Lorna Glen Introduced Predator Control

Post-bait survey report

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Summary

- The annual aerial baiting of Lorna Glen was carried out 5-7 July 2013. In addition to the usual before and after track count surveys, and with assistance from Colleen Sims and Judy Dunlop, 7 cats were trapped and fitted with GPS collars about 2 weeks prior to baiting to further assess the efficacy of baiting.
- As described in an earlier report, due to wet weather, the pre-bait survey in June was reduced to 4 nights on the western lines and 3 nights on the eastern lines. For consistency, the post-bait survey was also reduced to this sample size (see Burrows and Liddelow June 2013 for details).
- Prior to baiting, cat density was high, the track activity index (TAI) being 19.5, the highest since baiting commenced on Lorna Glen in winter 2003. This was up from 12.9 recorded in August 2012 after the unsuccessful July 2012 baiting.
- Following the July 2013 baiting, the cat TAI fell to 7.1, representing a 61.3% reduction.
- Prior to baiting, there was an estimated 29 individual cats (IDI = 29) recorded on a total of 100 km of sample transect, which is ~26% higher than recorded last year after baiting. This represents the highest cat IDI since the pre-baiting assessment in winter 2004. After the July 2013 baiting, the IDI fell to 14, representing a reduction of 52%.
- GPS-collared cats were located some 4 weeks post-baiting with the aid of an aircraft. Aerial observers were able to locate the collared cats to within 150-450 m and ground crews were able to retrieve the collars. Due to distance from access tracks (up to 2.6 km) and the relatively poor range of the collars (~700 m from the ground), few collars would have been retrieved without the aircraft.
- Of the 7 radio-tagged cats, 5 collars were in mortality mode and five dead cats were consequently recovered. Four dead cats were found in the open and one was retrieved from a hollow tree stump. All showed signs of 1080 poisoning.
- Two collars were not in mortality mode. A total of ~6 hours over 2 days was spent pursuing one of the live cats. Being in relatively open country, the cat did not take refuge in a hollow or a burrow, but was hiding under vegetation, making it very difficult to capture / kill - it moved away each time we approached it. It was clear that continuing to “chase” the live cats with the aid of the aircraft was going to become time consuming and expensive, and given time constraints, we decided to abandon the pursuit.
- One of the live cats is in the vicinity of Porcupine Bore, the other, near Hegarty’s Bore. The batteries in the radio collars are likely to fail after about 87 days (or by about 4 September 2013).
- Of the 7 radio collared cats, 5 were killed by baiting, representing a reduction of 71.4%. Compared to a TAI reduction of 61.3%, this result gives us confidence that the TAI is a useful estimate of cat density.
- While GPS data stored on the collars are yet to be properly analysed, it appears that four cats died within several days of baiting and one died ~9-10 days after baiting. A more detailed report on the cat movements, activity patterns and time of death will be prepared following analysis of the copious amount of data recovered from the collars.
- Prior to baiting, the wild dog / dingo TAI was 2.3, reducing to 0.8 after baiting, representing a 65.2% reduction. Prior to baiting, the estimated number of individual dogs on the 100 km of survey transect (IDI) was 6, falling to 3 after baiting, representing a 50% reduction.
- Mulgara track activity was significantly down this year, with ~25% of active lure stations visited compared with ~60% visitation in 2012. This, together with a better bait drop

pattern, may have contributed to the improved knockdown of feral cats following baiting this year.
- Weather conditions just prior to, during and just after baiting were dry and cool. While 107 mm of rain fell on 1 March, the total / accumulative rainfall for the first half of 2013 was about average (Figure 1). Daily maxima and minima of <20^{o}C and <6^{o}C respectively are preferred for optimal bait uptake. These conditions were experienced on about 40% of days approximately one week before and one week after baiting (see Figure 2).
- The July 2013 baiting could be characterised as moderately successful.

Recommendations
- While the baiting has been moderately successful, cat density is sufficiently high to impact fauna reintroductions. Therefore, 'free range' (outside the fenced refuge) reintroductions should be preceded by an intensive cat trapping program within at least a 5 km radius of reintroduction foci. To avoid by-catch, traps set in either drums or buckets should be used with appropriate lures suspended from gantries ("swingers").
- There are early signs that mulgara could be a good 'indicator species' - i.e., indicative of seasonal conditions and of the general condition of small and medium size mammals. Mulgara density may also be indicative of likely baiting success. The active lure stations are a useful technique for assessing mulgara density, and while data are limited, we suggest reconsideration of (expensive) aerial baiting if the mulgara index is >30% (i.e., more than 30% of active lure stations are visited my mulgara). It may be more effective and efficient to carry out strategic ground trapping and baiting instead.
- Establish a permanent network of drum / bucket traps inside and outside the fenced refuge at 1 km intervals. 44 gallon half-drums have been placed inside the refuge in preparation for the next cat breach. These drums need to be filled with sand.
- Buckets filled with sand should be placed around the outer perimeter at 1 km intervals and activated (lures and traps set) once a cat is detected patrolling the refuge.
- Another hot wire should be placed on the outside of the refuge at about 1.5 m above ground. Hot wires are cheap insurance when compared to the cost of removing a cat from the refuge (~$20,000).
- A network of trail cameras should be installed inside the refuge at 1 km intervals and inspected weekly. Using surveillance cameras is much more cost-effective than dragging and inspecting for tracks and they provide valuable information when responding to a breach.
- Carry out an assessment of introduced predators and of mulgara density on Earaheedy as soon as it is practical to do so.

Acknowledgements
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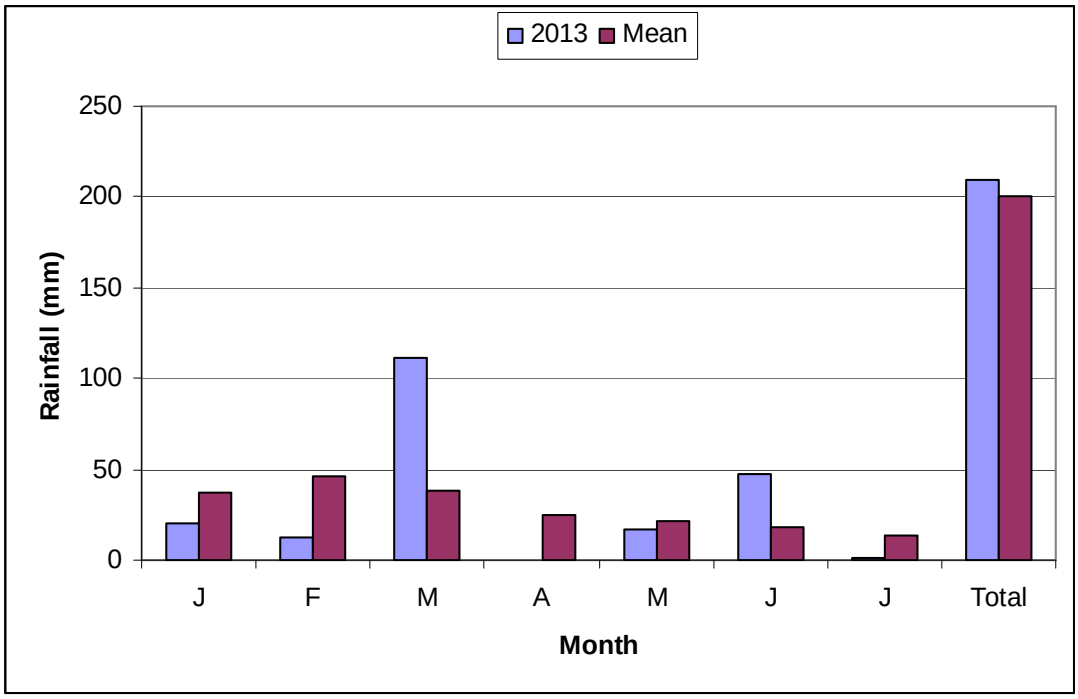

Figure 1: Monthly rainfall at Lorna Glen to July 2013 and the long term monthly means. While 107 mm fell on the 1 March, the total rainfall over the 7 month period was about average.

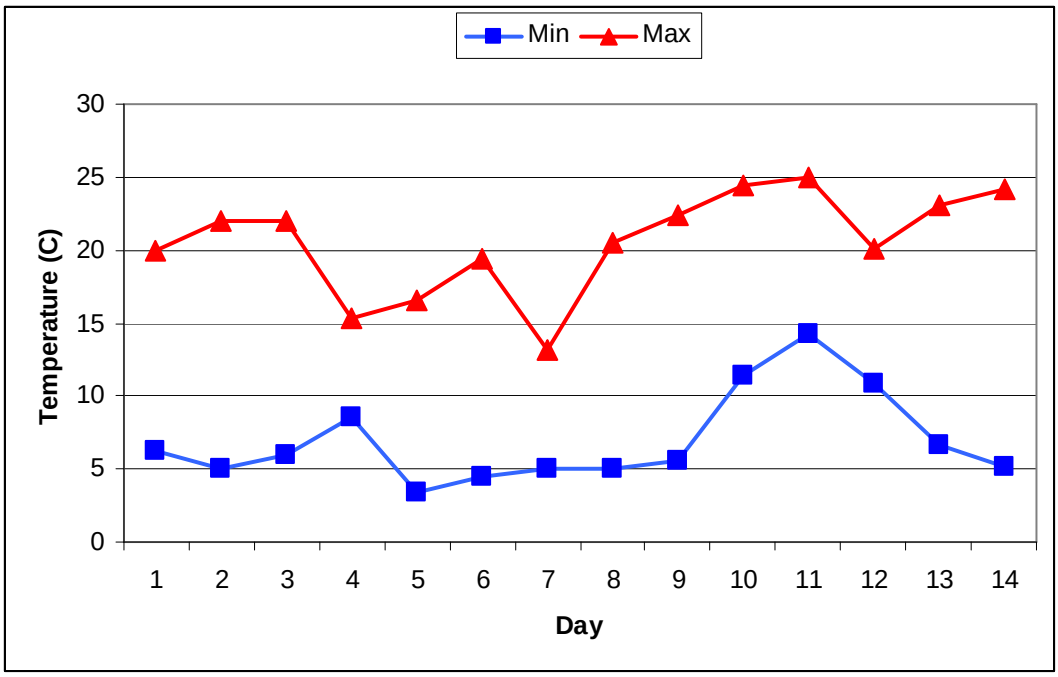

Figure 2: Daily minimum and maximum temps for Wiluna during the aerial baiting window (1-14 July 2013). Maxima <20^{o} C are preferred.

Data Summary

Table 1: Summary of track activity index (TAI) for cats & dogs only. TAI for 10 Transects (each 10 km. Transects 1-3; 3 nights; Transects 4-10; 4 nights.) Pre-bait count is in RED, post-bait in BLUE

Transect	Day 1		Day 2		Day 3		Day 4		Totals	
	Cat	Dog	Cat	Dog	Cat	Dog	Cat	Dog	Cat	Dog
1 PRE	1	0	2	1	0	2			3	3
POST	1	0	1	0	1	0			3	0
2 PRE	3	0	3	0	3	0			9	0
POST	2	1	1	0	1	0			4	1
3 PRE	2	1	2	0	1	1			5	2
POST	1	0	0	0	1	1			2	0
5A PRE	0	0	0	0	2	0			2	0
POST	0	0	0	0	0	0			0	0
5B PRE	1	0	2	0	0	0			3	0
POST	0	0	0	0	0	0			0	0
6 PRE	3	1	1	0	3	1	2	1	9	3
POST	0	0	0	1	0	0	2	0	2	1
7 PRE	3	0	1	0	1	0	1	0	6	0
POST	1	0	1	0	1	0	1	0	4	0
8 PRE	2	0	2	0	3	0	2	0	9	0
POST	1	0	0	0	0	0	0	0	1	0
9 PRE	3	0	3	0	2	0	3	0	11	0
POST	0	0	2	0	1	0	3	0	8	0
10 PRE	3	0	2	0	3	0	2	0	10	0
POST	0	0	0	0	1	1	0	0	1	1
Total PRE	21	2	18	1	18	4	10	1	67	8
POST	6	1	4	1	6	1	7	0	26	3
							Mean TAI PRE		**19.1**	**2.3**
							POST		**7.4**	**0.8**
							% Reduction		**61.3%**	**65.2%**

Figure 1 shows the trend in cat density (based on track activity - TAI) at Lorna Glen since 2003. Notable features are:

- Significant reduction following the initial baiting in 2003.
- Sustained reduction of the TAI (mostly <10) as a result of annual aerial baiting up to 2012, when baiting was unsuccessful (see 2012 report).
- Modal trend associated with activity increase between baiting events.
- Inability to eradicate cats, therefore the potential for a relatively rapid increase following good seasons.
- As indicated above, there has been a rapid increase in cat density over 2012-2013 as a result of good conditions, high prey availability and poor baiting success in 2012. All factors are related.
- Moderately successful baiting in July 2013 with the TAI down from 19.1 to 7.4 (a 61.3% reduction).

Figure 4 is a sample of seven days of cat movement data downloaded from one of the retrieved GPS collars. Over this period, this male cat established a home range of about 1600 ha. A more detailed analysis is being undertaken of the movement data downloaded from the five retrieved collars.

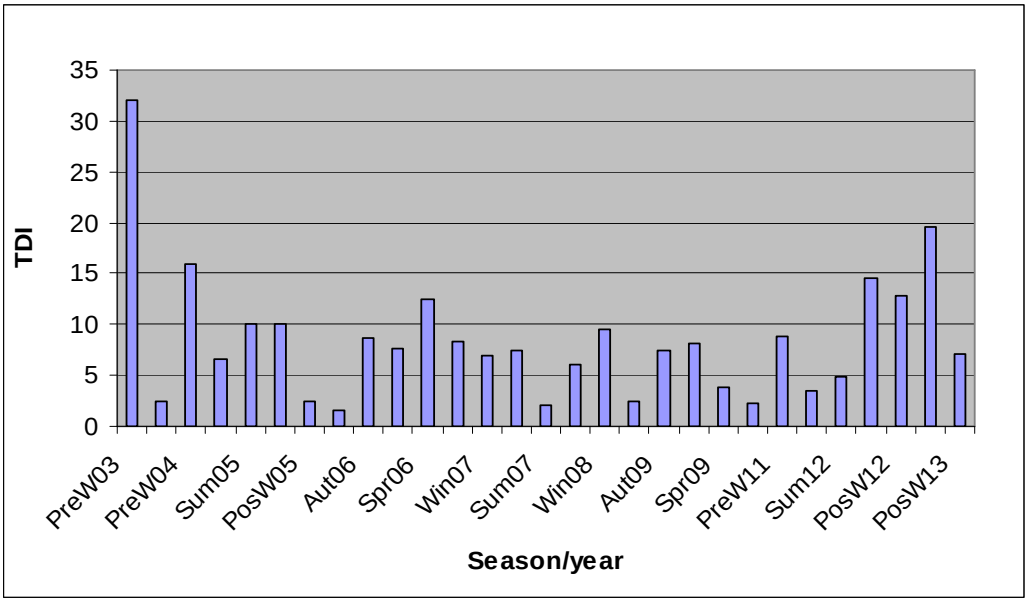

Figure 3: Long term trend in feral cat track activity index (TDI). An index <10 is the preferred state.

Table 2: Estimated number of individual cats and dogs encountered on 100 km of transects.

Transect	Cats		Dogs	
	Pre-bait	Post-bait	Pre-bait	Post-bait
1	2	2	2	0
2	4	3	0	1
3	3	1	1	0
5A	3	0	0	0
5B	2	0	1	0
6	3	2	1	1
7	3	2	1	0
8	3	1	0	0
9	3	3	0	0
10	3	1	0	1
TOTAL	**29**	**15**	**6**	**3**

Plate 1: One of the five GPS-collared cats killed by the July 2013 baiting

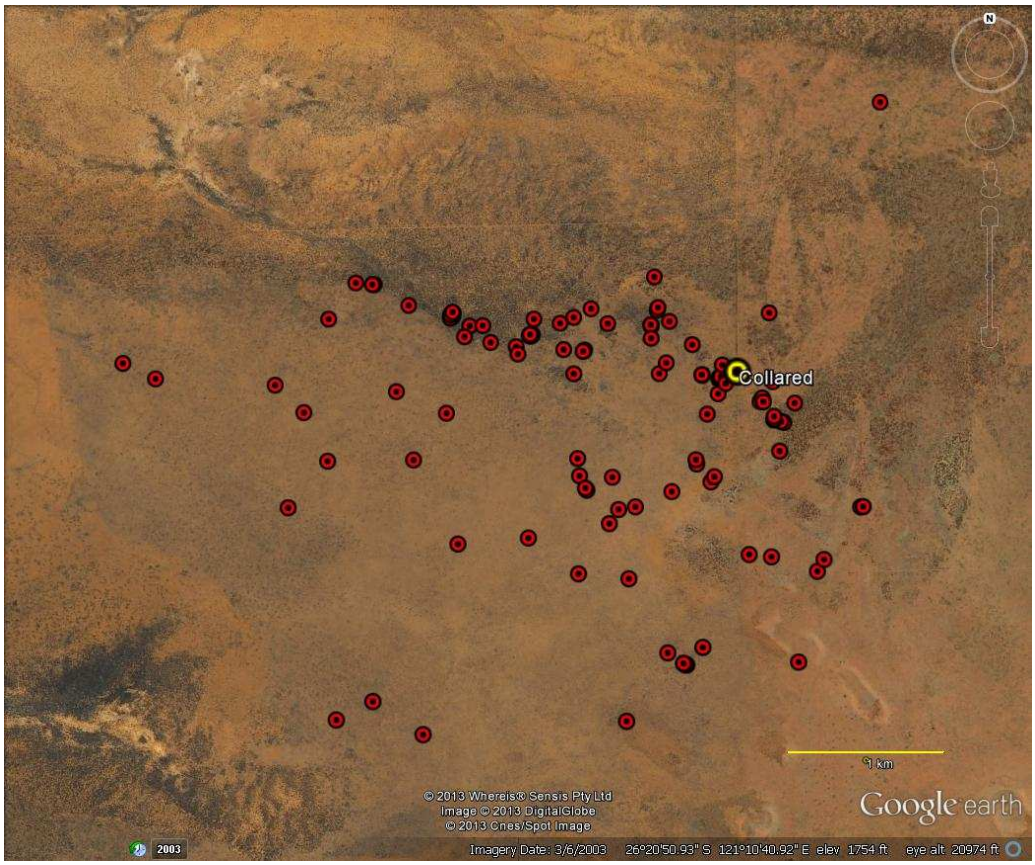

Figure 4: An example of 7 days of movement of one of the radio collared cats. GPS collars recorded the cat's position every 2 hours (not all fixes are shown).

Plate 2: The unpleasant task of recovering a GPS collar from a decomposed cat.

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 = (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 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 = (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.