

Matuwa Introduced Predator Control Program

2015 Aerial Baiting Report

Neil Burrows, Graeme Liddelow, Bruce Ward, Vanessa Jackson and Errol Thoomes
Department of Parks & Wildlife
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Summary of Results

- Aerial baiting on Matuwa was carried out during the week of 6 July 2015. Weather during and one week after baiting was generally cool to cold, and mostly within the desired temperature range for baiting (Figure 1). Total rainfall for 2015 (up to end of October) was 187 mm, which is 16% below the average annual rainfall to this time of year (~220 mm) (Figure 2). Baiting followed the standard protocol.
- This year, trail cameras were used in conjunction with the standard track counting method to assess the effectiveness of baiting. Fifty Reconix cameras (camera traps) were set up at 2 km intervals along the standard 100 km track count survey lines. Camera spacing (2 km) was designed to minimize the likelihood of 'trapping' the same cat on more than one camera on the same night whilst having a sufficient sample size (number of cameras).
- Cameras remained armed in the field through the period 25 June to 12 August 2015 (49 nights). This provided 12 nights (600 camera nights) of pre-bait data. Following baiting, a period of 11 days was allowed to elapse after which data captured by the cameras were considered to be 'post-bait' data. The post-bait trapping period was from 19 July to 12 August 2015 (25 nights or 1250 camera nights).
- Camera trap data were analysed for the pre- and post-bait periods by recording the number of individual cats and dogs 'trapped' by each camera each night. Distinguishing features (markings), time of capture and the travel direction of the animal were also recorded. Where the same cat was trapped at the same camera more than once on the same night, it was scored as one capture. On occasions when the same cat was captured on one or more cameras (2 km apart) on the same night, it was scored as multiple captures, consistent with the rule-set for track counting. In most cases, individual cats could be identified but identifying individual dogs and other animals was difficult. Because of the different pre-and post-bait time periods, data were standardized to the number of captures per camera per night. For example, during the pre-bait period, there were 42 cat captures over 12 nights from 50 cameras (600 camera nights), equating to 0.070 captures per camera night.
- A standard track count survey was carried out at the control (unbaited) site on Kurara Kurara (KK) over the period 25-27 October 2015 (40 km x 3 nights only – rain interrupted) in an area west of Jenny's bore, Garden Patch bore, Dingo bore and Pope's well. Much (~60%) of the survey area was burnt by wildfire about 11 months prior to the survey.
- Prior to baiting, the cat Track Activity Index (TAI) on Matuwa was 16.8 (Figure 3) and the number of individual cats estimated to be on the 100 km transect was 26. After baiting, the cat TAI fell to 8.2 and the number of individual cats was estimated to be 25. This represents a 51% reduction in the cat TAI, but little change in the estimated number of individual cats, bearing in mind that estimating individual cats from footprints is difficult, so unreliable. Nonetheless, it is a little disconcerting that there was virtually no difference in this measure between the pre- and post- bait surveys.

- Camera traps recorded a pre-bait capture rate of 0.070 cat captures per camera night compared with a post-bait capture rate of 0.028, representing a 60% reduction following baiting.
- Prior to baiting, the dog TAI on Matuwa was 3.4 and after baiting, it was 2.2 representing a 35% reduction. However, the camera traps revealed a pre-bait dog capture rate of 0.048 captures per camera night and a post bait capture rate of 0.011, a 77% reduction. This suggests that the 2 km separation of cameras is not adequate to reliably census dogs – i.e., the same dog can walk past multiple cameras in one night. This is further confounded by the difficulty in identifying individual dogs. Other techniques, such as 'occupancy' could be tried to better estimate changes in abundance using camera traps.
- No foxes were recorded from track surveys or on the cameras.
- Other fauna captured by the cameras included mallee fowls, brushtail possums, hopping mice, mulgaras, bilbies, echidna, emus, kangaroos, camels, rabbits and an assortment of other birds.
- Cat TAI measured on the unbaited control at KK was 26.0 (~ three times higher than Matuwa) and the dog TAI was 0.84, about one third of the post-bait level on Matuwa.
- Trends in mulgara and rabbit density are shown in Figures 4 and 5. Clearly mulgara density on Matuwa is significantly down on the boom period of 2012/13, but is still high compared with KK. There is a suggestion in the data that cat baits may be impacting on the mulgara population – we know mulgara take the baits - but the net gain as a result of good fire management and cat control, is a good population of mulgara. As indicated below, the combined effects of large wildfires and high cat densities is diabolical for mulgara (and probably many other species)
- The mulgara population on KK has declined significantly to very low levels since the 2014 survey, most likely due to the combined effects of the recent extensive bushfires in spinifex country (no cover) and the relatively high cat density (predation pressure). There was a noticeable sparsity of small mammal footprints generally (including rabbit) on the KK survey lines.

Conclusions and recommendations

- Cat baiting appears to have been effective this year (50-60% reduction in cat activity) and the TAI is now below 10.
- Using trail camera traps was effective. While there are more sophisticated techniques for analyzing the data, the simple measure of captures per camera night appears to be meaningful for cats but not for dogs. In future, camera traps will be installed at least 21 days prior to baiting and collected 31 days after baiting, allowing a 10 day period for the baits to have effect.
- As part of the transitioning to camera traps, both the track count technique and the cameras should be used again, and including at KK, in 2016. If funding is available, it would be advantageous to train Martu to assist with the track counting surveys.
- As discussed in earlier reports, it would be very worthwhile evaluating the cost-effectiveness of follow-up strategic ground trapping using drum and / or ground traps. Three trappers each running a 20 km trap line (20 trap stations) over 7 nights would be very effective. More trialing is needed to improve the effectiveness of drum traps to minimize by-catch.

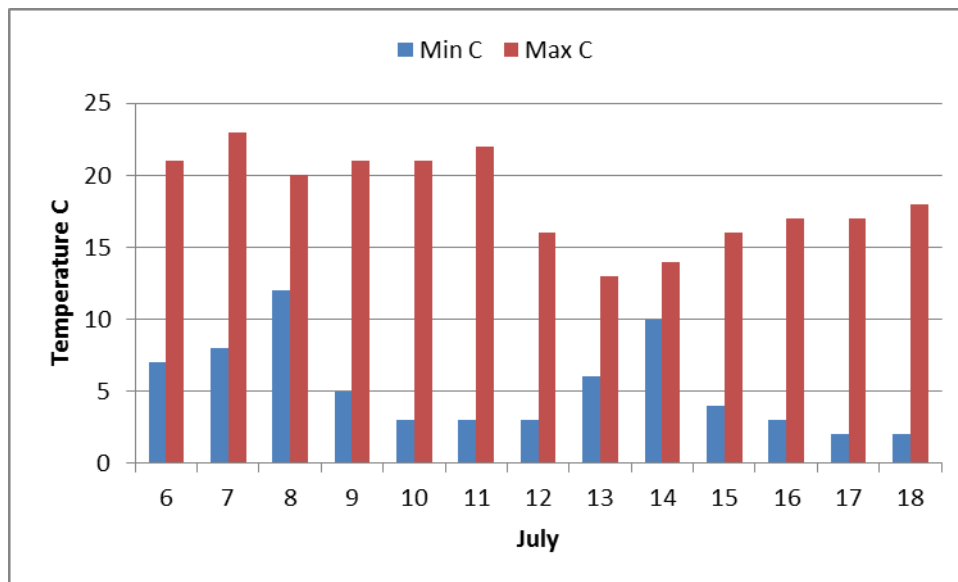


Figure 1: Daily minimum and maximum temperatures during and after aerial baiting (week of 6 July 2015). Maxima <20° C are preferred.

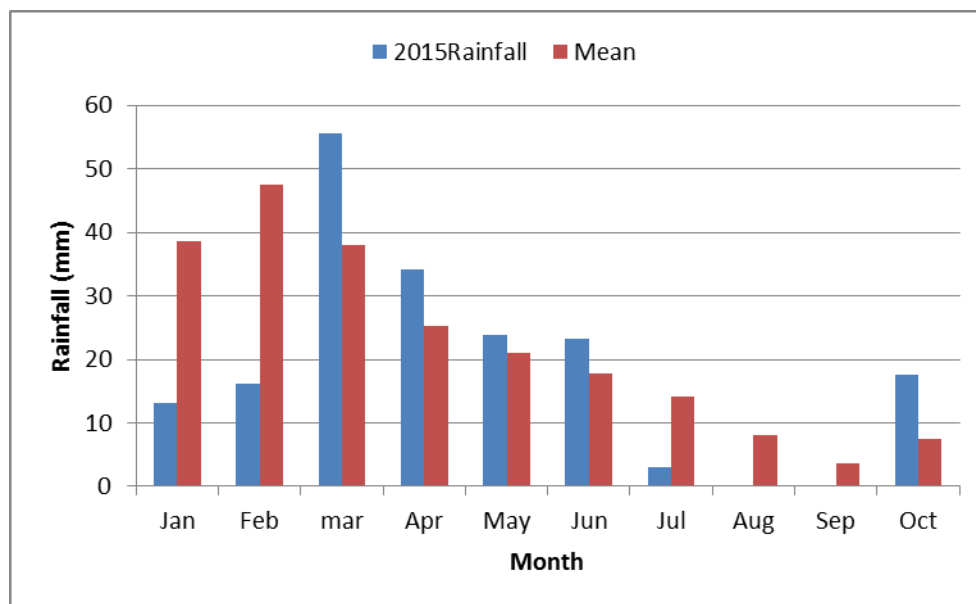


Figure 2: Monthly rainfall at Matuwa for 2015 to October, and the long term monthly means. Total rainfall over this period was 16% below the long term average for this period.

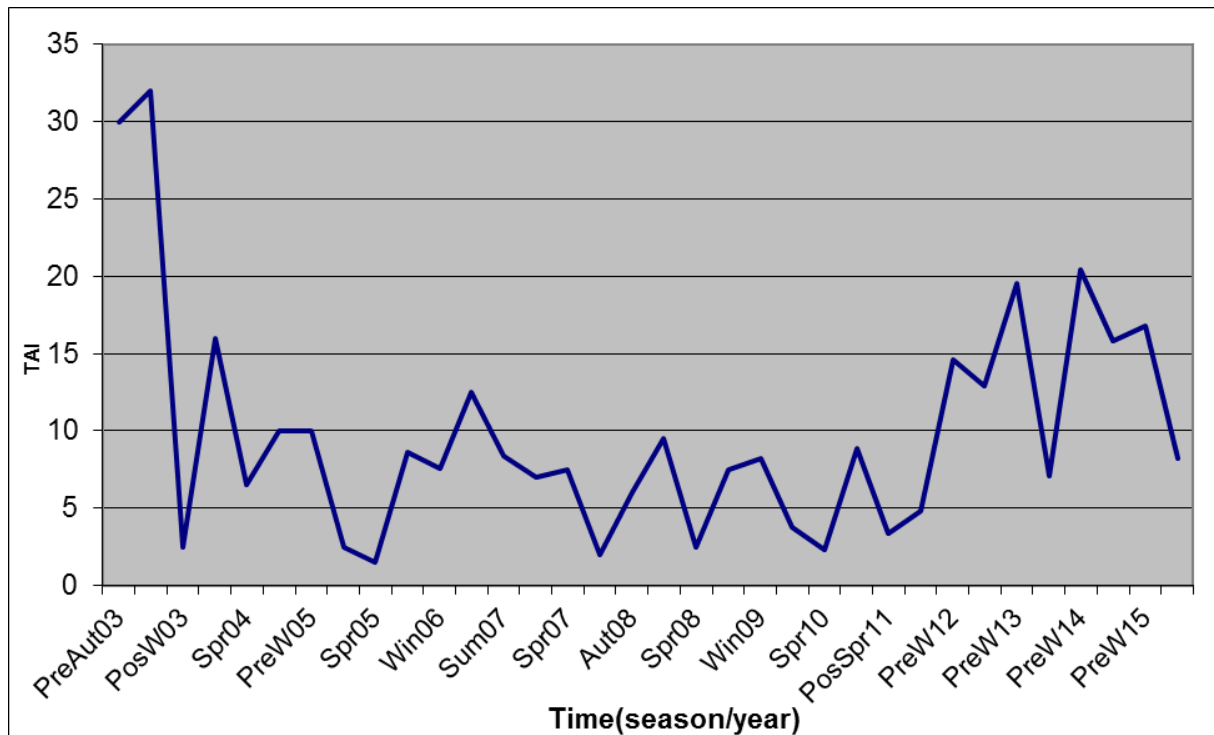


Figure 3: Trends in cat Track Activity Index (TAI) at Matuwa from autumn 2003 to winter 2015. The 2015 baiting reduced the TAI from 16.8 to 8.2, a 51.9% reduction. The cat TAI on Kurara Kurara, which has never been baited with cat baits, was 26.0 in spring 2015, ~68% higher than LG.

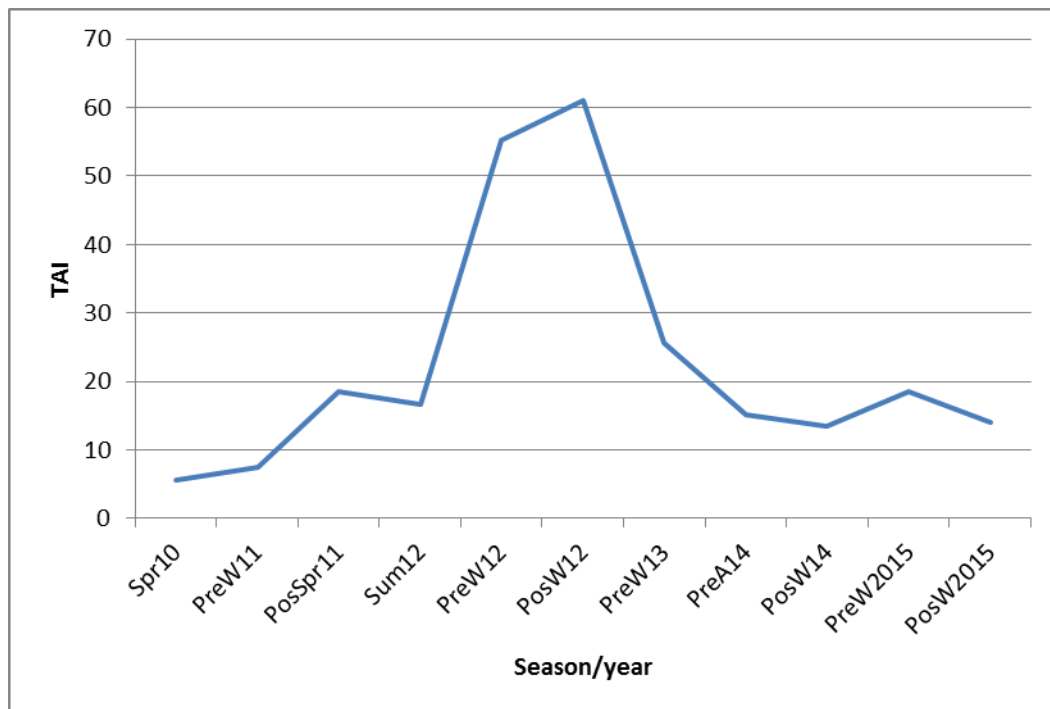


Figure 4: Mulgara TAI for Matuwa from spring 2010 to winter 2015. Kurara Kurara spring 2015 TAI = 3.3 compared with Matuwa TAI = 12.0. The TAI is the proportion (%) of FAPs stations visited by mulgara.

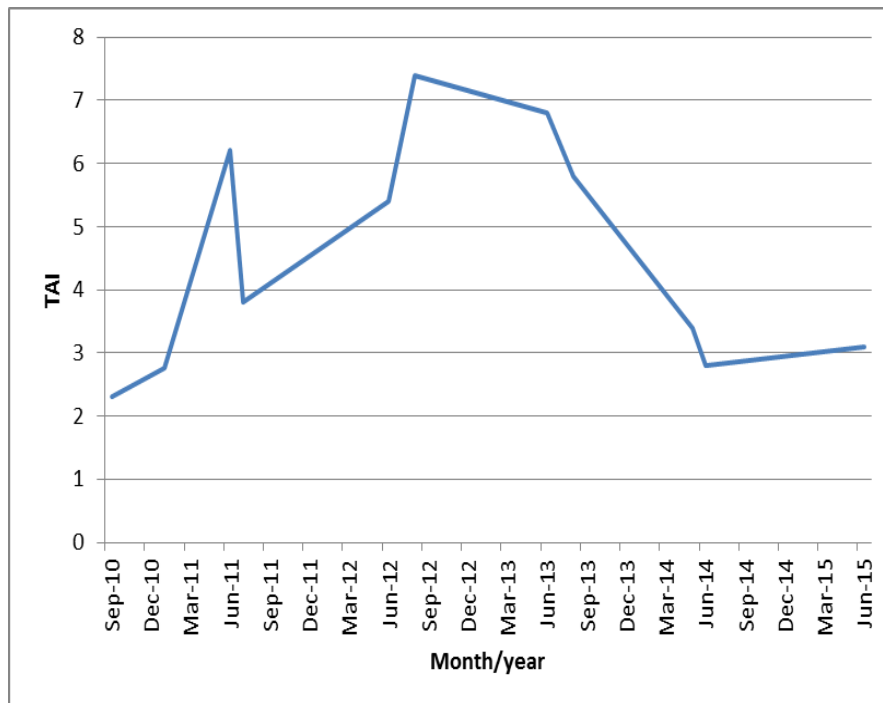
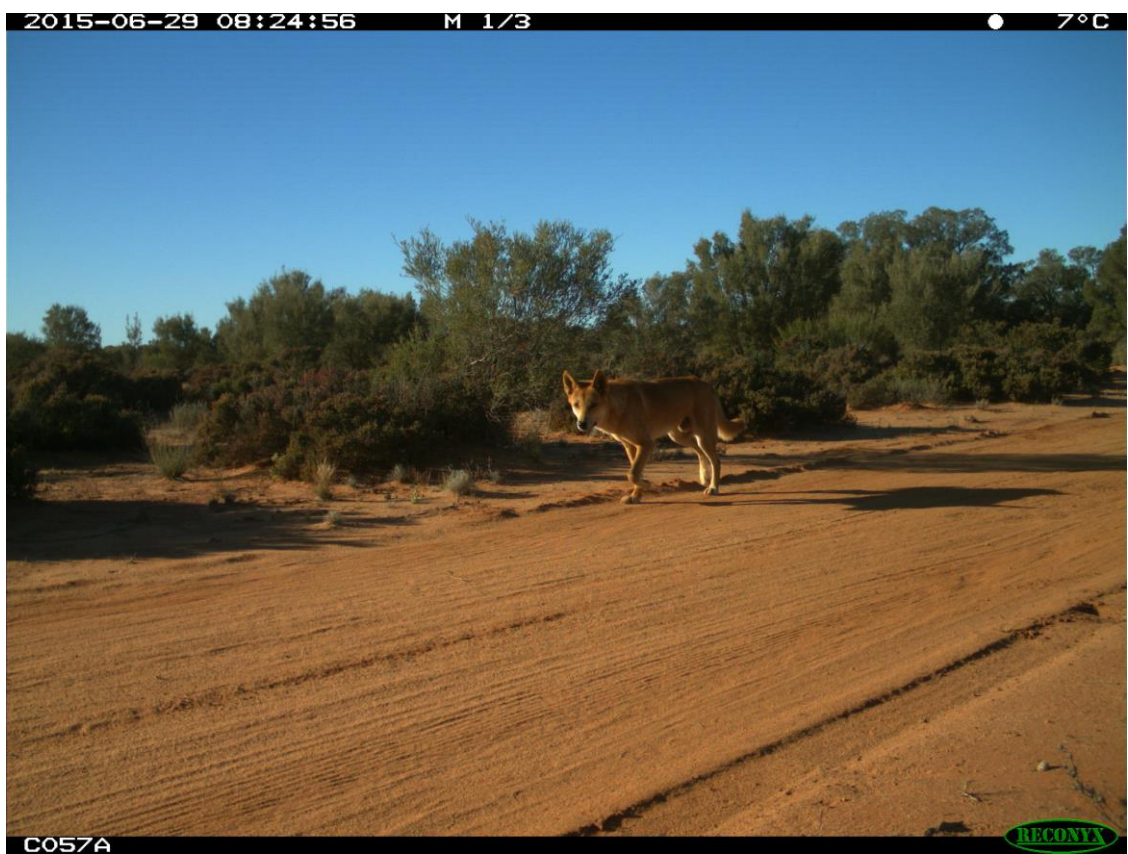


Figure 5: Rabbit TAI for Matuwa from spring 2010 to winter 2015. Kurara Kurara winter 2015 TAI = 2.5

Predator Track Count Summary 2015

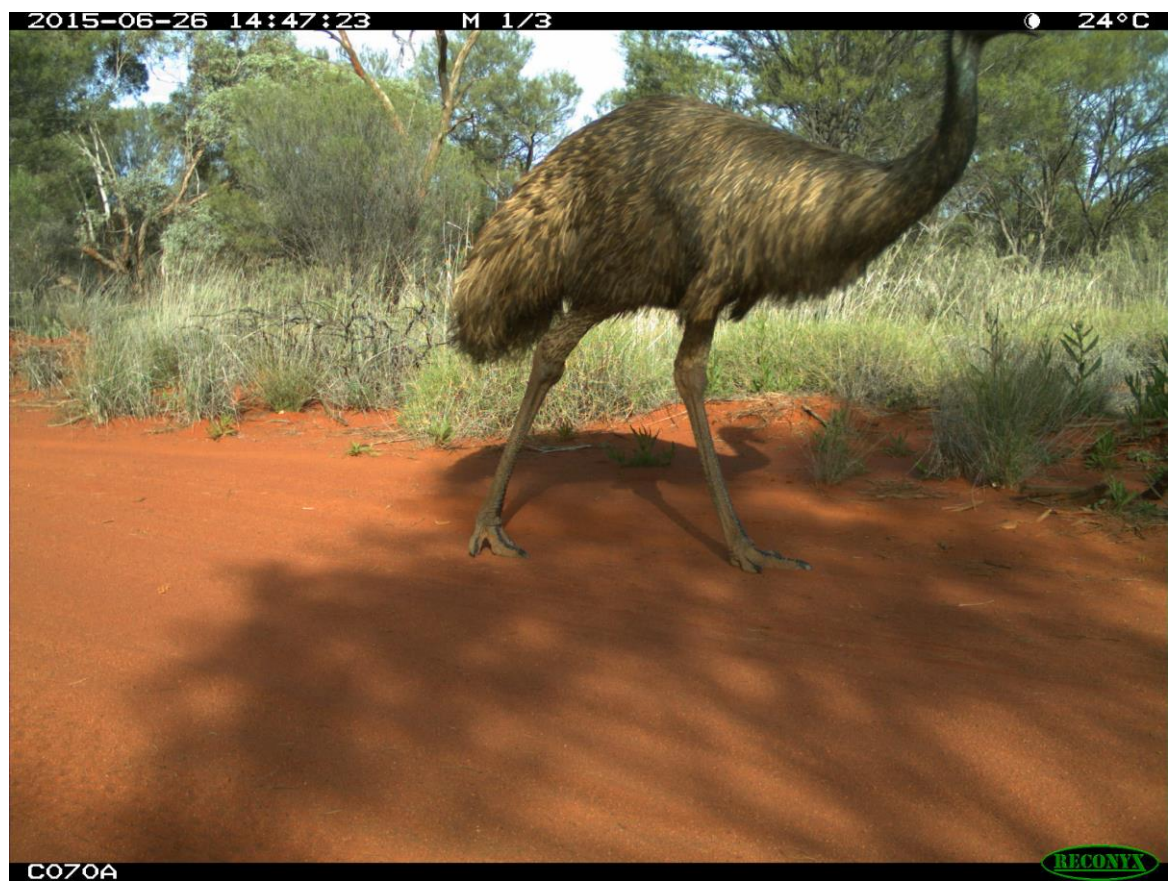
Table 1: Summary of *pre-* and *post-* bait track activity index (TAI) for cats & dogs. 10 transects over 5 nights at Matuwa (MA) and 4 transects over 3 nights (25-27 October 2015) at *Kurara Kurara* (KK) (unbaited). Pre-bait assessment MA on 25-29 June 2015; Baiting week of 6 July 2015; Post-bait assessment on MA 13-17 August 2015. (NS= no survey – rain affected)

Transect	Day 1		Day 2		Day 3		Day 4		Day 5	
	Cat	Dog	Cat	Dog	Cat	Dog	Cat	Dog	Cat	Dog
1										
MAPre	2	0	2	0	1	0	1	0	2	0
MAPost	0	0	0	0	0	0	0	0	0	0
KK	3	0	3	0	3	0	NS	NS	NS	NS
2										
MAPre	2	0	2	0	1	0	2	0	2	0
LGPost	1	0	1	0	1	1	0	0	1	0
Earaheedy	3	0	2	0	1	0	NS	NS	NS	NS
3										
MAPre	1	0	2	0	1	0	2	0	1	0
LGPost	1	0	0	0	0	0	0	0	2	0
Earaheedy	3	0	3	0	3	0	NS	NS	NS	NS
4										
MAPre	3	1	2	1	1	1	1	1	1	1
MAPost	0	1	0	1	1	1	1	0	0	1
Earaheedy	3	0	2	0	1	1	NS	NS	NS	NS
5A										
MAPre	3	0	3	0	2	0	1	0	2	0
LGPost	1	1	0	0	1	0	0	0	2	0
6										
MAPre	1	0	2	0	2	0	1	1	1	0
LGPost	1	0	3	0	1	0	0	0	2	0
7										
MAPre	2	0	1	0	3	0	2	0	1	0
MAPost	1	0	0	0	0	0	0	0	1	0
8										
MAPre	3	0	1	0	1	0	2	1	1	2
LGPost	1	0	2	0	2	2	1	1	1	0
9										
MAPre	2	0	1	0	2	0	2	0	3	2
LGPost	2	2	2	0	2	1	1	0	2	0
10										
MAPre	1	1	1	0	2	1	1	0	1	2
LGPost	0	1	0	0	1	0	0	0	0	0













Appendix

Explanatory notes - estimating introduced predator density

Feral cats, and to a lesser extent, wild dogs, are rarely seen and their populations are difficult to determine using trapping or spotlighting techniques. Therefore, indirect measures are used to estimate relative abundance. We use two measures, which rely on skilled observers and some sampling rule sets.

1. The Track Activity Index (TAI), which is calculated from the total number of sets of tracks (footprint sets) recorded over 5 nights for the 10 dragged transects each 10 km long. Algar and Burrows provide a rule set for determining whether a set of discontinuous track sets detected on a transect on the same day is counted as one or more track sets. In essence, if cat tracks are the same size, going in the same direction and are less than 2 km apart, we assume it is the same animal. The TAI is the measure currently used to set thresholds for free range fauna re-introductions ($TAI < 10.0$).

$$TAI = (\text{total number of track sets counted over 5 nights} \times 100) / 500.$$

Where cats have not been controlled in the arid zone, the TAI is usually 25-35. It can be as high as 55-65 in regions such as Shark Bay that sustains very high rabbit populations.

2. The Individual Density Index (IDI): This is calculated from the estimated number of individual animals (cats or dogs) detected by footprints along the dragged transects over 5 nights. That is, after 5 nights, we examine the data and estimate how many individual animals we think there are along the 100 km (10 transects x 10 km) of dragged transects and express this as a number per 100 km. This is estimated based on the size of the cat (or dog) and where along the transect it is detected each night. The IDI is calculated by:

$$IDI = (\text{No. of individuals} \times 100) / 100.$$

The IDI is less reliable than the TDI because it requires somewhat subjective (expert) judgments and assumptions to be made about the actual number of individual animals on the transects over 5 nights.

To compare the TAI and the IDI, consider the following example:

After 5 nights of surveying a 10 km transect, we record one cat track set each night, so the $TAI = (5 \times 100) / 50 = 10.0$. However, because of the size and location of the tracks, we conclude that the tracks have been made by 2 individual cats, so the $IDI = (2 \times 100) / 10 = 20.0$. If we concluded that the tracks were made by 3 cats, then the $IDI = (3 \times 100) / 10 = 30.0$, etc.

3. The camera trap index is calculated by determining the number of camera captures per night per camera. For each night, the number of captures is recorded. If a cat is captured on the same camera more than once on the same night, it is recorded as a single capture. If the cat is recorded on more than one camera on the same night it is recorded as multiple captures (cameras are 2 km apart). For example, 50 cameras out for 20 nights yields 45 captures (cats). Therefore, the capture rate per camera per night is $45 / (50 \times 20) = 0.045$ captures per camera per night.