CAT CONTROL FOR `PROJECT EDEN'

by

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Background

As part of the Advisory Team on `Project Eden', myself and research colleague Joe-Ann Sinagra were invited to Peron Peninsula (13-23, September, 1995). We were requested to assess cat preference for two non-toxic bait types, conduct pre-bait cyanide transects and advise the Management Team on control options. Below are documented our findings and recommendations.

Cat Bait Trials

Previous Trials at Peron

An earlier field trial (2-4 August, 1995), conducted by R. Armstrong at Peron, indicated that cats showed little interest in the kangaroo-meat sausage baits. Along a 15 km transect, with bait placement every 100 m, a number of baits were apparently visited by a number (?) of cats but, none were consumed. He suggested that cats were not interested in the bait at this time of year and this was possibly due to the abundance of other prey, in particular rabbit kittens.

R. Smith (pers. comm.), prior to the above trial, was having moderate success with cats taking rabbit carcasses. Cats at Peron that are used to taking live

rabbits and scavenging from dead rabbit carcasses thus, it was suggested that bait made from kangaroo meat may not be as attractive to them. Consequently we compared preference for the two bait types.

Trial - Rabbit Carcass versus Kangaroo Meat Sausage Bait

Study Sites

Two sites were selected to test the acceptability of the two non-toxic bait types. These sites were also to be used for the pre-aerial bait cyanide transects. The number and location of cats thought to be present during the bait trial could then be verified as animals collected along the cyanide transects.

Site 1 followed the track north from `Peron Bore' to `Old 10 Mile Tank', south to `Cape Rose Tank' and west to `Peron Bore', a distance of 22.5 km (see Fig. 1a).

Site 2 started at `Monkey Mia Rd.' south to `War Tank', east to `Burnt Brown Tank' and north to `Monkey Mia Tanks', a distance of 24.5 km (see Fig. 1b).

Baits

Only the hindquarters of rabbits were used as baits because of the lack of meat available for 1080 injection and difficulty of drying other body portions. The hindquarters were split in two and sun-dried on racks. It required approximately 24 h for the rabbit carcass to dry suitably as a bait medium (see Plate 1). The baits were approximately 15 cm in length and weighed >200 g.

Kangaroo-meat sausages were manufactured by the Agriculture Protection Board. The baits were approximately 5 cm x 2 cm and 30 g wet-weight. Baits

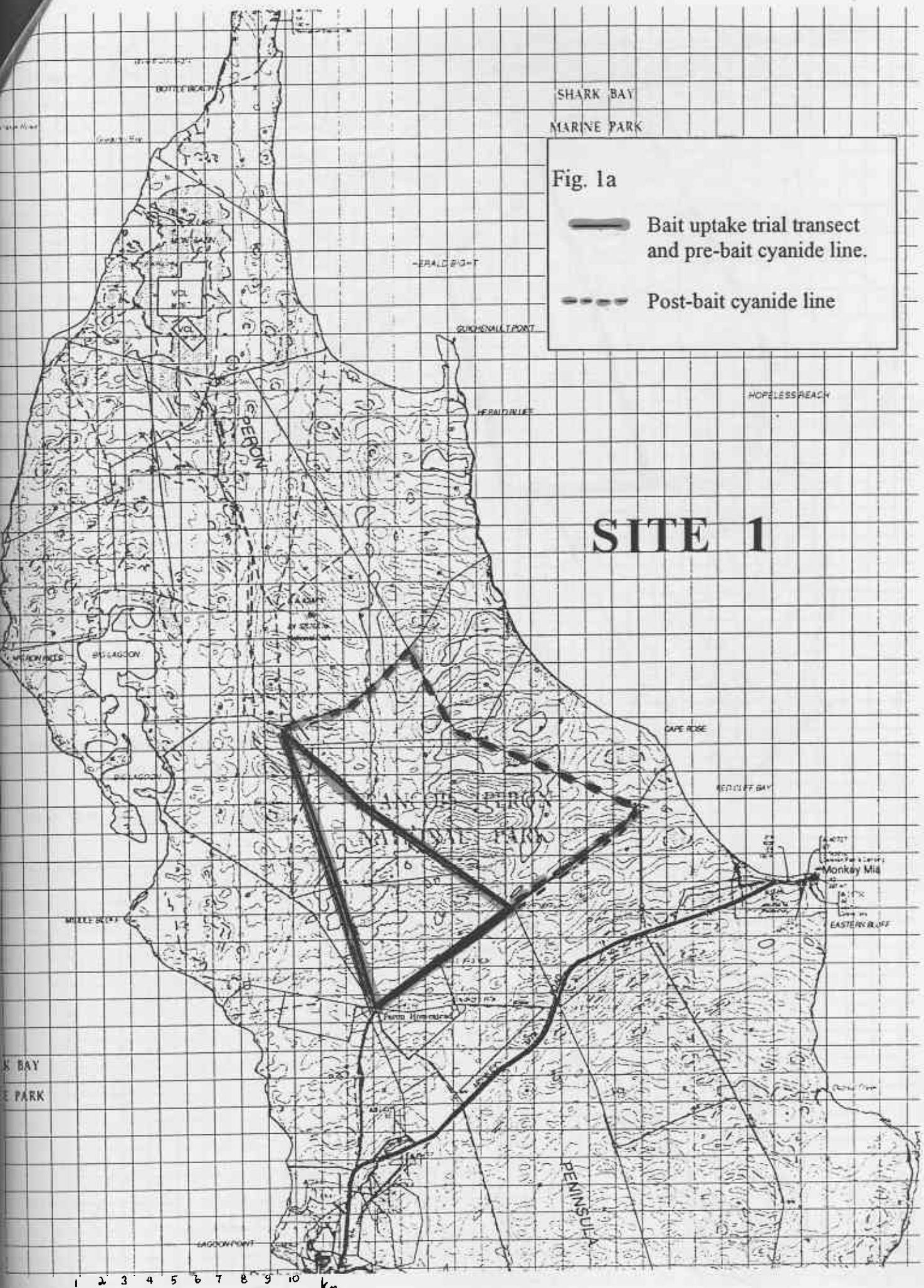
were frozen fresh (ie. prior to drying). Prior to use, the baits were thawed and then sun-dried for approximately one hour.

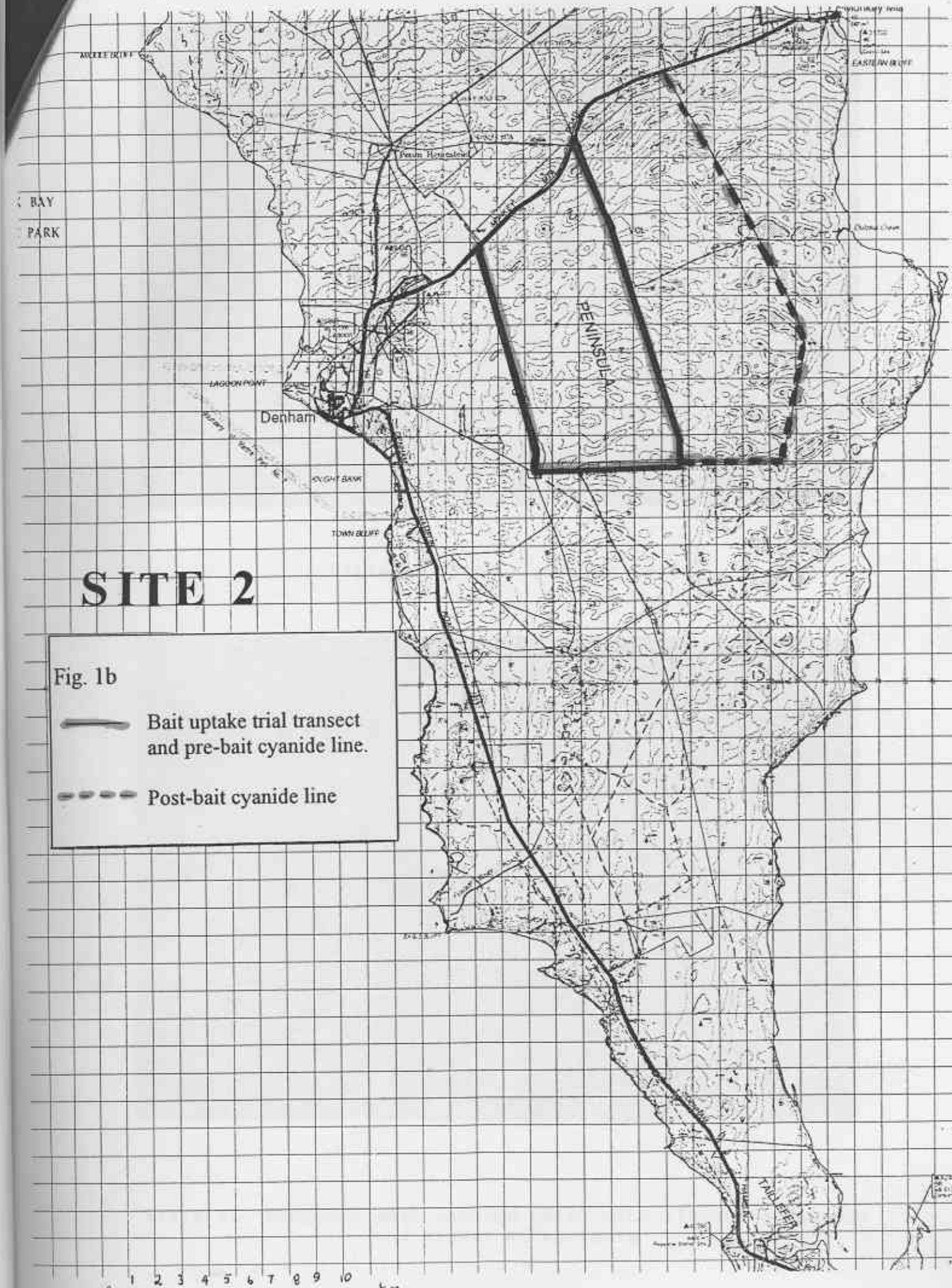
To enhance the flavour and acceptability of the bait, chicken "digest" was surface coated (5% w/w) onto the surface of the sausages and allowed to set. Fenugreek seeds were ground and added to the "digest" (1% w/w), prior to it being surface coated.

Bait acceptance is enhanced if visual attractants are employed as a cat's hunting skills rely, to a large extent, on visual cues rather than a sense of smell. To increase the visibility of the bait, duck down was allowed to dry on the "digest". Several quill feathers were also attached to the end of the sausage in such a manner so that they would flap in the wind (see Plate 2).

Originally, it was hoped to place both baits at individual bait stations and thus have a direct comparison of bait preference. However, it was thought that differences in the size and appearance of the two baits may have biased results. One bait type may have attracted cats to the bait stations and influenced consumption of the other, less preferred, bait. As such, individual bait types were placed at alternate bait stations. Bait stations were located at 100 m intervals, at pegged sites. The sites were pegged several days prior to bait placement to reduce the influence of human activity on the behaviour of cats.

The bait stations were examined daily, over three consecutive days, by two teams, one group responsible for Site 1 and the other for Site 2. Evidence of fresh cat and fox activity, along the length of the transects, was determined by paw prints crossing the vehicle tracks. Bait uptake was recorded and the species/category responsible noted. Visits to bait stations where baits were not removed and activity at bait stations where baits had been removed on previous days were noted. To mimic aerial delivery of toxic baits in an operational baiting campaign, baits were not replaced if removed.


SHARK BAY
MARINE PARK
Fig. 1a
Bait uptake trial transect and pre-bait cyanide line.
Post-bait cyanide line
SITE 1
PERON
PENINSULA
Monkey Mia
CAPE ROSE
HOPELESS BEACH
QUICKSAND POINT
LAGOON POINT
0 1 2 3 4 5 6 7 8 9 10 km
SCALE.



SITE 2

Fig. 1b

Bait uptake trial transect and pre-bait cyanide line.

Post-bait cyanide line

Plate 1. Rabbit carcass bait

Plate 2. Kangaroo meat sausage bait, with flavour enhancers and visual attractants

Results

A summary of bait uptake, at both sites, is presented in Tables 1 and 2.

Table 1. Comparison of bait uptake for the two bait types at Site 1. Data indicate the number of baits taken each day (n: R=113, S=113)

Animal	Day 1		Day 2		Day 3	
	R	S	R	S	R	S
Crow	24	28	38	37	18	16
Reptile	3	1	2	2	-	1
Fox	3	-	-	-	-	-
Fox pass bait stn.	5	7	1	-	-	-
Fox pass non-bait stn.	-		4		2	
Cat	-	-	-	-	-	-
Cat pass bait stn.	-	-	-	-	10	10
Cat pass non-bait stn.	-		3		37	
Baits remaining					20	23

Table 2. Comparison of bait uptake for the two bait types at Site 2. Data indicate the number of baits taken each day (n: R=123, S=123)

Animal	Day 1		Day 2		Day 3	
	R	S	R	S	R	S
Crow	14	9	54	40	18	23
Reptile	-	1	1	2	-	3
Fox	2	3	3	4	-	2
Fox pass bait stn.	10	6	1	-	5	1
Fox pass non-bait stn.	-		1		23	
Cat	-	-	-	-	-	1
Cat pass bait stn.	-	-	-	-	-	-
Cat pass non-bait stn.	-		-		2	
Baits remaining					22	31

The results indicate that bait uptake, for either bait type, by both foxes and cats was minimal. Only one cat consumed a bait. It was the only animal observed at Site 2.

Estimates of cat abundance based on track activity alone should be treated with extreme caution, as the methodology incorporates a number of biases, including interpretation. Taking this qualification into account, evidence of track activity suggested cat numbers were in low abundance at both sites

(apart from Day 3, Site 1). Estimated number of cats, along the transects, in Site 1 and Site 2, over the three day period, are presented in Table 3.

Table 3. Estimated number of cats at each site

Site	Number of cats		
	Day 1	Day 2	Day 3
1	2	3	9
2	-	-	1

Bait uptake by non-target species, especially crows, significantly reduced bait availability over the three day period. By day 3, crows had removed 71% and 64% of baits from Site 1 and Site 2 respectively. This high bait removal by crows may have contributed to the poor uptake by cats, as evidenced by the number of bait stations, with no bait present, visited by cats on Day 3, Site 1.

Discussion

It is suggested that the poor uptake of both baits by cats and foxes was directly attributable to the availability of other food resources at the time of the trial. Rabbits in the area had recently produced young which would provide an easy source of prey for both feral predators. In addition, at the time of the trial, a mosquito driven myxomatosis epizootic provided an abundant source of dead and dying rabbits.

No baiting program is likely to achieve total eradication of cats. However, if an abundance of other, `easy' prey is available baiting effectiveness, using any bait type, is likely to be significantly reduced. Any reduction in food resource availability will improve this baiting efficiency and thus, bait uptake

by cats can be expected to improve as rabbit numbers diminish. The abundance of rabbits at Peron will decline as mortality from myxomatosis peaks and the number of young born and surviving over summer falls.

The abundance of cats differed between sites. Cats are not generally distributed uniformly within a given area but are rather concentrated in `hot spots' and less dense elsewhere. Cat numbers in the southern area of Peron (ie south of the Monkey Mia Rd.) appeared lower than in the northern area of the Park. Cyanide lines (32 km in total length) conducted, south of `Peron Homestead', to test options for cat lures also indicated low cat abundance, with only one cat track being recorded. However, estimates of cat abundance would undoubtedly have been significantly affected by the abundance of dead and dying rabbits. Cat activity and distances travelled in search of prey would have been reduced, resulting in lower evidence of cats on the tracks.

Recommendations

At the completion of the bait uptake trial, the results and control options were discussed in a meeting at Peron. Present at this meeting were N. Burrows, P. Christensen, R. Smith and myself. It was decided to postpone the pre-aerial cyanide baiting program and experimental, aerial baiting campaign until bait uptake improved. A number of recommendations for feral cat control were discussed, these and others are outlined below:-

Bait Uptake Trials

To assess whether bait consumption is influenced by time of year and/or rabbit numbers, bait uptake trials should be conducted at regular periods. It is suggested that these trials be conducted at monthly intervals, beginning immediately, using the standard procedures documented above, with certain modifications as outlined below.

- Sites 1 and 2 should be permanently pegged, using jarrah survey stakes, at 100 m intervals.
- Baits removed should be replaced to avoid low bait availability and mimic a repeated aerial bait drop, over several weeks (see Recommendation relating to baiting frequency).
- Bait uptake should be examined for a minimum of five days to maximise the opportunity of cats, to intercept the transects and thus reduce the daily variability in cat activity observed in this trial.
- Two people will be required to undertake these trials and these personnel should conduct all such trials. Bias from operator assessment of track activity can then be standardized and interpreted.
- Rabbit activity should also be monitored during the bait uptake trials. On the transect next to each bait station presence/absence of rabbit sign should be recorded.

Thus, it should be possible to ascertain whether time of year and/or the abundance of rabbits affects bait uptake by cats and foxes.

Bait Type

Data from the uptake trial will provide information on the most suitable bait as a control option. I do not believe other bait mediums proposed, such as quail, will prove more successful than the two to be tested.

- If rabbit carcass baits are to be used either alone or in combination with kangaroo-meat sausages, a `Trial Permit' will be required for this bait type.

- The amount of 1080 bound, and thus unavailable, in this bait medium (which contains skin and bone) is unknown. It will be necessary to test whether such baits are lethal following injection of 4.5 mg of 1080.

- Another problem with using such a large bait is the possibility of sub-lethal doses. If cats eat only part of the bait they are likely to receive a sub-lethal dose. A similar result will occur if the baits are partially consumed by crows and subsequently eaten by cats. Sub-lethal doses will result in animals becoming bait shy and exacerbate the problem of control.

- The bait and associated problems should be discussed with R. Armstrong.

Baiting Campaign

- A preliminary baiting campaign should be implemented as soon as cat activity on the tracks is associated with visiting bait stations and consuming the baits offered in the bait uptake trial.

- The preliminary baiting trial should be conducted in the area north of Monkey Mia Rd. to the fire buffer at the `Old Ten Mile Bore'. If this trial proves successful, based on percentage kill of radio-collared individuals and differences in pre- and post-baiting CPUE indices (see below), a broad-scale baiting across the peninsula should be conducted immediately.

- A baiting intensity of 30 baits/km^2 is recommended. The baiting program should be conducted in three stages of 10 baits/km^2 each. Baits should be laid at 3-4 day intervals. This baiting regime will optimise the availability of quality baits over time and maximise the likelihood of cats finding baits when they are hungry. Baiting in this manner will also limit the impact of crows on bait availability.

Baiting Effectiveness Census Techniques

It is recommended that baiting effectiveness (ie. the percentage of the population killed) be determined by changes in pre- and post-baiting cyanide CPUE's, in conjunction with the proportion of radio-collared animals killed. The protocol for re-introduction of native species in `Project Eden' is also dependent on CPUE data.

- Immediately prior to the baiting campaign, pre-bait cyanide transects should be conducted. The pre-bait cyanide transects are those used in bait uptake trials (see Figs. 1a and 1b). Collection of cats along these lines will therefore also provide information on the number of individuals involved in bait uptake. The most appropriate cyanide technique for cats is still being refined and will be available at the time of pre-bait census.

- Limited track access on Peron restricts both the location and length of post-baiting cyanide transects. The proposed post-baiting cyanide transect in the preliminary baiting campaign is shown in Fig. 1a. With the implementation of broad-scale baiting a proposed second post-baiting cyanide transect is shown in Fig. 1b.

Radio-collared Population

Cats should be captured and radio-collared to refine the trapping technique as a post-baiting control option for eradication. The percentage kill of this population, following the preliminary baiting will also provide an additional measure, to changes in CPUE's, of baiting efficiency. However, determination of baiting efficiency based on percentage kill of a radio-collared population alone, should be treated with caution. Results may be biased because trapped animals may be predisposed to eating carrion or alternatively become bait shy due to the stress of capture.

- Trapping of cats should be restricted to the preliminary aerial bait site.

- The bait area should be divided into a trap grid network. The traps should be located at 500 m intervals and left in place for a minimum of five days.

- The recommended traps are known as Victor "Soft-Catch" traps. A variety of decoy/lures should be employed on any trap grid so that cats do not become familiar with the trapping technique.

- Care is required when setting traps. Any poorly set trap that is sprung with no capture will result in the animal being trap shy. To maximize trapping efficiency every effort to reduce human scent and ground disturbance should be made when setting traps. The traps should be boiled prior to use and only handled with gloves.

General

- Results of the above trials should be forwarded to both the Management and Advisory Teams as soon as they become available, so that future directions can be determined.

- Any novel ideas/techniques should be thoroughly discussed with both the Management and Advisory Teams, prior to their implementation. Detailed research elsewhere may have already examined these methodologies.

- It is suggested that both S. Milne and S. Tritton be invited to obtain cyanide and 1080 licences. These people are on-site for extensive periods during the outlined program and will provide an additional workforce. Also, if certain techniques are required to be tested on a limited scale, particularly CPUE methods, cost and time-saving will be achieved by using people on-site.

Finally, research into developing and refining techniques for feral cat control is ongoing. Information on any advances will be forwarded as it becomes available. Thus, prior to implementation of a baiting campaign, decisions can be made on current methodology to ensure every possible success for `Project Eden'.