OPTIMISING LARGE SCALE CAT PREDATION CONTROL FOR WILDLIFE RECOVERY

A Progress Report to The Wind Over Water Foundation

December 2001

by

D. Algar, G.J. Angus, M.L. Onus and P.J. Fuller

Department of Conservation and Land Management, Science Division, P.O. Box 51, Wanneroo, WA 6946.

Government of Western Australia

DEPARTMENT OF Conservation AND LAND MANAGEMENT

Conserving the nature of WA

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Background

Feral cats (*Felis catus*) pose a serious threat to populations of small to medium-sized native vertebrates particularly in the semi arid and arid regions (Dickman 1996; Anon. 1999). Anecdotal evidence has indicated that predation by feral cats, either acting singly or in concert with other factors, has resulted in the local extinction of a number of species on islands and mainland Australia. Predation by feral cats also affects the continued survival of many native species persisting at low population levels (Dickman 1996; Smith and Quin 1996) and has prevented the successful re-introduction of species to parts of their former range (Gibson *et al.* 1994; Christensen and Burrows 1995).

Feral cats may displace native carnivores reducing their population viability (Dickman 1996). They are also reservoirs and vectors for a number of diseases and parasites that affect the health and well being of both humans and native wildlife (Dickman 1996; Anon. 1999).

Control of feral cats is recognised as one of the most important conservation issues in Australia today. The impact of feral cats on native fauna is acknowledged by Commonwealth legislation, as outlined in Schedule 3 of the *Endangered Species Protection Act 1992*. The national 'Threat Abatement Plan for Predation by Feral Cats' (Anon. 1999) lists 38 species on Schedule 1 of the above Act for which there is a known or inferred threat from feral cat populations. That is, 38 threatened native species have been identified as potentially benefiting from effective feral cat control, as part of their management/recovery programs.

Toxic baiting is seen as the method most likely to produce an effective operational method for cat control (Anon. 1999). Development of an effective baiting technique for the control of the feral cat is cited as a high priority action by the national Threat Abatement Plan for Predation by Feral Cats (Anon. 1999). The Department of Conservation and Land Management has designed and developed a bait medium that is attractive to feral cats and effective in controlling them on a localised scale. The baits are manufactured at the Department's Bait Factory at Harvey. This bait medium has been employed as an integral part of successful island eradications off the Western Australian coast (Algar and Burbidge 2000; Algar *et al.* in press) and was used as the sole tool of eradication on Faure Island (Algar *et al.* in prep.). A strategic program has been developed for extensive trialing of the cat bait aimed at developing proven optimal broad-scale control programs. An outline of this program was provided to The Wind Over Water Foundation (March 2001), and subsequently the Foundation offered to support this research program for five years (2001-2005).

As outlined in the sponsorship proposal, there were three main areas where research was focussed during this initial period: -

- Preliminary baiting intensity trials in the Gibson Desert;
- Commencement of non-target bait uptake assessment (Gibson Desert);
- Site selection in the Gascoyne/Shark Bay District and Kimberley for suitable areas to conduct the second stage of baiting intensity trials.

In addition to these areas of investigation a survey of potential sites on the Nullarbor to assess the census technique was also undertaken.

The above are all key aspects of the development of an effective broad scale aerial baiting strategy for feral cats.

Summarised below are the results of the work that has been conducted over the sponsored period May – December 2001. The field work for each of these research areas has been completed and laboratory analyses have commenced. Analyses are to be completed by the end of January and a more complete and comprehensive report will be forwarded at the end of February 2002. A statement of fund expenditure used to conduct the research is appended (see Appendix A, Table 5). Also included are the results of bait uptake by feral cats in relation to the time of year. These trials, funded by National Heritage Trust, were undertaken to enable baiting programs to be conducted when bait uptake is at its peak and therefore maximise efficiency.

Preliminary Baiting Intensity Trials in the Gibson Desert

Introduction

In order to bait effectively in operational control, optimisation of delivery, optimisation of timing and the potential impacts to non-target species require clarification. Baits must be delivered at a level that maximises their uptake by cats but minimises the number of baits required which will also minimise the potential risk posed to non-target species. The study reported here is the first in a series aimed at determining an optimum delivery of baits, from an aircraft, for the control of feral cats. Successful control has previously been achieved by deploying a nominal 100 baits/km^2, in strategic areas (Algar and Burbidge 2000; Algar *et al.* in press; Algar *et al.* in prep.). This nominal distribution was therefore used as a benchmark, with which to assess the efficacy of lower baiting densities.

Two aerial baiting densities were compared for their efficacy in controlling feral cats. A nominal 100 baits/km^2 was compared with 50 baits/km^2. The most appropriate methodology to assess the efficacy of differing baiting intensities was to conduct trials using non-toxic biomarked baits. This was followed by trapping exercises to determine the extent of labelled animals in the trapped population and thus determination of the percentage of the population that consumed a bait (i.e. baiting efficiency). The use of toxic baits and monitoring the decline in the cat population after baiting has a number of problems. It was unlikely that baiting permits would be issued prior to assessing the impact on non-target species and also the accuracy of census techniques to measure changes in the cat population pre- and post-baiting have not been verified. Employing the use of non-toxic, biomarked baits also had the advantage of enabling the assessment of non-target bait consumption. Small ground-dwelling vertebrates were sampled concurrently and the potential risk of poisoning from the two baiting regimes was assessed and compared.

Methodology

Site

This study was conducted within and adjacent to the western portion of the Gibson Desert Nature Reserve, Western Australia, approximately 750 km north east of Kalgoorlie. The area is the subject of a long-term study of introduced predators and implications for fauna conservation (Christensen and Burrows 1995; Burrows *et al.* in prep). The exact location was initially selected for the existing network of roads, first established in the 1960s by the Eagle Exploration Company, for the purposes of mineral exploration. Some of this road network has been maintained and expanded on by the Department for the purposes of wildlife conservation and research.

Baits and Bait Distribution

The bait is similar to a chipolata sausage, approximately 25 g wet-weight, dried to 20 g, blanched (that is, placing in boiling water for one minute) and then frozen. The bait is composed of 70% kangaroo meat mince, 20% chicken fat and 10% digest and flavour enhancers that are highly attractive to feral cats. Baits were frozen and vacuum sealed at manufacture and maintained in a frozen state until no more than 24 h before distribution. At this point, baits were laid on elevated sheets of corrugated iron and allowed to thaw.

The biomarker used was Rhodamine B (RB) 50 mg/bait, as this marker is an efficient tool in determining bait consumption by cats (Fisher *et al.* 1999) and a wide range of non-target species (Fisher 1998). This biomarker also has advantages over other bait markers in being relatively non-invasive, simple and inexpensive. RB is a systemic bait marker, which when consumed causes short-term staining of body tissues, digestive and faecal material that it comes in contact with. Certain metabolites of RB are absorbed by the body and incorporated into growing tissue. Significantly they are incorporated into growing hair, scales, feathers and nails. Mammal hair, particularly vibrissae can be readily removed and examined for marking.

Two densities of bait distribution were carried out, the benchmark 100 baits per km^2 and as a comparison, 50 baits per km^2. The western half of the study area was treated with the lower bait density and the eastern half with the higher bait density. The two areas were of equal size 350 km^2 and support similar vegetation types.

Baits were distributed from a Cessna 210 aircraft, flying at 100 knots and 1000 ft AGL. The aircraft was guided by a TRAX-NAV navigation system with pre-set flight lines for the target areas. A sensor in the bait delivery tube recorded the point of bait ejection. Course deviation indicator was set to ± 50 m. A timing light indicated to the bombardier a preset interval, at which baits must be distributed, to achieve the desired bait distribution. Flight cells were 1 km intervals and baits were packaged on site to contain the required number of baits per cell, to achieve the nominal 100 and 50 baits/km^2. Baits were delivered to the baiting tube, such that a single bait package was delivered 'evenly' over each cell. Baits were distributed over the study area on the 13 -15 July 2001.

Trapping Program

Department researchers have developed a highly successful technique to trap feral cats using lures that mimic signals employed in communication between cats (Algar *et al.* in press). Cats are very inquisitive about other cats in their area and their communication traits are principally reliant on audio and olfactory stimuli. The trapping technique utilises padded leg-hold traps, Victor 'Soft Catch'® traps No. 3 (Woodstream Corp., Lititz, Pa.; U.S.A.), a Felid Attracting Phonic (FAP), which is an audio lure that produces a sound of a cat call, and a blended mixture of faeces and urine (Pongo). The FAP is employed to attract the attention of cats at distance and pongo is the principal lure that imitates the scent marking, and therefore presence, of an unrecognised individual enticing the animal into the trap.

Each trap site consists of a channel slightly wider than the width of one trap and 80 cm in length, cleared into a bush to create a one-way (blind) trap set. The bush also provides shelter for the captured animal. Two traps, one in front of the other are positioned at the entrance of the blind set, at each trap site. A trap bed is made so that when lightly covered with soil, the traps are level with the surrounding ground surface. Both traps are secured in position by a 30 cm long chain to an anchor peg of length 30 cm. A foam pad is placed below the pressure plate to prevent soil from falling into the trap bed and compacting under the plate. The traps are then lightly covered with soil.

All traps are routinely checked at first light each day.

A buffer of 5 km was employed on all dimensions of each treatment, in which baiting was carried out but no sampling was undertaken. The buffer was employed to reduce the probability of capturing individual cats generally resident outside the particular treatment area or outside the study area entirely. Traps were set, in any given area, so as to allow at least 10 days, following bait distribution, for bait consumption and biomarker metabolism. Traps were placed at nominal 500 m intervals along available transect, within each treatment area. The lure types were alternated to include a FAP + Pongo combination at one interval and Pongo only at the alternate interval.

Two trapping programs were undertaken, the first was conducted between the 25-31 July. A second trapping program was conducted 4-10 September to increase the sample size particularly of female cats, which were in low numbers during the first trapping period. This second trapping period coincided with a Landscope expedition to the area, which enabled costs to be significantly reduced.

Necropsies

Captured animals were destroyed upon capture with a hollow-point .22 projectile, fired at point blank range, into the top of the skull. Individuals were weighed and sexed. Females were examined for indications of lactation, foetuses *in utero* and placental scarring. Vibrissae and stomachs were removed for later examination.

Vibrissae collected from both cats and non-target mammals were stored in sealed plastic bags, out of direct sunlight until examination in the laboratory. All samples taken were labelled with the field number assigned to each captured animal. Methods of detection of Rhodamine B marking and the interpretation of results are described and discussed by Fisher *et al.* (1999) and Fisher (1998).

Stomachs of captured cats were extracted on site and stored in a 10% formalin solution until formal examination in the laboratory. Each stomach is being examined for the volume and composition of food items present. Volume is scored subjectively on the basis of the size of the stomach (individual), volume of material present and the level of distention of the stomach wall. Dietary composition is being examined for the identity and number of items present.

Results

A total of 54 cats was trapped during the two trapping programs. The number of cats trapped in each baiting intensity site for each trapping period are given in Table 1. The percentage of individuals labelled with the biomarker Rhodamine B is also presented.

Table 1. The number of cats trapped in each baiting intensity site for each trapping period. The percentage of individuals labelled with the biomarker Rhodamine B is indicated in parentheses

Site	Trapping period 1 (July)		Trapping period 2 (September)	
	No. males	No. females	No. males	No. females
50 baits/km^2	12 (100%)	1 (100%)	5 (60%)	3 (67%)
100 baits/km^2	18 (89%)	4 (50%)	9 (67%)	2 (50%)

All individual cats captured were adult or sub-adult, and all were sexually mature.

Very few females were captured during the exercise; they represented just 18.5% of all captures. Assuming that a population would normally consist of an approximately equal representation by both males and females, there is a significantly greater representation of males in this sample ($\alpha = 0.01$).

In the 50 baits/km^2, 86% of the sampled cat population consumed at least one bait and in the 100 baits/km^2, 76% of the sampled cat population consumed at least one bait.

Discussion

The reason for the low number of female cats sampled during the two trapping periods is complex and requires a more detailed evaluation of previous trapping and baiting programs conducted in the area. This information will be provided in the following comprehensive report at the end of February.

The principal result from this study indicates that the two baiting treatments were not significantly different in baiting efficacy, for the control of feral cats. The greater percentage of labelled cats from the 50 baits/km^2 treatment suggests that the lower baiting density would have proven at least as efficacious as the greater density, for the control of feral cats. This reduction in required baiting intensity for effective control represents a considerable cost saving to control programs. Baiting intensities of 25 and 50 baits/km^2 will now be assessed to further refine optimal baiting intensity.

Bait Consumption by Non-target Species

Introduction

It is essential that a comprehensive assessment of risk to non-target species from the new bait medium be undertaken. The most appropriate method of assessing bait consumption by non-target species is in the field under natural conditions of climate and alternative food resources rather than the artificial alternative of penned laboratory trials. Maximum bait consumption by non-target species is expected to occur when their other food resources are lowest and therefore when prey abundance for cats is also at a minimum. As such, assessing bait uptake by non-target species when the baiting intensity trials, using non-toxic, biomarked baits, are being conducted is appropriate. These baiting intensity trials will provide information on bait consumption by individuals in the field and thus the likely impact of an operational baiting program on species' populations at the various baiting intensities. The study reported here is the first in a series aimed at determining bait consumption by non-target species at these baiting intensities. Small ground-dwelling vertebrates were sampled concurrently during the baiting intensity trials in the Gibson Desert and the potential risk of poisoning from the two baiting regimes was assessed and compared.

Methodology

Vertebrate fauna was sampled at four sites within the study area, two in each treatment. Each trapping site consisted of both pitfall and medium Elliott box traps. Five pitfall trap lines were operated at each site, each consisting of five pitfalls, serviced by a common aluminium insect screen drift-fence. Pitfalls were 500 mm lengths of 150 Ø stormwater pipe, spaced at 5 m intervals. Pitfall sets were spaced at 20 m intervals. Drift-fences were 300 mm in height and extended 2 m beyond the two terminal pitfalls, giving a total length of 24 m for each pitfall trap. Two Elliott traps were placed at each pitfall trap line, one at each end of the drift fence, under a shrub, within 2 m of the fence. Elliott traps were baited with a peanut paste and ground ('quick') rolled oats mixture, with sufficient peanut paste to bind the oats.

As with the cat trapping program, non-target vertebrate fauna sampling was conducted over two periods 25-30 July and 4-10 September to maximise sample size. All vertebrate captures were collected daily, and returned to a central point for processing where they were identified to species. Reptiles were measured (snout-vent and tail length), marked, sexed where possible macroscopically and released. Individuals and their scat were examined externally for staining by RB. Mammals were weighed, measured (head-body and tail length), sexed and examined for reproductive condition. Individuals and their scat were examined externally for staining by RB. Mystacial vibrissae were removed under anaesthesia with Isoflurane (Anstee and Needham 1996), to determine those individuals labelled with RB. Individuals were then observed for recovery from anaesthesia, marked and released.

A summary of non-target fauna captures is presented in Table 2. All captures were made in pitfalls with no captures from Elliott traps. Skinks were the most numerous captures, with a strong representation by *Ctenotus pantherinus ocellifer*. The only taxon represented at all sites was *Ningaui ridei*, with most taxa represented at two or three sites.

Table 2. Summary of non-target fauna captures

Species	No. captures		
	July	September	Total
Reptiles			
Ctenophorus isolepis gularis	5	9	14
Ctenotus calurus	3	1	4
Ctenotus grandis	-	1	1
Ctenotus helenae	1	-	1
Ctenotus pantherinus ocellifer	14	4	18
Cyclodomorphus branchialis	1	-	1
Delma haroldi	5	6	11
Delma nasuta	5	7	12
Delma tincta	2	1	3
Diplodactylus elderi	-	2	2
Pogona minor minor	1	-	1
Tiliqua multifasciata	-	1	1
Total	37	32	**69**
Mammals			
Mus domesticus	-	7	7
Ningaui ridei	11	19	30
Notomys alexis	3	1	4
Pseudomys desertor	2	8	10
Pseudomys hermannsbergensis	3	5	8
Sminthopsis macroura	-	1	1
Sminthopsis youngsoni	1	1	2
Total	20	42	**62**

Of the 131 total captures, no mammal or reptile captured exhibited evidence of marking with RB, from gross examination, at the time of capture. Examination of the vibrissae under UV light indicated that of the 62 non-target mammals captured, none was marked by RB.

Discussion

From this preliminary trial, the suite of native species trapped in the area does not appear to be at risk from either baiting intensity. The refinement of baiting intensity, at this stage, from 100 baits/km^2 to 50 baits/km^2 also reduces the risk to other potential non-target species. Further baiting intensity trials and assessment of bait consumption by native species (particularly medium-sized mammals) are to be conducted to reduce the risk to these animals during toxic baiting campaigns.

In addition to reducing the risk to non-target species from baiting programs by refining optimum baiting intensities, other avenues are also being pursued to further reduce the potential risk. Currently, toxic cat baits are dosed at 4.5 mg of 1080/bait however; there is potential scope to reduce the dose per bait to 3.0 mg 1080 and thereby reduce the risk to non-target species from baiting programs. Recent advances in bait manufacture technology have provided a greater precision and regulation of dosage and incorporation into the bait medium. A series of pen trials, using 1080 baits, will be conducted to determine whether baits are lethal to cats at the reduced dose rate.

The Department is also collaborating with Environment Australia and the Department of Natural Resources and Environment (Victoria) in developing a felid-specific toxin. This research has provided a toxin, and research programs are about to commence testing its efficacy in the field. Results of the baiting intensity trials discussed above are crucial to these research programs.

Site Selection in the Gascoyne/Shark Bay District and Kimberley for suitable areas to conduct the second series of baiting intensity trials

Two sites have been selected where the second series of baiting intensity trials are to be conducted Mt Augustus in the Gascoyne District and Wanjarri Nature Reserve in the north-eastern Goldfields. Reconnaissance of a number of sites in the Gascoyne was conducted in October to assess their suitability for this trial. The Mt Augustus site provided the best option and has also recently been acquired as Department estate.

The first of the second series of baiting intensity trials is planned for March 2002 at Mt Augustus. This trial is planned to be conducted concurrently with a baiting trial on Peron Peninsula, as part of 'Project Eden'. This will provide additional valuable information in the Gascoyne on the effectiveness of cat baiting programs at sites where rabbits are abundant (Peron) and scarce (Mt Augustus). The timing of the baiting intensity trial at Wanjarri will depend on the results of the optimal baiting period currently being assessed at the site.

Selection of a site in the Kimberley has been discontinued because of the annual threat of extensive wildfires across the region. The ever present likelihood of fire during the dry season and the potential loss of resources (time, money and effort) precludes conducting trials in the region at this stage.

Census Techniques

A technique that provides the capacity to efficiently and reliably census feral cat populations is an essential pre-requisite for feral cat operational control programs. The technique will enable the planning and proven implementation of clearly defined prescriptions for cat control. Importantly, it will provide an objective assessment of the effectiveness of operational control measures in reducing cat density.

Departmental researchers have developed a track count index (Burrows *et al.* in prep) and trapping technique (Algar *et al.* 1999) that individually or in concert have the potential to provide a reliable, standard, simple and efficient method of censusing feral cat populations.

An evaluation of potential sites on the Nullarbor was conducted during this initial funding phase even though the research on census techniques is not due to commence until 2004. This reconnaissance of sites was undertaken because the opportunity arose during the course of unrelated work and therefore presented significant cost savings. Much of our earlier work during the course of bait development was conducted on the Nullarbor principally because of the density of cats, flat terrain and ease of access. These features suggested the area would also provide an ideal location to undertake the census technique assessment. Reconnaissance of sites enabled their suitability to be assessed and importantly provided the opportunity to discuss the program with the various land users in the area. The program was well received by these people and the station owners/managers and kangaroo shooters are now providing key survey information of cat densities at various sites.

Timing of Baiting Programs to Maximise Efficiency

Introduction

Research conducted to-date has suggested that the percentage of the cat population that will consume a bait may be influenced by the availability of predator-vulnerable young prey (particularly where rabbits are the primary prey), which is a function of season/rainfall. This optimum baiting period occurs in autumn in areas influenced by Mediterranean climatic regimes when live young, predator-vulnerable prey are not present. In the arid zone where rainfall is unreliable, the time and intensity of rainfall events such as cyclones and thunderstorms will determine the abundance of live prey.

Examination of whether bait uptake is influenced by the time of year and if so, when bait uptake is at its peak, will determine the optimum timing of control programs to maximise efficiency.

Bait uptake in relation to time of year for the Shark Bay area has been reviewed (Algar and Angus 2000 and Algar *et al.* in press). In this region seasonal decline in primary prey (rabbits) for cats on Peron was consistent with an increase in bait uptake from mid-January onwards. Rabbit abundance, especially the incidence of predator vulnerable, young rabbits in the prey population is a function of season. Rabbit breeding in this environment occurs immediately following the onset of significant rainfall and will also occur following summer rains. Young rabbits and emergent rabbit kittens are present in the population until late spring/early summer. The abundance of rabbits tends to decline through summer and autumn and this may be significantly affected by summer epizootics of mosquito vectored myxomatosis.

Bait uptake is currently being assessed at Wanjarri (NHT grant) and will be completed by the end of February 2002. Results of this work to-date are summarised below.

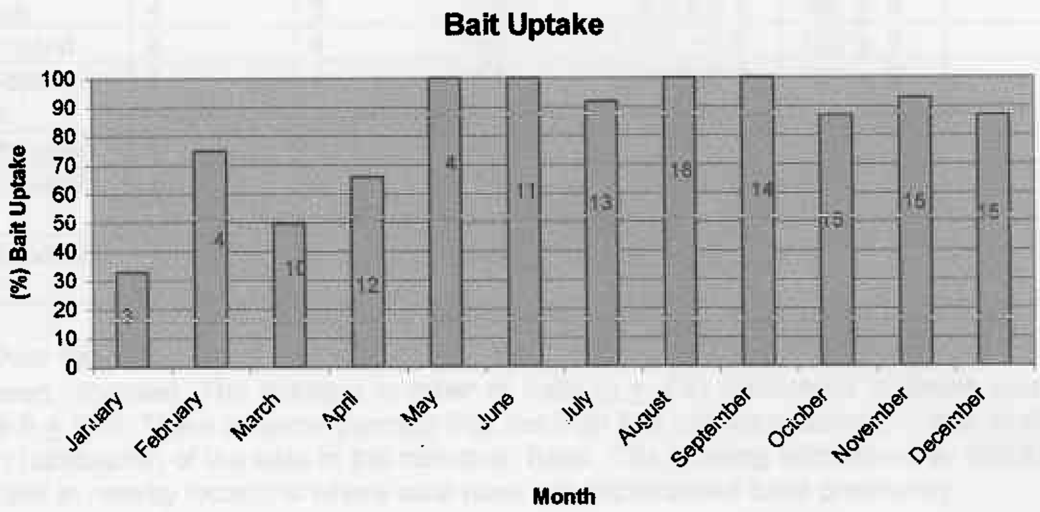
Methodology

Bait uptake is being monitored at monthly intervals and follows the methodology adopted for the Shark Bay study (Algar *et al.* in press) except the baits being used in this study are non-toxic.

Results

Wildfire swept through the original study site on Albion Downs Station during the January monitoring period and necessitated relocation of the study. The February and subsequent monitoring period have been conducted on Wanjarri Nature Reserve. Bait uptake trials and assessment of prey availability have been conducted over a four day period each month. The length of the sampling periods in February and May were affected by rain but all others were completed as scheduled. Bait uptake by feral cats across the study periods has been high, particularly from mid autumn onwards. Bait uptake data across the study periods are presented in Figure 1.

Fig. 1. Bait uptake data for each of the study periods. The data have been pooled over the four days each month and are expressed as the percentage of individual cats that contacted a bait and consumed it. The sample size (that is, the number of cats that contacted a bait) for each month is indicated within the respective bars



The data are also presented as daily bait uptake for each month to indicate variability in bait uptake for each period (see Table 3).

Table 3. The mean and standard error of daily bait uptake for each month. The data are expressed as the percentage of individual cats that contacted a bait and consumed it each day

Date	No. sampling days	No. days cats contact baits	No. cats contact baits (entire sampling period)	Daily No. cats contact baits (μ ± se)	Daily bait uptake (%) (μ ± se)	Comment
January	3	2	3	1.0 ± 0.6	25 ± 25	Fire
February	1	1	4	4.0	75	Rain
March	4	4	10	2.5 ± 0.5	50 ± 20	
April	4	4	12	3.0 ± 0.6	63 ± 7	
May	3	1	4	4.0	100	Rain
June	4	4	11	2.8 ± 0.5	100 ± 0	
July	4	3	13	3.3 ± 1.3	94 ± 6	
August	4	4	18	4.5 ± 1.0	100 ± 0	
September	4	4	14	3.5 ± 0.3	100 ± 0	
October	4	4	15	3.8 ± 0.3	88 ± 7	
November	4	4	15	3.8 ± 1.0	95 ± 5	
December	4	4	15	3.8 ± 0.5	89 ± 7	

Over the entire study period to-date, a total of 1 043-bait consumption events by feral cats has been recorded. The average number of baits (μ ± s.e) consumed by those cats per day was (9.0 ± 0.6). There is some concern that the high bait uptake observed in this study may be due to habituation of the cats to the non-toxic baits. This is being addressed by conducting periodic trials in nearby locations where cats have not experienced baits previously.

Discussion

Data collection will be completed by the end of February 2002, when a further report will be forwarded. This report will include all bait uptake data and analysis of bait uptake with respect to time of year and prey abundance, which will define the optimum timing of feral cat baiting campaigns.

Conclusions

The step-wise approach to developing an optimal large-scale cat predation control strategy for wildlife recovery outlined above is being pursued to provide for effective and cost-efficient wildlife recovery. The focus is on optimising cat predation control through aerial baiting and providing a comprehensive evaluation of any impact on non-target species populations. The program is structured to enable analysis of the cost-benefit of various baiting regimes on both feral cats and non-target species and provide information essential to gaining registration of the cat bait. Once registration is achieved, the baiting protocols developed will be able to be implemented across the arid and semi-arid interior of Australia and perhaps elsewhere in the world.

Acknowledgements

Sponsorship by The Wind Over Water Foundation is gratefully acknowledged for the significant contribution it has made to the feral cat control research program.

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Budget

Sponsorship for this program enabled the research program to commence in May 2001. To be able to conduct the research program it was necessary to employ two additional Technical Officers as indicated in the sponsorship proposal. This annual salary cost will not exceed $100,000. Budget estimates for the various components of the program to-date were provided in March 2001 (see Table 4).

Table 4. Sponsorship budget estimates

Activity	Cost ($)
Salary	66,000
Baiting intensity prelim. Trial (Gibson Desert)	50,000
Non-target bait uptake field assessment (Gibson Desert)	25,000
Site selection Gascoyne and Kimberley	20,000
Total Cost	**161,000**

During this course of this initial sponsorship period, significant savings were made by being able to conduct a number of activities in conjunction with other programs. Further savings were made as a result of abandoning further research in the Kimberley at this stage and not undertaking the site selection in this region.

A breakdown of the costs associated with individual components of the program to-date is provided in Table 5.

Table 5. Costs associated with individual components of the program

Item	Cost
Salary	66,000
Gibson Desert baiting intensity trials	
Baits	14,000
Aircraft charter	1,790
Materials	11,373
Vehicle lease and running charges	13,574
Travel	10,026
Overtime, wages and overheads	8,621
Site selection in the Gascoyne	1,450
Site selection for census techniques	1,320
Felid-specific toxin collaborative program	15,050
Total	**$143,204**