FERAL PESTS PROGRAMME

PROJECT 11

METHODS OF BROADSCALE CAT CONTROL, AND FOX CONTROL AT A NUMBAT RE-INTRODUCTION SITE. Year 1.

Final Report, December 1993

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SUMMARY

The aims of this project are to develop an effective means of presenting sodium fluoroacetate (1080) to feral cats as a method of broadscale control and to investigate the incidence of cat predation on numbats in a re-introduction area where fox control is being carried out.

In the initial stages of the feral cat control research, work has concentrated on development of methods to trap and radio-collar feral cats, and on the selection of a bait medium through pen and field trials.

The most effective method of trapping was found to be use of leg-hold traps. The Victor "Soft-catch" trap is preferred due to the lack of damage to captured cats.

Bait acceptability trials were delayed through impoundment of cat baits being imported from New Zealand. Five commercially available bait types are being tested in pen trials at a cat welfare centre. A prototype cat bait developed by Applied Biotechnologies Pty Ltd has shown greatest acceptability to the semi-feral cats used in pen trials, followed closely by a smaller version of the standard fox bait used in Western Australia.

Fox control by aerial baiting was carried out at the numbat re-introduction site at Karroun Hill Nature Reserve in October 1993. Follow-up cyanide baiting yielded no foxes, indicating that the baiting was effective, although the presence of cats in the area was confirmed by sightings and detection of cat sign. Monitoring of the re-introduced numbat population at Karroun Hill has focussed on determining cause of death of radio-collared animals. Only three deaths were recorded in 1993; one was due to a raptor and the other two to unidentified predators. However, signal loss from transmitters fitted to another six numbats may conceal further mortality. An attempt has been made to improve the reliability of transmitters fitted to numbats at Karroun Hill for 1994.

PREFACE

Following a request from Feral Pests Program personnel, this project was formulated as a combination of two project proposals submitted for funding by the Department of Conservation and Land Management. The scope of the overall project is as follows

1. To develop methods to trap and radio-collar feral cats at a site in a Western Australia.

If time permits:

2. To establish a radio-collared group of approximately 20 cats at a field site for baiting trials.

3. To run a trial baiting using 1080 fox baits to measure the percentage kill on a radio-collared group of feral cats in the wild.

4. If an unacceptably low bait take is indicated in the trials of fox baits, to run a baiting trial using another bait type currently being developed to measure the percentage kill on a radio-collared feral cat population.

5. To reduce fox numbers by aerial baiting with 1080 in an area of Karroun Hill Nature Reserve in which numbats are being re-introduced. The area, of approximately 40 000 ha, will be baited twice during 1993.

6. To monitor the effectiveness of the fox control at Karroun Hill NR using cyanide transects.

7. To monitor the numbat colony at Karroun Hill and determine sources of mortality (allocated to raptor, fox, cat, or other) in 1993 for comparison with previous years.

This report will deal with Scope Items 1 to 4 under Section A and Scope Items 5 to 7 in Section B.

SECTION A: METHODS OF BROADSCALE CAT CONTROL

Introduction

Control methods for feral cats have not been extensively researched in Australia. When cat control has been implemented it has generally relied on using standard fox baiting procedures. These routine procedures consist of aerial baiting campaigns (5 to 10 baits/km^2) using dried meat baits. The recommended baits are cut from kangaroo meat (120g wet-weight), injected with 4.5 mg of 1080 and then dried to 40% of their original weight. There are however, no data on the effectiveness of fox baits in controlling cats. There is circumstantial evidence that despite susceptibility to 1080 poison, bait uptake by cats is low during existing control campaigns.

There is an urgent need to develop and implement effective and economic feral cat control campaigns. It is necessary to establish the effectiveness of conventional fox baits in reducing cat numbers. If bait uptake is low, as expected, compare effectiveness with a more acceptable bait type.

As stated in the Progress Report, the initial intention was to use a cat bait developed in New Zealand as the second `more acceptable bait type'. Results from New Zealand indicate reasonable acceptability in pen trials. However, certain risks are associated with this approach as the bait may prove less palatable to feral cats living in arid and semi-arid areas of Australia than to feral cats in New Zealand. It was therefore decided to examine the acceptability of a number of commercially available bait types in pen and field trials. The most preferred bait option could then be selected prior to the commencement of the expensive baiting effectiveness baiting trials.

Results of these bait preference trials would also be invaluable in developing a number of techniques essential to control programmes. Trap success would be improved with the development of lures. The trials could also prove useful in developing an index for measuring cat abundance (discussed later).

The primary objectives to be addressed by this programme are therefore as follows:-

Bait Acceptability Trials

Pen trials will be conducted to examine bait preference/acceptability to cats. Additives that cause an ingestion response will also be investigated to improve bait uptake. The various baits will then be tested in the field to complement the pen trials. Field trials will ensure that the results obtained from pen trials, using urban cats, are not biased because of previous domestic feeding history.

Bait Effectiveness Trials

Field trials will then be conducted to determine the level of baiting effectiveness achieved using standard 1080 meat baits and the preferred bait choice from pen and field trials. Baiting effectiveness will be determined by the proportion of the population killed.

As it was necessary to conduct the bait acceptability trials before the examination of baiting effectiveness, Scope Items 2,3 and 4 are to be conducted during the second phase of this project (see Scope Items, Phase 2 1993/94). The following report documents Scope Item 1 and progress to date in bait acceptability trials listed as Scope Items for Phase 2.

1. To Develop Methods To Trap And Radio-Collar Feral Cats At A Site In Western Australia.

Traps

There are three main trap types that can be used to capture feral cats: treadle snares, cage traps and offset jaw leg-hold traps. Choice of a trap type to use in this programme was based on two considerations. Trap efficiency or trap success rate was of obvious importance however, it was also necessary to consider management implications by standardising the trapping technique. Results of this study will be used by management/operational staff and where necessary trapping may be

required if total cat eradication is warranted (eg islands or small-scale areas).

Although we have successfully used `humane treadle snares' for a number of years to capture both foxes and cats it is apparent that many people experience difficulty in setting snares. The treadle snare tends to be cumbersome because of its size and also the firing mechanism is slower than for leg-hold traps. As a result, the number of snares sprung without capture tends to be greater than for leg-hold traps. For the above reasons it was decided that the `humane treadle snare' was not an appropriate trap type for this research programme.

The neophobic reaction of cats to objects in their environment suggested the most appropriate test for trap types would be in the arid zone where cats would have little experience of wire and other metal objects. Comparison of capture rates for standard wire cage traps and leg-hold traps was conducted by Neil Burrows' Desert Dreaming Group in consultation with the Feral Cat Research Group. Trap success was examined in the Gibson Desert Nature Reserve during the follow-up assessment of boodie (*Bettongia lesueur*) and golden bandicoot (*Isoodon auratus*) re-introduction programmes.

Trap sites were selected at 400 m intervals along a 12 km transect and pre-baited for seven days. Cage traps (Sheffield Wire Products, possum/cat traps, measuring 700 x 300 x 300 mm) were then set and left in place for six days. Although cats investigated the trap sites, no animals were captured. The traps were then wired shut and left in place for a period of three months to overcome possible neophobia. A subsequent trapping exercise also resulted in no captures. The cage traps were then removed and Lanes Ace traps padded with a high density foam were set and baited with the same lure. Over a period of 4 days 3 cats were captured.

We, as have other workers, also experienced little success using cage traps to capture cats apart from in urban areas or rubbish tips. As a result of this study and previous trapping programmes we have undertaken it was decided to employ leg-hold traps for this research programme. Victor Soft-Catch design, model 0473 (Woodstream

Corporation) are to be used. These traps are more compact than Lanes Ace rabbit traps yet have a greater trap plate area. They present fewer problems from the point of view of animal welfare, being designed to hold animals without causing leg damage.

Radio-Collars

It was decided to use radio-collars developed by a local manufacturer (B. J. Radio and Rigging, Biotronics Div.). These collars have been used previously and were as reliable as others from a variety of manufacturers. Discussion, refinement and testing of collars over the past six months has further enhanced their performance. The improvements to the radio-collars are listed below:-

a) The maximum weight of the radio-collar including battery, collar, antenna and transmitter package is approximately 150g.

b) The power is supplied by Tadiran batteries which have a 150% better performance than the lithium batteries more commonly used. Three AA size batteries, rather than one C size battery, will be used in the configuration. The weight is equivalent but the capacity is greater: AA Tadiran batteries give 7.6 amp. hr as opposed to 5.2 amp.hr for C size lithium batteries. These modifications increase expected field life-time from 12 to 18 months which we will be able to sacrifice to increase range.

c) The whip antennas have an improved vertical radiation pattern (omnidirectional). Superflex wire is now being used to prevent breaking of wire at the transmitter connection due to fatigue. The radiating section of the antenna is covered with a high quality adhesive heat shrink tubing.

d) The transmitter components are surface mounted on a CAD designed printed circuit board. A CMOS chip has also been included to control pulse interval and width. A soldered connection will be used to start the transmitter. This will alleviate the need for high resistance reed switches, that often break and are a major cause of premature failure of transmitters in the field.

Chemical Restraint

It will be necessary to immobilise captured cats to enable attachment of radio-collars, recording of weight and other body measurements and to take blood samples for viral screening. A relatively new drug medetomidine HCl (trade name Domitor) is now available. This drug has a wide dose safety margin and has the added benefit of having a reversal agent Atipamezole HCl (trade name Antisedan). Being able to reverse the effects of the tranquillising drug will reduce stress on captured animals as `knockout' time can be reduced.

Bait Acceptability Trials

Pen Trials

Permission was granted to conduct the pen trials at the Perth Cat Haven. Fortunately this provides an opportunity to work with essentially semi-feral cats rather than the domestic cats in catteries. Results of the bait acceptability trials may therefore be less biased than originally anticipated.

Cats in the Haven are housed in individual enclosures and were offered a choice of the five commercially available, non-toxic bait mediums. Bait preference, that is the bait medium first selected and consumed by an individual, was assessed on a minimum of 100 individual animals. The bait mediums were offered at the normal time of feeding. Baits were only offered once to any individual cat to avoid any learned behaviour that may confound the test and also to simulate toxic bait delivery in the field.

The bait mediums are described below:-

Standard fox bait:- The recommended baits are cut from kangaroo meat (120g wet-weight) and then dried to 40% of their original weight. These baits are supplied by the Agriculture Protection Board.

New Zealand cat bait:- This is a fishmeal-based pellet bait. The pellets weigh 1g and are 8 mm in length and have a diameter of 2 mm. The baits are produced by Salmon Services (NZ) Ltd. and are supplied to Manaaki Whenua Landcare Research New Zealand Ltd.

Incitec bait (D-K9):- This is a sausage type bait, composed of kangaroo meat and fats. The bait is 35 mm in length and weighs 11g. The baits are produced by Incitec Ltd. Brisbane.

Foxoff:- Foxoff is a shelf stable meat substitute bait. Each bait weighs 55g and is 30 mm cubed. The baits are produced by Applied Biotechnologies Pty. Ltd. Melbourne.

Pussoff:- Pussoff is a prototype fishmeal-based cat bait similar in design to Foxoff and produced by the same company.

Due to bureaucratic red tape the bait acceptability trials were delayed. We experienced considerable difficulty in obtaining the bait medium from New Zealand. The shipment of this bait type was impounded by Customs, their release subject to permit approval (AQIS) as an application to import biological material. The application forms required details of bait ingredients and manufacturing methods. Such information was confidential and it was necessary to sign a confidentiality release. The baits have only just been released, subject to a number of further conditions. It has taken two months to obtain permission to test 1 kg of cat baits.

Whilst completing this report we have just finished the bait medium trials. A summary of the data has been included however statistical analysis has not yet been undertaken. Some conclusions can be made while more detailed interpretation will await discussions with the biometricians. These results will be presented early in 1994 as an Appendix to this report.

As indicated above, bait weight and size differed between the various bait mediums. To remove any bias associated with cats selecting a bait type based on size alone, bait mediums were offered of comparable mass/volume. Cats were removed from their enclosure to allow random

placement of baits. As the cats were returned to the pens they would invariably investigate each bait type and then select their most preferred option. A number of cats consumed more than one bait and therefore bait acceptance was ranked 1 to 5. A total of 159 cats was tested for bait acceptance of these 104 selected at least one bait medium. The data are summarised in Table 1.

Table 1. Cat acceptance of various bait mediums in pen trials.

Preference	Bait Type				
	Standard	NZ	Incitec	Foxoff	Pussoff
1	40	3	24	3	34
2	22	3	12	4	13
3	6	4	5	2	4
4	1	5	3	1	1
5	1	1	1	3	0
1&2	66	6	36	7	47

Additives that cause an ingestion response will then be investigated to see whether bait uptake can be further improved. Through a comprehensive review of nutritional literature pertaining to cats and perseverance in discussions with manufacturers of cat food we have been able to obtain detailed information on substances that are used to enhance the flavour and taste of cat foods. It is believed that these substances will have a major influence on bait uptake.

These additives will be incorporated into the most preferred bait medium from the initial pen trial. The bait, with additives will then be tested in the same manner as the initial pen trial to see whether bait uptake is improved.

Field Trials

After testing bait uptake in pen trials, uptake will then be examined in the field to make sure that the results were not biased due to previous domestic feeding history. It will be necessary to test the bait types across a range of geographic zones as bait preference may differ according to habitat. Feral cats in Western Australia may be considered a threat to native species in three broad geographic zones:- coastal; semi-arid and arid regions.

Surveys for feral cats were conducted in a number of areas to enable selection of study sites. To assess feral cat presence a number of techniques had to be used, including track counts, spotlighting and discussion with local landholders and CALM staff. This further highlights the need to develop a suitable technique that can be used, across regions, to assess cat density. Survey methods and results are presented in Table 2. Four areas, that cover the above geographic ranges, were selected as study sites. Location of the study sites is shown in Figure 1. A further site in State Forest (Jarrahdale) was also selected to test bait acceptability as it is anticipated that feral cats may increase in abundance following the broadscale fox baiting programmes proposed.

Table 2. Survey methods and results for field trial site selection

Site	Method	Distance (km)	Cat nos
Kanandah	spotlight	72	28
Wanjarri	track counts	180	14
Karroun Hill	track counts	44	5
Francois Peron	track counts	42	8-10
Jarrahdale	local discussion	50	20+

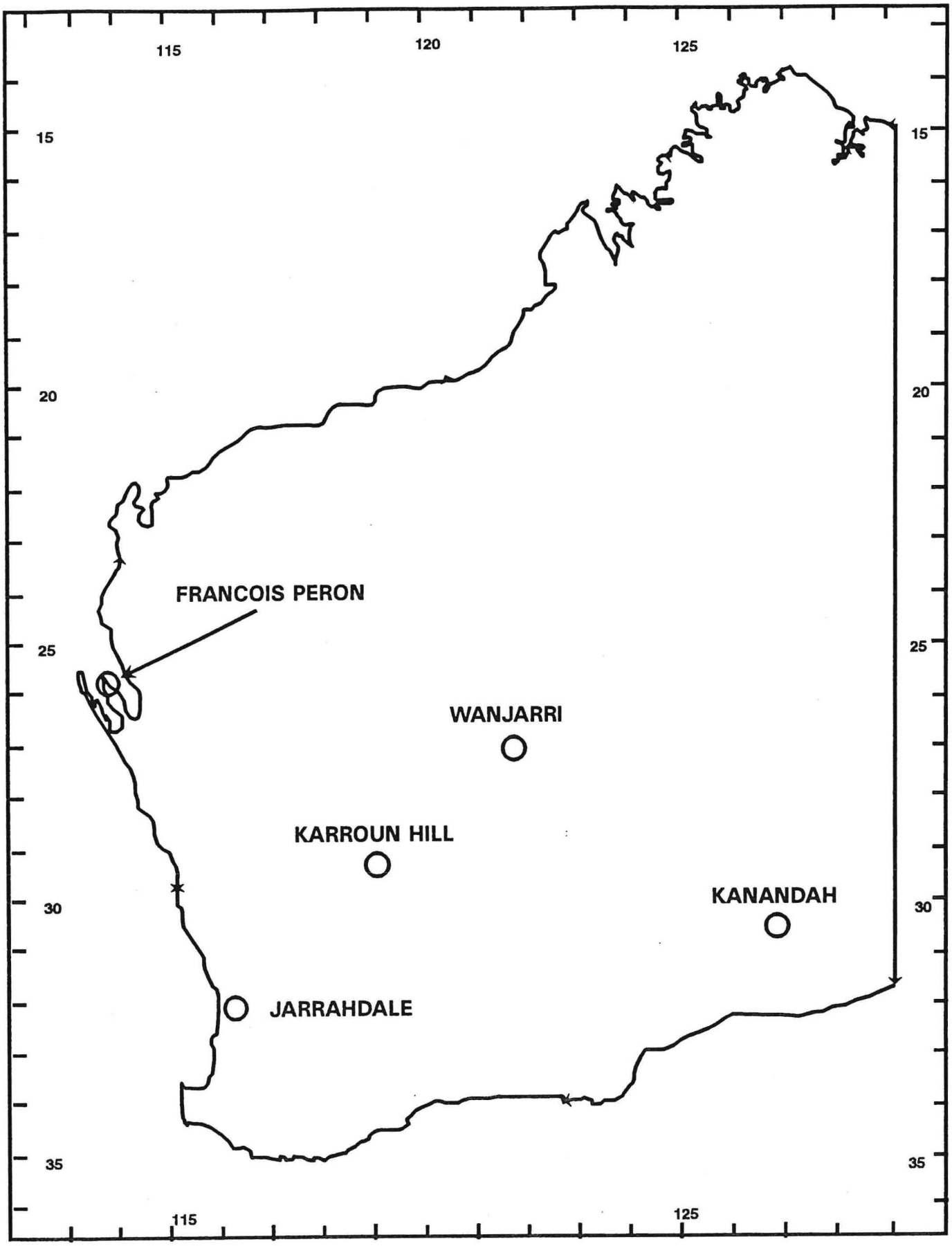

FIG 1: FIELD SITES SELECTED FOR BAIT ACCEPTABILITY TRIALS

Bait preference may vary according to environmental conditions. In good seasons, when live prey is abundant, bait uptake may be significantly lower than in poor seasons. Examination of bait uptake during a good season will therefore provide a more conclusive test of bait acceptability. Higher than average rainfall in the semi-arid and arid zones has led to successive good seasons and thus an opportunity to undertake the most appropriate bait uptake tests has been presented.

Several baits and additives will be selected from the range of responses achieved from the pen trials to test on feral cat populations. Cats will be offered a choice bait/additive types at each bait station. Sodium cyanide will be incorporated into the baits to ensure retrieval of individuals following bait uptake.

Standard cyanide baiting procedures will be adopted for this investigation (Algar and Kinnear 1992). The study is designed to maximise feral cat sample size, as a minimum of 20 cats is required from each site. Bait preference will then be assessed on the basis of kill numbers for the different bait options.

Results of the bait preference trials will also be invaluable in developing a number of techniques essential to control programmes:-

a) Development of lures to improve trap success as a control option.

b) A suitable attractant would also be of value in the development of an index for measuring cat density. Two options are available; the scent station method and CPUE an index generated from kills along cyanide bait transects. The scent station method is used extensively in America as a measure of carnivore abundance (Linhart and Knowlton 1975; Griffith *et al.* 1981). The cyanide baiting technique also provides a valuable tool for sampling populations. Cyanide kills provide information on demographic parameters relevant to control strategies such as age and sex structure, fecundity and the incidence of disease.

Bait Effectiveness Trials

The effectiveness of standard 1080 baits and the preferred bait choice from the above trials will then be field tested in several distinct geographic zones. The field study will be conducted in areas where cat densities are relatively high so when baited, results can be accurately interpreted without confounding due to low sample bias. Two sites, separated by a buffer, will be selected where cats will be trapped. Radio-collars will be fitted to the captured cats to enable monitoring of activity post-baiting and enable retrieval of dead animals. The efficiency of the control programme will be determined by the proportion of dead radio-tagged cats retrieved after baiting. A cross-over design will be employed in the testing of baiting effectiveness. Site 1 will be initially baited with bait A and Site 2 with bait B. Following retrieval of dead, radio-tagged cats, the baiting regimes will then be reversed. This design will provide a comprehensive evaluation of baiting effectiveness and remove any site biases that may confound treatment effect.

Conclusion

In the short term we will be able to answer many of the initial questions relating to feral cat control strategies:-

a) The stepwise approach outlined will quickly provide detailed information on bait options for feral cats.

b) The methodology used will provide additional information relevant to control strategies.

c) The baiting effectiveness of standard fox baits and the most preferred bait option from pen and field trials can be assessed.

Thus, feral cat control campaigns will be placed on a sound scientific basis.

Anticipated Publications

Relative acceptability of bait materials to feral cats.

Measuring the effectiveness of 1080 baiting to control feral cats.

Population parameters of feral cats in Western Australia, relevant to control strategies.

The incidence of viral antibodies in feral cats in Western Australia.

The diet of feral cats in Western Australia.

Animal Experimentation Ethics Committee approval

Methods and use of equipment and materials detailed in Section A of this report have received approval from CALM's Animal Experimentation Ethics Committee (CALM AEEC 10/93 and 11/93).

References

Algar, D., and Kinnear, J.E. (1992). Cyanide baiting to sample fox populations and measure changes in relative abundance. In "Wildlife Rabies Contingency Planning in Australia". (Eds P. O'Brien and G. Berry.) pp. 135-8. Bureau of Rural Resources Proceedings No. 11 (Australian Government Printing Service: Canberra.)

Griffith, B., Wight, H.M., Overton, W.S., and Meslow, E.C. (1981). Seasonal properties of the coyote scent station index. In "Symposium on Census and Inventory Methods for Population and Habitat". (Eds. F.L. Miller, and A. Gunn.) pp. 197-220.

Linhart, S.B., and Knowlton, F.F. (1975). Determining the relative abundance of coyotes by scent station lines. *Wildl. Soc. Bull.* **3**, 119-24.

SECTION B: FOX CONTROL AT A NUMBAT RE-INTRODUCTION SITE

Introduction

This project was designed to provide further data on the threat posed by feral cats to attempts to re-introduce numbats to semi-arid areas. Specifically, it involves continuation of the monitoring of re-introduced numbats at Karroun Hill Nature Reserve to determine sources of mortality under a regime of fox control using aerial baiting with standard fox baits containing 1080.

The re-introduction of numbats to Karroun Hill has been in progress since 1986. Between 5 and 20 individuals have been released there each year since October 1986 and their progress monitored by radio-tracking. Dingo control by aerial baiting with 1080 meat baits was being carried out already, so no additional fox control was attempted initially. In the first two years, predation by foxes was recorded, so some fox control by baiting from the few tracks was implemented. Predation by foxes continued, so aerial baiting was introduced in 1990-1991. During those years, predation by foxes decreased, but predation by cats became a factor.

The significance of cat predation in numbat populations is difficult to quantify. During the 10-year study of numbats at Dryandra and during re-introduction projects at Boyagin NR and Karroun Hill NR, cause of death of radio-collared numbats has been recorded (Figure 2). Only at Karroun Hill as cat predation been definitely identified as a cause of death, albeit at relatively low incidence. The large "unidentified predator" component at Karroun Hill in Figure 2 almost certainly includes some cat kills, and further work is now in progress to attempt to identify the responsible predator from marks left on plastic collar bands.

Methods

<u>Fox control (scope item 5)</u>

Research in the south-west of Western Australia has shown that aerial baiting using dried meat baits containing 4.5 mg of 1080 distributed at a

density of 6 baits per km^2 is sufficient to kill over 90% of the resident foxes (CALM 1990) The times of year for most effective fox baiting are in September/October, before juvenile dispersal, and in March, to kill immigrant juveniles. Additional baiting during summer provides further protection as young foxes invade vacant habitat. Baiting in winter may be less effective as rain reduces the toxicity of the baits.

The baited area is shown in the map in Figure 3. The baiting route flown follows 20 north-south lines 20 km in length separated by 1 km. The plane is kept on course by the use of a GPS unit. Baits are dropped at intervals of approximately 130 m (about every 2-3 seconds). 3000 baits are distributed over the 40 000 ha area in this manner, giving a rate of 7.5 baits per km^2.

Effectiveness of fox control (scope item 6)

Death of foxes by 1080 poisoning is not instantaneous, and poisoned individuals can move well away from the point of bait uptake before dying. The cyanide transect method was developed to provide an index of fox density (Algar and Kinnear 1992). This technique was used in the current project to assess the density of foxes remaining on the numbat release site and its surrounds after baiting.

A carcase (sheep, kangaroo etc) is dragged along the track where the cyanide line is to be laid, to provide a scent trail. Wax capsules containing 1 gm of powdered sodium cyanide mixed with an anti-caking agent are attached by wire traces to metal plates of 10 cm diameter buried 10 cm deep in the track in the scent trail. These cyanide capsules are laid along the track at 200 m intervals, two at a site, and covered with one of two bait materials: condensed milk and icing sugar on one capsule and an ox liver and blood homogenate on the other. These capsules are laid as late as possible before dark and are checked and removed at dawn the following day to minimise risk to diurnal non-target animals. Foxes taking the baits are generally killed within a few metres of the bait station. Tracks of animals investigating the baits can be seen in the sand or soft soil at the bait station. An impression can then be gained of the activity of animals that have not taken baits.

The effectiveness of the aerial baiting in removing foxes from the numbat release site was measured by the use of cyanide transects run on 17-18 November 1993. This allowed six weeks for bait uptake by resident foxes in the study area. Three cyanide transects each 5 km in length were laid in this way along tracks within the baited area at Karroun Hill. Transects of 15 km total length (cyanide baits laid at 200m intervals) were thus run on both nights.

Numbat monitoring (scope item 7)

All numbats released at Karroun Hill are fitted with radio-collars. These collars contain two-stage transmitters (AVM P2-1V or Biotrack TW-2) powered by a 1.5V Hg675 mercury cell, giving a life of 4-6 months and a ground-ground range of 500-1000 m. An aircraft (Cessna 172 or 182) fitted with a side-looking Yagi antenna on each wing, giving a sideways range of 3-5 km in each direction, is used to locate dispersing numbats and to check for other transmitters not located in ground searches. The release site is visited each 6-8 weeks and the numbats are located on the ground. Their survival or mortality is noted and if possible the animals are caught, weighed, measured, condition and breeding status noted, transmitter battery replaced if necessary.

Results

Fox control (scope item 5)

The first baiting was carried out on 6 October 1993. The area of 40 000 ha (shown in Figure 3) surrounding the release site at Karroun Hill was baited at a rate of 7.5 baits per km^2.

Effectiveness of fox control (scope item 6)

No foxes were killed on the transects, and no sign of foxes, cats or dingoes was seen on the tracks where cyanide transects were laid. The tracks of one cat were seen, however, in the numbat release area on a track where no transect had been laid.

Numbat monitoring (scope item 7)

In December 1992, five numbats were translocated from Dryandra to Karroun Hill NR. At that time there were three radio-collared adults already present, and four young born at Karroun Hill had been fitted with radio-collars in October 1992. On 1 January 1993, therefore, there was a possible maximum of 12 radio-collared numbats living on the reserve.

A new female carrying four young was captured at Karroun Hill on 26 June 1993. Three of her young and three young of another female were fitted with radio-collars on 27 October 1993.

Figure 4 shows the number of radio-collared numbats known to be alive at Karroun Hill during 1993. Table 3 shows the fate of the live numbat/functioning radio-collar units that ceased during 1993. The largest group were those animals whose signals were lost. This highlights an apparent problem with the transmitters that were being used until early 1993. An unprecedented rate of loss of signal was experienced during 1992 and 1993 and consequently another manufacturer is now being used to provide transmitters for this study. It is likely that some of the numbats whose signals were lost are still alive.

Table 3. Fate of live numbat/functioning transmitter units at Karroun Hill between 1 January and 3 November 1993. Twelve units were intact at 1 January 1993.

Fate	**Number**
Signal lost	6
Unidentified predator	2
Raptor	1
Still working Dec. 1993	3
Total	12

The "unidentified predators" responsible for two of the three recorded deaths could have been either birds or mammals. The plastic-covered collars retain some marks and scratches and an attempt is now being made to obtain more specific information on the identity of the predators

responsible for these deaths, by presenting similar collars to cats, foxes and raptors in captivity.

Discussion

The baiting carried out at Karroun Hill NR in October presented no problems of logistics. It was also shown to be very effective, possibly in combination with other baiting being carried out, in removing foxes from the area. The low occurrence of cats recorded in the area is also of interest. Although the track system in the reserve is very sparse, a greater presence of cats might be anticipated, given the experiences of workers in other areas (Shark Bay, Gibson Desert, Tanami Desert) who recorded an increase in cat numbers following fox baiting. Fox control has been carried out on this project at various intensities since 1988, and it might be expected that if a strong response were going to occur, it might have begun by now. The need for cat control is underlined, however, especially in the light of experiences in the Gibson Desert and Tanami Desert, where small numbers of cats were responsible for great damage to re-introduced marsupials.

The second baiting proposed in Scope item 5 has not been carried out. The times of year at which baiting is most effective in fox control are March and September-October. By the time this project had commenced, it was too late for a March baiting. The first baiting was carried out in October 1993 and it is intended to bait again in March and October 1994. The Scope for the second year of the project now includes two baiting actions, rather than the single baiting originally proposed.

Work proposed for 1994 will focus again on close monitoring of the re-introduced numbat population. Four radio-collared numbats were translocated from Dryandra to Karroun Hill in December 1993 to supplement the group of nine currently radio-collared in the reserve.

Animal Experimentation Ethics Committee approval

Methods and use of equipment and materials detailed in Section B of this report have received approval from CALM's Animal Experimentation Ethics Committee (CALM AEEC 20/92).

References

Algar, D., and Kinnear, J.E. (1992). Cyanide baiting to sample fox populations and measure changes in relative abundance. In "Wildlife Rabies Contingency Planning in Australia". (Eds P. O'Brien and G. Berry.) pp. 135-8. Bureau of Rural Resources Proceedings No. 11 (Australian Government Printing Service: Canberra.)

CALM (1990). 'A manual for fox control.' Unpublished report to World Wide Fund for Nature Australia.

Figure 2. Percentage frequency of causes of death amongst radio-collared numbats in populations studied.

UP	Unidentified predator
RA	Raptor
FO	Fox
CA	Cat
PY	Carpet python
BU	Burnt in fire
RK	Road kill
CC	Caught by collar
DU	Dead, unexplained

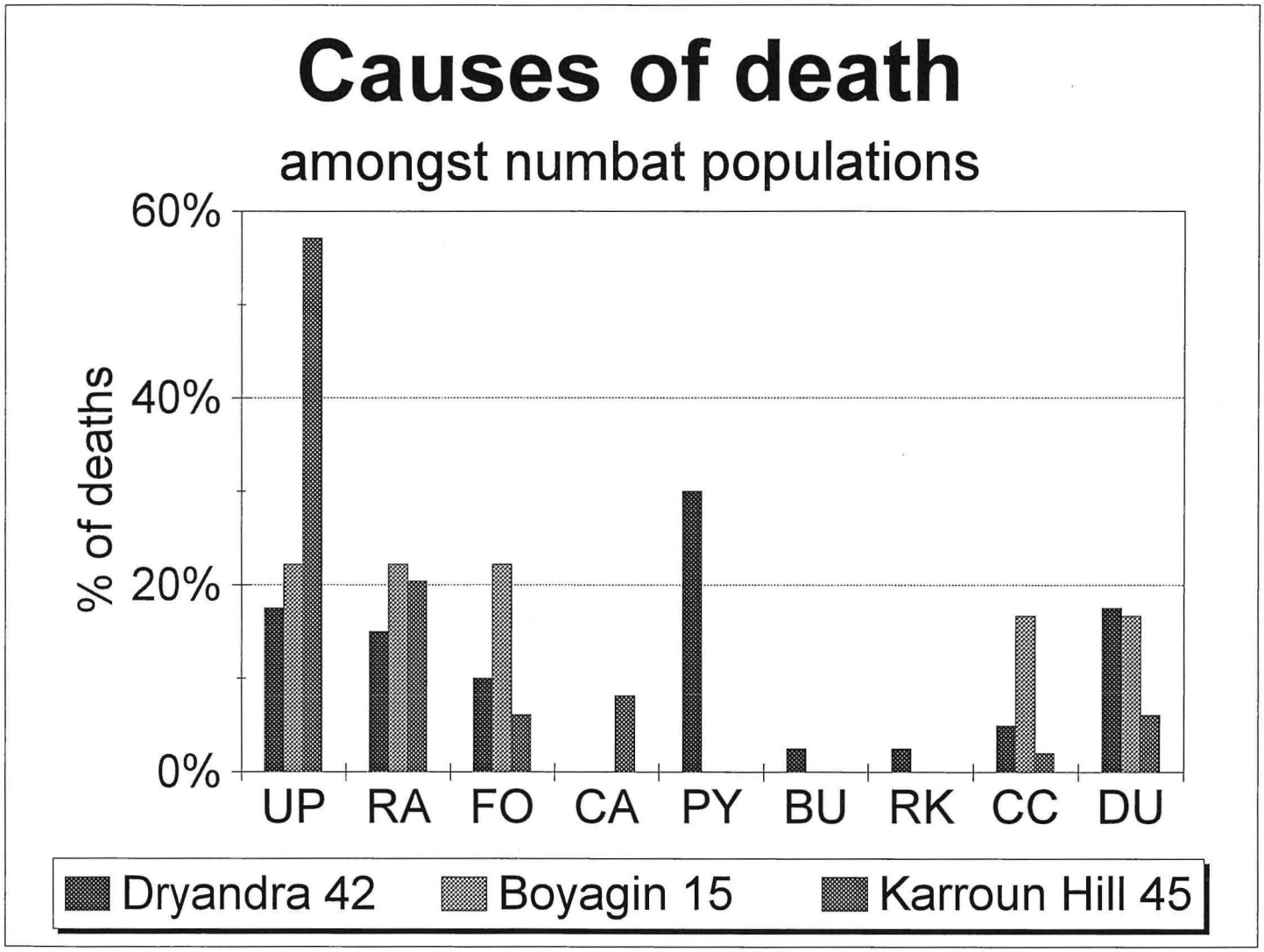
Causes of death
amongst numbat populations
60%
40%
20%
0%
% of deaths
UP
RA
FO
CA
PY
BU
RK
CC
DU
Dryandra 42
Boyagin 15
Karroun Hill 45

Figure 3. Map of Karroun Hill Nature Reserve showing baited area.

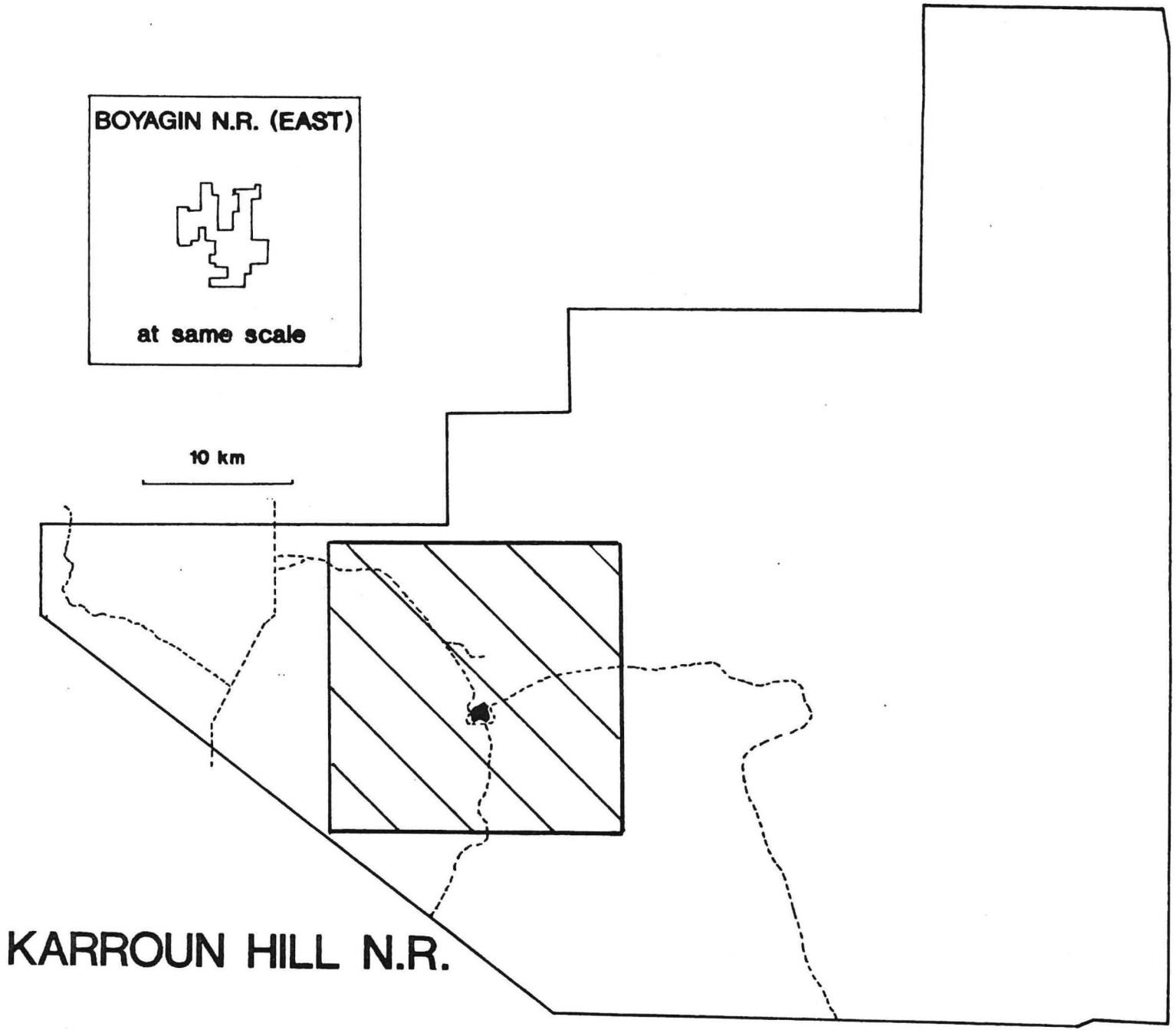
BOYAGIN N.R. (EAST)
at same scale
10 km
KARROUN HILL N.R.

Figure 4. Number of live radio-collared numbats at Karroun Hill at the beginning of each month. No data yet for 1 December.

Live radio-collared numbats

at Karroun Hill Nature Reserve in 1993

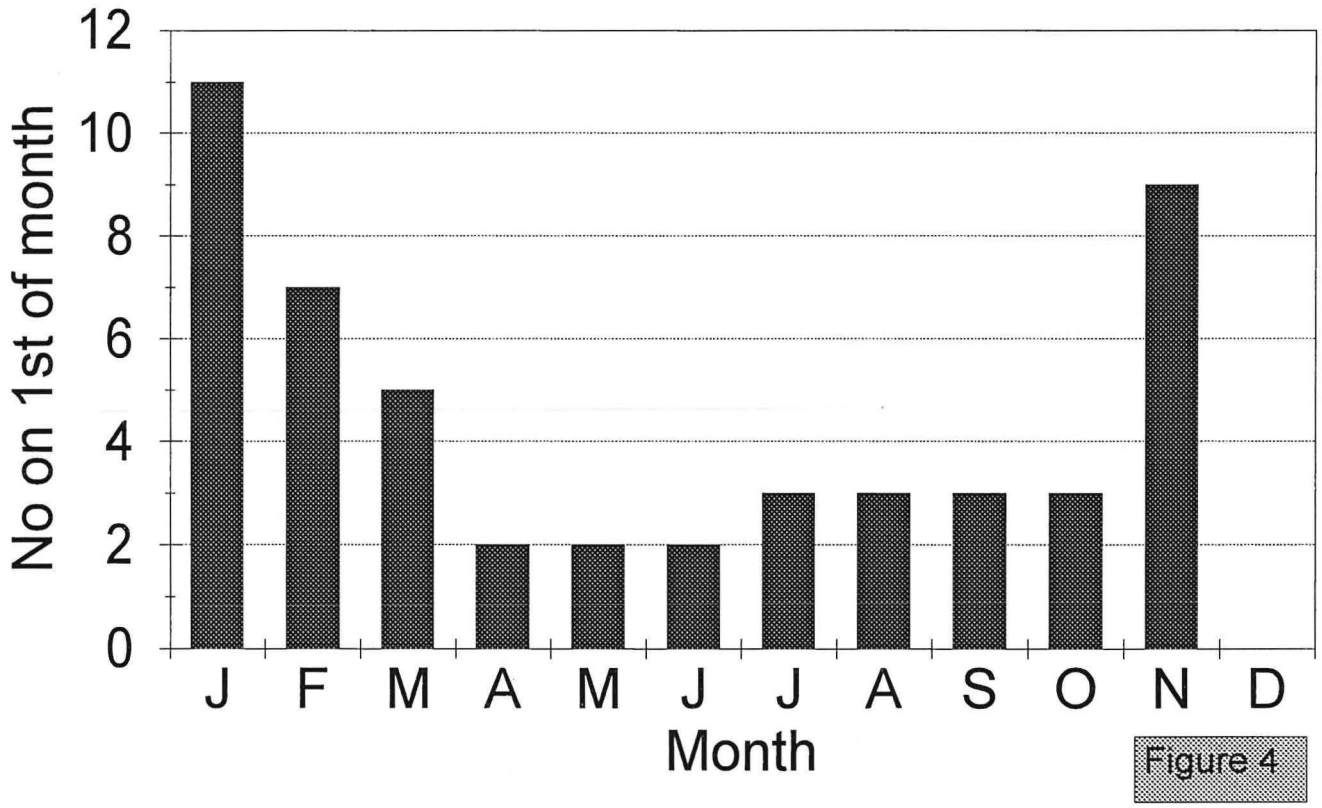

Figure 4