	Floor	25/09/2018	1829	Cat	D	Complete	W	39	tabby
6	Floor	25/09/2018	2116	Bandicoot spp	D	Complete	E	40	
6	Floor	25/09/2018	2245	Bandicoot spp	D	Complete	E	41	
6	Floor	27/09/2018	1847	Bandicoot spp	D	Complete	E	42	
6	Floor	27/09/2018	2150	Cat	D	Incomplete	W-E	44-45	tabby- prey in mouth
6	Floor	28/09/2018	1918	Bandicoot spp	D	Complete	E	47	
6	Floor	28/09/2018	2247	Northern brown bandicoot	D	Complete	W	48	
6	Floor	29/09/2018	1826	Cat	D	Complete	W	49	
6	Floor	29/09/2018	1843	Bandicoot spp	D	Complete	E	50	
6	Floor	29/09/2018	2027	house mouse	Pr	Complete	E	51	
6	Floor	30/09/2018	1839	Bandicoot spp	D	Complete	E	52	
6	Floor	30/09/2018	2143	Bandicoot spp	D	Complete	E	53	
6	Floor	1/10/2018	1836	Bandicoot spp	D	Complete	E	55	
6	Floor	2/10/2018	0210	Bandicoot spp	D	Complete	E	57	
6	Floor	2/10/2018	2140	Bandicoot spp	D	Complete	E	58	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
6	Floor	2/10/2018	2340	Bandicoot spp	Pr	Complete	W	59	
6	Floor	4/10/2018	0201	Bandicoot spp	D	Complete	E	62	
6	Floor	5/10/2018	0441	Bandicoot spp	D	Complete	E	64	
6	Floor	5/10/2018	1948	Bandicoot spp	D	Complete	E	65	
6	Floor	6/10/2018	1915	Bandicoot spp	D	Complete	E	67	
6	Floor	6/10/2018	2137	Small mammal spp	D	Complete	E	68	
6	Floor	7/10/2018	0211	Bandicoot spp	D	Complete	E	69	
6	Floor	7/10/2018	0350	Small mammal spp	D	Complete	E	70	
6	Floor	9/10/2018	1939	Bandicoot spp	D	Complete	E	73	
6	Floor	9/10/2018	2112	Bandicoot spp	D	Complete	E	74	
6	Floor	16/10/2018	0321	Bandicoot spp	D	Complete	E	81	
6	Floor	17/10/2018	1951	Bandicoot spp	D	Complete	E	82	
6	Floor	18/10/2018	0430	Bandicoot spp	D	Complete	E	84	
6	Floor	20/10/2018	0257	Northern brown bandicoot	Pr	Complete	E	87	
6	Floor	20/10/2018	0335	Bandicoot spp	D	Complete	E	88	
6	Floor	20/10/2018	1926	Bandicoot spp	D	Complete	W	89	
6	Floor	21/10/2018	2102	Cat	D	Complete	E	90	tabby
6	Floor	22/10/2018	1914	Bandicoot spp	D	Complete	W	91	
6	Floor	23/10/2018	2203	Bandicoot spp	D	Complete	E	92	
6	Floor	26/10/2018	1927	Cat	D	Incomplete	W-E	95	tabby
6	Floor	27/10/2018	2030	Bandicoot spp	D	Complete	E	98	
6	Floor	27/10/2018	2245	Bandicoot spp	D	Complete	E	99	
6	Floor	28/10/2018	1917	Bandicoot spp	D	Complete	E	101	
6	Floor	28/10/2018	2049	Northern brown bandicoot	D	Complete	W	102	
6	Floor	30/10/2018	2030	Rodent spp	D	Complete	E	104	
6	Floor	30/10/2018	2114	Bandicoot spp	D	Complete	E	105	
6	Floor	31/10/2018	1934	Bandicoot spp	D	Complete	E	3	
6	Floor	31/10/2018	2149	Northern brown bandicoot	Pr	Complete	W	4	
6	Floor	2/11/2018	2229	Echidna	D	Complete	E	8-9	
6	Floor	4/11/2018	0224	Bandicoot spp	D	Complete	E	11	
6	Floor	4/11/2018	2139	Bandicoot spp	D	Complete	E	13	
6	Floor	11/11/2018	2109	Bandicoot spp	D	Complete	E	17	
6	Floor	12/11/2018	1941	Bandicoot spp	D	Complete	E	19	
6	Floor	12/11/2018	2248	Bandicoot spp	D	Complete	E	21	
6	Floor	13/11/2018	0218	Bandicoot spp	D	Complete	E	23	
6	Floor	14/11/2018	0014	Bandicoot spp	D	Complete	E	24	
6	Floor	15/11/2018	0101	Bandicoot spp	D	Complete	E	25	
6	Floor	15/11/2018	0346	Bandicoot spp	D	Complete	E	26	
6	Floor	18/11/2018	0000	Bandicoot spp	D	Complete	E	29	
6	Floor	18/11/2018	2207	Bandicoot spp	D	Complete	E	31	
6	Floor	19/11/2018	1946	Bandicoot spp	D	Complete	E	32	
6	Floor	21/11/2018	0310	Bandicoot spp	D	Complete	E	33	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
6	Floor	21/11/2018	2211	Bandicoot spp	D	Complete	E	34	
6	Floor	22/11/2018	1957	Bandicoot spp	D	Complete	E	35	
6	Floor	25/11/2018	0849	Lace monitor	D	Complete	E	46	
6	Floor	27/11/2018	2144	Black rat	Pr	Incomplete	NDM	52	
6	Floor	29/11/2018	2322	Bandicoot spp	D	Complete	E	53-54	
6	Floor	1/12/2018	2022	Antechinus spp	Pr	Complete	E	56	
6	Floor	5/12/2018	0005	Antechinus spp	Pr	Complete	E	63	
6	Floor	5/12/2018	0348	Antechinus spp	Pr	Complete	E	64	
6	Floor	14/12/2018	0049	Bandicoot spp	D	Complete	E	67	
6	Floor	14/12/2018	0052	Northern brown bandicoot	Pr	Complete	W	68	
6	Floor	14/12/2018	2201	Bandicoot spp	D	Complete	E	69	
6	Floor	15/12/2018	1532	Lace monitor	D	Complete	E	70	
6	Floor			Microbat spp	D	4 vids			
6	FF	nil							
6	FF	12/11/2018	0203	Microbat spp	D	Incomplete	NDM	4	
6	FF	13/11/2018	0338	small mammal spp	D	Incomplete	NDM	20	Ontop of camera, only part of tail visible
7	Floor	19/09/2018	1747	Cat	D	Complete	W	11	Ginger cat
7	Floor	4/10/2018	2157	Black rat	D	Complete	W	13	
7	Floor	5/10/2018	2253	Bandicoot spp	D	Incomplete	E-W	14-15	
7	Floor	15/10/2018	0257	Small mammal spp	D	Complete	E	16	
7	Floor	14/11/2018	0506	EG kangaroo	D	Incomplete	W-E	8-9	
7	Floor	27/11/2018	2334	Northern brown bandicoot	Pr	Complete	W	12	
7	Floor	28/11/2018	0213	Bandicoot spp	D	Complete	E	13	
7	Floor	9/12/2018	0424	EG kangaroo	D	Incomplete	W-E	18-19	
7	Floor	12/12/2018	0016	Bandicoot spp	D	Complete	E	21	
7	Furniture	10/10/2018	2125	Antechinus spp	D	Complete	E	17,19	
7	Furniture	13/10/2018	0136	Antechinus spp	D	Complete	E	21	
7	Furniture	21/10/2018	0333	Antechinus spp	D	Complete	E	26	
7	Furniture	23/10/2018	0309	Antechinus spp	D	Complete	E	28	
7	Furniture	24/10/2018	0426	Antechinus spp	D	Complete	E	29	
7	Furniture	24/10/2018	1925	Antechinus spp	D	Complete	E	30	
7	Furniture	26/10/2018	2222	Antechinus spp	D	Complete	E	31	
7	Furniture	27/10/2018	2005	Antechinus spp	D	Complete	E	32	
7	Furniture	20/10/2018	2106	Antechinus spp	D	Complete	E	1	
7	Furniture	2/11/2018	1952	Antechinus spp	D	Complete	E	4	
7	Furniture	2/11/2018	2306	Antechinus spp	D	Complete	W	5	
7	Furniture	5/11/2018	1955	Antechinus spp	D	Complete	E	10	
7	Furniture	6/11/2018	2151	Antechinus spp	D	Complete	E	15	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
7	Furniture	10/11/2018	1953	Antechinus spp	D	Complete	E	21	
7	Furniture	15/11/2018	2202	Antechinus spp	D	Complete	E	29	
7	Furniture	NA	NA	Microbat spp	D	present in 16 vids	NA	NA	
8	Floor	23/09/2018	0333	Antechinus spp	Pr	Complete	E	6	
8	Floor	28/09/2018	2112	Antechinus spp	Pr	Complete	E	9	
8	Floor	8/10/2018	2018	Bandicoot spp	D	Complete	E	10	
8	Floor	8/10/2018	2041	Bandicoot spp	D	Complete	E	11	
8	Floor	9/10/2018	2358	Bandicoot spp	D	Complete	W	13	
8	Floor	18/10/2018	0204	Northern brown bandicoot	D	Complete	W	17	
8	Floor	19/10/2018	0035	Bandicoot spp	D	Complete	E	18	
8	Floor	19/10/2018	0220	Rodent spp	D	Complete	E	19	
8	Floor	22/10/2018	2103	Bandicoot spp	D	Complete	E	20	
8	Floor	23/10/2018	1902	Bandicoot spp	D	Complete	E	21	
8	Floor	25/10/2018	2032	Bandicoot spp	D	Complete	E	22	
8	Floor	26/10/2018	0804	Lace monitor	D	Complete	W	23	
8	Floor	26/10/2018	1608	Lace monitor	D	Complete	E	24	
8	Floor	28/10/2018	1904	Bandicoot spp	D	Complete	E	25	
8	Floor	29/10/2018	2308	Bandicoot spp	D	Complete	E	1	
8	Floor	1/11/2018	1747	Dogs x 2	D	Complete	E	3	one brown/black, the other white/black
8	Floor	2/11/2018	2102	BtPoss spp	D	Complete	E	4	
8	Floor	3/11/2018	0116	Bandicoot spp	D	Complete	E	5	
8	Floor	4/11/2018	2244	Bandicoot spp	D	Complete	E	6	
8	Floor	4/11/2018	2342	Bandicoot spp	D	Complete	E	7	
8	Floor	5/11/2018	0852	Lace monitor	D	Complete	W	8	
8	Floor	5/11/2018	1922	Bandicoot spp	D	Complete	E	9	
8	Floor	5/11/2018	2038	Bandicoot spp	D	Complete	E	10	
8	Floor	5/11/2018	2105	Bandicoot spp	D	Complete	E	11	Juvenile
8	Floor	21/11/2018	2145	Antechinus spp	D	Complete	E	12	
8	Floor	4/12/2018	2011	Bandicoot spp	D	Complete	E	19	
8	Floor	10/12/2018	0857	Lace monitor	D	Complete	E	23	
8	Floor								
8	Floor								
8	Floor								
8	Furniture	29/09/2018	2114	Antechinus spp	D	Complete	E	4	
8	Furniture	17/10/2018	1912	Antechinus spp	D	Incomplete	W-E	5	
8	Furniture	18/10/2018	2338	Microbat spp	D	Incomplete	NDM	6	
8	Furniture	19/10/2018	0231	Antechinus spp	D	Complete	W	7	
8	Furniture	20/10/2018	1918	Antechinus spp	D	Complete	W	9	
8	Furniture	24/10/2018	0250	Microbat spp	D	Incomplete	NDM	10	
8	Furniture	24/10/2018	2032	Small mammal spp	D	Incomplete	NDM	11	Ontop of camera
8	Furniture	30/10/2018	2101	Antechinus spp	D	Complete	E	1	
8	Furniture	31/10/2018	2147	Antechinus spp	D	Complete	E	2	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
8	Furniture	3/11/2018	0129	Antechinus spp	D	Complete	E	3	
8	Furniture	4/11/2018	0341	Antechinus spp	D	Complete	W	4	
8	Furniture	4/11/2018	2039	Antechinus spp	D	Complete	E	5	
8	Furniture	6/11/2018	2137	Antechinus spp	D	Complete	E	6	
8	Furniture	11/11/2018	2142	Antechinus spp	D	Complete	E	8	
8	Furniture	13/11/2018	2050	Antechinus spp	D	Complete	E	9	
8	Furniture	14/11/2018	2209	Antechinus spp	D	Complete	E	10	
8	Furniture	17/11/2018	0038	Antechinus spp	D	Complete	E	11	
8	Furniture	3/12/2018	1937	Antechinus spp	D	Complete	E	21	
8	Furniture	6/12/2018	0312	Antechinus spp	D	Complete	E	22	
8	Furniture	7/12/2018	2049	Antechinus spp	D	Complete	E	25	
8	Furniture	7/12/2018	2133	Antechinus spp	D	Complete	E	26	
8	Furniture								
8	Furniture								
9	Furniture	20/09/2018	0420	Antechinus spp	D	Incomplete	W-E	1-2	
9	Furniture	29/09/2018	2155	Antechinus spp	D	Complete	E	5-6	
9	Furniture	7/10/2018	1951	Antechinus spp	D	Complete	W	7	
9	Furniture	7/10/2018	2011	Antechinus spp	D	Complete	E	8	
9	Furniture	7/10/2018	2042	Antechinus spp	D	Complete	W	9	
9	Furniture	11/10/2018	2216	Antechinus spp	D	Complete	E	10	
9	Furniture	13/10/2018	2350	Antechinus spp	D	Complete	E	12	
9	Furniture	17/10/2018	0006	Antechinus spp	D	Complete	E	15	
9	Furniture	18/10/2018	0216	Antechinus spp	D	Complete	E	16	
9	Furniture	19/10/2018	0411	Antechinus spp	D	Incomplete	W-E	17-18	
9	Furniture	23/10/2018	0307	Antechinus spp	D	Complete	E	19	
9	Furniture	26/10/2018	1919	Antechinus spp	D	Complete	E	20	
9	Furniture	30/10/2018	1840	Antechinus spp	D	Complete	E	1	
9	Furniture	2/11/2018	2017	Antechinus spp	D	Incomplete	W-E	7-10	
9	Furniture	3/11/2018	2348	Antechinus spp	D	Complete	W	12	
9	Furniture	4/11/2018	0135	Antechinus spp	D	Incomplete	E-W	13-14	
9	Furniture	4/11/2018	2032	Antechinus spp	D	Complete	E	18-19	
9	Furniture	6/11/2018	0230	Antechinus spp	D	Complete	E	21	
9	Furniture	7/11/2018	1956	Antechinus spp	D	Complete	W	22	
9	Furniture	15/11/2018	0334	Antechinus spp	D	Complete	E	30	
9	Furniture	17/11/2018	2246	Antechinus spp	D	Complete	E	33	
9	Furniture	21/11/2018	1921	Antechinus spp	D	Complete	E	38	
9	Furniture	27/11/2018	1949	Antechinus spp	D	Complete	E	46	
9	Furniture	27/11/2018	2030	Antechinus spp	D	Complete	W	47	
9	Furniture	27/11/2018	2311	Antechinus spp	D	Complete	E	49	
9	Furniture	28/11/2018	2000	Antechinus spp	D	Complete	E	50	
9	Furniture	28/11/2018	2139	Antechinus spp	D	Complete	W	51	
9	Furniture	29/11/2018	2039	Antechinus spp	D	Complete	W	53	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
9	Furniture	29/11/2018	2111	Antechinus spp	D	Complete	E	54	
9	Furniture	30/11/2018	2210	Antechinus spp	D	Complete	W	61	
9	Furniture	2/12/2018	0016	Antechinus spp	D	Complete	W	65	
9	Furniture	2/12/2018	1950	Antechinus spp	D	Complete	E	66	
9	Furniture	2/12/2018	2051	Antechinus spp	D	Complete	E	67	
9	Furniture	2/12/2018	2121	Antechinus spp	D	Complete	E	68	
9	Furniture	2/12/2018	2157	Antechinus spp	D	Complete	W	69	
9	Furniture	4/12/2018	2327	Antechinus spp	D	Complete	E	76	
9	Furniture	5/12/2018	1918	Antechinus spp	D	Complete	E	77	
9	Furniture	9/12/2018	2000	Antechinus spp	D	Complete	E	83	
9	Furniture	9/12/2018	2142	Antechinus spp	D	Complete	E	84	
9	Furniture	10/12/2018	0026	Antechinus spp	D	Complete	E	85	
9	Furniture	10/12/2018	2007	Antechinus spp	D	Complete	E	88	
9	Furniture	10/12/2018	2050	Antechinus spp	D	Complete	W	89	
9	Furniture	10/12/2018	2105	Antechinus spp	D	Complete	E	90	
9	Furniture	12/12/2018	2253	Antechinus spp	D	Complete	E	95	
9	Furniture	13/12/2018	0039	Antechinus spp	D	Complete	E	96	
9	Furniture	13/12/2018	0224	Antechinus spp	D	Complete	W	97	
9	Furniture	13/12/2018	0419	Antechinus spp	D	Complete	E	98	
9	Furniture	13/12/2018	2114	Antechinus spp	D	Complete	E	99	
9	Furniture	13/12/2018	2227	Antechinus spp	D	Complete	W	101	
9	Furniture	14/12/2018	2146	Antechinus spp	D	Complete	W	103	
9	Furniture	14/12/2018	2236	Antechinus spp	D	Complete	E	104	
9	Furniture	14/12/2018	2343	Antechinus spp	D	Incomplete	W-E	105-106	
9	Furniture	15/12/2018	0108	Antechinus spp	D	Complete	E	108	
9	Furniture	15/12/2018	0228	Antechinus spp	D	Complete	E	110	
9	Furniture	15/12/2018	2024	Antechinus spp	D	Complete	E	112	
9	Furniture	15/12/2018	2107	Antechinus spp	D	Complete	W	113	
9	Furniture	15/12/2018	2212	Antechinus spp	D	Complete	E	114	
9	Floor east	20/09/2018	1820	Cat	D	Complete	E	1	
9	Floor east	21/09/2018	0132	Cat	D	Complete	E	2	tabby
9	Floor east	29/09/2018	1923	Rodent spp	D	Complete	E	5	
9	Floor east	4/10/2018	1837	Rodent spp	D	Complete	E	6	
9	Floor east	5/10/2018	0100	Black rat	D	Complete	W	7	
9	Floor east	6/10/2018	2317	Small mammal spp	D	Complete	W	9	
9	Floor east	10/10/2018	1942	Black rat	Pr	Complete	W	11	
9	Floor east	11/10/2018	0249	Black rat	Pr	Incomplete	E-W	12	
9	Floor east	13/10/2018	2115	Bandicoot spp	D	Complete	E	15	
9	Floor east	20/10/2018	0809	Lace monitor	D	Complete	E	17	
9	Floor east	20/10/2018	1501	EW Dragon	D	Complete	E	18	
9	Floor east	26/10/2018	2005	Bandicoot spp	D	Complete	E	19	
9	Floor east	27/10/2018	1902	Bandicoot spp	D	Complete	W	20	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
9	Floor east	27/10/2018	2131	Bandicoot spp	D	Complete	E	22	
9	Floor east	28/10/2018	2019	Bandicoot spp	D	Complete	E	23	
9	Floor east	28/10/2018	2139	Bandicoot spp	D	Complete	W	24	
9	Floor east	14/11/2018	0855	Lace monitor	D	Complete	E	2	
9	Floor east	17/11/2018	0604	Cat	D	Complete	W	3	Black with white paws
9	Floor east	24/11/2018	2106	Wallaby spp	D	Complete	E	10	
9	Floor east	1/12/2018	0037	Rufous Bettong	Pr	Complete	E	29	
9	Floor east	1/12/2018	2020	Rufous Bettong	Pr	Complete	E	30	
9	Floor east	2/12/2018	1932	Rufous Bettong	D	Complete	E	32-33	
9	Floor east	4/12/2018	0717	EW Dragon	D	Incomplete	NDM	37	
9	Floor east	5/12/2018	0033	Rufous Bettong	D	Complete	E	38	
9	Floor east	5/12/2018	2257	Rufous Bettong	D	Complete	E	39	
9	Floor east	6/12/2018	2328	Rufous Bettong	D	Incomplete	NDM	41	
9	Floor east	7/12/2018	2322	Rufous Bettong	D	Complete	E	46	
9	Floor east	8/12/2018	1926	Rufous Bettong	D	Complete	E	49	
9	Floor east	8/12/2018	2333	Rufous Bettong	D	Complete	E	50	
9	Floor east	9/12/2018	2337	Rufous Bettong	D	Complete	E	54	
9	Floor east	10/12/2018	0856	Lace monitor	D	Complete	W	56	
9	Floor east	10/12/2018	1940	Rufous Bettong	D	Complete	E	57	
9	Floor east	11/12/2018	1925	Rufous Bettong	D	Complete	E	59	
9	Floor east	16/12/2018	2133	Antechinus spp	Pr	Complete	E	60	
9	Floor east	17/12/2018	0250	Rufous Bettong	D	Complete	W	61	
10	Floor west	NIL							
10	Floor west	7/11/2018	1609	EW Dragon	D	Incomplete	NDM	6	
10	Floor west	13/11/2018	2225	Antechinus spp	Pr	Complete	E	8	
10	Floor west	14/11/2018	0842	Lace monitor	D	Complete	W	9	
10	Floor west	15/11/2018	2051	Antechinus spp	Pr	Complete	E	10	
10	Floor west	23/11/2018	0855	Lace monitor	D	Complete	W	15	
10	Floor west	23/11/2018	1515	Lace monitor	D	Complete	W	16	
10	Floor west	24/11/2018	2058	EG kangaroo	D	Complete	W	19	
10	Floor west	27/11/2018	1543	Lace monitor	D	Complete	W	20	
10	Floor west	27/11/2018	1603	Lace monitor	D	Complete	E	21	
10	Floor west	30/11/2018	0208	Rufous Bettong	D	Complete	W	28-30	
10	Floor west	30/11/2018	0259	Rufous Bettong	D	Complete	W	32-33	
10	Floor west	30/11/2018	1915	Rufous Bettong	D	Complete	E	34	
10	Floor west	1/12/2018	0016	Rufous Bettong	D	Complete	W	35	
10	Floor west	1/12/2018	0055	Rufous Bettong	D	Complete	E	36	
10	Floor west	1/12/2018	0226	Rufous Bettong	D	Complete	W	37	
10	Floor west	1/12/2018	1907	Rufous Bettong	D	Complete	E	38	
10	Floor west	1/12/2018	2003	Rufous Bettong	D	Complete	W	39	
10	Floor west	2/12/2018	0147	Rufous Bettong	D	Complete	E	40	
10	Floor west	3/12/2018	0102	Rufous Bettong	D	Incomplete	NDM	44	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
10	Floor west	3/12/2018	0218	Rufous Bettong	D	Complete	W	46-47	
10	Floor west	3/12/2018	1559	Lace monitor	D	Complete	W	48	
10	Floor west	3/12/2018	1928	Rufous Bettong	D	Complete	E	49	
10	Floor west	3/12/2018	2146	Rufous Bettong	D	Complete	W	50	
10	Floor west	3/12/2018	2214	Rufous Bettong	D	Complete	E	51	
10	Floor west	4/12/2018	0039	Rufous Bettong	D	Complete	W	52-53	
10	Floor west	4/12/2018	0141	Rufous Bettong	D	Complete	E	54	
10	Floor west	4/12/2018	0859	Lace monitor	D	Complete	E	57	
10	Floor west	4/12/2018	1918	Rufous Bettong	D	Complete	E	58	
10	Floor west	4/12/2018	2309	Rufous Bettong	D	Complete	E	60	
10	Floor west	5/12/2018	0241	Rufous Bettong	D	Complete	E	62	
10	Floor west	5/12/2018	1932	Rufous Bettong	D	Complete	E	64	
10	Floor west	5/12/2018	2216	Rufous Bettong	D	Complete	W	65	
10	Floor west	6/12/2018	0256	Rufous Bettong	D	Complete	E	66	
10	Floor west	6/12/2018	0341	Rufous Bettong	D	Complete	W	67	
10	Floor west	6/12/2018	1919	Rufous Bettong	D	Complete	E	68-69	
10	Floor west	6/12/2018	2326	Rufous Bettong	D	Complete	E	71	
10	Floor west	7/12/2018	1924	Rufous Bettong	D	Complete	E	73	
10	Floor west	8/12/2018	0026	Rufous Bettong	D	Complete	E	75	
10	Floor west	8/12/2018	0317	Rufous Bettong	D	Complete	W	76	
10	Floor west	8/12/2018	2104	Rufous Bettong	D	Complete	E	77	
10	Floor west	9/12/2018	0154	Rufous Bettong	D	Complete	E	79	
10	Floor west	9/12/2018	0245	Rufous Bettong	D	Complete	W	80	
10	Floor west	9/12/2018	2028	Rufous Bettong	D	Complete	E	81	
10	Floor west	9/12/2018	2304	Rufous Bettong	D	Complete	W	82	
10	Floor west	10/12/2018	0135	Rufous Bettong	D	Complete	E	83	
10	Floor west	10/12/2018	0841	Lace monitor	D	Complete	E	85	
10	Floor west	11/12/2018	0007	Rufous Bettong	D	Complete	E	86	
10	Floor west	14/12/2018	2354	Rodent spp	D	Complete	E	90	
10	Floor west	16/12/2018	2118	Rodent spp	D	Complete	E	92	
10	Floor west	17/12/2018	0247	Rufous Bettong	D	Complete	E	93	
10	Floor west	17/12/2018	0423	Rufous Bettong	Pr	Complete	E	95	
10	Floor west	17/12/2018	1528	Lace monitor	D	Complete	E	96	
10	Furniture west	22/09/2018	0430	Antechinus spp	D	Complete	E	4	
10	Furniture west	24/09/2018	2108	Antechinus spp	D	Incomplete	E-W	5-7	
10	Furniture west	25/09/2018	0412	Antechinus spp	D	Complete	E	9	
10	Furniture west	26/09/2018	1844	Antechinus spp	D	Complete	E	11	
10	Furniture west	27/09/2018	1807	Antechinus spp	D	Complete	E	12	
10	Furniture west	30/09/2018	1812	Antechinus spp	D	Complete	E	13	
10	Furniture west	4/10/1948	2344	Antechinus spp	D	Incomplete	NDM	17	
10	Furniture west	9/10/2018	2359	Antechinus spp	D	Complete	E	22	
10	Furniture west	10/10/2018	1910	Antechinus spp	D	Complete	E	24	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
10	Furniture west	10/10/2018	2053	Antechinus spp	D	Complete	E	26	
10	Furniture west	12/10/2018	0305	Antechinus spp	D	Complete	E	29	
10	Furniture west	12/10/2018	1911	Antechinus spp	D	Complete	E	31-32	
10	Furniture west	12/10/2018	2200	Antechinus spp	D	Complete	E	34	
10	Furniture west	13/10/2018	0156	Antechinus spp	D	Complete	E	35	
10	Furniture west	13/10/2018	2145	Antechinus spp	D	Complete	E	37	
10	Furniture west	14/10/2018	0012	Antechinus spp	D	Complete	E	39	
10	Furniture west	14/10/2018	1914	Antechinus spp	D	Complete	E	41-42	
10	Furniture west	15/10/2018	2034	Antechinus spp	D	Complete	E	43-49	
10	Furniture west	15/10/2018	2256	Antechinus spp	D	Incomplete	E-W	50	
10	Furniture west	16/10/2018	0312	Antechinus spp	D	Complete	W	51	
10	Furniture west	17/10/2018	0016	Antechinus spp	D	Complete	E	52	
10	Furniture west	17/10/2018	0417	Antechinus spp	D	Complete	E	54	
10	Furniture west	18/10/2018	0231	Antechinus spp	D	Complete	E	56	
10	Furniture west	19/10/2018	0239	Antechinus spp	D	Incomplete	E-W	58-59	
10	Furniture west	21/10/2018	0208	Antechinus spp	D	Complete	E	64	
10	Furniture west	25/10/2018	0408	Antechinus spp	D	Complete	E	67	
10	Furniture west	31/10/2018	2107	Antechinus spp	D	Complete	E	2	
10	Furniture west	3/11/2018	0357	Antechinus spp	D	Complete	E	7	
10	Furniture west	5/11/2018	1913	Antechinus spp	D	Complete	E	15	
10	Furniture west	6/11/2018	1927	Antechinus spp	D	Complete	E	16	
10	Furniture west	22/11/2018	2309	Antechinus spp	D	Complete	E	26	
10	Furniture west	24/11/2018	2258	Antechinus spp	D	Complete	E	32	
10	Furniture west	2/12/2018	1904	Antechinus spp	D	Complete	E	38	
10	Furniture west	7/12/2018	0143	Antechinus spp	D	Complete	E	39	
10	Furniture west	11/12/2018	1909	Antechinus spp	Pr	Complete	E	42	
10	Furniture west	15/12/2018	0307	Antechinus spp	D	Complete	W	44	
10	Furniture west			Microbat spp	D	3 vids			
11	Floor	20/09/2018	0112	Bandicoot spp	D	Complete	E	2	
11	Floor	26/09/2018	0614	Guinea fowl	D	Complete	E	7-11	
11	Floor	27/09/2018	2219	Bandicoot spp	Pr	Complete	E	15	
11	Floor	28/09/2018	2248	Bandicoot spp	D	Complete	E	17	
11	Floor	30/09/2018	2349	Bandicoot spp	Pr	Complete	E	19	
11	Floor	1/10/2018	1920	Bandicoot spp	Pr	Complete	W	20	
11	Floor	2/10/2018	0103	Bandicoot spp	Pr	Complete	E	21	
11	Floor	8/10/2018	2052	Northern brown bandicoot	D	Complete	W	26	
11	Floor	20/10/2018	1500	Lace monitor	D	Complete	W	30	
11	Floor	22/10/2018	0809	Lace monitor	D	Complete	E	33	
11	Floor	30/10/2018	0630	Cat	D	Complete	W	2	Black with white paws
11	Floor	3/11/2018	1816	Dogs x 2	D	Complete	W	4	german shepherd and big white dog
11	Floor	9/11/2018	1552	Lace monitor	D	Complete	E	2	
11	Floor	10/11/2018	0201	Cat	D	Complete	E	3	Black with white paws

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
11	Floor	13/11/2018	0248	Cat	D	Complete	E	8	Black with white paws
11	Floor	13/11/2018	1658	Lace monitor	D	Complete	W	9	
11	Floor	17/11/2018	0420	Cat	D	Complete	E	11	
11	Floor	20/11/2018	2042	Northern brown bandicoot	D	Complete	E	14	
11	Floor	23/11/2018	2023	Bandicoot spp	D	Complete	E	19	
11	Floor	26/11/2018	0750	Lace monitor	D	Complete	E	20	
11	Floor	27/11/2018	2305	Bandicoot spp	D	Complete	E	22	
11	Floor	1/12/2018	0801	Lace monitor	D	Complete	E	25	
11	Floor	8/12/2018	0523	Cat	D	Complete	E	31	Black with white paws
11	Floor	9/12/2018	1514	Lace monitor	D	Complete	E	32	
11	Floor	9/12/2018	1606	Lace monitor	D	Complete	E	33	
11	Floor	13/12/2018	2304	Bandicoot spp	Pr	Complete	W	34	
11	Furniture	NIL							
11	Furniture	30/10/2018	2005	Antechinus spp	D	Complete	W	2	
11	Furniture	30/10/2018	2034	Antechinus spp	D	Complete	E	3	
11	Furniture	1/11/2018	1944	Antechinus spp	D	Complete	W	4-6	
11	Furniture	1/11/2018	2018	Antechinus spp	D	Complete	E	7	
11	Furniture	4/11/2018	0301	Antechinus spp	D	Complete	E	11	
11	Furniture	4/11/2018	0412	Antechinus spp	D	Complete	E	12,14	
11	Furniture	4/11/2018	2251	Antechinus spp	D	Complete	W	15	
11	Furniture	5/11/2018	0029	Antechinus spp	D	Complete	E	16	
11	Furniture	5/11/2018	0154	Antechinus spp	D	Complete	E	18	
11	Furniture	6/11/2018	0424	Antechinus spp	D	Complete	E	20	
11	Furniture	7/11/2018	2301	Antechinus spp	D	Complete	W	21	
11	Furniture	10/11/2018	0900	Lace monitor	D	Complete	E	22	On ground
11	Furniture	15/11/2018	0136	Antechinus spp	D	Complete	W	24	
11	Furniture	15/11/2018	0238	Antechinus spp	D	Complete	E	25	
11	Furniture	22/11/2018	0210	Antechinus spp	D	Complete	E	27	
11	Furniture	26/11/2018	0117	Antechinus spp	D	Complete	E	30	
11	Furniture	27/11/2018	2339	Antechinus spp	D	Complete	E	33	
11	Furniture	28/11/2018	2159	Antechinus spp	D	Complete	E	35	
11	Furniture	29/11/2018	2300	Antechinus spp	D	Complete	E	39	
11	Furniture	30/11/2018	2030	Antechinus spp	D	Incomplete	W-E	40	
11	Furniture	1/12/2018	2027	Antechinus spp	D	Complete	E	43	
11	Furniture	1/12/2018	0351	Antechinus spp	D	Complete	E	45	
11	Furniture	2/12/2018	2210	Antechinus spp	D	Incomplete	W-E	46-47	
11	Furniture	3/12/2018	0030	Antechinus spp	D	Complete	E	49	
11	Furniture	4/12/2018	2203	Antechinus spp	D	Incomplete	W-E	51-52	
11	Furniture	5/12/2018	0054	Antechinus spp	D	Complete	E	54	
11	Furniture	5/12/2018	0236	Antechinus spp	D	Complete	E	55	
11	Furniture	6/12/2018	0102	Antechinus spp	D	Complete	E	62	
11	Furniture	6/12/2018	0328	Antechinus spp	D	Incomplete	W-E	63-64	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
11	Furniture	6/12/2018	0415	Antechinus spp	D	Complete	E	66	
11	Furniture	9/12/2018	2117	Antechinus spp	D	Complete	E	70	
11	Furniture	10/12/2018	2145	Antechinus spp	D	Complete	E	72	
11	Furniture	12/12/2018	0207	Antechinus spp	D	Incomplete	W-E	73-74	
11	Furniture	13/12/2018	0209	Antechinus spp	D	Complete	E	75	
11	Furniture	15/12/2018	0038	Antechinus spp	D	Complete	E	77	
11	Furniture	15/12/2018	2103	Antechinus spp	D	Complete	E	79	
11	Furniture	16/12/2018	0036	Antechinus spp	D	Complete	E	81	
11	Furniture	16/12/2018	0306	Antechinus spp	D	Complete	E	83	
11	Furniture	17/12/2018	0056	Antechinus spp	D	Complete	E	85	
11	Furniture	17/12/2018	0247	Antechinus spp	D	Complete	E	87	
12	Furniture	NA	0522	Antechinus spp	D	Complete	E	2	
12	Furniture	NA	0411	Antechinus spp	D	Incomplete	E-W	3	
12	Furniture	NA	2006	Antechinus spp	D	Complete	E	8	
12	Furniture	NA	2149	Microbat spp	D	Incomplete	NDM	18	
12	Furniture	NA	0428	Microbat spp	D	Incomplete	NDM	24	
12	Furniture	NA	2020	Antechinus spp	D	Incomplete	W-E	27	
12	Furniture	NA	2051	Antechinus spp	D	Complete	E	30-31	
12	Furniture	NA	0007	Microbat spp	D	Incomplete	NDM	35	
12	Furniture	NA	0322	Antechinus spp	D	Complete	E	38-42	
12	Furniture	NA	1857	Antechinus spp	D	Incomplete	W-E	60-61	
12	Furniture	NA	0241	Antechinus spp	D	Complete	E	63,65	
12	Furniture	NA	0403	Antechinus spp	D	Complete	E	66	
12	Furniture	NA	1841	Antechinus spp	D	Complete	E	68	
12	Furniture	NA	2239	Antechinus spp	D	Complete	E	70-72	
12	Furniture	NA	2002	Antechinus spp	D	Complete	E	76-79	
12	Furniture	NA	2015	Antechinus spp	D	Complete	E	81	
12	Furniture	NA	2109	Antechinus spp	D	Complete	E	82	
12	Furniture	NA	2046	Antechinus spp	D	Complete	E	85-86	
12	Furniture	NA	2150	Antechinus spp	D	Complete	W	87	
12	Furniture	NA	0122	Antechinus spp	D	Complete	E	89	
12	Furniture	1/11/2018	2315	Antechinus spp	D	Complete	W	3	
12	Furniture	2/11/2018	0206	Antechinus spp	D	Complete	E	4	
12	Furniture	3/11/2018	0036	Antechinus spp	D	Complete	E	5	
12	Furniture	4/11/2018	0326	Antechinus spp	D	Complete	W	6	
12	Furniture	4/11/2018	1900	Antechinus spp	D	Complete	E	7	
12	Furniture	6/11/2018	2041	Antechinus spp	D	Complete	E	8-9	
12	Furniture	7/11/2018	1944	Antechinus spp	D	Complete	W	10	
12	Furniture	8/11/2018	1923	Antechinus spp	D	Complete	E	11	
12	Furniture	9/11/2018	1936	Antechinus spp	D	Incomplete	W-E	13-14	
12	Furniture	11/11/2018	1903	Antechinus spp	D	Complete	E	16	
12	Furniture	13/11/2018	2124	Antechinus spp	D	Incomplete	NDM	17-18	

Site No.	Cam position	Date	Time	Species	Accuracy	Crossing type	Movement direction	Image No's	Comments
12	Furniture	18/11/2018	0050	Antechinus spp	D	Complete	E	19-20	
12	Furniture	19/11/2018	0029	Antechinus spp	D	Incomplete	W-E	21-22	
12	Furniture	19/11/2018	1849	Antechinus spp	D	Incomplete	W-E	23-24	
12	Furniture	20/11/2018	0331	Antechinus spp	D	Complete	E	26	
12	Furniture	21/11/2018	0204	Antechinus spp	D	Complete	W	27-28	
12	Furniture	21/11/2018	0303	Antechinus spp	D	Complete	E	29	
12	Furniture	21/11/2018	2311	Antechinus spp	D	Complete	E	31	
12	Furniture	24/11/2018	2100	Antechinus spp	D	Complete	E	35	
12	Furniture	27/11/2018	2057	Antechinus spp	D	Incomplete	W-E	36-38	
12	Furniture	28/11/2018	0040	Antechinus spp	D	Complete	E	39-40	
12	Furniture	28/11/2018	0334	Antechinus spp	D	Complete	E	42	
12	Furniture	28/11/2018	1910	Antechinus spp	D	Incomplete	W-E	44-46	
12	Furniture	28/11/2018	2156	Antechinus spp	D	Incomplete	W-E	47-48	
12	Furniture	29/11/2018	0106	Brush-tailed phascogale	D	Complete	W	49	
12	Furniture	4/12/2018	0147	Antechinus spp	D	Complete	W	55	
12	Furniture	5/12/2018	2130	Antechinus spp	D	Complete	E	56	
12	Furniture	6/12/2018	2315	Antechinus spp	D	Complete	W	57	
12	Furniture	11/12/2018	0028	Antechinus spp	D	Incomplete	W-E	59-61	
12	Furniture	11/12/2018	0323	Antechinus spp	D	Complete	E	62	
12	Furniture	11/12/2018	1926	Antechinus spp	D	Complete	E	64	
12	Furniture	14/12/2018	0203	Antechinus spp	D	Complete	E	65	
12	Furniture	16/12/2018	0313	Brush-tailed phascogale	D	Complete	E	66	
12	Floor	1/11/2018	1555	Lace monitor	D	Complete	E	8	
12	Floor	7/11/2018	1949	Fox	D	Complete	W	15	
12	Floor	13/11/2018	0801	Lace monitor	D	Complete	E	26	
12	Floor	3/12/2018	0709	Lace monitor	D	Complete	E	73	

Appendix C: Road mortality surveys

Table C1: Details of road mortality surveys adjacent koala culverts monitored on W2B sections 1 & 2 and a segment of Wardell Road and Old Pacific Highway, Wardell.

Site/Side	Date	Survey no.	Observers	Start	End	Road kill	Age	Easting	Northing	Cleared off Rd	Live fauna on Rd edge	Notes	Weather
1													
East	24/9/18	1	BT	1530	1545	Nil							
	6/12/18	2	NM	1340	1350	Nil							
West	24/9/18	1	NM	1530	1545	Swamp Wallaby	Old	515605	6681408	No	Nil		
	6/12/18	2	OT	1340	1350	Nil							
2													
East	24/9/18	1	BT	1545	1600	Nil					Nil		
	6/12/18	2	OT	1345	1355	Nil							
West	24/9/18	1	NM	1545	1600	Medium bird	Old	515434	6681658	No	Nil		
						Macropod spp.	Old	515395	6681702	No	Nil		
	6/12/18	2	NM	1345	1355	Nil							
3													
East	20/9/18	1	NM	1330	1347	Nil							
	6/12/18	2	OT	1636	1646	Nil							
West	20/9/18	1	NP	1330	1347	Carpet Python	Fresh	514525	6682215	No	Nil		Storm
						Carpet Python	Old	514390	6682255	Yes			
	6/12/2018	2	NM	1636	1646	Nil					Nil		
4													
East	28/9/18	1	OT	1345	1401	Swamp Wallaby	Fresh	514148	6682459	Yes	Nil		Fine
	6/12/18	2	OT	1645	1655	Nil							
West	28/9/18	1	NM	1345	1401	Carpet Python	Old	514148	6682367	Yes	Nil		Fine
						UnID. Med. mammal	Old	514039	6682459	No		Smudge	
	6/12/18	2	NM	1645	1655	Carpet Python	Old	514170	6682340	part of	Nil	Skin cleared off, vertebrae still remaining	
5													
East	28/9/18	1	BT	1404	1418	Nil					Nil		Fine
	6/12/18	2	NM & OT	740	748	Swamp Wallaby	Old	513254	6684848	no	Nil		Fine
West	28/9/18	1	BT	1345	1358	Kookaburra	Old	150n		Yes	Nil		Fine
						Kookaburra	Old	50n		Yes			
	6/12/18	2	NM & OT	728	737	Nil					Nil		Fine
6													
East	20/9/18	1	NM	1305	1320	Prob Bearded Dragon	Fresh	513168	6685416	No	Nil		Fine and warm
	6/12/18	2	NM & OT	807	814	Nil					Nil		

Site/ Side	Date	Survey no.	Observers	Start	End	Road kill	Age	Easting	Northing	Cleared off Rd	Live fauna on Rd edge	Notes	Weather
West	20/9/18	1	NP	1305	1320	Bearded Dragon	Old	513175	6685306	No	Nil		Fine and warm
	6/12/18	2	NM & OT	816	824	Nil					Nil		
7													
East	20/9/18	1	NP	1237	1252	Macropod spp.	Very old	508646	6688669	Yes	Nil		Fine and warm
	6/12/18	2	OT	947	959	Prob swamp wallaby	Old	509047	6688459	No	Nil		Fine
						Swamp Wallaby	Old	508747	6688646	No	Nil		
West	20/9/18	1	NM	1237	1252	Unidentified mammal	Very old	508675	6688698	Yes	Nil		Fine and warm
						Black-shouldered kite	Old	508724	6688664	Yes	Nil		
						Medium bird	Very old	508913	6688540	Yes	Nil		
	6/12/18	2	NM	947	959	Nil					Nil		Fine
8													
East	20/9/18	1	NM	1215	1230	Nil					Nil		Fine and warm
	6/12/2018	2	OT	918	928	Nil					Nil		Fine
West	20/9/18	1	NP	1215	1230	Nil					Nil		Fine and warm
	6/12/2018	2	NM	918	928	Nil					Nil		Fine
9&10													
East	20/9/18	1	NP	1115	1130	Blue-tongue lizard	Fresh	506100	6692726	No	Nil		Fine and warm
						Prob NB Bandicoot	Very old	506122	6692691	Yes	Nil		Fine and warm
	5/12/2018	2	NM & OT	1508	1518	Nil							Fine
West	20/9/18	1	NP	1131	1146	Nil							
	5/12/2018	2	NM & OT	1358	1417	Large macropod	Very old	506013	6692506	No	Nil		Fine
						Prob Swamp wallaby	Very old	505911	6692795	No	Nil		
						Prob Swamp wallaby	Very old	505912	6692831	No	Nil		
11													
East	20/9/18	1	NP	1040	1055	Small snake	Very old	505844	6693395	Yes	Nil		Fine and warm
	5/12/2018	2	NM & OT	1613	1628	Nil					Nil		Fine
West	20/9/18	1	NP	1055	1110	Nil					Nil		Fine and warm
	5/12/2018	2	NM & OT	1600	1610	Nil					Nil		Fine
12													
East	19/9/18	1	NP	1510	1525	Nil					Nil		Fine and warm
	5/12/2018	2	NM & OT	1153	1205	Nil					Nil		Fine

Site/ Side	Date	Survey no.	Observers	Start	End	Road kill	Age	Easting	Northing	Cleared off Rd	Live fauna on Rd edge	Notes	Weather
West	19/9/18	1	NP	1530	1545	Nil					Nil		Fine and warm
	5/12/2018	2	NM & OT	1209	1225	Nil					Nil		Fine
Wardell Road													
	3/10/18	1	NP	1536	1610	Cane toad		543417	6798151		Nil		Fine
						Cane toad		543334	6798167				
						Brown tree snake		543024	6798218				
	30/11/2018	2	NP	1410	1435	Fox		543805	6798064		Nil		Fine & hot
						Fox		543770	6798082				
						Cane toad		542981	6798236				
Old Pacific Highway													
	3/10/18	1	NP	1625	1725	Kookaburra		546365	6800063		Nil		Fine
						Hare		546346	6799918				
						Dragon spp.		546097	6799303				
						Black foxing fox		545954	6799055				
						Unid mammal		545938	6799034				
						Chicken		545876	6798842				
						Flying fox spp.		545863	6798825				
						Grey fantail		545832	6798705				
						Echidna		545580	6797984				
	30/11/2018	2	NP	1453	1550	Water dragon		546391	6800283		Nil		Fine & hot
						Lace monitor		545889	6798851				
						Collared sparrowhawk		545858	6798797				
						Lace monitor		545832	6798720				
						Unid med mammal		545611	6798061				
						Black rat		545996	6799141				
						Unid small mammal		545857	6798833				
						Unid med bird		545810	6798682				