Matuwa Introduced Predator Control Program
2016 Aerial Baiting Report

Neil Burrows, Graeme Liddelow and Errol Thoomes
Department of Parks & Wildlife
August 2016

Introduction

In 2015, assessment of the effectiveness of aerial baiting was undertaken using both track counts and trail cameras. During this trial, cameras gave similar results to the track count technique, so in 2016, cameras only were used. On 3 June 2016, fifty Reconix cameras (camera traps) were set 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). A map of camera locations is at Appendix 1.

Aerial baiting on Matuwa was carried out 18-19 July 2016, one week later than originally scheduled due to rain. Weather during and soon after baiting was generally cool (max. 17-20^{o}C; min. 2-10^{o}C) – for cat baiting, colder dry weather is preferable. Total rainfall for 2016 (up to end July) was ~192 mm, or 10 mm below average to this time of year. However, cumulative rainfall over the past three years was about 16% above average. Cool rather than cold weather, and rainfall just prior to baiting, resulted in less than ideal conditions for optimal bait uptake. Above average cumulative rainfall since 2014 resulting in high live prey abundance further reduced the conditions for bait uptake. Baiting followed the standard protocol although the density of baiting may have been closer to 40 rather than the prescribed 50 baits km^2. It is difficult to manually deliver 50 baits km^{-2} from high speed twin engine aircraft.

Cameras remained armed in the field from 3 June to 17 August, giving a total of 74 nights (3,700 camera nights). This provided 45 nights (2,250 camera nights) of pre-bait data, which was about 7 nights longer than intended due to the baiting being postponed. Following baiting, a period of 10 days was allowed to elapse after which data captured by the cameras were considered to be 'post-bait' data. The post-bait camera trapping period therefore was from 28 July to 17 August 2016 (20 nights or 1,000 camera nights). Initially the intention was for 38 nights pre-bait and 27 nights post-bait, but rain-caused delays to baiting skewed the timing.

Camera trap data were analysed for the pre- and post-bait periods by recording the number of individual cats and dogs (and other fauna) '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 trapped on the same night on the same camera could be identified but identifying individual dogs and other animals was difficult.

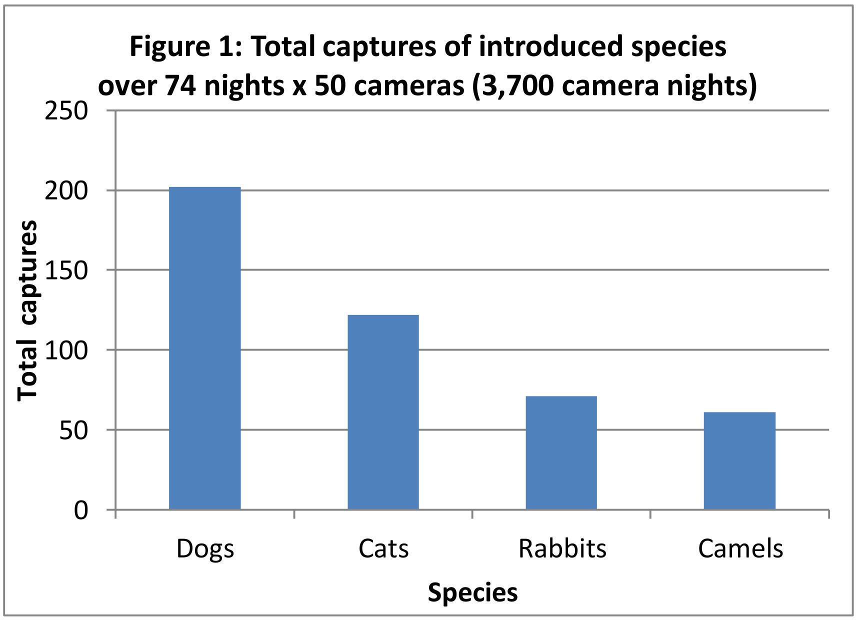
The variable quality of pictures meant that it was not possible to identify, with certainty, all individual animals between nights or throughout the trapping session (74 days), so as with the original Track Activity Index, a Camera Activity Index (CAI) was developed that did not rely on tracking and identifying individuals throughout the session. 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 2015 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. To make the new camera activity index easier to interrupt and communicate, we have converted the index to captures per 100 camera nights, so 0.070 captures per camera night equates to a CAI of 7.0 captures per 100 camera nights.

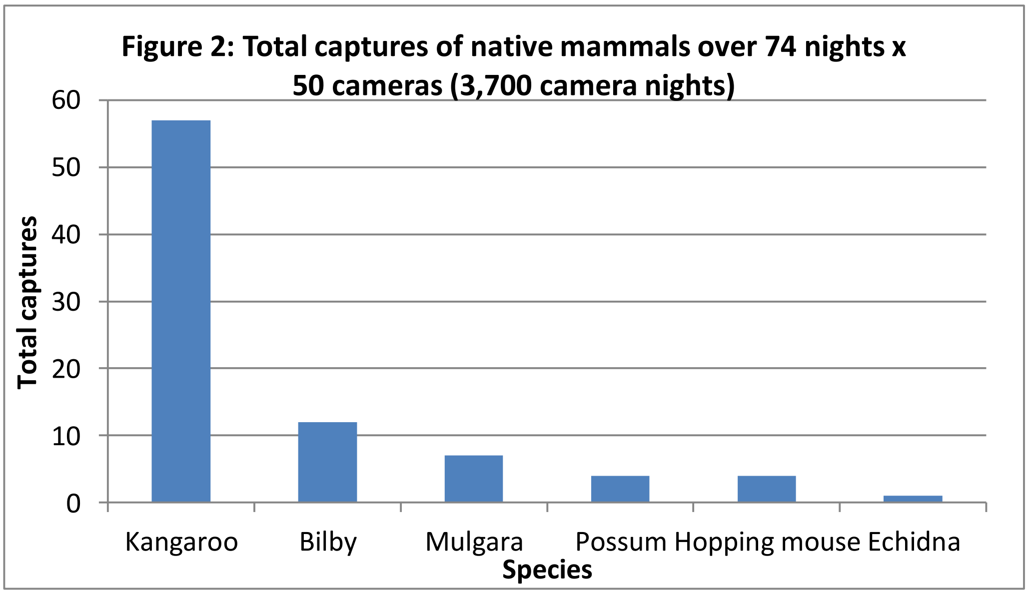
2016 Results
A summary of camera trap results over the entire 74 nights is shown in the figures below. Notable features include:

- High capture of dogs, camels, rabbits and kangaroos.
- Captures of bilbies (cameras MA053, MA060, MA063, MA071, MA088, MA0100, MA0101), possums (camera MA066), mulgaras and hopping mice.

Other captures of interest:

- A dingo carrying an adult echidna
- Two collared (exMike Wysong study) dingoes
- Bustard with a chick
- Emu with chicks



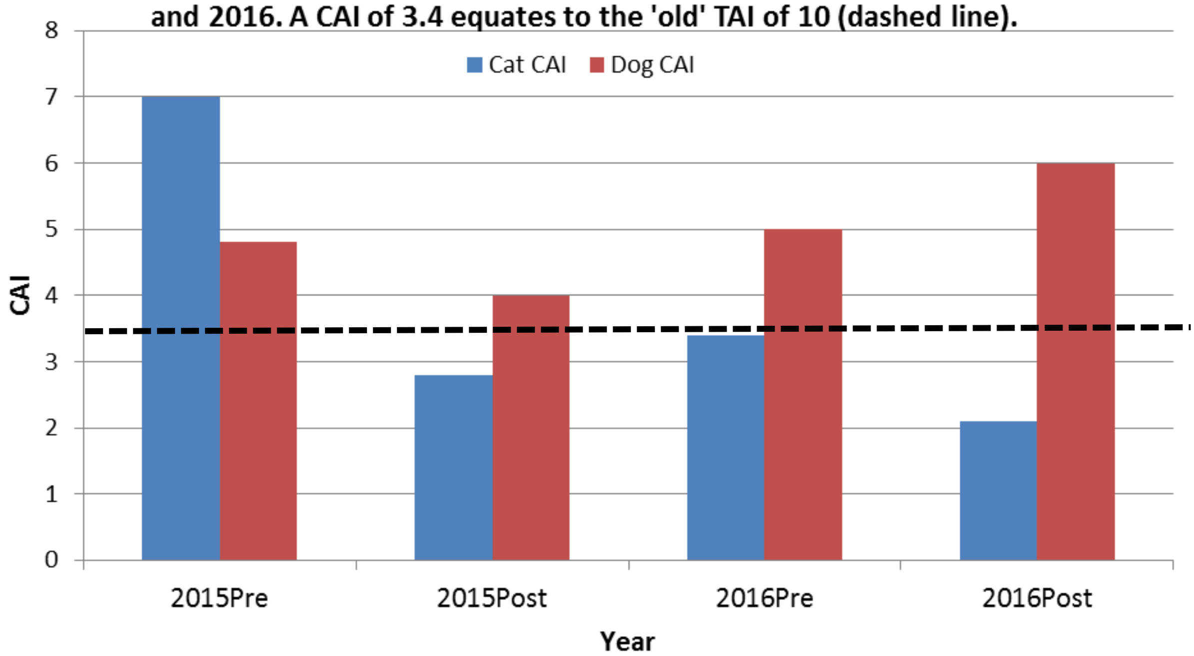


2016 baiting effectiveness

Cats:

- Camera traps recorded a pre-bait CAI of 3.4, which compares to the 2015 pre- and post-bait CAIs of 7.0 and 2.8 respectively. Therefore, between baitings (July 2015 to July 2016), the cat CAI increased by 23.5%.
- The post-bait cat CAI was 2.1, representing a 38% reduction in cat activity attributable to baiting. While this is a low level of knockdown, it must be remembered that a) weather conditions were sub-optimal and b) the law of diminishing returns - the cat density prior to baiting was low. A pre-bait CAI of 3.4 equates to the ‘old’ Track Activity Index (TAI) of about 10 and a post-bait CAI of 2.1, equates to a TAI of ~6.1. Expecting high levels of knockdown (>75%) of an already reduced cat population is unrealistic – as the cat density decreases, baiting will be less effective unless significantly greater control effort is expended. The current cat density is about as low as we can expect to achieve with annual aerial baiting.

Figure 3: Cat and dog camera activity index (CAI) pre and post bait, 2015 and 2016. A CAI of 3.4 equates to the 'old' TAI of 10 (dashed line).



Dogs

- Prior to baiting, the dog CAI was 5.0, which was similar to pre-bait 2015 (4.8) and after baiting, it actually increased to 6.0. Based on this methodology, baiting was ineffective against dogs, however it is questionable whether a 2 km spacing of the cameras is adequate for dogs - the same dog can walk past multiple cameras in one night, or walk past a specific camera more than once per 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.
- Notwithstanding limitations of the methodology, there is a high density of dogs on Matuwa. This could be helping to suppress cat density, although dogs are equally capable of preying on native fauna as cats, so consideration should be given to road baiting with dog baits.

- No foxes were recorded on the cameras.

- Trends in mulgara and rabbit density, as shown in previous reports, are not shown here because this (camera) methodology is not comparable with the previous track count method. It is recommended that in 2017, cameras are synchronously set out at both Matuwa and Karara Karara – the latter acting as an unbaited reference area.


2016-06-13 02:25:04
M 2/3
12°C
063
RECONYX


2016-07-22 21:40:57
M 2/3
9°C
066
RECONYX

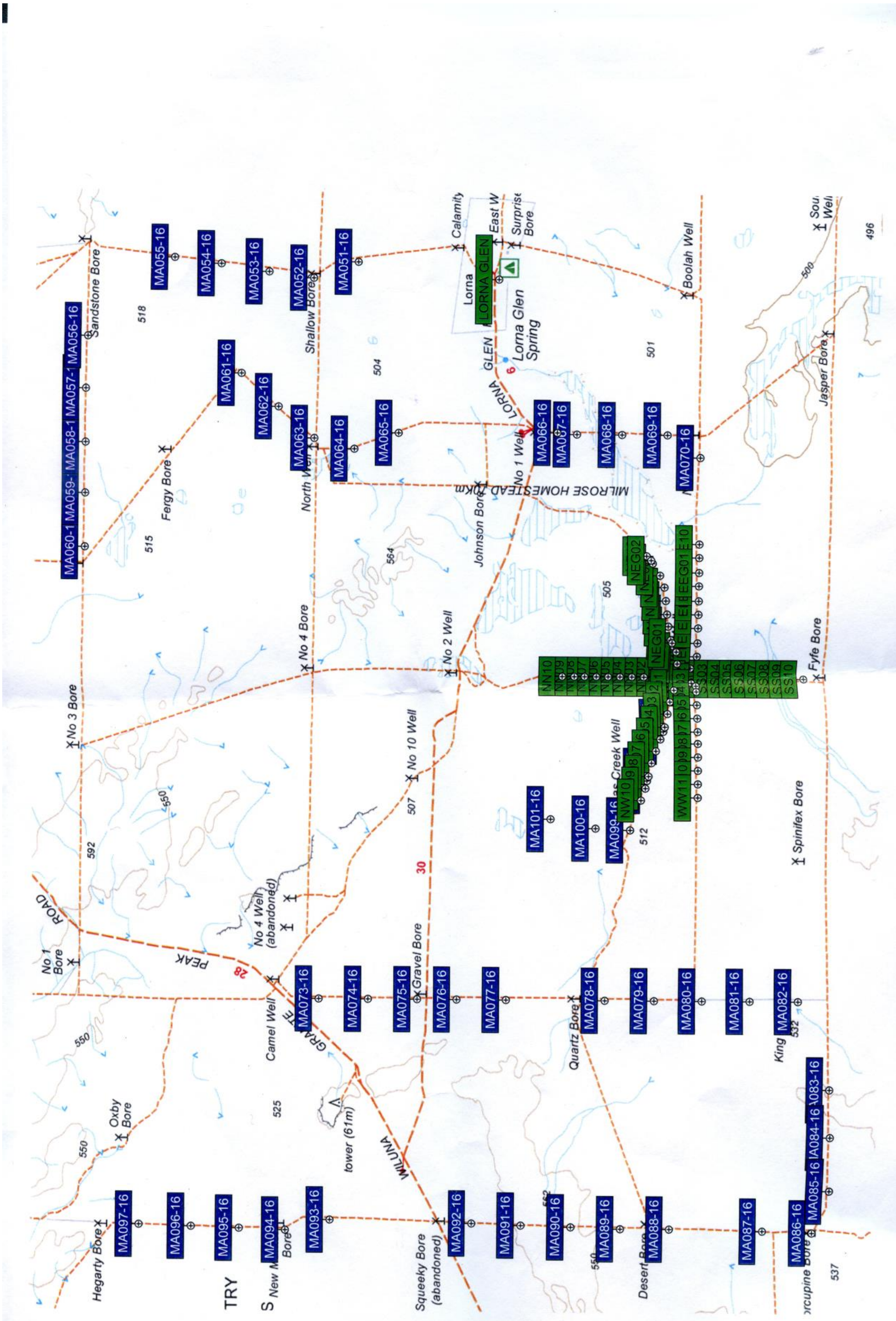

2016-08-08 08:59:29
M 2/3
16°C
079
RECONYX


2016-08-01 19:31:47
M 1/3
9°C
080
RECONYX


2016-07-31 16:50:02
M 1/3
20°C
082
RECONYX


2016-08-15 16:49:04
M 2/3
29°C
097
RECONYX

Appendix 1
Camera locations



Appendix 2
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 = (total number of track sets counted over 5 nights X 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 <u>individual</u> 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 = (No. of individuals X 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 x 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 x 100) / 10 = 20.0. If we concluded that the tracks were made by 3 cats, then the IDI = (3 x 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 x 20) = 0.045 captures per camera per night and the cape rate per 100 camera nights is 4.5 – the camera activity index (CAI).