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Occupancy monitoring of fauna at Warralong, 2019

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Summary

This study provides initial baseline data for future monitoring at Warralong to determine the effects on the occupancy of fauna, and especially feral predators, after predator and fire management is implemented and to inform adaptive management. Occupancy was monitored using remote cameras and 2 ha sign plots. Feral cat (*Felis catus*) occupancy was very high: 0.79 (±0.19 SE) from plots and 0.92 (±0.07 SE) from cameras. A single red fox (*Vulpes vulpes*) was detected. Changes in occupancy of other species such as the greater bilby (*Macrotis lagotis*), brush-tailed mulgara (*Dasyurus blythi*), and spinifex hopping mouse (*Notomys alexis*) can also be used in the future to assess the effectiveness of management. An online portal for viewing spatial data of camera detections has been created.

Major recommendations include:

- Monitoring design and data collection is replicated as close as possible during future monitoring to ensure comparable data. A suggested plan on the timing of monitoring events pre- and post- management is provided.
- Continue to employ both remote camera and 2 ha sign plots in combination and then examine differences in changes in occupancy in the two techniques after several monitoring events.
- Cameras should be placed at more bilby burrows in future monitoring events to be similar in number to cameras positioned on vehicle tracks (i.e. 20).
- During any subsequent monitoring, cameras should be triggered (i.e. walk in front of) in the field when set, checked, and retrieved to confirm cameras are functioning correctly.
- Continued use of the CPW software is recommended as it provides an efficient and consistent way to store and score images and output data for analyses.
- Early detection of fox presence is important. A preliminary quick review of images each time data is downloaded from cameras to identify any fox present, would enable a rapid response to control this threat.
- The management area be extended to the north to encompass the “River” bilby colony and a buffer zone to ensure effective management. This will require negotiation with the De Grey Station lease holders.

1 Background

In 2014 the Department of Biodiversity, Conservation and Attractions (DBCA) Bilby Research Team together with Warralong community members identified an active greater bilby (*Macrotis lagotis*) population on the Coongan Pastoral Lease. Since 2014, further observations of bilby presence have been recorded in 2015, 2016, 2018 (Dziminski *et al.* 2019) and 2019 (Dziminski *et al.* 2020). A collaborative project involving the Warralong Community, DBCA, Roy Hill, CSIRO and Greening Australia was initiated in 2018 to monitor and manage the bilby population at Warralong. Management of feral species and fire is planned. To understand if management actions are successful, and to inform adaptive management, a program of occupancy monitoring before and after the implementation of management is required. Concurrent abundance monitoring of bilbies is being undertaken to detect any rapid changes in response to management.

1.1 Occupancy and detection

Occupancy is defined as the probability that a species uses a location (i.e., were recently present in the location, but may not be physically present there at the time of surveying). It can also be interpreted as the proportion of locations used by the species. In the occupancy surveys, detection is defined as the probability of detecting evidence of the focal species given the species uses the location. In this study, locations were defined as 2 ha plots, 100m lengths of tracks/roads and remote camera detection areas. The detection data was analysed using occupancy models that explicitly account for imperfect detection (MacKenzie *et al.* 2002). Not accounting for detection probability may lead to misleading inferences about occupancy (MacKenzie *et al.* 2006).

Vehicle tracks provide movement corridors for invasive predators and their activity on tracks can be magnitudes higher than off tracks (Raiter *et al.* 2018). Since the main objective of this study was to monitor feral predators, we positioned cameras observing vehicle tracks to increase the detection of these target species. Furthermore, bilby burrows can act as natural lures in the landscape, with many other prey species as well as bilbies inhabiting them, attracting predators that regularly visit these features in an often barren landscape (Hofstede and Dziminski 2017; Dawson *et al.* 2019). Therefore, we also positioned cameras on some bilby burrows to increase detection of feral predators.

1.2 Aims

The aim of this study was to develop a monitoring program to detect the effectiveness of planned management and inform adaptive management of feral predators, in particular feral cats (*Felis catus*) and red foxes (*Vulpes vulpes*).

Specific objectives were to:

- Determine the occupancy of feral predators before and after management is implemented.

- Compare the detection and occupancy values derived from 2 ha plot surveys and remote cameras.
- Compare the detection and occupancy values derived from different aged sign, and sign on plots vs vehicle tracks.
- Determine occupancy of a suite of fauna species as potential indicators of feral predator and fire management.
- Detect potential differences in occupancy of species within and outside the defined management area.

This study provides the initial baseline data for the aims and objectives above.

2 Methods

2.1 Remote cameras

Remote cameras (Reconyx PC900 Hyperfire Professional) were allocated to 30 locations in the Coongan Pastoral Lease (Figure 1 and Table 4). Twenty were positioned observing vehicle tracks, with half of these equally distributed within and outside the management area. These 20 cameras were paired with nearby adjacent 2 ha plots. The remaining ten cameras were positioned observing bilby burrow entrances within the management area; one of these failed (BB07) and was excluded from analyses. Camera locations were revisited during the 2019 dry season on four occasions: to deploy on 8-11 May, change batteries and memory cards on 22-24 July, 2-4 September, and retrieval on 14 October. Camera settings are attached in Appendix 1; Figure 1. Cameras were attached to 1.8 m steel fencing posts using a "Direct Mount" (Outdoor Cameras Australia). After the first revisit it was noted that cattle interfered with some cameras rubbing themselves against the posts and cameras, altering the camera position. Subsequently on the second revisit, three extra fencing posts were added around the central camera post as a barrier.

Colorado Parks and Wildlife Photo Warehouse (CPW) was used to store and score images. CPW was used to generate occupancy data (binary presence/absence) for 10 occasions of 2-week periods (20 weeks total) and four occasions of 35-day periods: both totaling to an observation period of 20 weeks. The 10 occasions of 2-weeks provided sufficient observations for occupancy analyses of most species. The dataset of four occasions of 35 days was generated as it is the closest to the four 2 ha plot occasions for comparison with adjacent paired plots.

Some species were grouped into categories to match those scored from 2 ha plots (Table 1).

Table 1. Species categories used in analyses of camera data.

Species category	Included species
Varanid lizard	Black-headed monitor (*Varanus tristis*) Large and small sand goannas (*Varanus gouldii*)
Medium lizard	Bearded dragon (*Pogona minor*) Centralian blue-tongue (*Tiliqua multifasciata*)
Small lizard	Central netted dragon (*Ctenophorus nuchalis*) All *Ctenotus* spp All gecko spp
Rodent/dunnart (non-hopping mouse)	All rats All non-hopping mice Little red kaluta (*Dasykaluta rosamondae*) Lesser hairy-footed dunnart (*Sminthopsis youngsoni*)

2.2 2 ha Sign plots

Sign plots were allocated to 32 locations in the Coongan Pastoral Lease (Table 2), with plots equally distributed within and outside the management area (Figure 1). Plots were revisited during the 2019 dry season on four occasions: 8-11 May, 22-24 July, 2-4 September and 14-16 October.

The standardised 2 ha sign plot technique provides systematically quantified and comparable data and is currently applied broadly in parts of arid and semi-arid Australia. At each 2 ha plot, trained observers recorded animal sign as well as plot covariates in a 2 ha area and 100 m of nearby vehicle track. During this survey, data was collected electronically using Mobile Data Studio (CreativityCorp Pty Ltd; Appendix 2).

Table 2. Locations of 2 ha sign plots.

Plot ID	Latitude*	Longitude*	100m of nearby track surveyed	Management treatment
1	-20.5827	119.6023	Yes	Within
2	-20.5832	119.7169	Yes	Within
3	-20.6199	119.8059	Yes	Outside
4	-20.5942	119.6687	Yes	Within
5	-20.6214	119.6635	Yes	Within
6	-20.5829	119.5284	Yes	Outside
7	-20.649	119.6387	Yes	Within
8	-20.6322	119.601	Yes	Within
9	-20.6561	119.6421	Yes	Within
10	-20.6398	119.6689	Yes	Within
11	-20.6734	119.6498	Yes	Within
12	-20.7231	119.6932	Yes	Outside
13	-20.7072	119.6822	Yes	Outside
14	-20.6769	119.536	Yes	Outside
15	-20.6978	119.6371	Yes	Outside
16	-20.5938	119.6189	No track nearby	Within
17	-20.6482	119.6289	No track nearby	Within
18	-20.6764	119.6439	No track nearby	Within
19	-20.6503	119.6912	No track nearby	Within
20	-20.6615	119.6893	No track nearby	Within
21	-20.7067	119.5277	Yes	Outside
22	-20.7142	119.6432	Yes	Outside
23	-20.6585	119.5274	Yes	Outside
24	-20.6143	119.4892	Yes	Outside
25	-20.7506	119.6972	Yes	Outside
26	-20.7935	119.6411	Yes	Outside
27	-20.5984	119.5901	Yes	Within
28	-20.6751	119.5819	Yes	Outside
29	-20.5437	119.5475	Yes	Outside
31	-20.6483	119.5641	Yes	Outside
32	-20.5868	119.6016	No track nearby	Within
33	-20.7304	119.6849	Yes	Outside

*WGS84

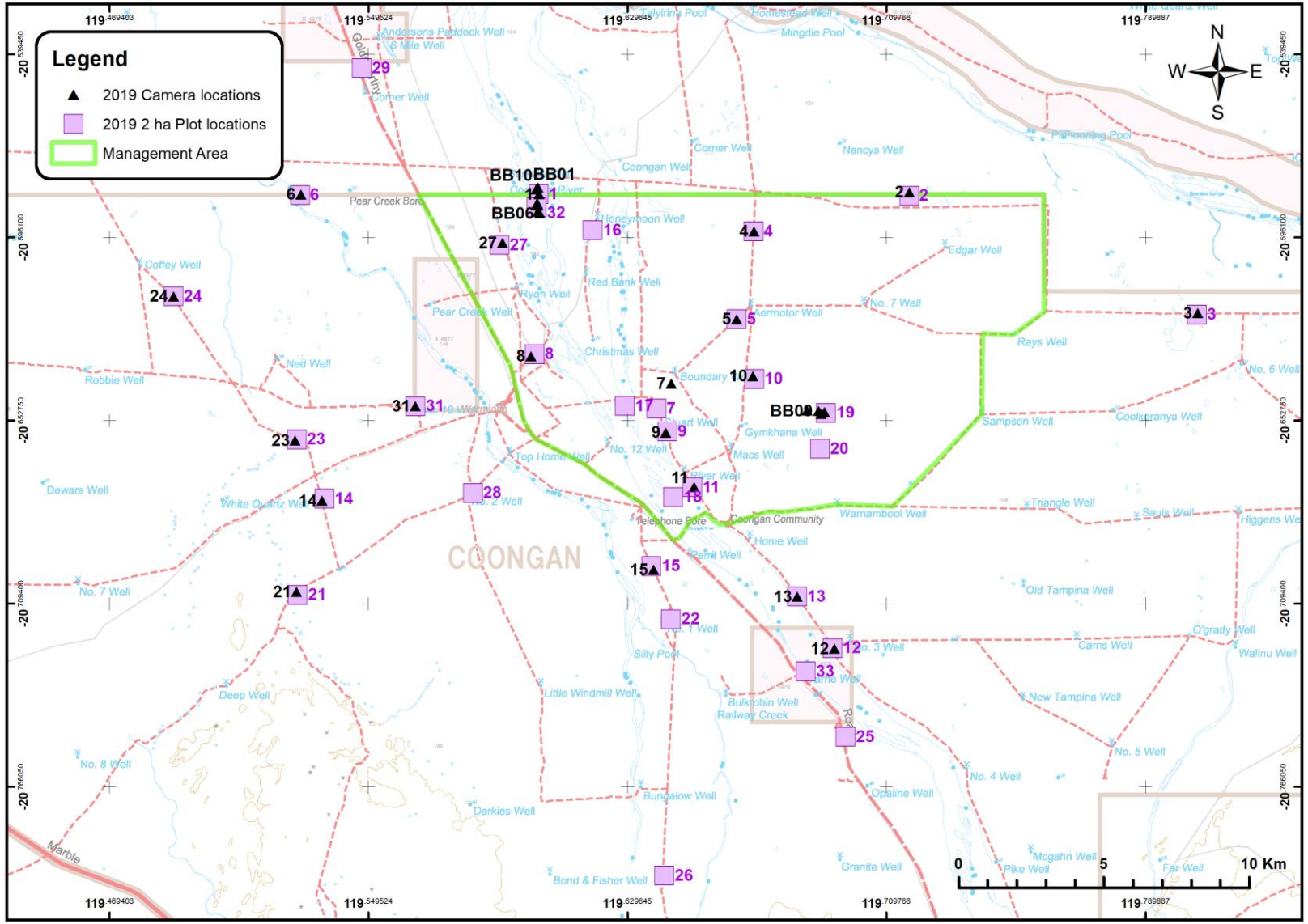
2.3 Occupancy analyses

All occupancy analyses were conducted in R using the RPresence package. Candidate models included simple single season models with no covariates [*psi(.)p(.)*], models with covariates reflecting the hypothesis of different detection of cameras on burrows and tracks [*psi(.)p(On tracks)*], and models with covariates reflecting the

hypothesis of different occupancy of cameras and plots within and outside the management area [*psi(Management)p(.)*]. Confidence intervals (5-95%) and beta values were calculated. High beta values indicate to interpret the associated occupancy or detection value with caution, usually because of a low or insufficient number of observations. When occupancy or detection is or approaches 1 or 0, then associated beta values can also be inflated. When occupancy or detection values approach 1 they also become unreliable for interpretation. If a model is more than 2 Akaike Information Criterion units lower than another (ΔAIC), then it is considered significantly better than that model.

Monitoring locations on the boundary of the management area were included in the management area (camera and plot locations 1 and 2). Since all occasions were within the dry season, we expected no survey time specific effects on detection. The 2 ha plot data was filtered to all combinations of age of sign and whether the sign was on vehicle tracks or on the 2 ha plot. This was done to examine differences in detection and the effects of using different age and vehicle track or plot-based sign on resultant occupancy values.

Figure 1. Fauna occupancy monitoring locations at Warralong in 2019.



3 Results

3.1 Camera effort and species detected

Species detected by cameras and 2 ha plots are listed in Table 3. Camera effort is shown in Table 4.

Table 3. Fauna detected on remote cameras and 2 ha sign plots.

Cameras	Sign plots	Cameras	Sign plots
Predators		Birds	
Cat	Cat	Australian bustard	Australian bustard
Fox	Dingo	Black-faced woodswallow	Bird - walking
Dingo		Brown falcon	Emu
Domestic dog		Brown goshawk	Quail
		Brown quail	
Introduced herbivores		Budgerigar	
Domestic cow	Domestic cow	Bush-stone curlew	
Dromedary camel	Donkey	Common bronzewing	
Horse	Dromedary camel	Crested pigeon	
	Horse	Crimson chat	
		Diamond dove	
Marsupials		Galah	
Brush-tailed mulgara	Brush-tailed mulgara	Grey-headed honeyeater	
Giant red kangaroo	Greater bilby	Little button quail	
Greater bilby	Kangaroo red or euro	Little crow	
Lesser-hairy footed dunnart	Wallaby - unknown	Magpie-lark	
Little red kaluta		Nankeen kestrel	
Speckled hare-wallaby		Pied butcherbird	
		Red-backed kingfisher	
Rodents		Rufous songlark	
Rat	Mouse / small rodent / dunnart	Singing bushlark	
Spinifex hopping mouse	Spinifex hopping mouse	Singing honeyeater	
Unknown mouse		Spinifex pigeon	
		Spotted nightjar	
Reptiles		Torresian crow	
Bearded dragon	Centralian blue-tongued skink	Variegated fairy wren	
Black-headed monitor	Night skink	Western bowerbird	
Black-headed python	Lizard - medium	Whistling kite	
Central netted dragon	Lizard - small	White winged fairy wren	
Centralian blue-tongued skink	Sand slider (Lerista)	Willie wagtail	
Large sand goanna	Varanid lizard	Yellow-throated miner	
Leopard ctenotus		Zebra finch	
Mengden's brown snake			
Mulga snake			
Small sand goanna			

Table 4. Remote camera locations and effort.

Location ID	Set date	Pull date	Days deployed	Trap nights	Latitude**	Longitude**	Number of photos	Location	Management treatment	Paired plot
1	09-May-19	14-Oct-19	158	131.97	-20.58277	119.60239	3471	Track	Within	1
2	09-May-19	14-Oct-19	158	158.9	-20.58215	119.71696	2144	Track	Within	2
3	09-May-19	14-Oct-19	158	158.86	-20.61952	119.80619	1400	Track	Outside	3
4	09-May-19	14-Oct-19	158	157.14	-20.59422	119.66884	460	Track	Within	4
5	09-May-19	14-Oct-19	158	129.16	-20.62144	119.66345	21029	Track	Within	5
6	06-May-19	14-Sep-19	131	137.55	-20.58282	119.52869	2927	Track	Outside	6
7	09-May-19	14-Oct-19	158	68.94	-20.64138	119.64324	5391	Track	Within	7
8	08-May-19	14-Oct-19	159	155.47	-20.63286	119.59982	2802	Track	Within	8
9	09-May-19	14-Oct-19	158	100.35	-20.65651	119.6416	1900	Track	Within	9
10	09-May-19	14-Oct-19	158	86.01	-20.639	119.6685	51357	Track	Within	10
11	10-May-19	14-Oct-19	157	156.9	-20.67327	119.65032	1735	Track	Within	11
12	09-May-19	14-Oct-19	158	143.17	-20.72336	119.69371	916	Track	Outside	12
13	09-May-19	14-Oct-19	158	158.92	-20.70728	119.68225	1044	Track	Outside	13
14	08-May-19	14-Oct-19	159	158.87	-20.67756	119.53523	1015	Track	Outside	14
15	10-May-19	14-Oct-19	157	150.24	-20.69892	119.63778	991	Track	Outside	15
21	08-May-19	14-Oct-19	159	158.16	-20.70578	119.52738	575	Track	Outside	21
23	08-May-19	14-Oct-19	159	158.97	-20.65896	119.52691	758	Track	Outside	23
24	08-May-19	14-Oct-19	159	144.96	-20.61433	119.48927	440	Track	Outside	24
27	08-May-19	14-Oct-19	159	46.25	-20.59787	119.59104	395	Track	Within	27
31	08-May-19	14-Oct-19	159	154.98	-20.6483	119.56415	2383	Track	Outside	31
BB01	09-May-19	14-Oct-19	158	130.87	-20.58126	119.60145	11009	Burrow	Within	
BB02	09-May-19	14-Oct-19	158	154.86	-20.58614	119.60201	7867	Burrow	Within	
BB03	09-May-19	14-Oct-19	158	157.29	-20.58547	119.60176	1974	Burrow	Within	
BB04-A	24-Jul-19	14-Oct-19	82	82.35	-20.65012	119.69071	537	Burrow	Within	
BB05	09-May-19	14-Oct-19	158	158.58	-20.58814	119.60202	2488	Burrow	Within	
BB06	09-May-19	14-Oct-19	158	156.37	-20.58873	119.60259	667	Burrow	Within	
BB07*	09-May-19	14-Oct-19	158	0.58	-20.64972	119.68531	56897	Burrow	Within	
BB08	09-May-19	14-Oct-19	158	155.66	-20.65072	119.68966	1292	Burrow	Within	
BB09	09-May-19	14-Oct-19	158	149.33	-20.64981	119.68882	1275	Burrow	Within	
BB10	10-May-19	14-Oct-19	157	83.61	-20.58064	119.60207	5400	Burrow	Within	

*Failed camera excluded from analyses. **WGS84.

3.2 Occupancy and detection

Occupancy and detection of key species are presented in detail below.

3.2.1 Feral cat (*Felis catus*)

Occupancy derived from cameras was very high, ranging between 0.85 (±0.11 SE) to 0.92 (±0.07 SE) with no differences between within and outside the management area (Table 5; Appendix 3, Table 1). No difference was identified in detection between cameras on vehicle tracks and cameras on burrows (Table 6; Appendix 3, Table 1), however the sample size of cameras on burrows was small (i.e. nine cameras).

Occupancy derived from plots varied up to 0.79 (±0.19 SE) depending on what age sign and vehicle track or plot observations were considered (Appendix 3, Table 1), with occupancy higher outside the management area when including all age sign just on plots and on plots and vehicle track combined (Table 7). Detection was generally higher on vehicle tracks, especially when restricting observations to very fresh sign (Appendix 3, Table 1).

Detection using cameras was higher in most cases, for example when comparing detection from cameras to all sign on plots and tracks (t = 2.4083, df = 38, P = 0.021; Appendix 3, Table 1), however was not significant when comparing fresh sign on tracks.

Table 5. Model comparisons of cameras on vehicle tracks within and outside the management area with all cameras on vehicle tracks for cat occupancy.

Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
psi()p()	0	0.7238	2	186.75
psi(Management)p()	1.95	0.273	3	186.7

Table 6. Model comparisons of cameras on burrows and not on burrows with all cameras for cat detection.

Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
psi()p(On_tracks)	0	0.606	3	254.19
psi()p()	0.9	0.3867	2	257.08

Table 7. Model comparisons of plots within and outside the management area with all plots for cat occupancy.

Dataset	Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
Very fresh sign (up to 2 days) on plots	psi(Management)p()	0	0.6823	3	50.3652
	psi()p()	1.5289	0.3177	2	53.8941
Fresh sign (up to 1 week) on plots	psi(Management)p()	0	0.6823	3	56.3559
	psi()p()	1.5289	0.3177	2	59.8848
All sign on plots	psi(Management)p()	0	0.9949	3	80.7525
	psi()p()	10.5321	0.0051	2	93.2846
Very fresh sign (up to 2 days) on tracks	psi()p()	0	0.6418	2	59.8848
	psi(Management)p()	1.1664	0.3582	3	59.0512
Fresh sign (up to 1 week) on tracks	psi()p()	0	0.5388	2	68.3901
	psi(Management)p()	0.3109	0.4612	3	66.701
All sign on tracks	psi()p()	0	0.5916	2	93.2846

Very fresh sign (up to 2 days) on plots and tracks	psi(Management)p()	0.7414	0.4084	3	92.026
	psi(Management)p()	0	0.6857	3	89.7244
	psi()p()	1.5602	0.3143	2	93.2846
Fresh sign (up to 1 week) on plots and tracks	psi(Management)p()	0	0.6857	3	93.4035
	psi()p()	1.5603	0.3143	2	96.9638
All sign on plots and tracks	psi(Management)p()	0	0.8988	3	124.3405
	psi()p()	4.3669	0.1012	2	130.7074

3.2.2 Red fox (*Vulpes vulpes*)

There was one detection of a fox at camera location 14 on 27 May 2019 at 19:02:29.

3.2.3 Dingo (*Canis lupus dingo*)

Occupancy derived from cameras ranged between 0.41 (±0.1 SE) to 0.58 (±0.12 SE) with no differences between within and outside the management area (Table 8; Appendix 3, Table 2). Cameras on burrows did not detect dingos (Table 9; Appendix 3, Table 2).

Occupancy derived from plots was high and varied up to 0.92 (±0.32 SE) depending on what age sign and vehicle track or plot observations were considered (Appendix 3, Table 2), with no differences between within and outside the management area (Table 10). Detection of sign of all age was highest on plots (Appendix 3, Table 2).

Detection using cameras was higher, comparing detection from cameras to the highest detection on plots resulted in significant difference (t = 2.8656, df = 38, P = 0.0067; Appendix 3, Table 2).

Table 8. Model comparisons of cameras on vehicle tracks within and outside the management area with all cameras on vehicle tracks for dingo occupancy.

Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
psi()p()	0	0.71	2	127.48
psi(Management)p()	1.83	0.29	3	127.31

Table 9. Model comparisons of cameras on burrows and not on burrows with all cameras for dingo detection.

Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
psi()p(On_tracks)	0	0.986	3	127.48
psi()p()	8.5	0.014	2	137.98

Table 10. Model comparisons of plots within and outside the management area with all plots for dingo occupancy.

Dataset	Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
Very fresh sign (up to 2 days) on plots	psi()p()	0	0.5752	2	11.6962
	psi(Management)p()	0.6059	0.4248	3	10.3021
Fresh sign (up to 1 week) on plots	psi()p()	0	0.7005	2	28.4496
	psi(Management)p()	1.6994	0.2995	3	28.149
All sign on plots	psi()p()	0	0.5388	2	63.5846
	psi(Management)p()	0.3108	0.4612	3	61.8954
Very fresh sign (up to 2 days) on tracks	psi()p()	0	0.7275	2	54.2957
	psi(Management)p()	1.9641	0.2725	3	54.2598
Fresh sign (up to 1 week) on tracks	psi()p()	0	0.7275	2	54.2957
	psi(Management)p()	1.9641	0.2725	3	54.2598
All sign on tracks	psi()p()	0	0.7201	2	70.1865

	psi(Management)p()	1.8896	0.2799	3	70.0761
Very fresh sign (up to 2 days) on plots and tracks	psi()p()	0	0.7127	2	59.7138
	psi(Management)p()	1.8167	0.2873	3	59.5305
Fresh sign (up to 1 week) on plots and tracks	psi()p()	0	0.7311	2	69.2713
	psi(Management)p()	2	0.2689	3	69.2713
All sign on plots and tracks	psi()p()	0	0.6782	2	103.7882
	psi(Management)p()	1.4906	0.3218	3	103.2788

3.2.4 Domestic dog (*Canis familiaris*)

There were 11 detections of domestic dogs at nine camera locations (01, 02, 07, 08, 12, 13, 14, 15, 31). Some of these were associated with people walking past cameras. It was not possible to distinguish dog from dingo sign on plots.

With these limited observations, occupancy from cameras was estimated at 0.85 (Appendix 3, Table 3) with high variation (±0.52 SE) so should be interpreted with caution. There were not enough observations to examine differences between and within the management area. No dogs were detected at burrows.

3.2.5 Dromedary camel (*Camelus dromedarius*)

Occupancy derived from cameras ranged between 0.2 (±0.1 SE) to 0.43 (±0.26 SE), with no differences between within and outside the management area (Table 11; Appendix 3, Table 4). There were no detections of camels at burrows (Appendix 3, Table 4).

The majority of sign on plots was observed on vehicle tracks, and occupancy varied up to 0.42 (±0.34 SE) depending on what age sign and vehicle track or plot observations were considered (Appendix 3, Table 4). Only sign of all age on vehicle tracks yielded sufficient observations to compare within and outside the management area, which showed no difference (Table 12; Appendix 3, Table 4). There was no significant difference in detection from cameras or plots (Appendix 3, Table 4).

Table 11. Model comparisons of cameras on vehicle tracks within and outside the management area with all cameras on vehicle tracks for camel occupancy.

Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
psi()p()	0	0.64	2	57.64
psi(Management)p()	1.16	0.36	3	56.8

Table 12. Model comparisons of plots within and outside the management area with all plots for camel occupancy.

Dataset	Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
All sign on tracks	psi()p()	0	0.6927	2	33.192
	psi(Management)p()	1.6257	0.3073	3	32.8177

3.2.6 Cattle (*Bos taurus*)

Occupancy derived from cameras was very high ranging between 0.94 (±0.05 SE) to 1, with complete (1 or 100 %) occupancy within and outside the management area (Appendix 3, Table 5). Detection on vehicle tracks was higher than on burrows, but detection at burrows was still substantial (Table 13; Appendix 3, Table 5).

Occupancy derived from plots was also high and varied from 0.73 (±0.09 SE) to 1 depending on what age sign and vehicle track or plot observations were considered (Appendix 3, Table 5), with no differences between within and outside the management area where occupancy was not 1 in both treatments (Table 14).

Detection was higher on plots than cameras when including all age sign (t = 2.2283, df = 38, P = 0.0319; Appendix 3, Table 5), but decreased when only fresh or very fresh sign was included.

Table 13. Model comparisons of cameras on burrows and not on burrows with all cameras for cattle detection.

Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
psi()p(On_tracks)	0	1	3	284.27
psi()p()	21.56	0	2	307.83

Table 14. Model comparisons of plots within and outside the management area with all plots for cattle occupancy.

Dataset	Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
Very fresh sign (up to 2 days) on plots	psi()p()	0	0.5189	2	176.3083
	psi(Management)p()	0.1512	0.4811	3	174.4595
Fresh sign (up to 1 week) on plots	psi()p()	0	0.7311	2	174.906
	psi(Management)p()	2	0.2689	3	174.906
All sign on plots	psi()p()	0	0.7311	2	65.1383
	psi(Management)p()	2	0.2689	3	65.1383
Very fresh sign (up to 2 days) on tracks	psi()p()	0	0.6699	2	158.838
	psi(Management)p()	1.4152	0.3301	3	158.2532
Fresh sign (up to 1 week) on tracks	psi(Management)p()	0	0.6823	3	166.1254
	psi()p()	1.5289	0.3177	2	169.6543
All sign on tracks	psi(Management)p()	0	0.6823	3	141.8951
	psi()p()	1.5289	0.3177	2	145.424
Very fresh sign (up to 2 days) on plots and tracks	psi(Management)p()	0	0.6104	3	173.8822
	psi()p()	0.898	0.3896	2	176.7802
Fresh sign (up to 1 week) on plots and tracks	psi()p()	0	0.7311	2	164.7338
	psi(Management)p()	2	0.2689	3	164.7338
All sign on plots and tracks	psi()p()	0	0.7311	2	42.228
	psi(Management)p()	2	0.2689	3	42.228

3.2.7 Horse (*Equus ferus*)

Occupancy derived from cameras ranged from 0.11 (±0.07 SE) to 0.22 (±0.1 SE), with no differences between within and outside the management area (Table 15; Appendix 3, Table 6). Some horses were detected at burrows, but the model did not identify significant differences (Table 16; Appendix 3, Table 6).

Occupancy derived from plots was higher ranging from 0.85 (±0.13 SE) to 0.87 (±0.13 SE) depending on what age sign and vehicle track or plot observations were considered (Appendix 3, Table 6), with not enough observations to identify differences between within and outside the management area. There were not enough observations on plots paired with cameras to compare detection.

Table 15. Model comparisons of cameras on vehicle tracks within and outside the management area with all cameras on vehicle tracks for horse occupancy.

Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
psi()p()	0	0.55	2	54.48
psi(Management)p()	0.41	0.45	3	52.89

Table 16. Model comparisons of cameras on burrows and not on burrows with all cameras for horse detection.

Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
psi()p(On_tracks)	0	0.62	3	65.46
psi()p()	0.97	0.38	2	68.43

3.2.8 Bilby (*Macrotis lagotis*)

Although this study was not specifically designed to monitor bilbies (see Dziminski *et al.* 2020 for abundance monitoring), increases in bilby occupancy may be detected during future monitoring events if management is successful. Therefore, these data are presented. Bilbies were only detected within the management area at burrows (Table 17; Appendix 3, Table 7) and occupancy derived from all cameras was 0.31 (±0.09 SE; Appendix 3, Table 7).

Occupancy derived from plots was lower than cameras ranging from 0.05 (±0.05 SE) to 0.1 (±0.06 SE) depending on what age sign and vehicle track or plot observations were considered (Appendix 3, Table 7). Bilbies were only observed within the management area which accounts for differences in occupancy between within and outside the management area (Table 18; Appendix 3, Table 7). There were no observations on cameras paired with plots, but detection on plots was high with a minimum of 0.46 (±0.17 SE; Appendix 3, Table 7).

Table 17. Model comparisons of cameras on burrows and not on burrows with all cameras for bilby detection.

Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
psi()p(On_tracks)	0	1	3	92.36
psi()p()	33.73	0	2	128.09

Table 18. Model comparisons of plots within and outside the management area with all plots for bilby occupancy.

Dataset	Model	ΔAIC	Weight	n Parameters	Negative 2 loglikelihood
Very fresh sign (up to 2 days) on plots	psi(Management)p()	0	0.7747	3	31.6214
	psi()p()	2.4698	0.2253	2	36.0912
Fresh sign (up to 1 week) on plots	psi(Management)p()	0	0.7747	3	31.6214
	psi()p()	2.4698	0.2253	2	36.0912
All sign on plots	psi(Management)p()	0	0.7747	3	31.5404
	psi()p()	2.4698	0.2253	2	36.0102
Very fresh sign (up to 2 days) on tracks	psi()p()	0	0.7311	2	0
	psi(Management)p()	2	0.2689	3	0
Fresh sign (up to 1 week) on tracks	psi()p()	0	0.7311	2	0
	psi(Management)p()	2	0.2689	3	0
All sign on tracks	psi()p()	0	0.7311	2	0
	psi(Management)p()	2	0.2689	3	0
Very fresh sign (up to 2 days) on plots and tracks	psi(Management)p()	0	0.7747	3	31.6214
	psi()p()	2.4698	0.2253	2	36.0912
Fresh sign (up to 1 week) on plots and tracks	psi(Management)p()	0	0.7747	3	31.6214
	psi()p()	2.4698	0.2253	2	36.0912

All sign on plots and tracks	psi(Management)p()	0	0.7747	3	31.5404
	psi()p()	2.4698	0.2253	2	36.0102

3.2.9 Remaining species

The remainder of species are not discussed in detail, but the data is provided in Appendix 3 for future comparison if required. Some species may be used as indicator species of management. For example, if management is successful, increases in occupancy of other species such as mulgara, hopping mice and lizards may be detected and may provide a rapid indicator of the effects of management.

3.3 Online portal

An online portal for viewing spatial data of camera detections has been created and can be viewed at: http://ningaui.ddns.net/apps/Warralong/

Login: warralong

Password: animals

Instructions on how to use the portal tools are attached in Appendix 4. Currently, only camera data has been included in this portal, however the possibility exists to incorporate the plot data in the future. This would allow visual representation of the probabilities of occupancy and detection for each species at each monitoring event.

4 Recommendations

4.1 Monitoring design

It is recommended that the described monitoring strategy be used consistently so that changes in occupancy can be detected. Observers should be sufficiently trained to identify animal sign, deploy and maintain cameras as well as identify species recorded on cameras. It is recommended that cameras be deployed for a minimum of eight weeks to ensure enough observations of key species are recorded, and that plots are surveyed on a minimum of four occasions at least two weeks apart. An example of a monitoring design using the minimum recommended time intervals is shown in Table 19. This should be implemented each year that management is implemented if the immediate effects of the management (primarily the control of feral cats) are to be measured.

Table 19. An example of a monitoring design using the minimum recommended time intervals.

Time	Event
Pre-management monitoring	
Any time prior to management	Bilby abundance monitoring
Management -8 weeks	Cameras deployed, sign plots surveyed (occasion 1)
Management -6 weeks	Sign plots surveyed (occasion 2) and cameras checked (fixings adjusted, obstructions cleared, data downloaded and batteries changed if required)
Management -4 weeks	Sign plots surveyed (occasion 2) and cameras checked (fixings adjusted, obstructions cleared, data downloaded and batteries changed if required)
Management -2 weeks	Sign plots surveyed (occasion 2) and cameras checked (fixings adjusted, obstructions cleared, data downloaded and batteries changed if required)
Management	Feral predator baiting
Post management monitoring	
Management +2 weeks (2 weeks optimal time period for uptake of Eradicat baits)	Sign plots surveyed (occasion 1) and cameras checked (fixings adjusted, obstructions cleared, data downloaded and batteries changed if required)
Management +4 weeks	Sign plots surveyed (occasion 2) and cameras checked (fixings adjusted, obstructions cleared, data downloaded and batteries changed if required)
Management +6 weeks	Sign plots surveyed (occasion 2) and cameras checked (fixings adjusted, obstructions cleared, data downloaded and batteries changed if required)
Management +8 weeks	Sign plots surveyed (occasion 4), cameras retrieved

4.2 Monitoring techniques

This study provides a baseline for future monitoring to determine the effects of management when implemented. There are various ways the data can be compartmentalised, in particular, examining sign of differing age and whether sign was observed only on plots, only on vehicle tracks or both. We presented all subsets of the data (Appendix 3). Although many combinations are present, it will enable identification of where differences occur in comparisons to future monitoring. For example, if cat management is successful, initial differences in occupancy may only be detected in a particular data subset (e.g. very fresh sign on vehicle tracks). It is recommended to continue to employ both remote camera and 2 ha sign plots in combination and then an assessment of the most effective monitoring approach following multiple monitoring events is required to examine differences in changes in occupancy in the two techniques. after several monitoring events.

Only nine cameras were positioned at bilby burrows. Bilby burrows are natural lures that attract cats (Figure 3 to Figure 7). It is recommended that cameras be placed at more bilby burrows to bring the number closer to the 20 cameras positioned on vehicle tracks. If more than 20 burrows are located then cameras should be deployed at the most recently active burrows but also maintaining the greatest spatial distribution possible. This will provide a more accurate comparison of occupancy and detection of cats at bilby burrows vs vehicle tracks.

4.3 Camera setup and settings

Protection of cameras from cattle interference is recommended by using three protective posts surrounding the camera post. Preliminary observations indicate that this was successful during this study.

If new Reconyx Hyperfire 2 cameras are used, recommended settings are provided in Appendix 1. Preference would be to maintain the same model of all cameras. If mixed cameras are deployed, they should be allocated randomly across locations, with even proportions within and outside the management area.

During all monitoring sessions the functioning of the cameras should be checked by purposely triggering the camera, checking that it triggered and then resetting (page 39 of the manual, Newkirk 2016). Continued use of the CPW software is recommended as it provides an efficient and consistent way to store and score images and output data for analyses.

4.4 Cat and fox occupancy

Feral cats and foxes were the two main target species of the occupancy monitoring. Cat occupancy was very high, comparable to occupancy in the La Grange area (Dziminski *et al.* 2018) and the central Kimberley (Hohnen *et al.* 2016). This provides justification for planned cat management.

A single fox was detected at camera location 14 (Figure 8). Foxes have been implicated as the single most important cause for the disappearance of bilbies in the southern portion of their range across the country (Bradley *et al.* 2015). Anecdotally, there are few fox records in the Pilbara region, however the sandplain habitat at Warralong possibly provides better habitat for foxes as opposed to the rocky areas typically surveyed in the Pilbara. As a single fox can decimate a bilby colony (Bradley *et al.* 2015), it is critical that any increase in fox occupancy is managed, potentially

also by trapping or shooting. A preliminary quick review of images each time data is downloaded from cameras will help to quickly identify any fox present, enabling a rapid response to eliminate this threat.

4.5 Management area

Since the northern (River) bilby colony extends north across the boundary onto De Grey Pastoral Lease with bilby activity and burrows in this area (Dziminski *et al.* 2020), it is recommended that the management area be expanded to encompass that bilby colony and a buffer zone to ensure effective management (Figure 2). This would require negotiation with the De Grey Station lease holders. Ideally this would include the same major management actions i.e. fire management, feral predator management and bilby abundance monitoring. If this is not possible, feral predator management and bilby abundance monitoring in the expanded area is recommended.

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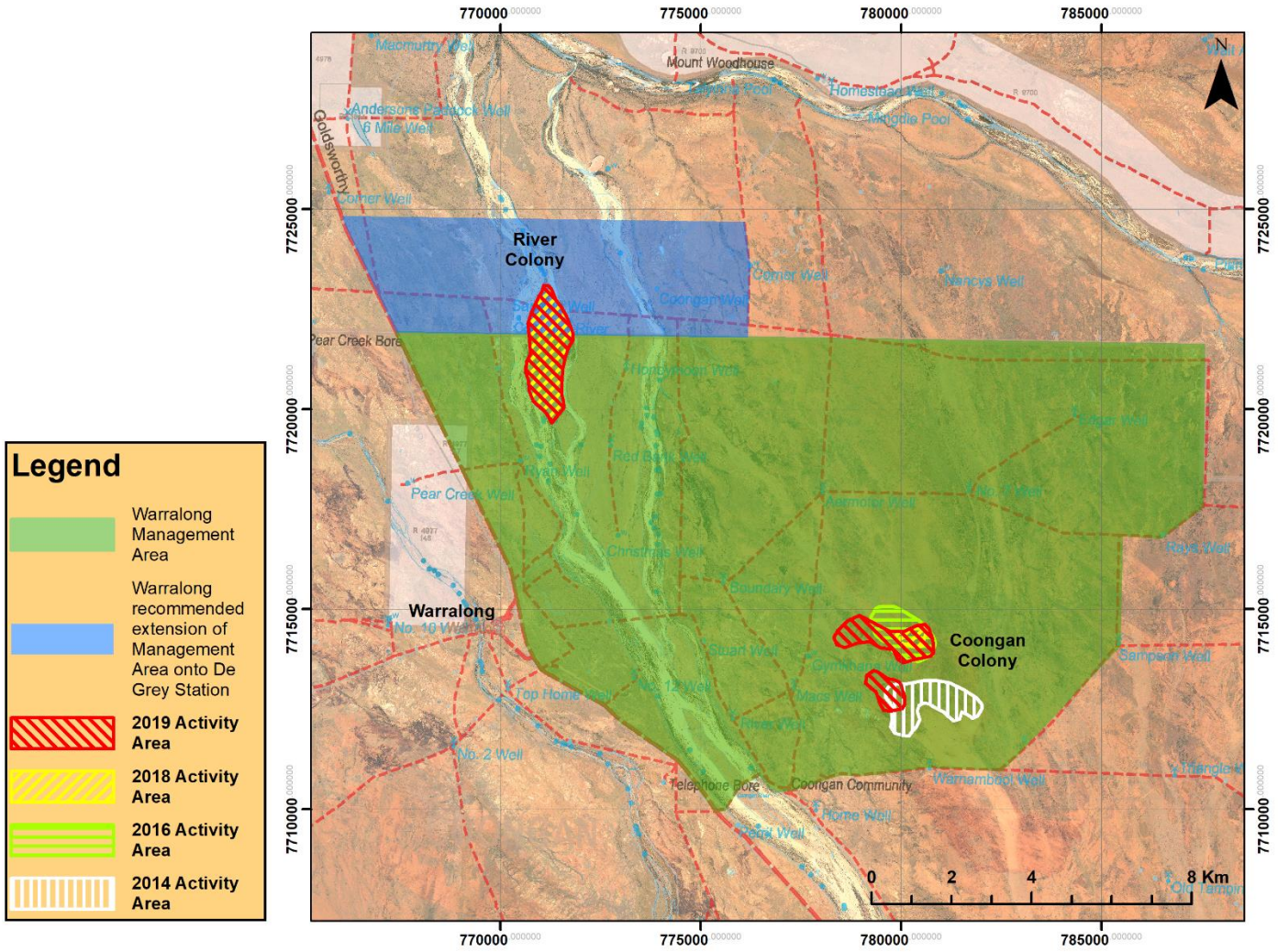


Figure 2. Recommended expansion of the Warralong Management Area.

Figure 3. Cat preying at bilby burrow BB1.

Figure 4. Cat preying at bilby burrow BB8 in June 2019.

Figure 5. Cat preying at bilby burrow BB8 in June 2019.

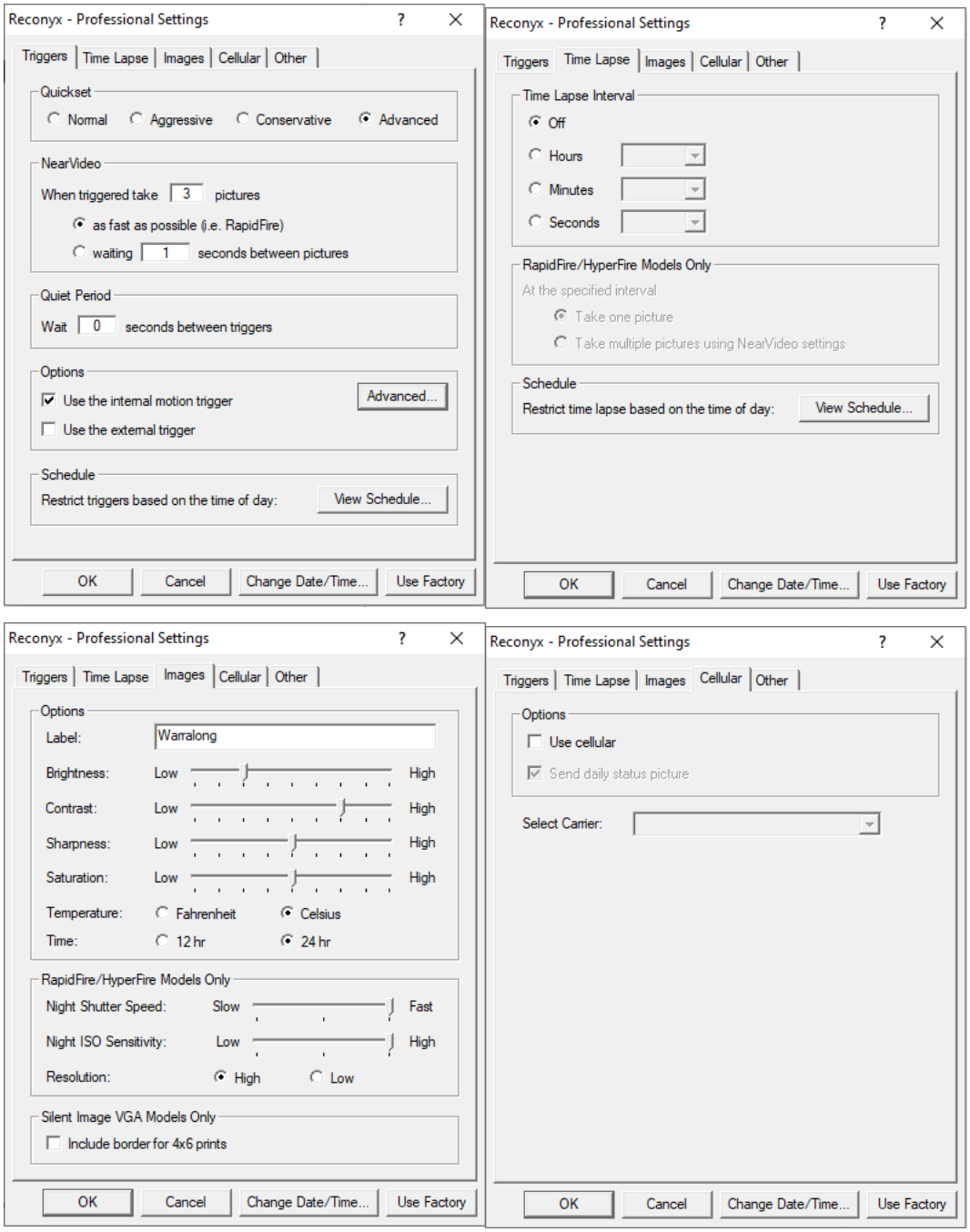
Figure 6. Bilby at bilby burrow BB8 earlier in May 2019 (same burrow as Figure 5).

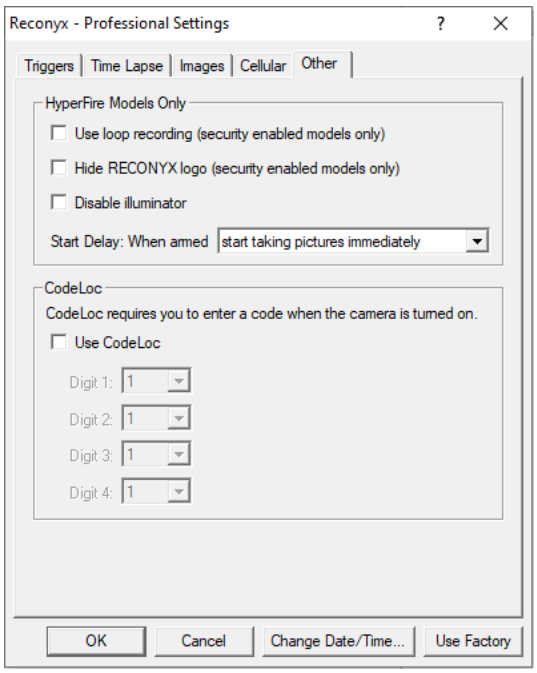
Figure 7. Cat preying at bilby burrow BB6.

Figure 8. Fox at camera location 14.

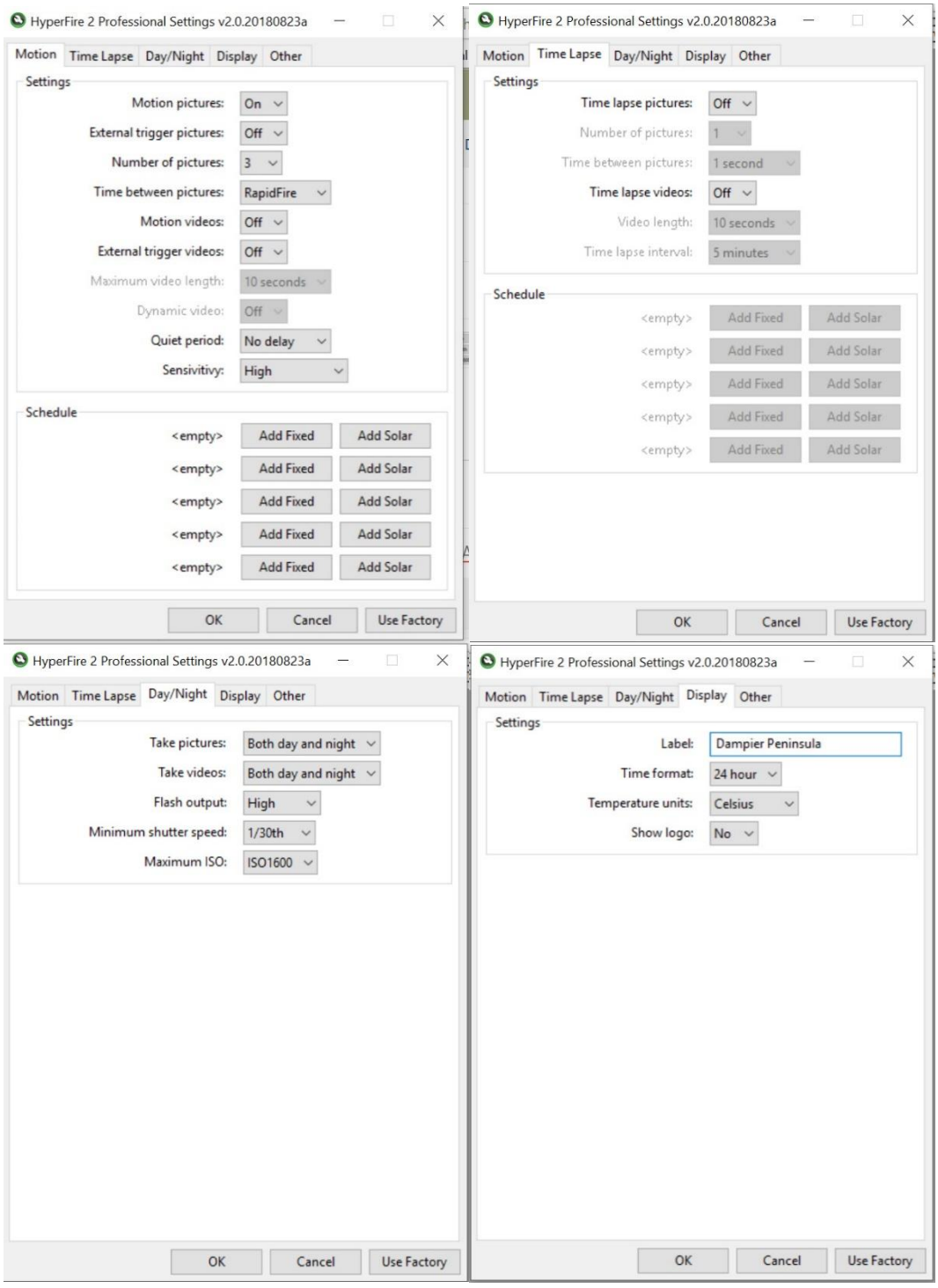
Appendix 1. Remote camera settings

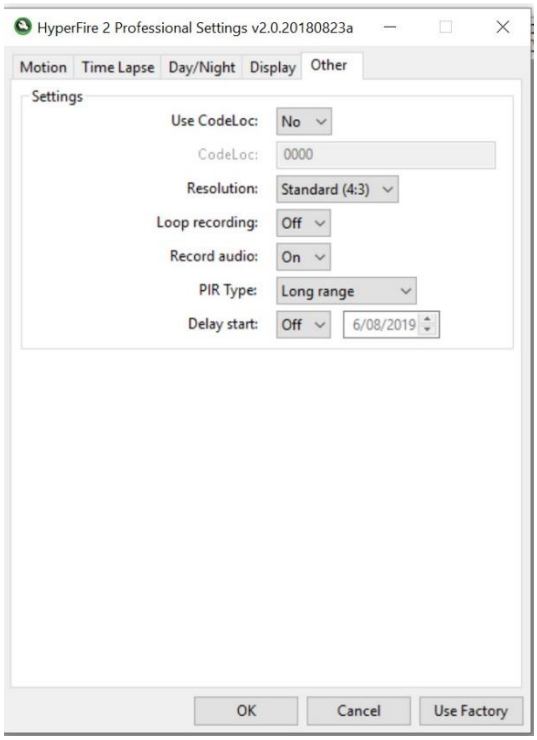
Appendix 1; Figure 1. Settings for Reconyx Hyperfire cameras.




Reconyx - Professional Settings
Triggers
Time Lapse
Images
Cellular
Other
HyperFire Models Only
Use loop recording (security enabled models only)
Hide RECONYX logo (security enabled models only)
Disable illuminator
Start Delay: When armed
start taking pictures immediately
CodeLoc
CodeLoc requires you to enter a code when the camera is turned on.
Use CodeLoc
Digit 1:
Digit 2:
Digit 3:
Digit 4:
OK
Cancel
Change Date/Time...
Use Factory

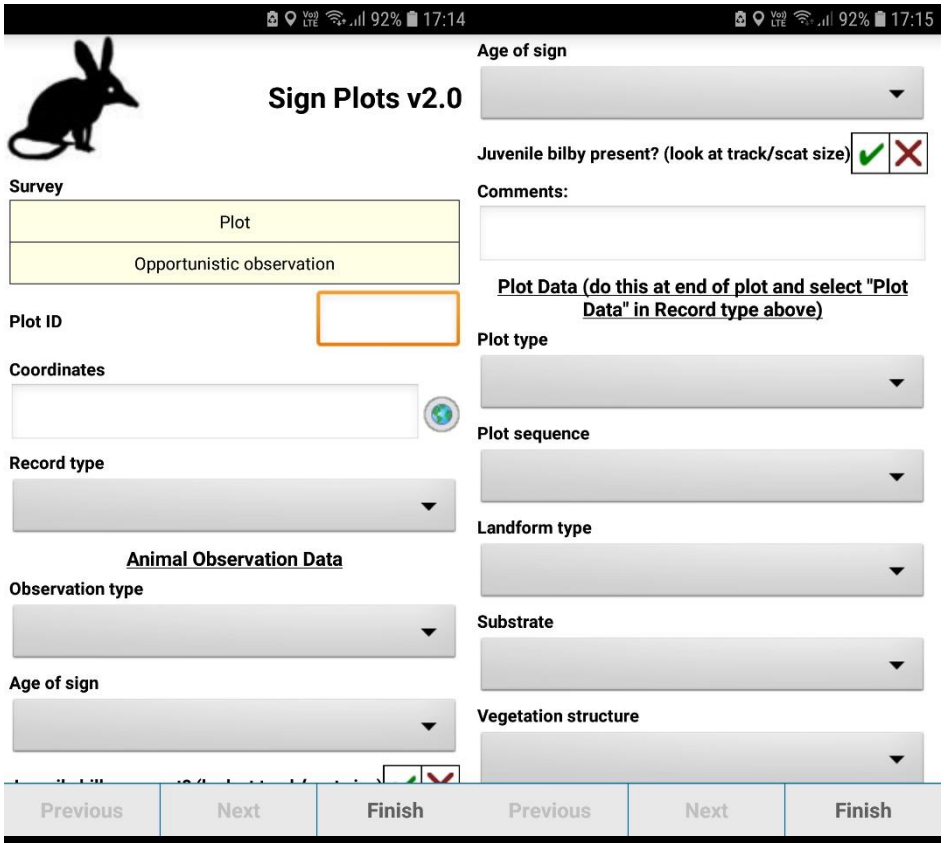
Appendix 1; Figure 2. Settings for Reconyx 2 Hyperfire cameras.

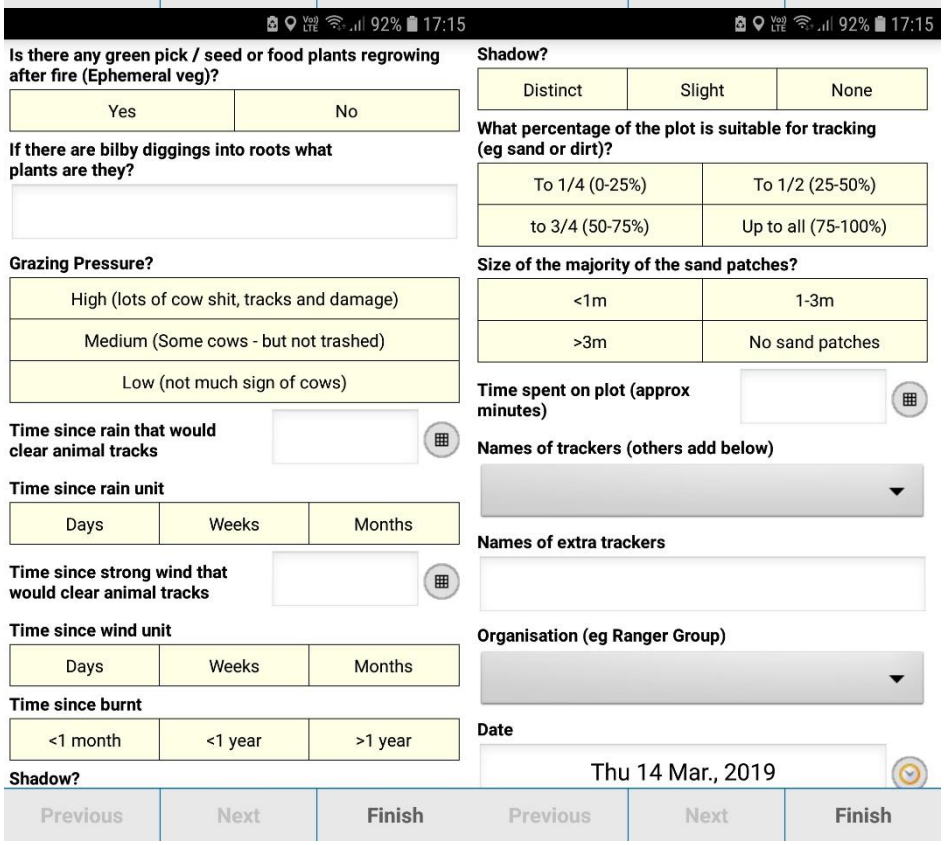


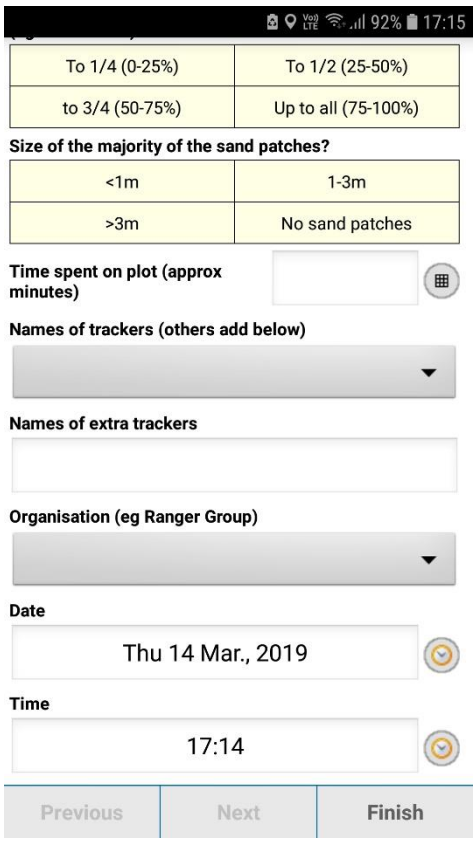

HyperFire 2 Professional Settings v2.0.20180823a
Motion
Time Lapse
Day/Night
Display
Other
Settings
Use CodeLoc:
No
CodeLoc:
0000
Resolution:
Standard (4:3)
Loop recording:
Off
Record audio:
On
PIR Type:
Long range
Delay start:
Off
6/08/2019
OK
Cancel
Use Factory

Appendix 2. Mobile Data Studio electronic input form and paper data sheet

Mobile Data Studio form






92% 17:15
To 1/4 (0-25%)
To 1/2 (25-50%)
to 3/4 (50-75%)
Up to all (75-100%)
Size of the majority of the sand patches?
<1m
1-3m
>3m
No sand patches
Time spent on plot (approx minutes)
Names of trackers (others add below)
Names of extra trackers
Organisation (eg Ranger Group)
Date
Thu 14 Mar., 2019
Time
17:14
Previous
Next
Finish

Paper form (for reference)

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2HA SIGN PLOT DATASHEET v1.5
FOR OCCUPANCY SURVEYS

Grazing pressure

☐ High (lots of cow shit, tracks and damage) ☐ Medium (some cows but not trashed) ☐ Low (not much sign of cows)

What percentage of the plot is suitable for tracking (eg sand or dirt)**?**

☐ To ¼ (0-25%) ☐ To ½ (25-50%) ☐ To ¾ (50-75%) ☐ Up to all (75-100%)

How big are the majority of the sand patches?

☐ less than 1m in width ☐ 1-3 m in width ☐ more than 3 m in width ☐ No sand patches

Shadow (look at own shadow

☐ Distinct shadow ☐ Slight shadow ☐ No shadow

Time since rain that would clear animal tracks (enter number) ☐ Days ☐ Weeks ☐ Months

Time since strong wind that would clear animal tracks (enter number) ☐ Days ☐ Weeks ☐ Months

Time since burnt (if known)

☐ <1 month ☐ <1 year ☐ >1 year

Any other comment/ notes:

Please submit datasheets to:
Department of Biodiversity, Conservation and Attractions - threatenedfauna@dbca.wa.gov.au, Woodvale Wildlife Research Centre, Bilby Research, Locked Bag 104 Bentley Delivery Centre WA 6983. (08) 9405 5105

Acknowledgements: WWF and Environs Kimberley assisted in producing the initial version of this template.

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2HA SIGN PLOT DATASHEET v1.5
FOR OCCUPANCY SURVEYS

Species (add if not listed) All species prelisted	Tracks	Scats	Burrow	Digging	Digging into roots of plants	Tracks or sign on road	Other (eg sighting, remains, nest, resting place etc – add)	Juveniles present?	Age of most recent sign (1,2,3)
Bird - Emu									
Bird - Hopping									
Bird - Quail									
Bird - Turkey (Bustard)									
Bird - Walking									
Insect									
Other									
Cat									
Camel									
Cow									
Donkey									
Fox									
Goat									
Horse									
Pig									
Rabbit									

6. WHEN FINISHED WALKING RECORD THE FOLLOWING

Plot type
☐ Random ☐ Targeted at habitat ☐ Known location of target species

Plot sequence
☐ First time ☐ Repeat survey ☐ Unknown

Landform type
☐ Drainage line ☐ Dune or dunes ☐ Other (type in below)
☐ Salt lake system ☐ Hill or higher area _____
☐ Plain (flat low ground)

Soil type (substrate)
☐ Sand ☐ Soil/clay ☐ Gravel

Vegetation structure
☐ Shrubland ☐ Open woodland ☐ Dense woodland ☐ Open grassland

Vegetation thickness
☐ Open (easy to walk through) ☐ Thick (very hard to walk through)

Is there any green pick / seed or food plants regrowing after fire (ephemeral vegetation)?
☐ Yes ☐ No

If there are bilby diggings into roots what plants are they? _____

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2HA SIGN PLOT DATASHEET v1.5

FOR OCCUPANCY SURVEYS

1. RECORD LOCATION AT THE START

Site Name/Location/Plot ID_____

GPS:Lat/Easting_____Long/Northing_____ Date _____/_____/_____

Ranger group _____Time started_____Time finished_____

Team members_____

2. TEAM SPLIT UP EVENLY AND WALK A 2HA AREA FOR APPROXIMATELY 20 MINUTES
(Approximately 200m x 100m area)

3. INSPECT 100M OF THE ROAD FOR SIGN (ensure to tick "on road" for this sign)

4. RECORD ANIMAL DATA (tick boxes in table below ✓)

5. RECORD AGE OF SIGNS AT END OF WALKING 2 HA PLOT (1,2 or 3 in last column below)
Age of Sign: 1. Fresh 1-2 days old 2. Older, 3 days to 1 week 3. In hard mud/substrate or >1week

Species (add if not listed) All species prelisted	Tracks	Scats	Burrow	Digging	Digging into roots of plants	Tracks or sign on road	Other (eg sighting, remains, nest, resting place etc – add)	Juveniles present?	Age of most recent sign (1,2,3)
Bilby									
Bandicoot									
Bettong									
Dingo									
Echidna									
Euro									
Hopping mouse									
Kangaroo Red									
Kangaroo unknown									
Kangaroo W Grey									
Large rat									
Marsupial mole									
Mouse / Small Rodent / Dunnart									
Mulgara/Ampurta									
Possum									
Quoll									
Wallaby Agile									
Wallaby Hare									
Wallaby - Northern Nailtail									
Wallaby - Spectacled Hare									
Wallaby - unknown									
Lizard - Blue tongue									
Lizard - Goanna large									
Lizard - Goanna small									
Lizard - Great Desert Skink									
Lizard - Medium									
Lizard - Small									
Lizard - Thorny devil									
Sand slider (Lerista)									
Snake - other									
Snake - Python									
Bird - Curlew									

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2HA SIGN PLOT DATASHEET v1.5
FOR OCCUPANCY SURVEYS

[OPTIONAL] If bilby burrows are found GPS the location of each one:

GPS Location (lat, long)	Any notes - location (e.g under log or tree), sensor camera number if placed

Photos of habitat taken? Y / N (if yes –list photo file names) _____

_____

_____

Appendix 3. Occupancy and detection tables

Appendix 3, Table 1. Cat occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.91**	0.07	0.64	0.98	2.33	0.90	**0.28**	0.03	0.22	0.35	-0.94	0.17	29
Cameras on tracks	psi(.)p(On_tracks)	**0.92**	0.07	0.66	0.98	2.41	0.90	**0.32**	0.04	0.24	0.40	-0.77	0.19	20
Cameras on burrows								**0.20**	0.05	0.11	0.32	-0.63	0.38	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.90**	0.08	0.62	0.98	2.25	0.91	**0.32**	0.04	0.24	0.40	-0.76	0.19	20
Within management area	psi(Management)p(.)	**0.89**	0.12	0.41	0.99	2.44	1.33	**0.32**	0.04	0.24	0.41	-0.76	0.19	10
Outside management area		**0.92**	0.10	0.46	0.99	-0.40	1.79							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	**0.54**	0.46	0.03	0.98	0.14	1.84	**0.10**	0.09	0.02	0.45	-2.18	1.01	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.26**	0.12	0.10	0.55	-1.03	0.62	**0.27**	0.12	0.10	0.55	-1.01	0.61	32
All sign on plots	psi(.)p(.)	**0.51**	0.17	0.22	0.79	0.03	0.67	**0.25**	0.09	0.12	0.45	-1.12	0.47	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	**0.26**	0.12	0.10	0.55	-1.03	0.62	**0.27**	0.12	0.10	0.55	-1.01	0.61	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	**0.29**	0.11	0.12	0.55	-0.90	0.55	**0.30**	0.11	0.13	0.55	-0.86	0.53	32
All sign on tracks	psi(.)p(.)	**0.51**	0.17	0.22	0.79	0.03	0.67	**0.25**	0.09	0.12	0.45	-1.12	0.47	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.51**	0.17	0.22	0.79	0.03	0.67	**0.25**	0.09	0.12	0.45	-1.12	0.47	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.43**	0.12	0.22	0.67	-0.26	0.50	**0.32**	0.09	0.18	0.52	-0.74	0.41	32
All sign on plots and tracks	psi(.)p(.)	**0.67**	0.13	0.38	0.87	0.70	0.60	**0.33**	0.07	0.20	0.48	-0.72	0.33	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	**0.18**	0.22	0.01	0.81	2.13	7.96	**0.10**	0.09	0.02	0.45	-2.18	1.01	16
Very fresh sign (up to 2 days) on plots outside management area		**0.89**	0.76	0.00	1.00	-3.65	7.23							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	**0.09**	0.09	0.01	0.45	-0.24	0.81	**0.27**	0.12	0.10	0.55	-1.01	0.61	16
Fresh sign (up to 1 week) on plots outside management area		**0.44**	0.20	0.14	0.79	-2.10	1.26							16
All sign on plots within management area	psi(Management)p(.)	**0.09**	0.09	0.01	0.46	2.48	3.81	**0.25**	0.09	0.12	0.45	-1.12	0.47	16
All sign on plots outside management area		**0.92**	0.27	0.01	1.00	-4.77	3.79							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	**0.18**	0.13	0.04	0.54	-0.61	0.78	**0.27**	0.12	0.10	0.55	-1.01	0.61	16
Very fresh sign (up to 2 days) on tracks outside management area		**0.35**	0.18	0.10	0.72	-0.93	1.05							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	**0.17**	0.11	0.04	0.50	-0.35	0.72	**0.30**	0.11	0.13	0.55	-0.86	0.53	16
Fresh sign (up to 1 week) on tracks outside management area		**0.41**	0.18	0.15	0.74	-1.27	1.02							16
All sign on tracks within management area	psi(Management)p(.)	**0.37**	0.18	0.11	0.73	0.60	1.01	**0.25**	0.09	0.12	0.45	-1.12	0.47	16
All sign on tracks outside management area		**0.65**	0.23	0.20	0.93	-1.14	1.09							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	**0.28**	0.16	0.08	0.64	1.04	1.27	**0.25**	0.09	0.12	0.45	-1.12	0.47	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		**0.74**	0.25	0.19	0.97	-2.00	1.31							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	**0.24**	0.13	0.07	0.55	0.54	0.78	**0.32**	0.09	0.18	0.52	-0.74	0.41	16
Fresh sign (up to 1 week) on plots and tracks outside management area		**0.63**	0.18	0.27	0.89	-1.71	0.98							16
All sign on plots and tracks within management area	psi(Management)p(.)	**0.39**	0.15	0.16	0.69	2.80	3.13	**0.33**	0.07	0.20	0.48	-0.72	0.32	16
All sign on plots and tracks outside management area		**0.94**	0.17	0.03	1.00	-3.24	3.09							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				24.94	-	**0.04**	0.02	0.01	0.11	-3.25	0.59	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.26**	0.21	0.04	0.75	-1.03	1.08	**0.19**	0.16	0.03	0.64	-1.45	1.03	20
All sign on plots	psi(.)p(.)	**0.53**	0.29	0.11	0.91	0.11	1.15	**0.19**	0.11	0.05	0.49	-1.45	0.73	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	**0.42**	0.18	0.14	0.76	-0.31	0.75	**0.27**	0.12	0.10	0.55	-1.01	0.61	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	**0.37**	0.14	0.15	0.66	-0.52	0.61	**0.34**	0.12	0.15	0.59	-0.68	0.54	20
All sign on tracks	psi(.)p(.)	**0.60**	0.19	0.25	0.88	0.42	0.78	**0.29**	0.10	0.14	0.51	-0.89	0.48	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.56**	0.20	0.21	0.86	0.25	0.82	**0.27**	0.10	0.11	0.51	-1.01	0.53	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.51**	0.16	0.22	0.79	0.04	0.66	**0.32**	0.10	0.15	0.55	-0.76	0.48	20
All sign on plots and tracks	psi(.)p(.)	**0.79**	0.19	0.29	0.97	1.31	1.12	**0.30**	0.09	0.16	0.49	-0.84	0.40	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	**0.85**	0.11	0.52	0.97	1.74	0.85	**0.59**	0.08	0.43	0.74	0.36	0.34	20

Appendix 3, Table 2. Dingo occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.41**	0.10	0.24	0.60	-0.38	0.40	**0.31**	0.06	0.21	0.42	-0.82	0.26	29
Cameras on tracks	psi(.)p(On_tracks)	**0.58**	0.12	0.35	0.78	0.31	0.48	**0.31**	0.06	0.21	0.43	-0.80	0.26	20
Cameras on burrows								**0.00**	0.00	0.00	1.00	-27.68	-	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.58**	0.12	0.35	0.78	0.31	0.48	**0.31**	0.06	0.21	0.43	-0.80	0.26	20
Within management area	psi(Management)p(.)	**0.53**	0.17	0.23	0.81	0.50	0.69	**0.31**	0.06	0.21	0.43	-0.80	0.26	10
Outside management area		**0.62**	0.16	0.30	0.86	-0.39	0.96							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				24.03	-	**0.01**	0.01	0.00	0.05	-4.84	1.00	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				22.72	-	**0.02**	0.01	0.01	0.07	-3.73	0.58	32
All sign on plots	psi(.)p(.)	**0.42**	0.24	0.10	0.83	-0.30	0.98	**0.17**	0.10	0.05	0.45	-1.62	0.72	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				31.24	-	**0.05**	0.02	0.03	0.11	-2.85	0.39	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				31.24	-	**0.05**	0.02	0.03	0.11	-2.85	0.39	32
All sign on tracks	psi(.)p(.)	Not enough observations				27.40	-	**0.08**	0.02	0.04	0.14	-2.47	0.33	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.71**	0.61	0.01	1.00	0.88	2.95	**0.09**	0.08	0.01	0.41	-2.33	1.01	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.53**	0.30	0.10	0.92	0.12	1.21	**0.15**	0.09	0.04	0.42	-1.76	0.72	32
All sign on plots and tracks	psi(.)p(.)	**0.85**	0.32	0.04	1.00	1.72	2.49	**0.17**	0.07	0.07	0.35	-1.62	0.51	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	Not enough observations				-26.25	-	**0.02**	0.02	0.00	0.10	-4.14	1.01	16
Very fresh sign (up to 2 days) on plots outside management area		Not enough observations				149.52	-							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	Not enough observations				23.09	17.69	**0.03**	0.02	0.01	0.11	-3.46	0.72	16
Fresh sign (up to 1 week) on plots outside management area		Not enough observations				-22.94	17.69							16
All sign on plots within management area	psi(Management)p(.)	**0.24**	0.19	0.04	0.72	0.43	1.48	**0.17**	0.10	0.05	0.45	-1.62	0.72	16
All sign on plots outside management area		**0.61**	0.35	0.08	0.97	-1.57	1.40							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	Not enough observations				1.98	5.65	**0.06**	0.03	0.02	0.14	-2.78	0.51	16
Very fresh sign (up to 2 days) on tracks outside management area		Not enough observations				23.88	-							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	Not enough observations				1.62	3.32	**0.09**	0.03	0.04	0.18	-2.37	0.43	16
Fresh sign (up to 1 week) on tracks outside management area		Not enough observations				22.98	-							16
All sign on tracks within management area	psi(Management)p(.)	**0.81**	0.73	0.00	1.00	0.43	2.42	**0.09**	0.08	0.01	0.41	-2.33	1.01	16
All sign on tracks outside management area		**0.61**	0.58	0.01	0.99	1.01	3.37							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	**0.53**	0.34	0.07	0.94	0.12	1.37	**0.15**	0.09	0.04	0.42	-1.76	0.72	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		**0.53**	0.34	0.07	0.94	0.00	1.30							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	**0.73**	0.34	0.09	0.99	3.47	14.26	**0.17**	0.07	0.07	0.36	-1.62	0.53	16
Fresh sign (up to 1 week) on plots and tracks outside management area		**0.97**	0.42	0.00	1.00	-2.49	13.37							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				22.42	-	**0.01**	0.01	0.00	0.08	-4.37	1.01	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				21.33	-	**0.02**	0.02	0.01	0.09	-3.66	0.72	20
All sign on plots	psi(.)p(.)	**0.40**	0.21	0.10	0.79	-0.42	0.90	**0.22**	0.13	0.06	0.55	-1.26	0.74	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				26.47	-	**0.09**	0.03	0.04	0.17	-2.34	0.40	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				26.47	-	**0.09**	0.03	0.04	0.17	-2.34	0.40	20
All sign on tracks	psi(.)p(.)	Not enough observations				24.58	-	**0.11**	0.04	0.06	0.20	-2.07	0.35	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				22.64	-	**0.10**	0.03	0.05	0.19	-2.20	0.37	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.68**	0.37	0.07	0.98	0.75	1.70	**0.17**	0.10	0.05	0.45	-1.62	0.73	20
All sign on plots and tracks	psi(.)p(.)	**0.92**	0.32	0.00	1.00	2.42	4.27	**0.20**	0.08	0.09	0.41	-1.36	0.52	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	**0.50**	0.12	0.28	0.72	-0.02	0.48	**0.69**	0.10	0.47	0.85	0.82	0.48	20

Appendix 3, Table 3. Dog occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.85**	0.52	0.00	1.00	1.70	3.98	**0.05**	0.03	0.01	0.18	-2.92	0.70	29
Cameras on tracks	psi(.)p(On_tracks)	Not enough observations				24.89	-	**0.06**	0.02	0.03	0.11	-2.70	0.33	20
Cameras on burrows								**0.00**	0.00	0.00	1.00	-38.02	-	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	Not enough observations				25.86	-	**0.06**	0.02	0.03	0.11	-2.70	0.33	20
Within management area	psi(Management)p(.)	**0.89**	0.47	0.00	1.00	31.17	-	**0.07**	0.02	0.03	0.13	-2.65	0.38	10
Outside management area		Not enough observations				-29.07	-							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	No observations												32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	No observations												32
All sign on plots	psi(.)p(.)	No observations												32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	No observations												32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	No observations												32
All sign on tracks	psi(.)p(.)	No observations												32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	No observations												32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	No observations												32
All sign on plots and tracks	psi(.)p(.)	No observations												32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	No observations												16
Very fresh sign (up to 2 days) on plots outside management area		No observations												16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	No observations												16
Fresh sign (up to 1 week) on plots outside management area		No observations												16
All sign on plots within management area	psi(Management)p(.)	No observations												16
All sign on plots outside management area		No observations												16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	No observations												16
Very fresh sign (up to 2 days) on tracks outside management area		No observations												16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	No observations												16
Fresh sign (up to 1 week) on tracks outside management area		No observations												16
All sign on tracks within management area	psi(Management)p(.)	No observations												16
All sign on tracks outside management area		No observations												16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	No observations												16
Very fresh sign (up to 2 days) on plots and tracks outside management area		No observations												16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	No observations												16
Fresh sign (up to 1 week) on plots and tracks outside management area		No observations												16
All sign on plots and tracks within management area	psi(Management)p(.)	No observations												16
All sign on plots and tracks outside management area		No observations												16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	No observations												20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	No observations												20
All sign on plots	psi(.)p(.)	No observations												20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	No observations												20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	No observations												20
All sign on tracks	psi(.)p(.)	No observations												20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	No observations												20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	No observations												20
All sign on plots and tracks	psi(.)p(.)	No observations												20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	Not enough observations				26.08	-	**0.14**	0.05	0.07	0.26	-1.79	0.38	20

Appendix 3, Table 4. Camel occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.20**	0.10	0.07	0.46	-1.41	0.64	**0.16**	0.07	0.06	0.33	-1.68	0.50	29
Cameras on tracks	psi(.)p(On_tracks)	**0.29**	0.14	0.09	0.61	-0.91	0.69	**0.16**	0.07	0.06	0.33	-1.69	0.50	20
Cameras on burrows								Not enough observations				-24.60	-	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.29**	0.14	0.09	0.61	-0.91	0.69	**0.16**	0.07	0.06	0.33	-1.69	0.50	20
Within management area	psi(Management)p(.)	**0.16**	0.15	0.02	0.64	-0.47	0.84	**0.16**	0.07	0.07	0.34	-1.66	0.50	10
Outside management area		**0.38**	0.20	0.11	0.77	-1.20	1.37							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				23.94	-	**0.03**	0.02	0.01	0.08	-3.43	0.51	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				27.30	-	**0.05**	0.02	0.02	0.10	-3.01	0.42	32
All sign on plots	psi(.)p(.)	Not enough observations				25.40	-	**0.10**	0.03	0.06	0.17	-2.18	0.29	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				19.90	-	**0.01**	0.01	0.00	0.05	-4.84	1.00	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				24.85	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	32
All sign on tracks	psi(.)p(.)	**0.16**	0.13	0.03	0.57	-1.62	0.97	**0.19**	0.16	0.03	0.64	-1.45	1.03	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.27**	0.22	0.04	0.76	-1.02	1.12	**0.15**	0.13	0.02	0.56	-1.76	1.02	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	Not enough observations				0.14	1.84	**0.10**	0.09	0.02	0.45	-2.18	1.01	32
All sign on plots and tracks	psi(.)p(.)	High beta value				23.65	-	**0.13**	0.03	0.08	0.19	-1.95	0.27	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	Not enough observations				25.48	-	**0.03**	0.02	0.01	0.08	-3.43	0.51	16
Very fresh sign (up to 2 days) on plots outside management area		Not enough observations				-2.57	-							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	Not enough observations				34.22	-	**0.05**	0.02	0.02	0.10	-3.01	0.42	16
Fresh sign (up to 1 week) on plots outside management area		Not enough observations				-9.02	-							16
All sign on plots within management area	psi(Management)p(.)	Not enough observations				1.61	-	**0.11**	0.04	0.06	0.21	-2.08	0.37	16
All sign on plots outside management area		Not enough observations				23.31	-							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	Not enough observations				-26	-	**0.02**	0.02	0.00	0.10	-4.14	1.01	16
Very fresh sign (up to 2 days) on tracks outside management area		Not enough observations				150	-							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	Not enough observations				19.98	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	16
Fresh sign (up to 1 week) on tracks outside management area		Not enough observations				0.01	-							16
All sign on tracks within management area	psi(Management)p(.)	**0.22**	0.20	0.03	0.72	-2.09	1.28	**0.19**	0.16	0.03	0.64	-1.45	1.03	16
All sign on tracks outside management area		**0.11**	0.12	0.01	0.60	0.83	1.38							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				-1.02	-	**0.15**	0.13	0.02	0.56	-1.76	1.02	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		Not enough observations				0.00	-							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				0.14	-	**0.10**	0.09	0.02	0.45	-2.18	1.01	16
Fresh sign (up to 1 week) on plots and tracks outside management area		Not enough observations				0.00	-							16
All sign on plots and tracks within management area	psi(Management)p(.)	Not enough observations				0.61	-	**0.15**	0.04	0.09	0.25	-1.72	0.32	16
All sign on plots and tracks outside management area		Not enough observations				26.00	-							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				26.92	-	**0.02**	0.02	0.01	0.09	-3.66	0.72	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				22.95	-	**0.05**	0.02	0.02	0.13	-2.94	0.51	20
All sign on plots	psi(.)p(.)	Not enough observations				25.08	-	**0.11**	0.04	0.06	0.20	-2.07	0.35	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				23.05	-	**0.01**	0.01	0.00	0.08	-4.37	1.01	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				26.50	-	**0.02**	0.02	0.01	0.09	-3.66	0.72	20
All sign on tracks	psi(.)p(.)	**0.26**	0.21	0.04	0.75	-1.03	1.08	**0.19**	0.16	0.03	0.64	-1.45	1.03	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.14**	0.11	0.03	0.51	-1.81	0.95	**0.27**	0.21	0.04	0.74	-1.01	1.06	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.42**	0.34	0.04	0.92	-0.30	1.41	**0.15**	0.13	0.02	0.56	-1.76	1.02	20
All sign on plots and tracks	psi(.)p(.)	Not enough observations				25.90	-	**0.15**	0.04	0.09	0.25	-1.73	0.31	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	**0.43**	0.26	0.08	0.86	-0.29	1.08	**0.23**	0.13	0.06	0.57	-1.21	0.76	20

Appendix 3, Table 5. Cattle occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.94**	0.05	0.75	0.99	2.81	0.88	**0.57**	0.03	0.51	0.64	0.30	0.14	29
Cameras on tracks	psi(.)p(On_tracks)	**1.00**	0.00	0.00	1.00	27.22	-	**0.67**	0.04	0.59	0.74	0.69	0.17	20
Cameras on burrows								**0.27**	0.05	0.18	0.39	-1.68	0.32	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**1.00**	0.00	0.00	1.00	26.90	-	**0.67**	0.04	0.59	0.74	0.69	0.17	20
Within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	28.65	-	**0.67**	0.04	0.59	0.74	0.69	0.17	10
Outside management area		**1.00**	-	-	-	-2.65	-							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	**0.99**	0.07	0.00	1.00	4.96	9.78	**0.46**	0.05	0.35	0.56	-0.18	0.22	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**1.00**	0.00	0.00	1.00	28.42	-	**0.57**	0.04	0.48	0.65	0.28	0.18	32
All sign on plots	psi(.)p(.)	**1.00**	0.00	0.00	1.00	28.08	-	**0.93**	0.02	0.87	0.96	2.58	0.35	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	**0.73**	0.09	0.53	0.87	0.98	0.45	**0.52**	0.06	0.40	0.63	0.06	0.24	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	**0.84**	0.07	0.65	0.94	1.65	0.54	**0.58**	0.05	0.47	0.68	0.31	0.22	32
All sign on tracks	psi(.)p(.)	**0.82**	0.07	0.64	0.92	1.49	0.46	**0.76**	0.04	0.66	0.83	1.14	0.23	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.96**	0.06	0.59	1.00	3.07	1.39	**0.52**	0.05	0.42	0.62	0.09	0.21	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**1.00**	0.00	0.00	1.00	27.52	-	**0.66**	0.04	0.57	0.73	0.65	0.19	32
All sign on plots and tracks	psi(.)p(.)	**1.00**	0.00	0.00	1.00	29.29	-	**0.96**	0.02	0.91	0.98	3.20	0.46	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	1.94	0.99	**0.48**	0.05	0.39	0.58	-0.07	0.20	16
Very fresh sign (up to 2 days) on plots outside management area		**0.87**	0.11	0.50	0.98	24.35	-							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	32.82	-	**0.57**	0.04	0.48	0.65	0.28	0.18	16
Fresh sign (up to 1 week) on plots outside management area		**1.00**	0.00	0.00	1.00	-2.04	-							16
All sign on plots within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	29.65	-	**0.93**	0.02	0.87	0.96	2.58	0.35	16
All sign on plots outside management area		**1.00**	0.00	0.00	1.00	2.30	-							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	**0.66**	0.13	0.39	0.86	1.35	0.71	**0.52**	0.06	0.40	0.63	0.06	0.24	16
Very fresh sign (up to 2 days) on tracks outside management area		**0.79**	0.12	0.49	0.94	-0.68	0.91							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	**0.71**	0.12	0.44	0.89	3.43	2.11	**0.58**	0.05	0.47	0.68	0.31	0.22	16
Fresh sign (up to 1 week) on tracks outside management area		**0.97**	0.06	0.33	1.00	-2.53	2.17							16
All sign on tracks within management area	psi(Management)p(.)	**0.69**	0.12	0.43	0.87	2.77	1.09	**0.76**	0.04	0.66	0.83	1.14	0.23	16
All sign on tracks outside management area		**0.94**	0.06	0.65	0.99	-1.97	1.22							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	1.74	0.81	**0.54**	0.05	0.45	0.63	0.16	0.19	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		**0.85**	0.10	0.54	0.97	25.66	-							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	34.88	-	**0.66**	0.04	0.57	0.73	0.65	0.19	16
Fresh sign (up to 1 week) on plots and tracks outside management area		**1.00**	0.00	0.00	1.00	-5.77	-							16
All sign on plots and tracks within management area	psi(Management)p(.)	**1.00**	-	-	-	27.50	-	**0.96**	0.02	0.91	0.98	3.20	0.46	16
All sign on plots and tracks outside management area		**1.00**	0.00	0.00	1.00	4.44	-							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	**0.90**	0.09	0.56	0.98	2.20	1.00	**0.51**	0.07	0.38	0.64	0.05	0.27	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**1.00**	0.00	0.00	1.00	29.66	-	**0.59**	0.06	0.48	0.69	0.35	0.23	20
All sign on plots	psi(.)p(.)	**1.00**	0.00	0.00	1.00	28.64	-	**0.91**	0.03	0.83	0.96	2.34	0.40	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	**0.88**	0.08	0.60	0.97	2.00	0.81	**0.57**	0.07	0.44	0.69	0.27	0.27	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	**0.97**	0.05	0.55	1.00	3.39	1.62	**0.63**	0.06	0.51	0.74	0.55	0.25	20
All sign on tracks	psi(.)p(.)	**0.95**	0.05	0.71	0.99	2.98	1.06	**0.80**	0.05	0.70	0.88	1.39	0.29	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.87**	0.08	0.62	0.96	1.89	0.72	**0.62**	0.06	0.49	0.73	0.49	0.27	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**1.00**	0.00	0.00	1.00	28.29	-	**0.70**	0.05	0.59	0.79	0.85	0.24	20
All sign on plots and tracks	psi(.)p(.)	**1.00**	0.00	0.00	1.00	30.12	-	**0.96**	0.02	0.89	0.99	3.25	0.59	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	**1.00**	0.00	0.00	1.00	28.82	-	**0.84**	0.05	0.72	0.91	1.65	0.36	20

Appendix 3, Table 6. Horse occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.20**	0.08	0.08	0.42	-1.37	0.53	**0.24**	0.08	0.12	0.42	-1.17	0.44	29
Cameras on tracks	psi(.)p(On_tracks)	**0.23**	0.10	0.09	0.47	-1.19	0.55	**0.30**	0.09	0.15	0.51	-0.86	0.45	20
Cameras on burrows								**0.05**	0.06	0.01	0.37	-2.03	1.26	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.22**	0.10	0.08	0.47	-1.27	0.58	**0.30**	0.09	0.15	0.51	-0.85	0.45	20
Within management area	psi(Management)p(.)	**0.35**	0.17	0.11	0.70	-2.15	1.06	**0.30**	0.09	0.15	0.50	-0.87	0.45	10
Outside management area		**0.10**	0.10	0.01	0.48	1.53	1.29							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				24.15	-	**0.06**	0.02	0.03	0.12	-2.71	0.37	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				26.29	-	**0.08**	0.02	0.04	0.14	-2.47	0.33	32
All sign on plots	psi(.)p(.)	**0.87**	0.13	0.39	0.99	1.90	1.19	**0.32**	0.06	0.21	0.46	-0.74	0.29	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				21.57	-	**0.01**	0.01	0.00	0.05	-4.84	1.00	32
All sign on tracks	psi(.)p(.)	Not enough observations				28.25	-	**0.03**	0.02	0.01	0.08	-3.43	0.51	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				24.15	-	**0.06**	0.02	0.03	0.12	-2.71	0.37	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	Not enough observations				24.24	-	**0.09**	0.02	0.05	0.15	-2.36	0.32	32
All sign on plots and tracks	psi(.)p(.)	**0.85**	0.13	0.45	0.97	1.71	0.97	**0.34**	0.06	0.23	0.47	-0.66	0.28	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	Not enough observations				23.09	-	**0.09**	0.03	0.04	0.18	-2.32	0.43	16
Very fresh sign (up to 2 days) on plots outside management area		Not enough observations				-23.49	-							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	Not enough observations				27.08	-	**0.10**	0.04	0.05	0.20	-2.18	0.40	16
Fresh sign (up to 1 week) on plots outside management area		Not enough observations				-26.92	-							16
All sign on plots within management area	psi(Management)p(.)	Not enough observations				28.20	-	**0.33**	0.05	0.24	0.44	-0.71	0.23	16
All sign on plots outside management area		Not enough observations				-27.33	-							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	Not enough observations				-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	16
Very fresh sign (up to 2 days) on tracks outside management area		Not enough observations				-14.12	-							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	Not enough observations				-37.74	-	**0.02**	0.02	0.00	0.10	-4.14	1.01	16
Fresh sign (up to 1 week) on tracks outside management area		Not enough observations				221.85	-							16
All sign on tracks within management area	psi(Management)p(.)	Not enough observations				34.77	-	**0.03**	0.02	0.01	0.08	-3.43	0.51	16
All sign on tracks outside management area		Not enough observations				-3.54	-							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				23.09	-	**0.09**	0.03	0.04	0.18	-2.32	0.43	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		Not enough observations				-23.49	-							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				30.39	-	**0.10**	0.04	0.05	0.19	-2.21	0.39	16
Fresh sign (up to 1 week) on plots and tracks outside management area		Not enough observations				-29.39	-							16
All sign on plots and tracks within management area	psi(Management)p(.)	Not enough observations				27.17	-	**0.34**	0.05	0.25	0.45	-0.66	0.23	16
All sign on plots and tracks outside management area		Not enough observations				-26.36	-							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				31.46	-	**0.06**	0.03	0.03	0.14	-2.71	0.46	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				26.97	-	**0.09**	0.03	0.04	0.17	-2.34	0.40	20
All sign on plots	psi(.)p(.)	Not enough observations				27.79	-	**0.29**	0.05	0.20	0.40	-0.91	0.25	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				-17.65	-	**0.01**	-	-	-	-4.71	-	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				22.39	-	**0.01**	0.01	0.00	0.08	-4.37	1.01	20
All sign on tracks	psi(.)p(.)	Not enough observations				24.68	-	**0.05**	0.02	0.02	0.13	-2.94	0.51	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				31.46	-	**0.06**	0.03	0.03	0.14	-2.71	0.46	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	Not enough observations				27.86	-	**0.10**	0.03	0.05	0.19	-2.20	0.37	20
All sign on plots and tracks	psi(.)p(.)	Not enough observations				25.34	-	**0.30**	0.05	0.21	0.41	-0.85	0.24	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	**0.11**	0.07	0.03	0.34	-2.14	0.75	**1.00**	0.00	0.00	1.00	29.19	-	20

Appendix 3, Table 7. Bilby occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.31**	0.09	0.17	0.50	-0.78	0.40	**0.63**	0.06	0.51	0.73	0.52	0.25	29
Cameras on tracks	psi(.)p(On_tracks)	Not enough observations				59.43	-	**0.00**	0.00	0.00	0.00	-110.91	0.50	20
Cameras on burrows								**0.63**	0.06	0.51	0.74	111.44	0.50	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	No observations												20
Within management area	psi(Management)p(.)	No observations												10
Outside management area		No observations												10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	**0.10**	0.06	0.03	0.28	-2.17	0.63	**0.46**	0.17	0.18	0.76	-0.18	0.67	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.10**	0.06	0.03	0.28	-2.17	0.63	**0.46**	0.17	0.18	0.76	-0.18	0.67	32
All sign on plots	psi(.)p(.)	**0.10**	0.05	0.03	0.26	-2.23	0.61	**0.56**	0.16	0.27	0.82	0.25	0.64	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	**0.00**	0.00	0.00	1.00	-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	**0.00**	0.00	0.00	1.00	-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	32
All sign on tracks	psi(.)p(.)	**0.00**	0.00	0.00	1.00	-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.10**	0.06	0.03	0.28	-2.17	0.63	**0.46**	0.17	0.18	0.76	-0.18	0.67	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.10**	0.06	0.03	0.28	-2.17	0.63	**0.46**	0.17	0.18	0.76	-0.18	0.67	32
All sign on plots and tracks	psi(.)p(.)	**0.10**	0.05	0.03	0.26	-2.23	0.61	**0.56**	0.16	0.27	0.82	0.25	0.64	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	**0.21**	0.11	0.06	0.49	-29.25	8.87	**0.46**	0.17	0.18	0.76	-0.18	0.67	16
Very fresh sign (up to 2 days) on plots outside management area		**0.00**	0.00	0.00	0.00	27.90	8.87							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	**0.21**	0.11	0.06	0.49	-29.25	8.87	**0.46**	0.17	0.18	0.76	-0.18	0.67	16
Fresh sign (up to 1 week) on plots outside management area		**0.00**	0.00	0.00	0.00	27.90	8.87							16
All sign on plots within management area	psi(Management)p(.)	**0.19**	0.10	0.06	0.46	-44.83	18.26	**0.56**	0.16	0.27	0.82	0.25	0.64	16
All sign on plots outside management area		**0.00**	0.00	0.00	0.00	43.41	18.26							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	**0.00**	-	-	-	-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	16
Very fresh sign (up to 2 days) on tracks outside management area		**0.00**	0.00	0.00	1.00	-14.12	-							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	**0.00**	-	-	-	-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	16
Fresh sign (up to 1 week) on tracks outside management area		**0.00**	0.00	0.00	1.00	-14.12	-							16
All sign on tracks within management area	psi(Management)p(.)	**0.00**	-	-	-	-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	16
All sign on tracks outside management area		**0.00**	0.00	0.00	1.00	-14.12	-							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	**0.21**	0.11	0.06	0.49	-29.25	8.87	**0.46**	0.17	0.18	0.76	-0.18	0.67	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		**0.00**	0.00	0.00	0.00	27.90	8.87							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	**0.21**	0.11	0.06	0.49	-29.25	8.87	**0.46**	0.17	0.18	0.76	-0.18	0.67	16
Fresh sign (up to 1 week) on plots and tracks outside management area		**0.00**	0.00	0.00	0.00	27.90	8.87							16
All sign on plots and tracks within management area	psi(Management)p(.)	**0.19**	0.10	0.06	0.46	-44.83	18.26	**0.56**	0.16	0.27	0.82	0.25	0.64	16
All sign on plots and tracks outside management area		**0.00**	0.00	0.00	0.00	43.41	18.26							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	**0.05**	0.05	0.01	0.31	-2.85	1.05	**0.46**	0.29	0.08	0.89	-0.18	1.16	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.05**	0.05	0.01	0.31	-2.85	1.05	**0.46**	0.29	0.08	0.89	-0.18	1.16	20
All sign on plots	psi(.)p(.)	**0.05**	0.05	0.01	0.31	-2.85	1.05	**0.46**	0.29	0.08	0.89	-0.18	1.16	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	**0.00**	-	-	-	-17.65	-	**0.01**	-	-	-	-4.71	-	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	**0.00**	-	-	-	-17.65	-	**0.01**	-	-	-	-4.71	-	20
All sign on tracks	psi(.)p(.)	**0.00**	-	-	-	-17.65	-	**0.01**	-	-	-	-4.71	-	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.05**	0.05	0.01	0.31	-2.85	1.05	**0.46**	0.29	0.08	0.89	-0.18	1.16	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.05**	0.05	0.01	0.31	-2.85	1.05	**0.46**	0.29	0.08	0.89	-0.18	1.16	20
All sign on plots and tracks	psi(.)p(.)	**0.05**	0.05	0.01	0.31	-2.85	1.05	**0.46**	0.29	0.08	0.89	-0.18	1.16	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	No observations												20

Appendix 3, Table 8. Kangaroo occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.49**	0.11	0.28	0.70	-0.05	0.45	**0.23**	0.05	0.15	0.34	-1.20	0.27	29
Cameras on tracks	psi(.)p(On_tracks)	**0.69**	0.13	0.41	0.88	0.82	0.61	**0.23**	0.05	0.15	0.34	-1.19	0.27	20
Cameras on burrows								**0.00**	0.00	0.00	1.00	-26.75	-	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.69**	0.13	0.41	0.88	0.82	0.61	**0.23**	0.05	0.15	0.34	-1.19	0.27	20
Within management area	psi(Management)p(.)	**0.91**	0.18	0.13	1.00	0.18	0.71	**0.23**	0.05	0.15	0.34	-1.22	0.27	10
Outside management area		**0.55**	0.18	0.23	0.83	2.12	2.22							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				26.37	-	**0.15**	0.03	0.10	0.22	-1.75	0.25	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.93**	0.20	0.04	1.00	2.55	2.97	**0.24**	0.06	0.14	0.39	-1.13	0.35	32
All sign on plots	psi(.)p(.)	**0.92**	0.05	0.73	0.98	2.48	0.74	**0.64**	0.05	0.54	0.72	0.55	0.20	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				22.48	-	**0.04**	0.02	0.02	0.09	-3.20	0.46	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				23.44	-	**0.05**	0.02	0.02	0.10	-3.01	0.42	32
All sign on tracks	psi(.)p(.)	Not enough observations				26.59	-	**0.05**	0.02	0.03	0.11	-2.85	0.39	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				27.95	-	**0.16**	0.03	0.10	0.23	-1.69	0.24	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.95**	0.19	0.01	1.00	2.87	3.68	**0.26**	0.06	0.15	0.40	-1.07	0.33	32
All sign on plots and tracks	psi(.)p(.)	**0.92**	0.05	0.73	0.98	2.48	0.74	**0.64**	0.05	0.54	0.72	0.55	0.20	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	Not enough observations				0.18	-	**0.19**	0.05	0.12	0.30	-1.44	0.29	16
Very fresh sign (up to 2 days) on plots outside management area		Not enough observations				27.43	-							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	Not enough observations				0.87	-	**0.27**	0.05	0.18	0.37	-1.02	0.25	16
Fresh sign (up to 1 week) on plots outside management area		Not enough observations				25.89	-							16
All sign on plots within management area	psi(Management)p(.)	**0.89**	0.08	0.60	0.98	3.04	1.43	**0.64**	0.05	0.54	0.72	0.55	0.20	16
All sign on plots outside management area		**0.95**	0.06	0.56	1.00	-0.94	1.66							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	Not enough observations				-0.94	-	**0.06**	0.03	0.02	0.15	-2.73	0.52	16
Very fresh sign (up to 2 days) on tracks outside management area		Not enough observations				28.12	-							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	Not enough observations				0.30	-	**0.06**	0.03	0.02	0.15	-2.76	0.52	16
Fresh sign (up to 1 week) on tracks outside management area		Not enough observations				27.17	-							16
All sign on tracks within management area	psi(Management)p(.)	Not enough observations				-0.12	-	**0.07**	0.03	0.03	0.17	-2.52	0.46	16
All sign on tracks outside management area		Not enough observations				25.80	-							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				0.08	-	**0.21**	0.05	0.13	0.31	-1.35	0.29	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		Not enough observations				25.95	-							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				1.28	-	**0.27**	0.05	0.19	0.38	-0.99	0.24	16
Fresh sign (up to 1 week) on plots and tracks outside management area		Not enough observations				23.24	-							16
All sign on plots and tracks within management area	psi(Management)p(.)	**0.89**	0.08	0.60	0.98	3.04	1.43	**0.64**	0.05	0.54	0.72	0.55	0.20	16
All sign on plots and tracks outside management area		**0.95**	0.06	0.56	1.00	-0.94	1.66							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				23.63	-	**0.15**	0.04	0.09	0.25	-1.73	0.31	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.93**	0.27	0.00	1.00	2.55	4.10	**0.23**	0.08	0.11	0.43	-1.21	0.47	20
All sign on plots	psi(.)p(.)	**0.92**	0.07	0.65	0.98	2.38	0.89	**0.64**	0.06	0.52	0.75	0.58	0.26	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				28.03	-	**0.05**	0.02	0.02	0.13	-2.94	0.51	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				28.03	-	**0.05**	0.02	0.02	0.13	-2.94	0.51	20
All sign on tracks	psi(.)p(.)	Not enough observations				32.62	-	**0.06**	0.03	0.03	0.14	-2.71	0.46	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				23.63	-	**0.15**	0.04	0.09	0.25	-1.73	0.31	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.93**	0.27	0.00	1.00	2.55	4.10	**0.23**	0.08	0.11	0.43	-1.21	0.47	20
All sign on plots and tracks	psi(.)p(.)	**0.92**	0.07	0.65	0.98	2.38	0.89	**0.64**	0.06	0.52	0.75	0.58	0.26	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	**0.63**	0.17	0.29	0.87	0.52	0.72	**0.42**	0.11	0.23	0.64	-0.31	0.46	20

Appendix 3, Table 9. Mulgara occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.26**	0.16	0.06	0.65	-1.05	0.84	**0.10**	0.06	0.03	0.30	-2.23	0.70	29
Cameras on tracks	psi(.)p(On_tracks)	**0.58**	0.34	0.08	0.96	0.33	1.40	**0.01**	0.01	0.00	0.10	-4.52	1.18	20
Cameras on burrows								**0.12**	0.07	0.03	0.35	2.51	1.17	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	Not enough observations				22.65	-	**0.01**	0.01	0.00	0.04	-5.06	1.00	20
Within management area	psi(Management)p(.)	Not enough observations				-26.98	-	**0.01**	0.01	0.00	0.10	-4.19	1.01	10
Outside management area		Not enough observations				141.85	-							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	**0.16**	0.13	0.03	0.57	-1.62	0.97	**0.19**	0.16	0.03	0.64	-1.45	1.03	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.27**	0.22	0.04	0.76	-1.02	1.12	**0.15**	0.13	0.02	0.56	-1.76	1.02	32
All sign on plots	psi(.)p(.)	Not enough occasions				0.88	2.95	**0.09**	0.08	0.01	0.41	-2.33	1.01	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				21.96	-	**0.01**	0.01	0.00	0.05	-4.84	1.00	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				21.96	-	**0.01**	0.01	0.00	0.05	-4.84	1.00	32
All sign on tracks	psi(.)p(.)	Not enough observations				21.96	-	**0.01**	0.01	0.00	0.05	-4.84	1.00	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.27**	0.22	0.04	0.76	-1.02	1.12	**0.15**	0.13	0.02	0.56	-1.76	1.02	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.39**	0.33	0.04	0.90	-0.45	1.37	**0.12**	0.11	0.02	0.50	-1.99	1.02	32
All sign on plots and tracks	psi(.)p(.)	Not enough occasions				2.21	8.84	**0.08**	0.07	0.01	0.38	-2.47	1.01	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	**0.11**	0.12	0.01	0.60	-1.27	1.14	**0.19**	0.16	0.03	0.64	-1.45	1.03	16
Very fresh sign (up to 2 days) on plots outside management area		**0.22**	0.20	0.03	0.72	-0.83	1.38							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	**0.13**	0.16	0.01	0.69	-0.41	1.42	**0.15**	0.13	0.02	0.56	-1.76	1.02	16
Fresh sign (up to 1 week) on plots outside management area		**0.40**	0.34	0.04	0.91	-1.46	1.45							16
All sign on plots within management area	psi(Management)p(.)	Not enough occasions				19.99	6.55	**0.09**	0.03	0.04	0.18	-2.32	0.43	16
All sign on plots outside management area		Not enough observations				-20.39	6.55							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	Not enough observations				21.28	-	**0.02**	0.02	0.00	0.10	-4.14	1.01	16
Very fresh sign (up to 2 days) on tracks outside management area		Not enough observations				-73.29	-							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	Not enough observations				21.28	-	**0.02**	0.02	0.00	0.10	-4.14	1.01	16
Fresh sign (up to 1 week) on tracks outside management area		Not enough observations				-73.29	-							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	**0.13**	0.16	0.01	0.69	-0.41	1.42	**0.15**	0.13	0.02	0.56	-1.76	1.02	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		**0.40**	0.34	0.04	0.91	-1.46	1.45							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	**0.16**	0.19	0.01	0.75	0.50	2.25	**0.12**	0.11	0.02	0.50	-1.99	1.02	16
Fresh sign (up to 1 week) on plots and tracks outside management area		**0.62**	0.53	0.02	0.99	-2.19	1.94							16
All sign on plots and tracks within management area	psi(Management)p(.)	Not enough occasions				22.13	5.49	**0.10**	0.04	0.05	0.20	-2.15	0.40	16
All sign on plots and tracks outside management area		Not enough observations				-22.74	5.49							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				23.15	-	-	0.02	0.01	0.09	-3.66	0.72	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				24.19	-	-	0.02	0.01	0.11	-3.25	0.59	20
All sign on plots	psi(.)p(.)	Not enough observations				27.58	-	-	0.03	0.03	0.16	-2.51	0.42	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				22.15	-	-	0.01	0.00	0.08	-4.37	1.01	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				22.15	-	-	0.01	0.00	0.08	-4.37	1.01	20
All sign on tracks	psi(.)p(.)	Not enough observations				22.15	-	-	0.01	0.00	0.08	-4.37	1.01	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				28.21	-	-	0.02	0.01	0.11	-3.25	0.59	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	Not enough observations				24.34	-	-	0.02	0.02	0.13	-2.94	0.51	20
All sign on plots and tracks	psi(.)p(.)	Not enough observations				26.24	-	-	0.03	0.04	0.17	-2.34	0.40	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	Not enough observations				21.87	-	**0.02**	0.02	0.00	0.12	-4.01	1.01	20

Appendix 3, Table 10. Hopping mouse occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.28**	0.09	0.15	0.47	-0.93	0.42	**0.49**	0.07	0.36	0.62	-0.06	0.27	29
Cameras on tracks	psi(.)p(On_tracks)	**0.28**	0.08	0.15	0.47	-0.95	0.42	**0.65**	0.21	0.24	0.92	0.61	0.91	20
Cameras on burrows								**0.47**	0.07	0.34	0.61	-0.73	0.95	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.05**	0.05	0.01	0.28	-2.94	1.03	**0.66**	0.19	0.26	0.92	0.68	0.87	20
Within management area	psi(Management)p(.)	Not enough observations				-710.41	1.13	**0.66**	0.21	0.23	0.93	0.67	0.96	10
Outside management area		Not enough observations				708.23	1.13							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	**0.85**	0.10	0.55	0.96	1.74	0.78	**0.41**	0.06	0.30	0.53	-0.35	0.25	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.85**	0.10	0.55	0.96	1.74	0.78	**0.41**	0.06	0.30	0.53	-0.35	0.25	32
All sign on plots	psi(.)p(.)	**0.85**	0.10	0.55	0.96	1.74	0.78	**0.41**	0.06	0.30	0.53	-0.35	0.25	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	**0.33**	0.18	0.09	0.72	-0.71	0.83	**0.19**	0.11	0.05	0.49	-1.45	0.73	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	**0.33**	0.18	0.09	0.72	-0.71	0.83	**0.19**	0.11	0.05	0.49	-1.45	0.73	32
All sign on tracks	psi(.)p(.)	**0.33**	0.18	0.09	0.72	-0.71	0.83	**0.19**	0.11	0.05	0.49	-1.45	0.73	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.86**	0.09	0.60	0.96	1.78	0.71	**0.46**	0.06	0.35	0.57	-0.18	0.23	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.86**	0.09	0.60	0.96	1.78	0.71	**0.46**	0.06	0.35	0.57	-0.18	0.23	32
All sign on plots and tracks	psi(.)p(.)	**0.86**	0.09	0.60	0.96	1.78	0.71	**0.46**	0.06	0.35	0.57	-0.18	0.23	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	**0.99**	0.11	0.00	1.00	0.89	0.69	**0.41**	0.06	0.30	0.53	-0.35	0.25	16
Very fresh sign (up to 2 days) on plots outside management area		**0.71**	0.14	0.39	0.90	4.03	14.98							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	**0.99**	0.11	0.00	1.00	0.89	0.69	**0.41**	0.06	0.30	0.53	-0.35	0.25	16
Fresh sign (up to 1 week) on plots outside management area		**0.71**	0.14	0.39	0.90	4.03	14.98							16
All sign on plots within management area	psi(Management)p(.)	**0.99**	0.11	0.00	1.00	0.89	0.69	**0.41**	0.06	0.30	0.53	-0.35	0.25	16
All sign on plots outside management area		**0.71**	0.14	0.39	0.90	4.03	14.98							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	**0.44**	0.27	0.09	0.87	-1.27	1.00	**0.19**	0.11	0.05	0.49	-1.45	0.73	16
Very fresh sign (up to 2 days) on tracks outside management area		**0.22**	0.17	0.04	0.67	1.02	1.17							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	**0.44**	0.27	0.09	0.87	-1.27	1.00	**0.19**	0.11	0.05	0.49	-1.45	0.73	16
Fresh sign (up to 1 week) on tracks outside management area		**0.22**	0.17	0.04	0.67	1.02	1.17							16
All sign on tracks within management area	psi(Management)p(.)	**0.44**	0.27	0.09	0.87	-1.27	1.00	**0.19**	0.11	0.05	0.49	-1.45	0.73	16
All sign on tracks outside management area		**0.22**	0.17	0.04	0.67	1.02	1.17							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	0.76	0.62	**0.46**	0.05	0.37	0.57	-0.14	0.21	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		**0.68**	0.13	0.39	0.88	25.57	-							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	0.76	0.62	**0.46**	0.05	0.37	0.57	-0.14	0.21	16
Fresh sign (up to 1 week) on plots and tracks outside management area		**0.68**	0.13	0.39	0.88	25.57	-							16
All sign on plots and tracks within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	0.76	0.62	**0.46**	0.05	0.37	0.57	-0.14	0.21	16
All sign on plots and tracks outside management area		**0.68**	0.13	0.39	0.88	25.57	-							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	**1.00**	0.00	0.00	1.00	26.48	-	**0.33**	0.05	0.23	0.43	-0.73	0.24	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**1.00**	0.00	0.00	1.00	26.48	-	**0.33**	0.05	0.23	0.43	-0.73	0.24	20
All sign on plots	psi(.)p(.)	**1.00**	0.00	0.00	1.00	26.48	-	**0.33**	0.05	0.23	0.43	-0.73	0.24	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	**0.53**	0.29	0.11	0.91	0.11	1.15	**0.19**	0.11	0.05	0.49	-1.45	0.73	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	**0.53**	0.29	0.11	0.91	0.11	1.15	**0.19**	0.11	0.05	0.49	-1.45	0.73	20
All sign on tracks	psi(.)p(.)	**0.53**	0.29	0.11	0.91	0.11	1.15	**0.19**	0.11	0.05	0.49	-1.45	0.73	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.98**	0.12	0.00	1.00	3.99	6.55	**0.39**	0.07	0.27	0.54	-0.43	0.30	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.98**	0.12	0.00	1.00	3.99	6.55	**0.39**	0.07	0.27	0.54	-0.43	0.30	20
All sign on plots and tracks	psi(.)p(.)	**0.98**	0.12	0.00	1.00	3.99	6.55	**0.39**	0.07	0.27	0.54	-0.43	0.30	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	**0.05**	0.05	0.01	0.29	-2.89	1.03	Not enough observations				28.20	-	20

Appendix 3, Table 11. Rodent/dunnart (non-hopping mouse) occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.42**	0.09	0.26	0.61	-0.32	0.38	**0.55**	0.05	0.45	0.65	0.21	0.22	29
Cameras on tracks	psi(.)p(On_tracks)	Not enough observations				27.81	-	**0.02**	0.01	0.01	0.06	-3.95	0.58	20
Cameras on burrows								**0.66**	0.06	0.54	0.76	4.60	0.63	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	Not enough observations				23.41	-	**0.02**	0.01	0.01	0.06	-3.95	0.58	20
Within management area	psi(Management)p(.)	Not enough observations				-0.35	1.92	**0.03**	0.02	0.01	0.11	-3.51	0.72	10
Outside management area		Not enough observations				27.96	-							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				30.13	-	**0.04**	0.02	0.02	0.09	-3.20	0.46	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				25.29	-	**0.05**	0.02	0.02	0.10	-3.01	0.42	32
All sign on plots	psi(.)p(.)	Not enough observations				26.47	-	**0.08**	0.02	0.04	0.14	-2.47	0.33	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				-28.24	-	**0.00**	-	-	-	-7.53	-	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				-28.24	-	**0.00**	-	-	-	-7.53	-	32
All sign on tracks	psi(.)p(.)	Not enough observations				-28.24	-	**0.00**	-	-	-	-7.53	-	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				30.13	-	**0.04**	0.02	0.02	0.09	-3.20	0.46	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	Not enough observations				25.29	-	**0.05**	0.02	0.02	0.10	-3.01	0.42	32
All sign on plots and tracks	psi(.)p(.)	Not enough observations				26.47	-	**0.08**	0.02	0.04	0.14	-2.47	0.33	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	Not enough observations				1.09	3.35	**0.04**	0.03	0.01	0.13	-3.06	0.59	16
Very fresh sign (up to 2 days) on plots outside management area		Not enough observations				25.65	-							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	Not enough observations				32.37	-	**0.05**	0.02	0.02	0.10	-3.01	0.42	16
Fresh sign (up to 1 week) on plots outside management area		Not enough observations				-8.53	-							16
All sign on plots within management area	psi(Management)p(.)	Not enough observations				35.40	-	**0.08**	0.02	0.04	0.14	-2.47	0.33	16
All sign on plots outside management area		Not enough observations				-9.27	-							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	Not enough observations				-28.24	-	**0.00**	-	-	-	-7.53	-	16
Very fresh sign (up to 2 days) on tracks outside management area		Not enough observations				-14.12	-							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	Not enough observations				-28.24	-	**0.00**	-	-	-	-7.53	-	16
Fresh sign (up to 1 week) on tracks outside management area		Not enough observations				-14.12	-							16
All sign on tracks within management area	psi(Management)p(.)	Not enough observations				-28.24	-	**0.00**	-	-	-	-7.53	-	16
All sign on tracks outside management area		Not enough observations				-14.12	-							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				1.09	3.35	**0.04**	0.03	0.01	0.13	-3.06	0.59	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		Not enough observations				25.65	-							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				32.37	-	**0.05**	0.02	0.02	0.10	-3.01	0.42	16
Fresh sign (up to 1 week) on plots and tracks outside management area		Not enough observations				-8.53	-							16
All sign on plots and tracks within management area	psi(Management)p(.)	Not enough observations				35.40	-	**0.08**	0.02	0.04	0.14	-2.47	0.33	16
All sign on plots and tracks outside management area		Not enough observations				-9.27	-							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				28.02	-	**0.05**	0.02	0.02	0.13	-2.94	0.51	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				24.60	-	**0.06**	0.03	0.03	0.14	-2.71	0.46	20
All sign on plots	psi(.)p(.)	Not enough observations				26.41	-	**0.07**	0.03	0.03	0.16	-2.51	0.42	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				-17.65	-	**0.01**	-	-	-	-4.71	-	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				-17.65	-	**0.01**	-	-	-	-4.71	-	20
All sign on tracks	psi(.)p(.)	Not enough observations				-17.65	-	**0.01**	-	-	-	-4.71	-	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				28.02	-	**0.05**	0.02	0.02	0.13	-2.94	0.51	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	Not enough observations				24.60	-	**0.06**	0.03	0.03	0.14	-2.71	0.46	20
All sign on plots and tracks	psi(.)p(.)	Not enough observations				26.41	-	**0.07**	0.03	0.03	0.16	-2.51	0.42	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	**0.00**	-	-	-	-20.89	-	**0.00**	-	-	-	-10.72	-	20

Appendix 3, Table 12. Emu occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	No observations												29
Cameras on tracks	psi(.)p(On_tracks)	No observations												20
Cameras on burrows														9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	No observations												20
Within management area	psi(Management)p(.)	No observations												10
Outside management area														10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				21.04	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				23.06	-	**0.02**	0.01	0.01	0.07	-3.73	0.58	32
All sign on plots	psi(.)p(.)	Not enough observations				2.21	-	**0.08**	0.07	0.01	0.38	-2.47	1.01	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				-	-	**0.00**	-	-	-	-7.53	-	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				-	-	**0.00**	-	-	-	-7.53	-	32
All sign on tracks	psi(.)p(.)	Not enough observations				-	-	**0.00**	-	-	-	-7.53	-	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				21.04	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	Not enough observations				23.06	-	**0.02**	0.01	0.01	0.07	-3.73	0.58	32
All sign on plots and tracks	psi(.)p(.)	Not enough observations				2.21	-	**0.08**	0.07	0.01	0.38	-2.47	1.01	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	Not enough observations				22.65	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	16
Very fresh sign (up to 2 days) on plots outside management area		Not enough observations				-0.07	-							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	Not enough observations				0.14	-	**0.03**	0.02	0.01	0.11	-3.46	0.72	16
Fresh sign (up to 1 week) on plots outside management area		Not enough observations				26.23	-							16
All sign on plots within management area	psi(Management)p(.)	Not enough observations				2.21	-	**0.08**	0.07	0.01	0.38	-2.47	1.01	16
All sign on plots outside management area		Not enough observations				0.00	-							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	Not enough observations				-	-	**0.00**	-	-	-7.53	-	-	16
Very fresh sign (up to 2 days) on tracks outside management area		Not enough observations				-	-							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	Not enough observations				-	-	**0.00**	-	-	-7.53	-	-	16
Fresh sign (up to 1 week) on tracks outside management area		Not enough observations				-	-							16
All sign on tracks within management area	psi(Management)p(.)	Not enough observations				-	-	**0.00**	-	-	-7.53	-	-	16
All sign on tracks outside management area		Not enough observations				-	-							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				22.65	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		Not enough observations				-0.07	-							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				0.14	-	**0.03**	0.02	0.01	0.11	-3.46	0.72	16
Fresh sign (up to 1 week) on plots and tracks outside management area		Not enough observations				26.23	-							16
All sign on plots and tracks within management area	psi(Management)p(.)	Not enough observations				2.21	-	**0.08**	0.07	0.01	0.38	-2.47	1.01	16
All sign on plots and tracks outside management area		Not enough observations				0.00	-							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				27.72	-	**0.02**	0.02	0.01	0.09	-3.66	0.72	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				27.72	-	**0.02**	0.02	0.01	0.09	-3.66	0.72	20
All sign on plots	psi(.)p(.)	Not enough observations				26.59	-	**0.06**	0.03	0.03	0.14	-2.71	0.46	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				-	-	**0.01**	-	-	-	-4.71	-	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				-	-	**0.01**	-	-	-	-4.71	-	20
All sign on tracks	psi(.)p(.)	Not enough observations				-	-	**0.01**	-	-	-	-4.71	-	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				27.72	-	**0.02**	0.02	0.01	0.09	-3.66	0.72	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	Not enough observations				27.72	-	**0.02**	0.02	0.01	0.09	-3.66	0.72	20
All sign on plots and tracks	psi(.)p(.)	Not enough observations				26.59	-	**0.06**	0.03	0.03	0.14	-2.71	0.46	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	No observations												20

Appendix 3, Table 13. Australian bustard occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	Not enough observations				21.04	-	**0.00**	0.00	0.00	0.03	-5.43	1.00	29
Cameras on tracks	psi(.)p(On_tracks)	Not enough observations				30.38	-	**0.01**	0.01	0.00	0.04	-5.06	1.00	20
Cameras on burrows								**0.00**	0.00	0.00	1.00	-26.53	-	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	Not enough observations				23.47	-	**0.01**	0.01	0.00	0.04	-5.06	1.00	20
Within management area	psi(Management)p(.)	Not enough observations				26.95	-	**0.01**	0.01	0.00	0.07	-4.51	1.01	10
Outside management area		Not enough observations				-84.82	-							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	**0.67**	0.15	0.35	0.88	0.69	0.67	**0.29**	0.07	0.17	0.45	-0.88	0.36	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.93**	0.20	0.04	1.00	2.55	2.97	**0.24**	0.06	0.14	0.39	-1.13	0.35	32
All sign on plots	psi(.)p(.)	**0.99**	0.07	0.00	1.00	4.96	9.78	**0.46**	0.05	0.35	0.56	-0.18	0.22	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	**0.42**	0.16	0.17	0.72	-0.32	0.65	**0.24**	0.10	0.10	0.47	-1.14	0.52	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	**0.38**	0.13	0.17	0.64	-0.50	0.54	**0.29**	0.10	0.14	0.51	-0.89	0.48	32
All sign on tracks	psi(.)p(.)	**0.41**	0.12	0.20	0.65	-0.38	0.52	**0.31**	0.09	0.16	0.51	-0.81	0.44	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.65**	0.11	0.42	0.83	0.61	0.48	**0.40**	0.07	0.27	0.54	-0.41	0.29	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.78**	0.12	0.49	0.93	1.25	0.67	**0.37**	0.06	0.26	0.50	-0.52	0.28	32
All sign on plots and tracks	psi(.)p(.)	**1.00**	0.00	0.00	1.00	26.02	-	**0.49**	0.04	0.41	0.58	-0.03	0.18	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	**0.75**	0.20	0.28	0.96	0.34	0.76	**0.29**	0.07	0.17	0.45	-0.88	0.36	16
Very fresh sign (up to 2 days) on plots outside management area		**0.58**	0.18	0.24	0.86	0.76	1.13							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	1.56	1.44	**0.25**	0.05	0.17	0.35	-1.11	0.25	16
Fresh sign (up to 1 week) on plots outside management area		**0.83**	0.21	0.22	0.99	23.93	-							16
All sign on plots within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	25.78	-	**0.45**	0.04	0.37	0.54	-0.19	0.18	16
All sign on plots outside management area		**1.00**	0.00	0.00	1.00	6.15	-							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	**0.47**	0.21	0.14	0.82	-0.52	0.80	**0.24**	0.10	0.10	0.47	-1.14	0.52	16
Very fresh sign (up to 2 days) on tracks outside management area		**0.37**	0.19	0.11	0.74	0.38	0.98							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	**0.42**	0.17	0.15	0.75	-0.69	0.71	**0.29**	0.10	0.14	0.51	-0.89	0.48	16
Fresh sign (up to 1 week) on tracks outside management area		**0.34**	0.16	0.11	0.67	0.36	0.91							16
All sign on tracks within management area	psi(Management)p(.)	**0.41**	0.16	0.15	0.72	-0.38	0.68	**0.31**	0.09	0.16	0.51	-0.81	0.44	16
All sign on tracks outside management area		**0.41**	0.16	0.15	0.72	0.00	0.88							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	**0.72**	0.15	0.38	0.92	0.30	0.61	**0.40**	0.07	0.27	0.54	-0.41	0.29	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		**0.58**	0.15	0.29	0.82	0.64	0.91							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	**0.89**	0.14	0.31	0.99	0.69	0.70	**0.37**	0.06	0.26	0.50	-0.52	0.28	16
Fresh sign (up to 1 week) on plots and tracks outside management area		**0.67**	0.16	0.34	0.89	1.38	1.52							16
All sign on plots and tracks within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	45.44	-	**0.49**	0.04	0.41	0.58	-0.03	0.18	16
All sign on plots and tracks outside management area		**1.00**	0.00	0.00	1.00	-19.71	-							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	**0.67**	0.24	0.20	0.94	0.72	1.07	**0.24**	0.10	0.10	0.47	-1.14	0.52	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.92**	0.32	0.00	1.00	2.42	4.27	**0.20**	0.08	0.09	0.41	-1.36	0.52	20
All sign on plots	psi(.)p(.)	**0.91**	0.09	0.53	0.99	2.30	1.11	**0.49**	0.07	0.36	0.63	-0.02	0.28	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	**0.56**	0.20	0.21	0.86	0.25	0.82	**0.27**	0.10	0.11	0.51	-1.01	0.53	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	**0.51**	0.16	0.22	0.79	0.04	0.66	**0.32**	0.10	0.15	0.55	-0.76	0.48	20
All sign on tracks	psi(.)p(.)	**0.56**	0.16	0.26	0.82	0.24	0.65	**0.34**	0.10	0.17	0.55	-0.68	0.44	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.62**	0.13	0.35	0.83	0.48	0.56	**0.43**	0.09	0.27	0.60	-0.30	0.36	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.67**	0.13	0.39	0.87	0.72	0.60	**0.43**	0.08	0.28	0.59	-0.29	0.34	20
All sign on plots and tracks	psi(.)p(.)	**0.94**	0.07	0.54	1.00	2.76	1.32	**0.55**	0.06	0.42	0.67	0.18	0.26	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	Not enough observations				23.47	-	**0.02**	0.02	0.00	0.12	-4.01	1.01	20

Appendix 3, Table 14. Bush stone curlew occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.18**	0.09	0.06	0.42	-1.50	0.61	**0.18**	0.07	0.08	0.37	-1.51	0.50	29
Cameras on tracks	psi(.)p(On_tracks)	**0.26**	0.13	0.09	0.56	-1.02	0.65	**0.18**	0.07	0.08	0.37	-1.50	0.50	20
Cameras on burrows								**0.00**	-	-	-	-26.64	-	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.26**	0.13	0.09	0.56	-1.02	0.65	**0.18**	0.07	0.08	0.37	-1.50	0.50	20
Within management area	psi(Management)p(.)	**0.30**	0.20	0.06	0.73	-1.16	0.86	**0.18**	0.07	0.08	0.37	-1.51	0.50	10
Outside management area		**0.24**	0.16	0.06	0.63	0.30	1.22							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	No detections												32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	No detections												32
All sign on plots	psi(.)p(.)	No detections												32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	No detections												32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	No detections												32
All sign on tracks	psi(.)p(.)	No detections												32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	No detections												32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	No detections												32
All sign on plots and tracks	psi(.)p(.)	No detections												32
		No detections												
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	No detections												16
Very fresh sign (up to 2 days) on plots outside management area														16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	No detections												16
Fresh sign (up to 1 week) on plots outside management area														16
All sign on plots within management area	psi(Management)p(.)	No detections												16
All sign on plots outside management area														16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	No detections												16
Very fresh sign (up to 2 days) on tracks outside management area														16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	No detections												16
Fresh sign (up to 1 week) on tracks outside management area														16
All sign on tracks within management area	psi(Management)p(.)	No detections												16
All sign on tracks outside management area														16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	No detections												16
Very fresh sign (up to 2 days) on plots and tracks outside management area														16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	No detections												16
Fresh sign (up to 1 week) on plots and tracks outside management area														16
All sign on plots and tracks within management area	psi(Management)p(.)	No detections												16
All sign on plots and tracks outside management area														16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	No detections												20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	No detections												20
All sign on plots	psi(.)p(.)	No detections												20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	No detections												20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	No detections												20
All sign on tracks	psi(.)p(.)	No detections												20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	No detections												20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	No detections												20
All sign on plots and tracks	psi(.)p(.)	No detections												20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	**0.22**	0.13	0.06	0.54	-1.29	0.75	**0.40**	0.19	0.12	0.76	-0.40	0.79	20

Appendix 3, Table 15. Varanid lizard occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.37**	0.11	0.19	0.60	-0.52	0.46	**0.22**	0.06	0.13	0.35	-1.28	0.33	29
Cameras on tracks	psi(.)p(On_tracks)	Not enough observations				29.83	-	**0.01**	0.01	0.00	0.04	-5.06	1.00	20
Cameras on burrows								**0.24**	0.05	0.16	0.36	3.93	1.04	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	Not enough observations				24.58	-	**0.01**	0.01	0.00	0.04	-5.06	1.00	20
Within management area	psi(Management)p(.)	Not enough observations				-26.79	-	**0.01**	0.01	0.00	0.10	-4.19	1.01	10
Outside management area		Not enough observations				102.82	-							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				1.72	-	**0.17**	0.07	0.07	0.35	-1.62	0.51	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				25.56	-	**0.20**	0.04	0.14	0.27	-1.42	0.22	32
All sign on plots	psi(.)p(.)	**0.87**	0.09	0.57	0.97	1.94	0.84	**0.43**	0.06	0.32	0.55	-0.29	0.24	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				-1.02	-	**0.15**	0.13	0.02	0.56	-1.76	1.02	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				-1.02	-	**0.15**	0.13	0.02	0.56	-1.76	1.02	32
All sign on tracks	psi(.)p(.)	Not enough observations				-0.45	-	**0.12**	0.11	0.02	0.50	-1.99	1.02	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				2.38	-	**0.18**	0.07	0.08	0.35	-1.52	0.46	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	Not enough observations				23.64	-	**0.21**	0.04	0.15	0.29	-1.32	0.22	32
All sign on plots and tracks	psi(.)p(.)	**0.86**	0.09	0.59	0.97	1.85	0.77	**0.44**	0.06	0.33	0.56	-0.23	0.24	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	Not enough observations				3.47	-	**0.17**	0.07	0.07	0.36	-1.62	0.53	16
Very fresh sign (up to 2 days) on plots outside management area		Not enough observations				-2.49	-							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	Not enough observations				72.80	-	**0.23**	0.05	0.15	0.34	-1.18	0.26	16
Fresh sign (up to 1 week) on plots outside management area		Not enough observations				-72.10	-							16
All sign on plots within management area	psi(Management)p(.)	Not enough observations				31.94	-	**0.44**	0.05	0.35	0.55	-0.23	0.21	16
All sign on plots outside management area		Not enough observations				-31.13	-							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	Not enough observations				-1.02	-	**0.15**	0.13	0.02	0.56	-1.76	1.02	16
Very fresh sign (up to 2 days) on tracks outside management area		Not enough observations				0.00	-							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	Not enough observations				-1.02	-	**0.15**	0.13	0.02	0.56	-1.76	1.02	16
Fresh sign (up to 1 week) on tracks outside management area		Not enough observations				0.00	-							16
All sign on tracks within management area	psi(Management)p(.)	Not enough observations				-0.13	-	**0.12**	0.11	0.02	0.50	-1.99	1.02	16
All sign on tracks outside management area		Not enough observations				-0.66	-							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				28.70	-	**0.18**	0.04	0.11	0.28	-1.49	0.29	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		Not enough observations				-27.39	-							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				31.71	-	**0.26**	0.05	0.18	0.37	-1.05	0.26	16
Fresh sign (up to 1 week) on plots and tracks outside management area		Not enough observations				-31.19	-							16
All sign on plots and tracks within management area	psi(Management)p(.)	Not enough observations				26.04	-	**0.45**	0.05	0.36	0.56	-0.18	0.21	16
All sign on plots and tracks outside management area		Not enough observations				-25.26	-							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				0.13	-	**0.23**	0.11	0.09	0.50	-1.18	0.60	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				23.92	-	**0.20**	0.04	0.13	0.30	-1.39	0.28	20
All sign on plots	psi(.)p(.)	**0.95**	0.10	0.25	1.00	2.85	2.01	**0.44**	0.07	0.31	0.58	-0.26	0.29	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				-0.30	-	**0.15**	0.13	0.02	0.56	-1.76	1.02	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				-0.30	-	**0.15**	0.13	0.02	0.56	-1.76	1.02	20
All sign on tracks	psi(.)p(.)	Not enough observations				0.50	-	**0.12**	0.11	0.02	0.50	-1.99	1.02	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				0.72	-	**0.24**	0.10	0.10	0.47	-1.14	0.52	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	Not enough observations				1.69	-	**0.27**	0.08	0.13	0.46	-1.01	0.43	20
All sign on plots and tracks	psi(.)p(.)	**0.93**	0.10	0.40	1.00	2.61	1.55	**0.46**	0.07	0.33	0.59	-0.18	0.28	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	Not enough observations				-20.89	-	Not enough observations				-10.72	-	20

Appendix 3, Table 16. Medium sized lizard occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.23**	0.11	0.09	0.49	-1.18	0.59	**0.17**	0.07	0.07	0.34	-1.61	0.49	29
Cameras on tracks	psi(.)p(On_tracks)	**0.55**	0.21	0.18	0.87	0.20	0.86	**0.01**	0.01	0.00	0.09	-4.47	1.10	20
Cameras on burrows								**0.21**	0.08	0.09	0.41	3.15	1.15	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	Not enough observations				21.28	-	**0.01**	0.01	0.00	0.04	-5.06	1.00	20
Within management area	psi(Management)p(.)	Not enough observations				22.30	-	**0.01**	0.01	0.00	0.07	-4.51	1.01	10
Outside management area		Not enough observations				-70.55	-							10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				25.79	-	**0.05**	0.02	0.02	0.10	-3.01	0.42	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.54**	0.46	0.03	0.98	0.14	1.84	**0.10**	0.09	0.02	0.45	-2.18	1.01	32
All sign on plots	psi(.)p(.)	**0.78**	0.45	0.02	1.00	1.25	2.61	**0.12**	0.08	0.03	0.36	-1.99	0.72	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				21.29	-	**0.01**	0.01	0.00	0.05	-4.84	1.00	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				21.91	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	32
All sign on tracks	psi(.)p(.)	Not enough observations				21.91	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.54**	0.46	0.03	0.98	0.14	1.84	**0.10**	0.09	0.02	0.45	-2.18	1.01	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.26**	0.12	0.10	0.55	-1.03	0.62	**0.27**	0.12	0.10	0.55	-1.01	0.61	32
All sign on plots and tracks	psi(.)p(.)	**0.78**	0.45	0.02	1.00	1.25	2.61	**0.12**	0.08	0.03	0.36	-1.99	0.72	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	Not enough observations				32.76	-	**0.05**	0.02	0.02	0.10	-3.01	0.42	16
Very fresh sign (up to 2 days) on plots outside management area		Not enough observations				-8.63	-							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	**0.54**	0.50	0.02	0.98	0.14	2.00	**0.10**	0.09	0.02	0.45	-2.18	1.01	16
Fresh sign (up to 1 week) on plots outside management area		**0.54**	0.50	0.02	0.98	0.00	1.59							16
All sign on plots within management area	psi(Management)p(.)	**0.62**	0.42	0.05	0.98	2.64	9.16	**0.12**	0.08	0.03	0.36	-1.99	0.72	16
All sign on plots outside management area		**0.93**	0.57	0.00	1.00	-2.14	8.12							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	Not enough observations				28.46	-	**0.02**	0.02	0.00	0.10	-4.14	1.01	16
Very fresh sign (up to 2 days) on tracks outside management area		Not enough observations				-97.61	-							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	Not enough observations				72.52	-	**0.03**	0.02	0.01	0.12	-3.43	0.72	16
Fresh sign (up to 1 week) on tracks outside management area		Not enough observations				-99.99	-							16
All sign on tracks within management area	psi(Management)p(.)	Not enough observations				72.52	-	**0.03**	0.02	0.01	0.12	-3.43	0.72	16
All sign on tracks outside management area		Not enough observations				-99.99	-							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	**0.54**	0.50	0.02	0.98	0.14	2.00	**0.10**	0.09	0.02	0.45	-2.18	1.01	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		**0.54**	0.50	0.02	0.98	0.00	1.59							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	**0.26**	0.15	0.07	0.63	-1.03	0.79	**0.27**	0.12	0.10	0.55	-1.01	0.61	16
Fresh sign (up to 1 week) on plots and tracks outside management area		**0.26**	0.15	0.07	0.63	0.00	1.00							16
All sign on plots and tracks within management area	psi(Management)p(.)	**0.62**	0.42	0.05	0.98	2.64	9.16	**0.12**	0.08	0.03	0.36	-1.99	0.72	16
All sign on plots and tracks outside management area		**0.93**	0.57	0.00	1.00	-2.14	8.12							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				26.06	-	**0.04**	0.02	0.01	0.11	-3.25	0.59	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.26**	0.21	0.04	0.75	-1.03	1.08	**0.19**	0.16	0.03	0.64	-1.45	1.03	20
All sign on plots	psi(.)p(.)	**0.53**	0.29	0.11	0.91	0.11	1.15	**0.19**	0.11	0.05	0.49	-1.45	0.73	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				23.21	-	**0.01**	0.01	0.00	0.08	-4.37	1.01	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				23.21	-	**0.01**	0.01	0.00	0.08	-4.37	1.01	20
All sign on tracks	psi(.)p(.)	Not enough observations				23.21	-	**0.01**	0.01	0.00	0.08	-4.37	1.01	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.26**	0.21	0.04	0.75	-1.03	1.08	**0.19**	0.16	0.03	0.64	-1.45	1.03	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.19**	0.11	0.05	0.49	-1.47	0.72	**0.34**	0.17	0.10	0.69	-0.68	0.77	20
All sign on plots and tracks	psi(.)p(.)	**0.53**	0.29	0.11	0.91	0.11	1.15	**0.19**	0.11	0.05	0.49	-1.45	0.73	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	Not enough observations				21.92	-	**0.02**	0.02	0.00	0.12	-4.01	1.01	20

Appendix 3, Table 17. Small sized lizard occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	**0.29**	0.10	0.14	0.52	-0.88	0.48	**0.23**	0.06	0.13	0.36	-1.23	0.34	29
Cameras on tracks	psi(.)p(On_tracks)	Not enough observations				33.95	-	**0.00**	0.00	0.00	0.00	-54.12	2.24	20
Cameras on burrows								**0.23**	0.05	0.14	0.34	52.90	2.24	9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	Not enough observations				-27.00	-	**0.05**	-	-	-	-3.03	-	20
Within management area	psi(Management)p(.)	Not enough observations				-29.32	-	**0.03**	-	-	-	-3.40	-	10
Outside management area		Not enough observations				-11.40	-		-	-	-		-	10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	**0.92**	0.07	0.67	0.99	2.47	0.91	**0.53**	0.05	0.42	0.63	0.10	0.21	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.92**	0.06	0.68	0.98	2.41	0.85	**0.54**	0.05	0.43	0.64	0.15	0.21	32
All sign on plots	psi(.)p(.)	**0.94**	0.06	0.70	0.99	2.69	0.93	**0.58**	0.05	0.48	0.67	0.30	0.20	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	**0.41**	0.18	0.14	0.75	-0.36	0.75	**0.21**	0.10	0.08	0.46	-1.33	0.60	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	**0.41**	0.18	0.14	0.75	-0.36	0.75	**0.21**	0.10	0.08	0.46	-1.33	0.60	32
All sign on tracks	psi(.)p(.)	**0.35**	0.13	0.15	0.63	-0.61	0.59	**0.27**	0.10	0.11	0.51	-1.01	0.53	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.91**	0.06	0.69	0.98	2.31	0.77	**0.56**	0.05	0.46	0.66	0.23	0.21	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.91**	0.06	0.70	0.98	2.27	0.74	**0.57**	0.05	0.47	0.66	0.28	0.21	32
All sign on plots and tracks	psi(.)p(.)	**0.93**	0.05	0.72	0.98	2.57	0.82	**0.61**	0.05	0.51	0.70	0.43	0.20	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	1.29	0.68	**0.54**	0.05	0.45	0.64	0.17	0.20	16
Very fresh sign (up to 2 days) on plots outside management area		**0.78**	0.11	0.49	0.93	27.39	-							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	**1.00**	NA	NA	NA	1.27	0.67	**0.55**	0.05	0.46	0.65	0.21	0.20	16
Fresh sign (up to 1 week) on plots outside management area		**0.78**	0.11	0.49	0.93	30.05	-							16
All sign on plots within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	1.64	0.74	**0.59**	0.05	0.49	0.68	0.35	0.20	16
All sign on plots outside management area		**0.84**	0.10	0.55	0.96	25.56	-							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	**0.41**	0.22	0.10	0.81	-0.36	0.91	**0.21**	0.10	0.08	0.46	-1.33	0.60	16
Very fresh sign (up to 2 days) on tracks outside management area		**0.41**	0.22	0.10	0.81	0.00	1.04							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	**0.41**	0.22	0.10	0.81	-0.36	0.91	**0.21**	0.10	0.08	0.46	-1.33	0.60	16
Fresh sign (up to 1 week) on tracks outside management area		**0.41**	0.22	0.10	0.81	0.00	1.04							16
All sign on tracks within management area	psi(Management)p(.)	**0.35**	0.17	0.11	0.71	-0.61	0.76	**0.27**	0.10	0.11	0.51	-1.01	0.53	16
All sign on tracks outside management area		**0.35**	0.17	0.11	0.71	0.00	0.94							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	1.24	0.65	**0.57**	0.05	0.48	0.66	0.29	0.20	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		**0.78**	0.11	0.49	0.93	24.74	-							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	1.23	0.64	**0.58**	0.05	0.49	0.67	0.33	0.20	16
Fresh sign (up to 1 week) on plots and tracks outside management area		**0.77**	0.11	0.49	0.92	24.01	-							16
All sign on plots and tracks within management area	psi(Management)p(.)	**1.00**	0.00	0.00	1.00	1.59	0.71	**0.61**	0.05	0.52	0.70	0.47	0.20	16
All sign on plots and tracks outside management area		**0.83**	0.10	0.55	0.95	27.84	-							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	**0.96**	0.08	0.23	1.00	3.28	2.30	**0.49**	0.07	0.37	0.62	-0.03	0.27	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	**0.95**	0.08	0.38	1.00	3.05	1.80	**0.51**	0.07	0.38	0.64	0.04	0.26	20
All sign on plots	psi(.)p(.)	**0.93**	0.07	0.61	0.99	2.58	1.09	**0.58**	0.06	0.45	0.70	0.32	0.26	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	**0.68**	0.37	0.07	0.98	0.75	1.70	**0.17**	0.10	0.05	0.45	-1.62	0.73	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	**0.68**	0.37	0.07	0.98	0.75	1.70	**0.17**	0.10	0.05	0.45	-1.62	0.73	20
All sign on tracks	psi(.)p(.)	**0.53**	0.23	0.16	0.87	0.13	0.91	**0.23**	0.11	0.09	0.50	-1.18	0.60	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	**0.95**	0.08	0.48	1.00	2.88	1.51	**0.53**	0.07	0.40	0.65	0.11	0.26	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	**0.94**	0.07	0.54	1.00	2.76	1.32	**0.55**	0.06	0.42	0.67	0.18	0.26	20
All sign on plots and tracks	psi(.)p(.)	**0.92**	0.07	0.64	0.99	2.46	0.96	**0.61**	0.06	0.49	0.72	0.45	0.26	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	Not enough observations				-20.89	-	**0.00**	-	-	-	-10.72	-	20

Appendix 3, Table 18. Lerista occupancy and detection.

Dataset	Model	Probability of occupancy	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	Probability of detection	SE	Lower 95% CI	Upper 95% CI	Beta	SE beta	N
Data from cameras (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	No observations												29
Cameras on tracks	psi(.)p(On_tracks)	No observations												20
Cameras on burrows														9
Data only from cameras on tracks (10 occasions of 2 weeks)														
All cameras	psi(.)p(.)	No observations												20
Within management area	psi(Management)p(.)	No observations												10
Outside management area														10
Data from all plot locations (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				26.81	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	32
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				26.81	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	32
All sign on plots	psi(.)p(.)	Not enough observations				26.81	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	32
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	32
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	32
All sign on tracks	psi(.)p(.)	Not enough observations				-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	32
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				26.81	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	32
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	Not enough observations				26.81	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	32
All sign on plots and tracks	psi(.)p(.)	Not enough observations				26.81	-	**0.02**	0.01	0.00	0.06	-4.14	0.71	32
Data from all plot locations separated by management treatment (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots within management area	psi(Management)p(.)	Not enough observations				74.22	-	**0.03**	0.02	0.01	0.12	-3.43	0.72	16
Very fresh sign (up to 2 days) on plots outside management area		Not enough observations				-102.27	-							16
Fresh sign (up to 1 week) on plots within management area	psi(Management)p(.)	Not enough observations				74.22	-	**0.03**	0.02	0.01	0.12	-3.43	0.72	16
Fresh sign (up to 1 week) on plots outside management area		Not enough observations				-102.27	-							16
All sign on plots within management area	psi(Management)p(.)	Not enough observations				74.22	-	**0.03**	0.02	0.01	0.12	-3.43	0.72	16
All sign on plots outside management area		Not enough observations				-102.27	-							16
Very fresh sign (up to 2 days) on tracks within management area	psi(Management)p(.)	Not enough observations				-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	16
Very fresh sign (up to 2 days) on tracks outside management area		Not enough observations				-14.12	-							16
Fresh sign (up to 1 week) on tracks within management area	psi(Management)p(.)	Not enough observations				-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	16
Fresh sign (up to 1 week) on tracks outside management area		Not enough observations				-14.12	-							16
All sign on tracks within management area	psi(Management)p(.)	Not enough observations				-28.24	-	**0.00**	-	0.00	1.00	-7.53	-	16
All sign on tracks outside management area		Not enough observations				-14.12	-							16
Very fresh sign (up to 2 days) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				74.22	-	**0.03**	0.02	0.01	0.12	-3.43	0.72	16
Very fresh sign (up to 2 days) on plots and tracks outside management area		Not enough observations				-102.27	-							16
Fresh sign (up to 1 week) on plots and tracks within management area	psi(Management)p(.)	Not enough observations				74.22	-	**0.03**	0.02	0.01	0.12	-3.43	0.72	16
Fresh sign (up to 1 week) on plots and tracks outside management area		Not enough observations				-102.27	-							16
All sign on plots and tracks within management area	psi(Management)p(.)	Not enough observations				74.22	-	**0.03**	0.02	0.01	0.12	-3.43	0.72	16
All sign on plots and tracks outside management area		Not enough observations				-102.27	-							16
Data only from plots paired with cameras on tracks (4 occasions 6-10 weeks apart)														
Very fresh sign (up to 2 days) on plots	psi(.)p(.)	Not enough observations				22.15	-	**0.01**	0.01	0.00	0.08	-4.37	1.01	20
Fresh sign (up to 1 week) on plots	psi(.)p(.)	Not enough observations				22.15	-	**0.01**	0.01	0.00	0.08	-4.37	1.01	20
All sign on plots	psi(.)p(.)	Not enough observations				22.15	-	**0.01**	0.01	0.00	0.08	-4.37	1.01	20
Very fresh sign (up to 2 days) on tracks	psi(.)p(.)	Not enough observations				-17.65	-	**0.01**	-	-	-	-4.71	-	20
Fresh sign (up to 1 week) on tracks	psi(.)p(.)	Not enough observations				-17.65	-	**0.01**	-	-	-	-4.71	-	20
All sign on tracks	psi(.)p(.)	Not enough observations				-17.65	-	**0.01**	-	-	-	-4.71	-	20
Very fresh sign (up to 2 days) on plots and tracks	psi(.)p(.)	Not enough observations				22.15	-	**0.01**	0.01	0.00	0.08	-4.37	1.01	20
Fresh sign (up to 1 week) on plots and tracks	psi(.)p(.)	Not enough observations				22.15	-	**0.01**	0.01	0.00	0.08	-4.37	1.01	20
All sign on plots and tracks	psi(.)p(.)	Not enough observations				22.15	-	**0.01**	0.01	0.00	0.08	-4.37	1.01	20
Data from cameras (4 occasions of 35 days)														
Data only from cameras on tracks paired with plots	psi(.)p(.)	No observations												20

Appendix 4. Camera Trap data analysis application developed around R and CPW Photo Warehouse.

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As part of an investigation into the value of camera traps as a monitoring tool, it has been necessary to extract and analyse data from large and complex datasets (many 100,000's of records). During this process we have developed some new and innovative techniques for interpreting data camera trap data.

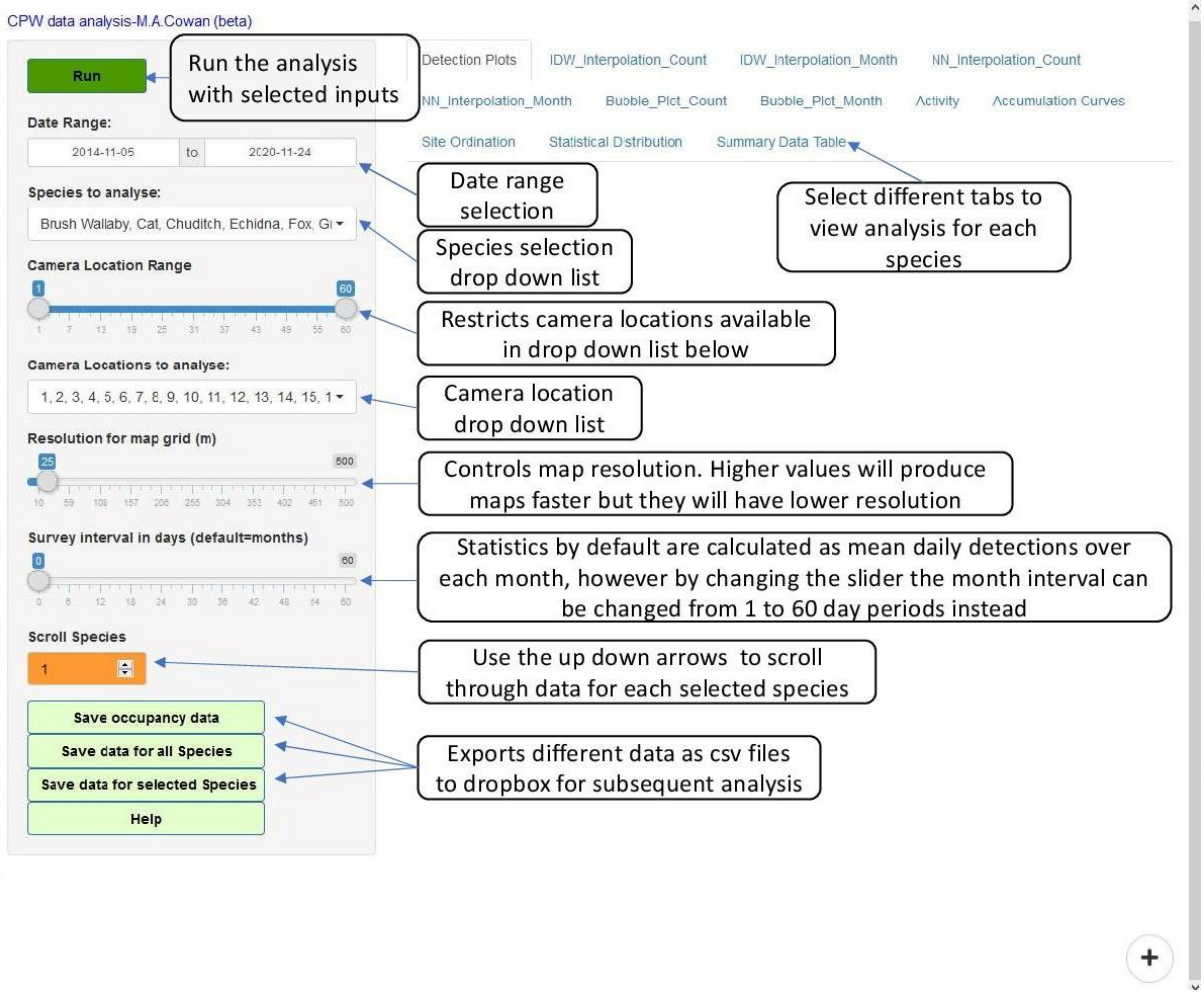
As many of these analytical techniques involve time consuming and onerous manual manipulation of data from the collection database, CPW Photo Warehouse, a number of R scripts were written to help automate this process. This has been taken a step further with the development of an online application based on R and RStudio's "Shiny" environment that is interactive for analysing, downloading, and reporting on systematically collected camera trap data. The application runs through a web interface and is therefore accessible from any browser with internet access, although Firefox is the preferred browser. Specific applications (projects) are password protected so only authorised users will have access.

This application may be useful to anyone working with large scale systematically collected (rather than opportunistic or small scale) camera trap data stored in CPW Photo Warehouse. It will enable users to extract, visualise and report in a timely and consistent manner with minimal effort and no requirements for understanding methods of data extraction from CPW Photo Warehouse.

Over the next few pages are screen shots, along with a brief summary of each of the pages associated with this application. All of these pages are accessible using the tabs along the top of the application page.

All of the graphs and maps can be directly copied and saved as .png files and are thus available for direct insertion into reports or presentations. Data outputs are saved to project specific Dropbox folders, for which the user will require a link (this will be sent to the data custodian when the application is set up). The Dropbox address is static for each project so once that link is acquired, all data downloads will be available from that location.

Prerequisites for setting the application up are a properly compiled CPW Warehouse database with no duplication of species names in the species list, no duplication of camera location names, and UTM coordinates for every listed camera location. When camera coordinates have been collected as non-projected geographic coordinates, they can be converted to UTM from within CPW Photo Warehouse. The project should also include a shapefile of a polygon boundary (projected as UTM and named "outline") and a line shapefile representing tracks or roads within the boundary polygon (projected as UTM and named "tracks").



The first page that opens when the application is started is this one. From here the user selects the elements they want to filter by, which include the range of dates (default is first and last date of data from within CPW Photo Warehouse), sampling interval (the default is months) the camera locations, resolution for interpolated maps, and a check against each species of interest. Pressing “Run” then extracts records based on these parameters and initiates a variety of data manipulations which can take as long as 45 seconds or more to complete for large datasets (>400,000 records). When “Run” completes the plots for the first species of interest will be displayed in the right-hand side of the window as shown on the following image.

If the user wants to undertake further analysis beyond what is available in the application based on the filter parameters, then simply using any of the three “save” buttons in the side panel will save the relevant data as a collated .csv file to Dropbox. This includes data formatted for occupancy analysis.

The above graphs are presented after “Run” completes. The top plot is the mean monthly detection rate over the range of dates and camera locations that were selected. Error bars are one standard deviation, and the grey ribbon represents the bounds of 95% CI. The dashed line is the trend.

The lower graph is a Cusum plot. It is particularly sensitive to shifts from a population mean and indicates both positive and negative trends. One of the advantages of this type of analysis is that for animal population data that is noisy and fluctuates significantly (most fauna monitoring data), trigger points for intervention or further investigation can be set to encompass this natural variability.

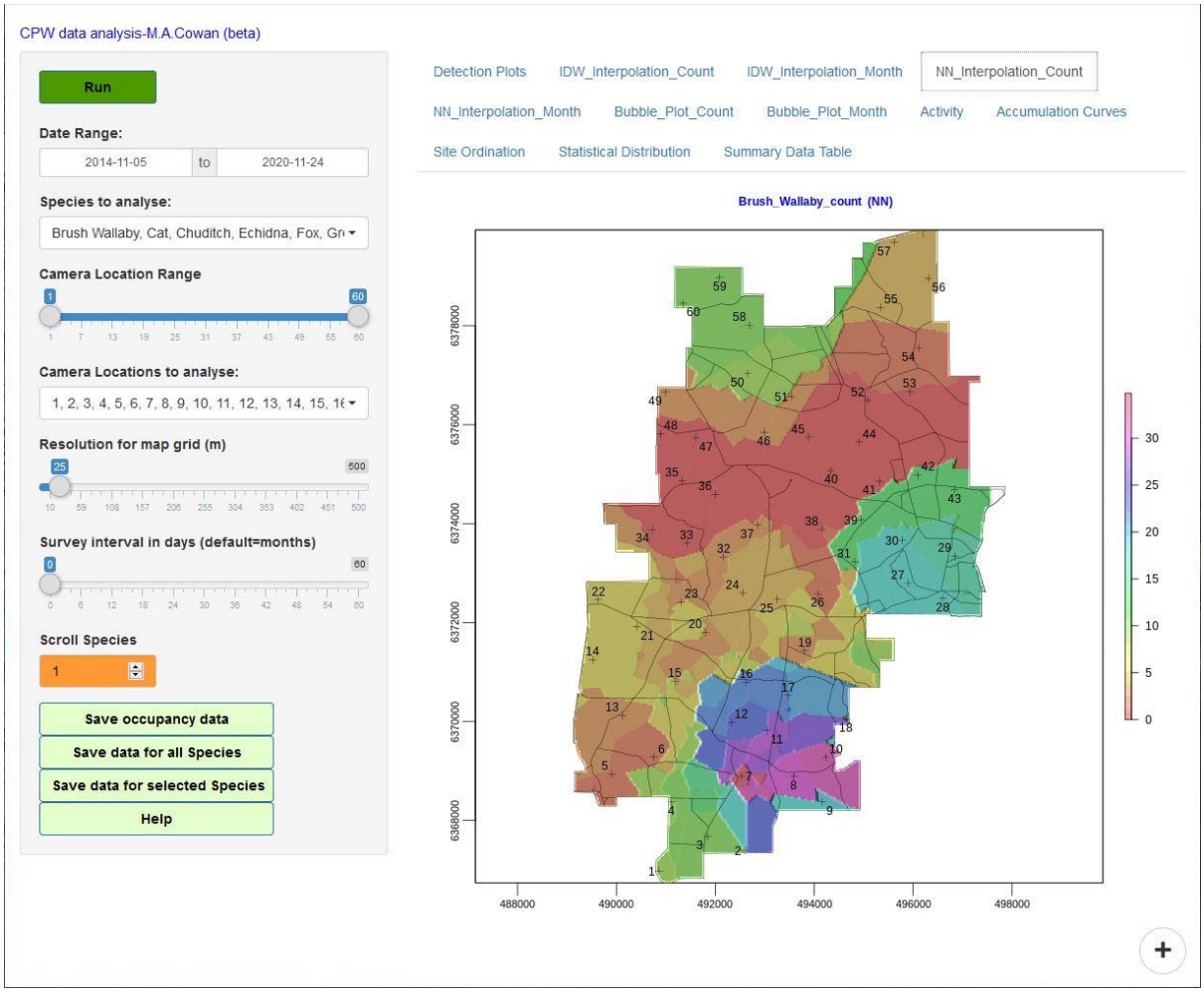
An important point for this page and all the others that follow is that it is just showing the data for the first species in the selected list. To view the same data for any other species in the selected list it is just a matter of scrolling up or down or entering a number in the “Display species” dialogue box. The user can move up or down through this list at any time and from within every page.

This page displays an interpolated map of species detection (IDW interpolation) for the total number of independent detections at each camera location.

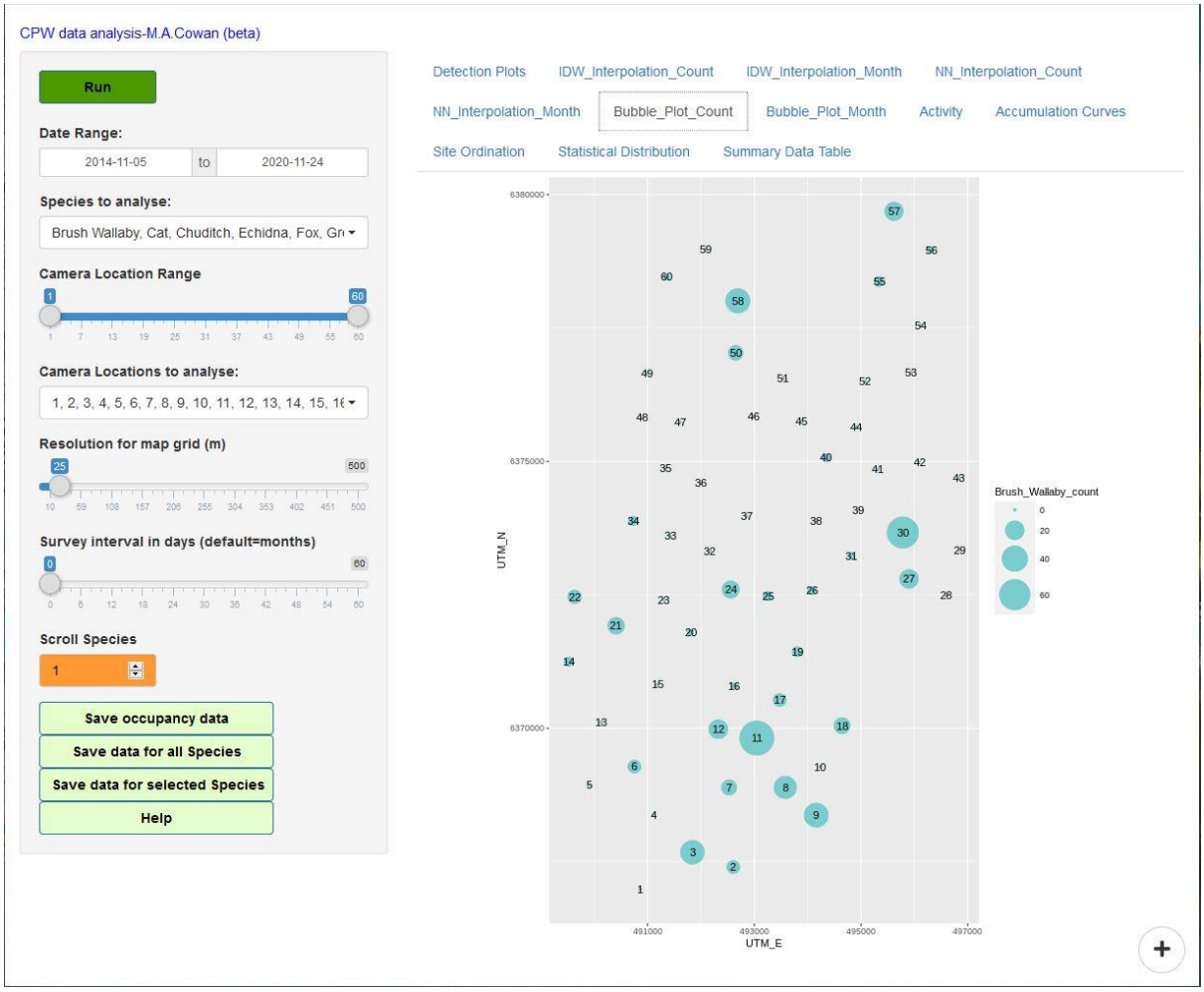
The speed of map creation is very dependent on the resolution used for mapping, therefore for viewing only, or for very large areas, lower resolutions will speed up map production.

Similar to this page is “IDW_interpolation_month”, however rather than presenting a total count of detections this map shows over how many months (or user defined intervals) a detection of a species occurred. This assists in providing a temporal context to the spatial data.

While on this page, or any other, all or any of the parameters in the side panel can be changed and by pressing “Run”, analysis will rerun and the page you are on will be updated accordingly. Again, the size of the dataset and the complexity of some of the analysis may mean it takes 30 seconds or more to refresh.

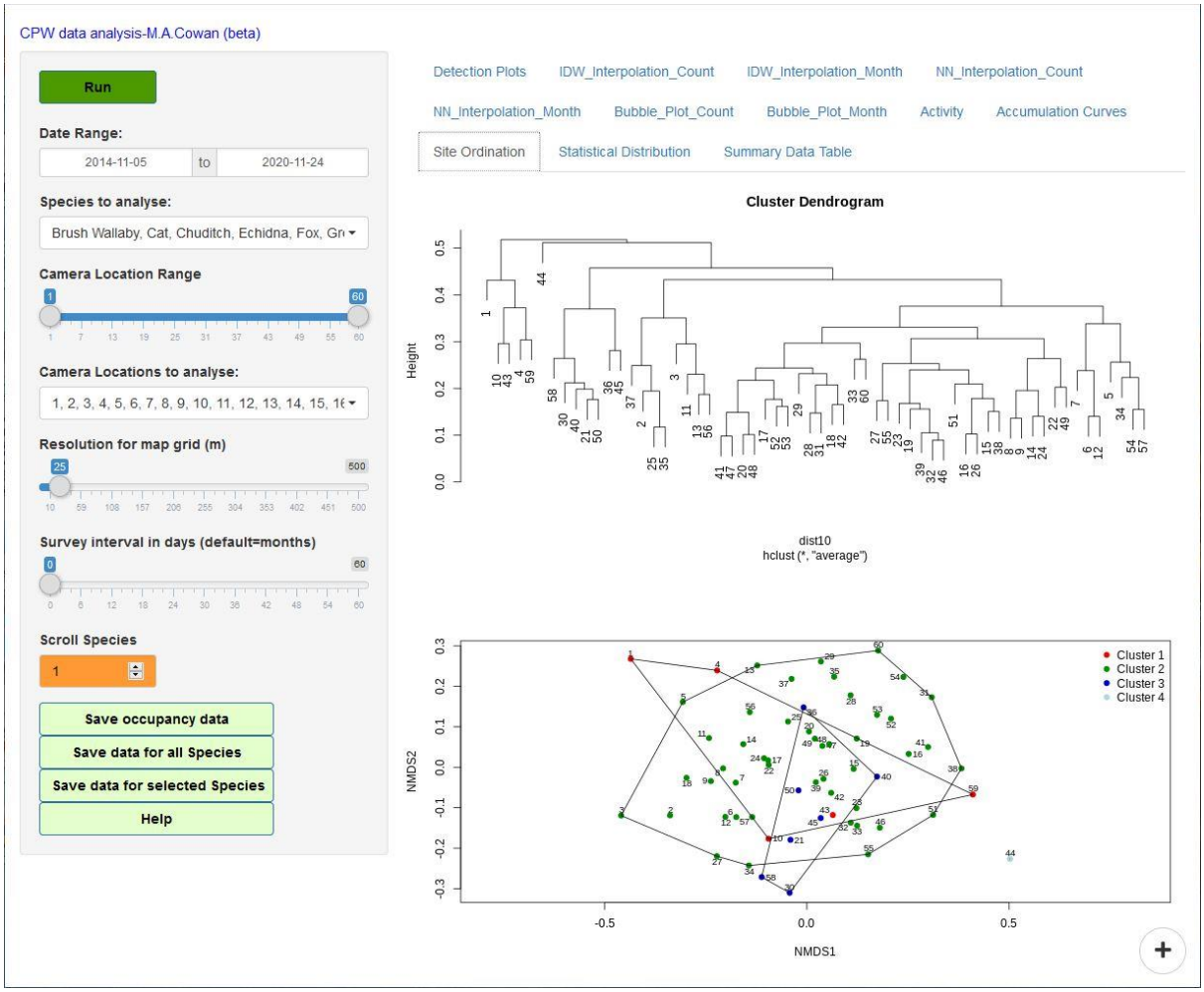


This page and “NN_interpolation_month” display the same data as IDW but use nearest neighbour (NN) analysis rather than Inverse Distance Weighting (IDW).

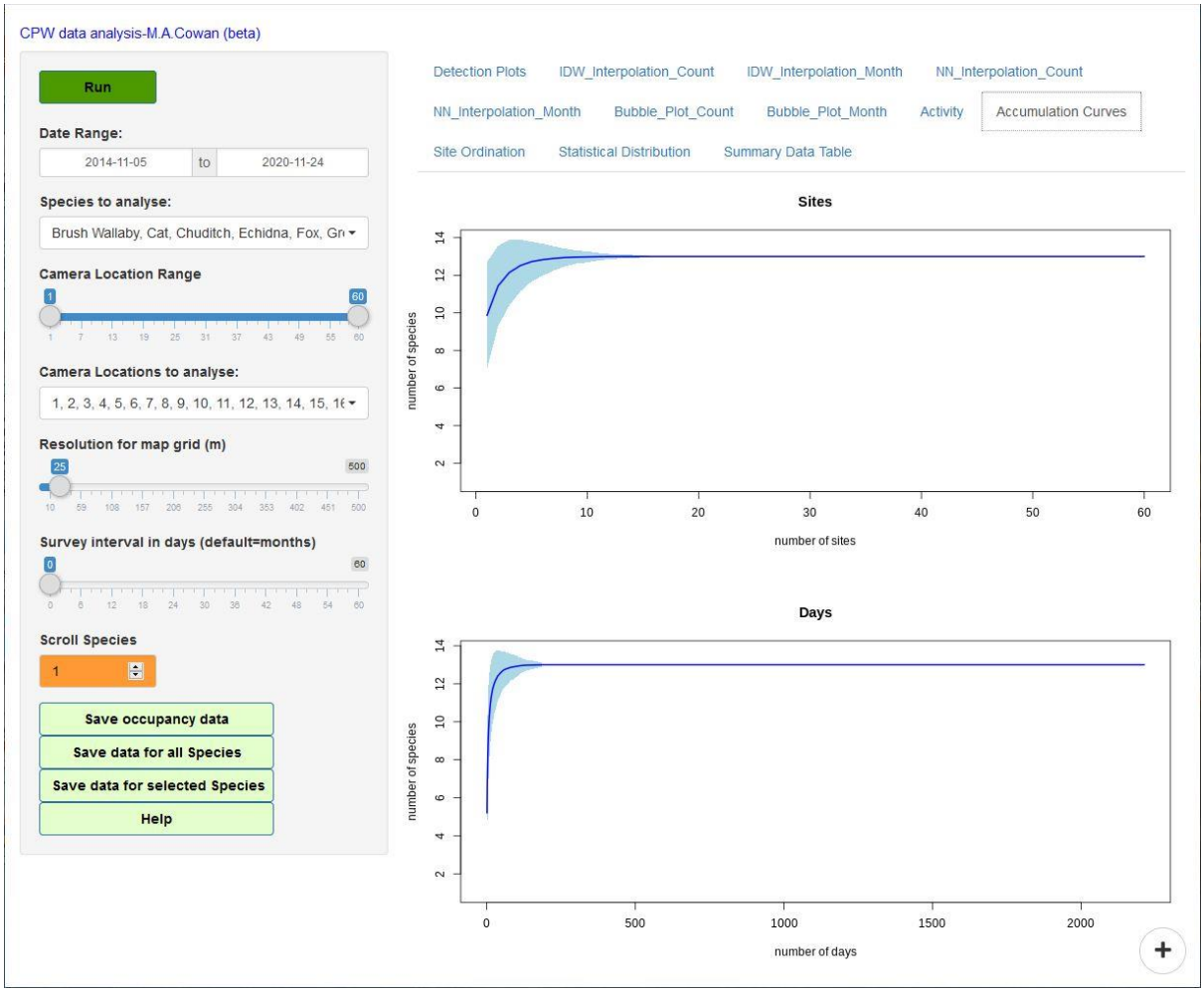


This page presents the same data as the previous tabs but as total detections at each site indicated by the size of the bubbles. This is equivalent to a heat map rather than an interpolated surface. The numbers, as in the interpolated maps, are the location IDs for each of the camera stations.

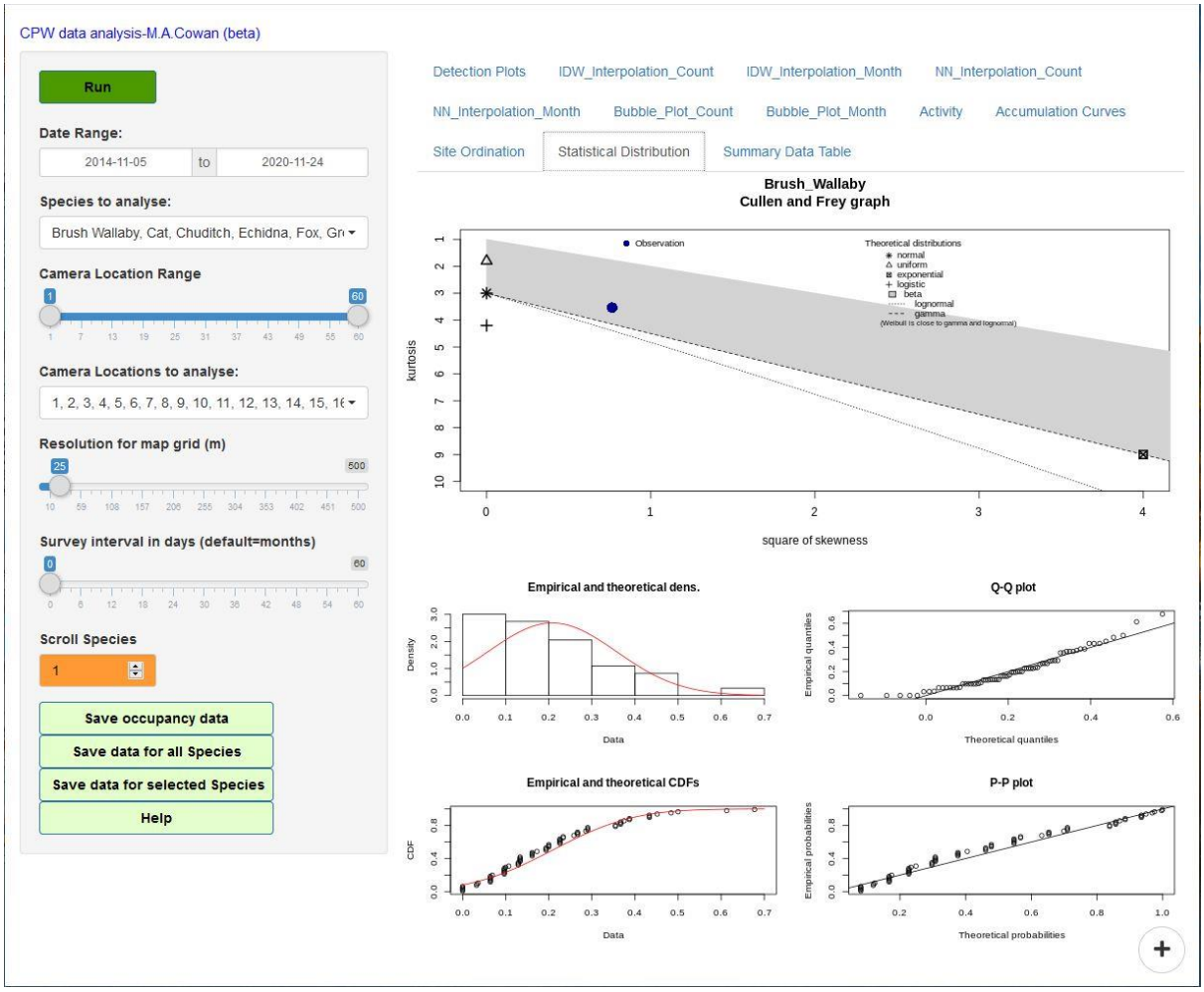
This page shows the species activity time within the filtered data parameters.



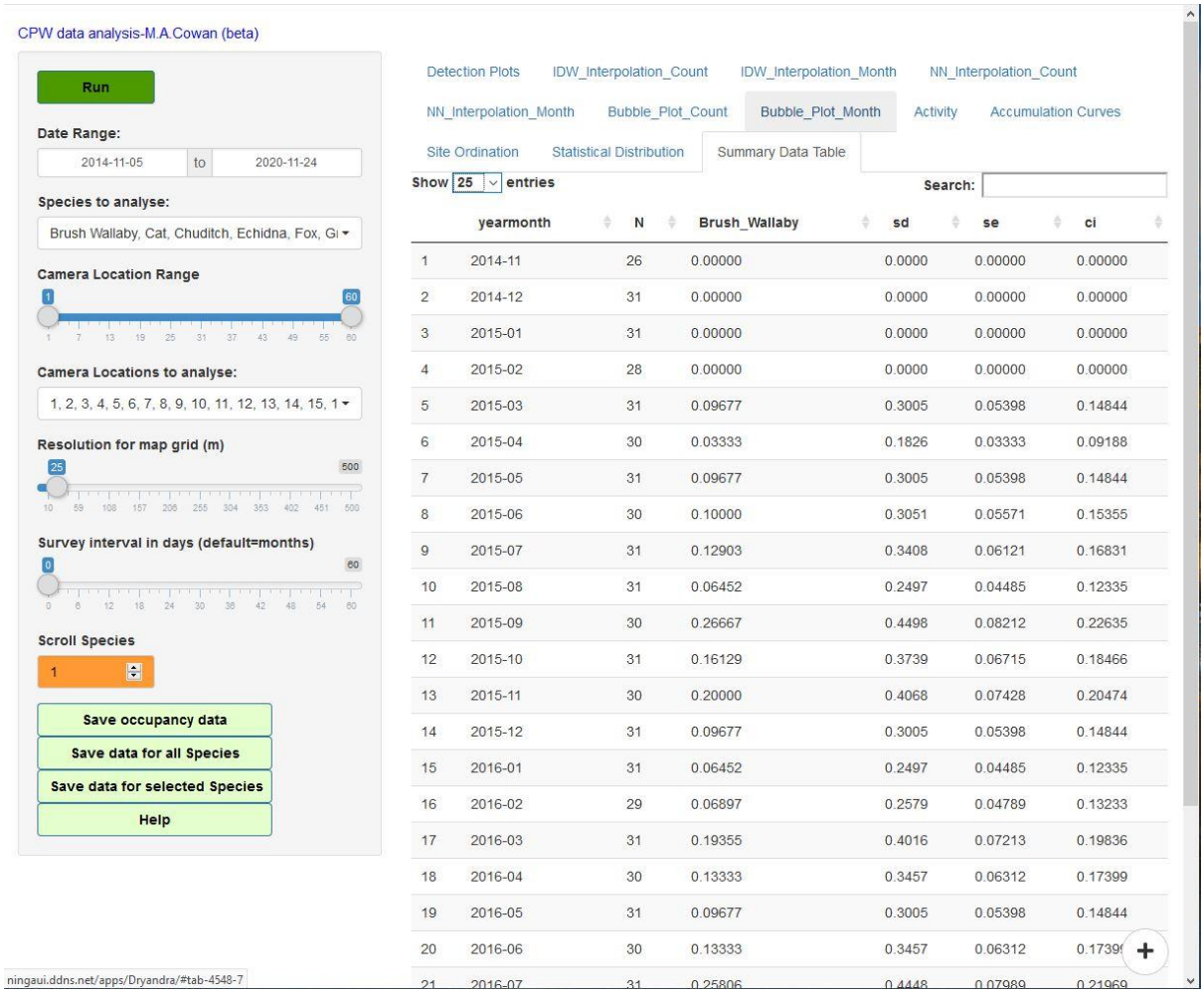
This page displays assemblage graphs for the “community” of selected species. The upper plot is a dendrogram of site (camera locations) similarity based on the Bray Curtis similarity measure. The lower plot is an ordination (nMDS) of the same data with clustering into the four most significant groups.



This page provides graphics of permutated species accumulation curves for the selected species. The upper graph is based on number of sites while the lower graph is number of days sampling. Both plots are using the same data but just use different methods of examining effort.



The plots on this page are about statistical data distribution for each species and how close the data are to normal data. This is useful to know prior to undertaking additional analysis if normality or understanding the data distribution is important.



This last tab is a summary of the data used for detection analysis and Cusum plots for each species. Depending on how large the data set is (number of months) there will be additional pages to scroll through with the dialogs on the main page. The number of records per page can also be changed. As with other tabs, the user can scroll through the different species by using the left hand side “Display species” button.

Again, as with any other page all the left hand parameters can be changed and then run to update this tab with a new set of data. This tab and every other tab will then have access to that data for all saved output, graphs and maps.