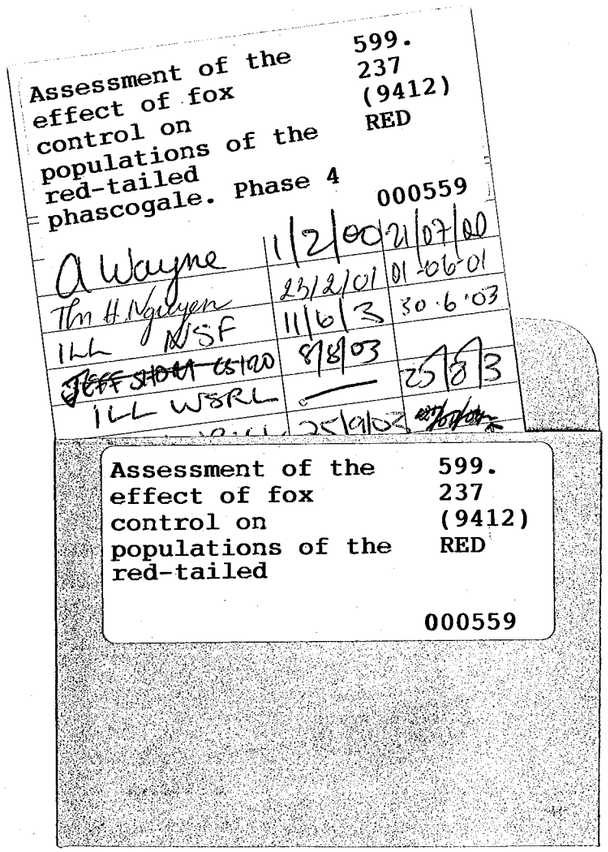

SUMMARY

Since 1993, an experiment has been in progress to test the hypothesis that fox control causes an increase in numbers of the red-tailed phascogale *Phascogale calura* where this species occurs in remnant vegetation in the Western Australian wheatbelt. Population numbers are monitored in three trapping sessions between March and June each year, before all the males of this semelparous species die, in July. *Phascogale calura* populations on nine reserves have been monitored. Fox control by 1080 baiting has been carried out since before 1985 on three of these reserves, and commenced on four more in late 1994. Two reserves remain unbaited as controls. Trapping grids were set up on the nine reserves in 1993 and the first full trapping program was carried out in 1994, prior to the commencement of fox control on the newly-baited reserves. The trapping program was repeated in 1995. It is expected that any effect of baiting on *P. calura* populations will be detected through relative changes in the numbers of phascogales captured.

The trapping program continued in 1996 under Phase 4 of this project. Between March 19 and the time of writing of this report, two trapping sessions of three nights' duration were conducted on each of two grids on each reserve (288 trapnights per session per reserve). The third trapping session scheduled for 1996 is currently under way. The first two trapping sessions have resulted in 302 captures (including repeats) and involved the capture of 151 individual red-tailed phascogales, and it is likely that 1996 totals will exceed those for 1995 (383 captures involving 149 individuals).

Analysis of the capture data for 1994-1996 shows that *P. calura* populations are affected by fox control, although there is a strong relationship between population numbers and rainfall in the previous year, tending to obscure the effect of other factors. The rate of change of population size on baited reserves is significantly different from that on unbaited reserves. This is despite the fact that the new baiting programs have only been in progress for between 17 and 20 months. In other documented cases in Western Australia, the response of native mammal populations to fox control has taken 3-5 years to be measurable.

The results to this stage underline the importance of fox control in the management of threatened mammal populations. It is strongly recommended that the experiment be continued for at least another two years, in order to strengthen its results.

CONTENTS

INTRODUCTION

The red-tailed phascogale (*Phascogale calura*) is a small (30-70 g) semi-arboreal carnivorous marsupial now found only in semi-arid woodlands in south-west of Western Australia. The record of the former distribution of this species provided by collections of live specimens indicates a patchy occurrence across much of arid and semi-arid Australia (Bradley 1995). Recent work on sub-fossil material shows that red-tailed phascogales were widely distributed across that area (e.g. Smith and Medlin 1982; Baynes and Baird 1992; Baynes and Jones 1993), but survey work as well as Aboriginal information show that the species has disappeared from much of that range (Friend and Friend 1992; Burbidge *et al.* 1988). As with many medium-sized Australian mammals, all *P. calura* populations in the arid zone and many in the semi-arid zone had disappeared by the end of the 1950s and many of the local extinctions coincided with the arrival of the red fox (*Vulpes vulpes*) (Finlayson 1961).

Today, conservation of the red-tailed phascogale relies on its persistence in a scatter of isolated, mostly small vegetation remnants in the southern part of the Western Australian wheatbelt (the region known as the "Great Southern"). Most of the known populations occur on nature reserves, over half of which are smaller than 300 ha (Friend and Friend 1992). These reserves are managed by the Department of Conservation and Land Management for nature conservation. In many of them, *P. calura* is the only threatened animal species recorded. The current project, funded under the Feral Pests Program, Australian Nature Conservation Agency, involves an experiment designed to quantify the effect of fox control on the population dynamics of *P. calura*, in order to determine whether baiting programs should be implemented to improve the conservation status of the species. This report gives details of the progress made on the Scope items laid out in the contract for Phase 4 of the project, covering work carried out in 1996. A general outline of the experiment follows.

Measurement of population size in P. calura

Adult *P. calura* are readily trapped in medium-sized Elliott traps, but juveniles are not. Due to the pattern of annual male die-off in this species after mating in July and the death of most females after weaning their first litter in November (Kitchener 1981, Bradley 1987), the most productive trapping period is between February and June, when all animals have attained adult size (and trappability) but prior to the male die-off. The strategy employed in this project is to run three trapping sessions at each site over a three-month period during that time, and to use the number of animals known to be alive (KTBA) at the second trapping session as the population index at each grid site.

Use of KTBA at the second of three trapping sessions is intended to provide a more reliable estimate of population numbers than one or two sessions. The length of a single trapping session is limited as a significant number of *P. calura* individuals go into traps every night they are set (Friend and Scanlon 1994, 1995a). The longer the trapping session, the greater is the risk of trap death due to lack of feeding and cold (*P. calura* tend not to eat the bait provided). In this project, therefore, trapping sessions are limited to three nights' duration.

During the second year of this project, interference with Elliott traps by possums (*Trichosurus vulpecula*) and woylies (*Bettongia penicillata*) increased to the point that on some reserves, 90-100% of traps were set off, reducing the likelihood of *P. calura* captures. Possums and woylies are too large to be caught in Elliott traps. Commencing in 1994, 10 Mascot Wireworks rat/bandicoot cage traps were set on each grid during trapping sessions in order to reduce interference with Elliott traps by capturing the larger species (Friend and Scanlon 1995b).

Experimental design

This experiment conforms to the BACI design (Before/After/Control/Impact). Regular trapping to assess red-tailed phascogale population numbers is carried out on a total of nine reserves in the Great Southern district of Western Australia. Fox control has been carried out on three of them (Dryandra, Tutanning and Boyagin) for at least five years prior to 1993. These reserves constitute a "baited control", on the assumption that their fauna populations have reached an equilibrium under a baiting regime. Fox control commenced on four of the other reserves (Jaloran, Dongolocking, Pingeculling and East Yornaning) between October and December 1994, and two (West Ashby and Yilliminning) will remain unbaited. Locations of these reserves are shown on Figure 1, and details of their size and baiting history are given in Friend *et al.* (1994).

Two trapping grids (6 x 8 medium Elliotts at 40 m spacing) have been established and permanently marked in suitable habitat on each reserve, and trapping sessions are conducted three times between February and June each year. During 1993 as Phase 1 of this project, the study reserves were selected after survey trapping, and one trapping session was conducted on each reserve. In 1994, as Phase 2 of this project, a full trapping program was conducted in order to establish population levels before the commencement of the new baiting programs. Phases 3 and 4 involved the repetition of that trapping program, in 1995 and 1996 respectively, to begin to assess the effect of fox control on *P. calura* populations. The trapping program will continue at least until 1997, allowing three post-baiting censuses to follow any changes in the size of *P. calura* populations. Other mammal populations, such as the numbat *Myrmecobius fasciatus* (Friend 1990), the woylie *Bettongia penicillata* and the tammar *Macropus eugenii* (Kinnear 1990) have responded to fox control within this time.

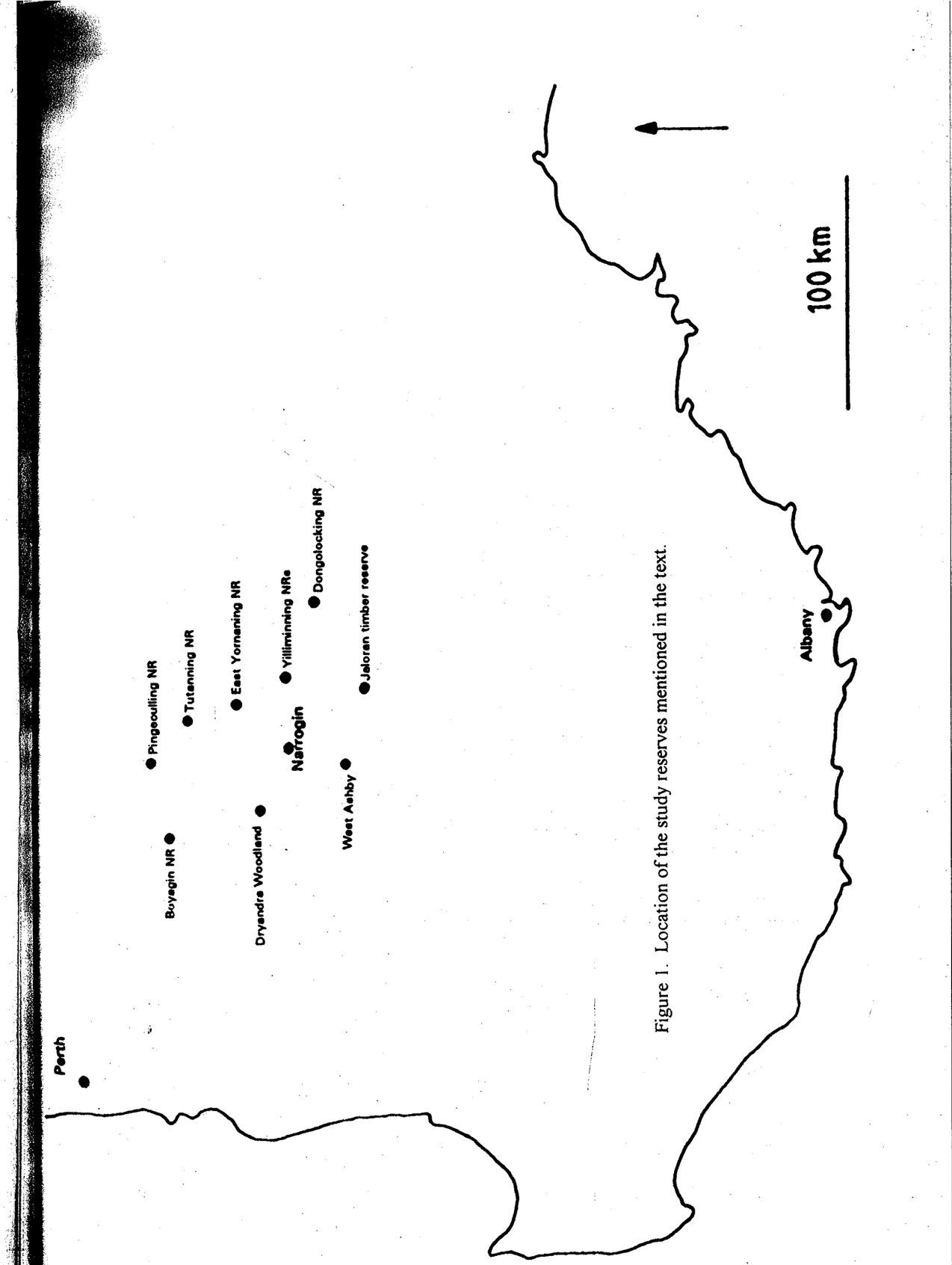

Figure 1. Location of the study reserves mentioned in the text.

BAITING AND TRAPPING PROGRAMS IN 1996 (SCOPE ITEM 1)

Scope item 1) ***Continue fox-baiting, continue to conduct trapping censuses on each of the trapping grids established in the first phase of the project..***

Fox control implementation

The new baiting programs implemented under this project are carried out by CALM district staff and commenced in October 1994. As explained in the final report for Phase 2 (Friend and Scanlon 1995a), baiting was introduced on four, rather than three reserves as originally proposed: Pingeculling, Jaloran, Dongolocking and East Yornaning. Baiting is now being carried out at Pingeculling and East Yornaning by CALM staff based in Pingelly and Narrogin, and at Jaloran and Dongolocking by CALM staff based in Katanning.

Ongoing fox-baiting on Dryandra, Tutanning and Boyagin is carried out by CALM staff based at Pingelly and Narrogin.

Currrent fox baiting procedures (CALM 1993) involve the spreading of dried meat baits from a vehicle or by plane. On small reserves surrounded by cereal and sheep farms, aerial baiting is generally not practicable, so vehicle-based baiting is used.

Baits are made from kangaroo meat cut into 120 g pieces and dried to 40% of their wet weight. After about one day of drying, the baits are injected with a solution of sodium fluoroacetate (1080) such that the dose per bait is 4.5 mg of 1080. One bait contains sufficient 1080 to kill any fox.

Baits are laid along perimeter firebreaks (except near corners, gates and areas used by the public) and some internal firebreaks. Before the commencement of baiting, the neighbours are contacted and warned of impending danger to wandering dogs. Warning signs are erected on baited reserves.

A regime of monthly baiting using meat baits commenced on Pingeculling on 13 October 1994, on Jaloran and Dongolocking on 24 October 1994 and on East Yornaning on 30 December 1994. Table 1 shows the dates on which subsequent baiting has been carried out. On Dongolocking and Jaloran, baits were initially distributed at 200 m intervals, but from 20 February 1995, baiting intensity was increased by reducing the distance between baits to 100 m for consistency with the baiting carried out at Pingeculling and East Yornaning and following guidelines for small reserves set out in CALM (1993).

Table 1. Dates on which baiting was carried out on newly baited study reserves, up to the end of May 1996. Dates in italics indicate distribution of baits at 200 m intervals along firebreaks; baiting on other dates was at 100 m intervals.

Jaloran and Dongolocking	Pingeculling	East Yornaning
24 October 1994	13 October 1994	
22 November 1994	16 November 1994	
23 December 1994	12 December 1994	30 December 1994
19 January 1995	20 January 1995	20 January 1995
20 February 1995	16 February 1995	14 February 1995
21 March 1995	21 March 1995	22 March 1995
24 April 1995	11 April 1995	12 April 1995
29 May 1995	17 May 1995	17 May 1995
28 June 1995	9 June 1995	9 June 1995
2 August 1995	4 July 1995	7 July 1995
15 August 1995	14 August 1995	16 August 1995
26 September 1995	13 September 1995	11 September 1995
24 October 1995	16 October 1995	17 October 1995
21 November 1995	15 November 1995	16 November 1995
14 December 1995	14 December 1995	13 December 1995
11 January 1996	7 January 1996	9 January 1996
14 February 1996	8 February 1996	8 February 1996
15 March 1996	7 March 1996	7 March 1996
12 April 1996	4 April 1996	4 April 1996
29 May 1996	2 May 1996	2 May 1996
	28 May 1996	28 May 1996

Trapping censuses

Methods

Methods and trapping grids used were as described earlier. In 1996, trapping commenced on 19 March. At the time of writing of this report, the second round of trapping had been completed, and the third was under way and due to be finished during the week of 10 June 1996. In the first two rounds, two trapping sessions were completed on all 18 grids, comprising 576 trap-nights on each reserve, or a total of 5184 trap-nights. The third round will comprise a further 288 trap-nights on each reserve, or a total of 2592 trap-nights. Table 2 shows the dates on which each of the three-night trapping sessions of the two completed rounds commenced on each reserve in 1996.

Table 2. Pre-mating period trapping program completed in 1996 at the time of writing of the report.

Reserve	First night of trapping session		Treatment
	Session 1	Session 2	
Dryandra	10/4/96	21/5/96	Long-baited
Tutanning	2/4/96	15/5/96	Long-baited
Boyagin	2/4/96	15/5/96	Long-baited
Jaloran	27/3/96	1/5/96	Newly baited
Dongolocking	19/3/96	23/4/96	Newly baited
Pingeculling	2/4/96	15/5/96	Newly baited
East Yornaning	10/4/96	21/5/96	Newly baited
West Ashby	27/3/96	1/5/96	Unbaited
Yilliminning	19/3/96	23/4/96	Unbaited

Results

Phascogale populations across reserves

A total of 302 captures (including repeats) was made during the first two rounds of the 1996 trapping program. This tally involved the capture of 151 individual red-tailed phascogales. At the current rate of captures, the 1996 total should easily exceed the 1995 total of 383 captures. Use of numbers known to be alive (KTBA) at the second trapping session has been found to be an robust measure of the red-tailed phascogale population size in this project (Friend and Scanlon 1995a). However, as only two trapping sessions have been completed so far, the nearest estimate of KTBA at the second trapping session is the number of individuals caught during the second trapping session. These totals will be slightly less than the KTBAs that will be calculated after the third trapping session, as we might anticipate the addition of a few individuals caught at the first and third, but not at the second trapping session. Table 3 shows the numbers of red-tailed phascogales known to be alive (KTBA) at the second trapping session on the study reserves in 1994 and in 1995, and the number of individuals

caught at the second trapping session in 1996. The data for each reserve (KTBAs or individuals captured at Session 2, pooled for both grids) are also presented in Figure 2.

Table 3. Numbers of red-tailed phascogales known to be alive (KTBA) on each grid at the second of three trapping sessions in 1994 and 1995, total KTBA on both grids in the nine study reserves in 1994 and 1995, and numbers of individuals captured on each grid and total caught on both grids on each reserve in the second trapping session of 1996.

Treatment	Reserve	Grid 1	Grid 2	Grids 1+2	Grid 1	Grid 2	Grids 1+2	Grid 1	Grid 2	Grids 1+2
		1994			1995			1996 (2nd session)		
Long-baited	Dryandra	1	1	**2**	1	1	**2**	0	2	**2**
Long-baited	Tutanning	11	5	**16**	7	11	**18**	10	11	**21**
Long-baited	Boyagin	6	4	**10**	9	4	**13**	3	4	**7**
Newly baited	Jaloran	11	7	**18**	1	4	**5**	3	3	**6**
Newly baited	Dongolocking	2	8	**10**	4	7	**11**	7	10	**17**
Newly baited	Pingeculling	10	2	**12**	5	8	**13**	17	15	**32**
Newly baited	East Yornaning	29	16	**45**	19	12	**31**	23	12	**35**
Unbaited	West Ashby	6	3	**9**	2	2	**4**	2	2	**4**
Unbaited	Yilliminning	10	9	**19**	4	0	**4**	3	2	**5**

Discussion

Phascogale populations across reserves

Due to the fact that the 1996 trapping program has not yet been completed, it is necessary to use the number of individuals captured at the second trapping session as an index of population numbers in 1996 for this analysis, whereas KTBA at the second of three trapping sessions will be used as the index for 1994 and 1995. Trapping data from previous years indicates that the third trapping session adds very few individuals to the number KTBA at the second of three trapping sessions. As an example, the two parameters are compared for 1994 and 1995 in Table 4.

Table 4. Comparison of total numbers of individuals caught at the second (May) trapping session and number known to be alive at the second of three trapping sessions in 1994 and 1995 (all reserves combined).

Year	Individuals caught at second trapping session	Individuals known to be alive at the second of 3 trapping sessions
1994	125	141
1995	94	101
1996	129	Not yet available

The mean KTBA pooled for the two grids on each reserve (± S.D.) in 1996 was 14.3 ± 12.5, compared with a means of 11.2 ± 9.2 in 1995 and 15.6 ± 12.2 in 1994.

Examination of rainfall data for several localities in the study area shows that the annual rainfall was very low in 1994 (Figure 3). Total KTBA on all reserves between

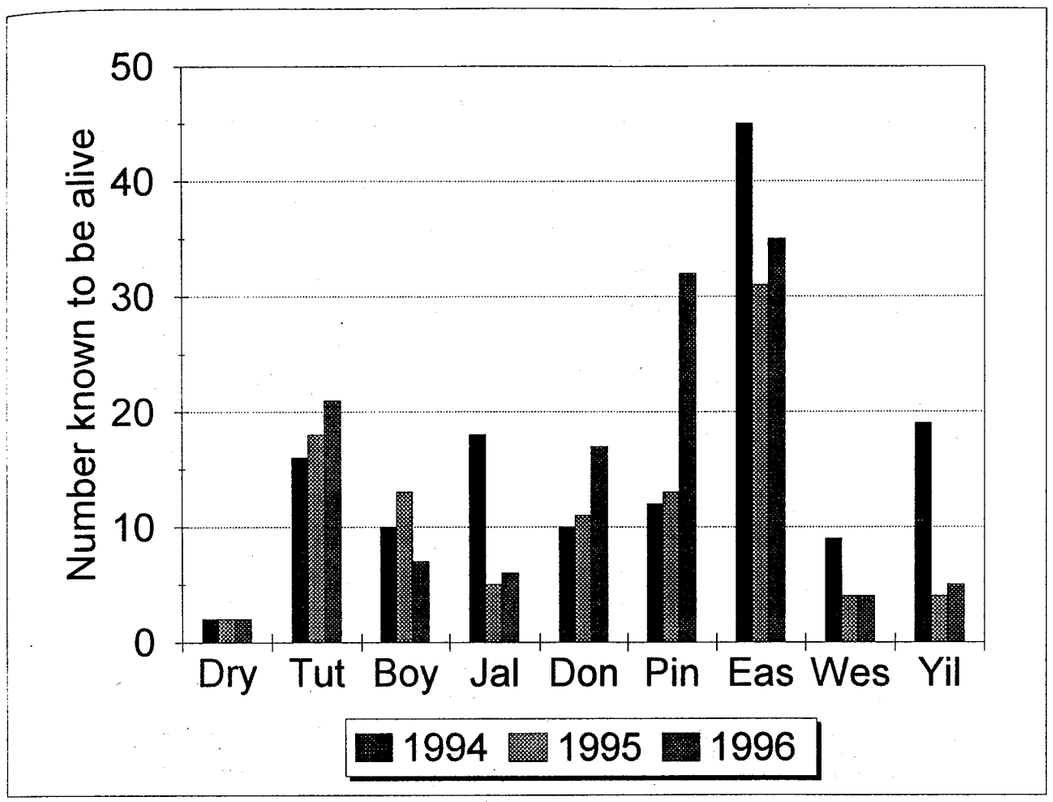

Figure 2. Numbers of red-tailed phascogales known to be alive on two trapping grids on each of nine study reserves in May 1994, 1995 and 1996. Data for 1994-5 comprise the numbers known to be alive at the second of three trapping sessions; data for 1996 comprise the number of individuals caught at the second trapping session only. Baiting commenced on Jaloran, Dongolocking and Pingeculling in October 1994 and at East Yornaning in December 1994.

Dry - Dryandra Woodland
Tut - Tutanning Nature Reserve
Boy - Boyagin Nature Reserve
Jal - Jaloran Road Timber Reserve
Don - Dongolocking Nature Reserve
Pin - Pingeculling Nature Reserve
Eas - East Yornaning Nature Reserve
Wes - West Ashby block, Highbury Woodland
Yil - Yilliminning Nature Reserve

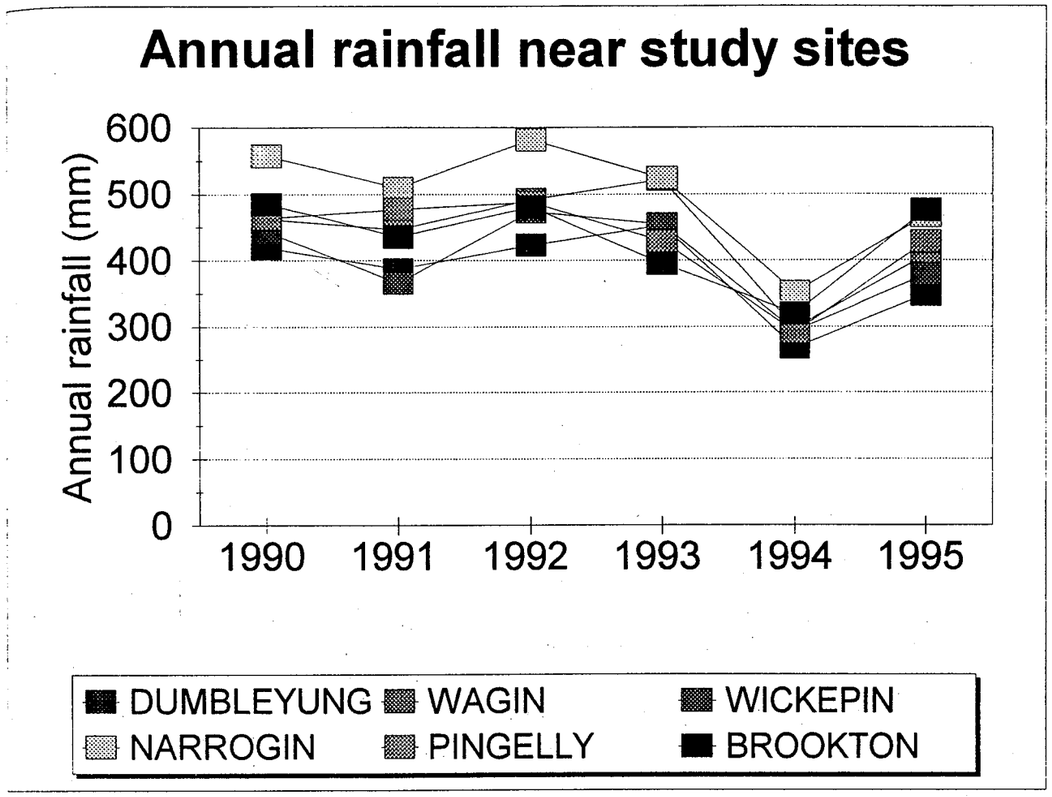

Figure 3. Annual rainfall recorded (1990-1995) at towns near the study reserves.

1993 and 1996 is highly correlated with total annual rainfall (mean of stations shown in Figure 3) in the previous year (see Figure 4: r^2=0.96 for these two variables), as found previously (Friend and Scanlon 1996). It is likely that low rainfall in one year would cause a phascogale population response in the following year, as decreases in invertebrate prey and the consequent failure of phascogale recruitment would take at least one breeding season to take effect.

Comparison of the population indices on individual reserves between years (Figure 2) shows evidence of a population crash in 1995 on Jaloran, West Ashby and Yilliminning, and a strong decline on East Yornaning. In 1996, the population at East Yornaning has recovered slightly, but those on the other three have not. On two of the newly baited reserves (Dongolocking and Pingeculling) there was no crash in 1995, and 1996 has seen marked increases. There has been little change on Dryandra, Boyagin and Tutanning.

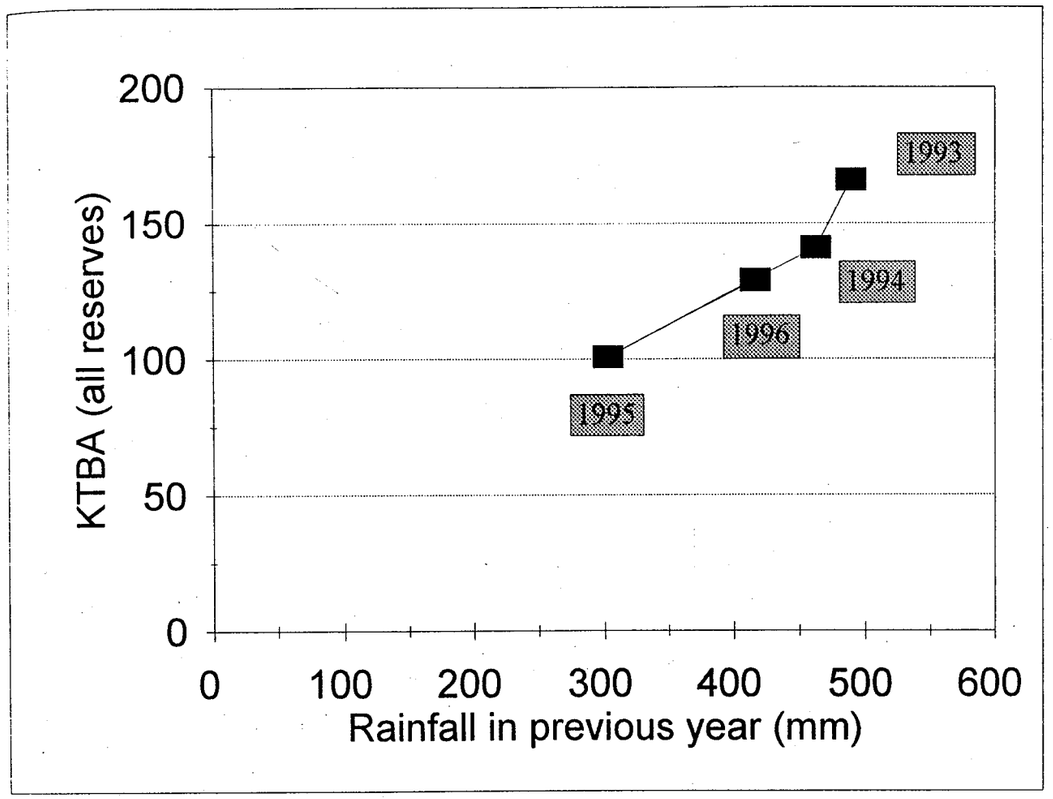

Figure 4. Plot of the number of red-tailed phascogales known to be alive on all study reserves in 1993, 1994, 1995 and 1996 against the previous year's annual rainfall (mean for the six towns listed in Figure 3). Phascogale numbers for 1993 and 1996 include all animals captured during one trapping session on each reserve.

RESPONSE OF *P. CALURA* TO FOX BAITING (SCOPE ITEM 2)

Scope item 2) ***Evaluate the response of* P. calura *to fox baiting.***

This experiment was designed to run for at least four years, giving one year's pre-baiting data and at least three years' post-baiting data on the newly-baited reserves. As explained in previous reports, it was not possible to collect a full set of pre-baiting data in 1993 during Phase 1 of the project, so those data were collected during Phase 2 (1994). The first post-baiting year's data were collected during Phase 3 (1995), and second post-baiting year's data under Phase 4 (1996). By the end of the second trapping session in 1996, the newly baited reserves had been subject to baiting for 20 months (17 months for East Yornaning).

Methods

Analysis of covariance was used to test the effect of the three baiting treatments (Long-baited, Newly-baited and Unbaited) on the rate of change of red-tailed phascogale numbers over the three years for which comparable data are available (1994, 1995 and 1996). The population indices discussed earlier were used (KTBA at the second of three trapping sessions for 1994 and 1995, and the number of individuals captured in the second trapping session for 1996), pooling the data for each reserve (i.e. Grid 1+2 data shown in Table 3). These data are grouped according to Treatment and Year (Figure 5). The data were log-transformed for the analysis because of the large variation in trap success on different reserves, the extremes being Dryandra (0.5 % in 1996) and East Yornaning (17.4 % in 1996).

Results

The Year x Treatment interaction tests whether the three treatments result in the same rate of change of the population index. This test indicates that the rates of change are not significantly different (Table 5). However, it is worth testing whether the rates of change differ between the Baited treatments (Long-baited and Newly-baited combined), and the Unbaited treatment. The contrast Long-baited vs. Newly-baited is far from significant, so it is valid to combine these as Baited treatments. The contrast Baited vs Unbaited is significant at the 0.05 level ($F_1 = 4.97$, $P = 0.04$), indicating that change in population indices on the baited reserves is not the same as that on the Unbaited reserves over the period 1994-1996.

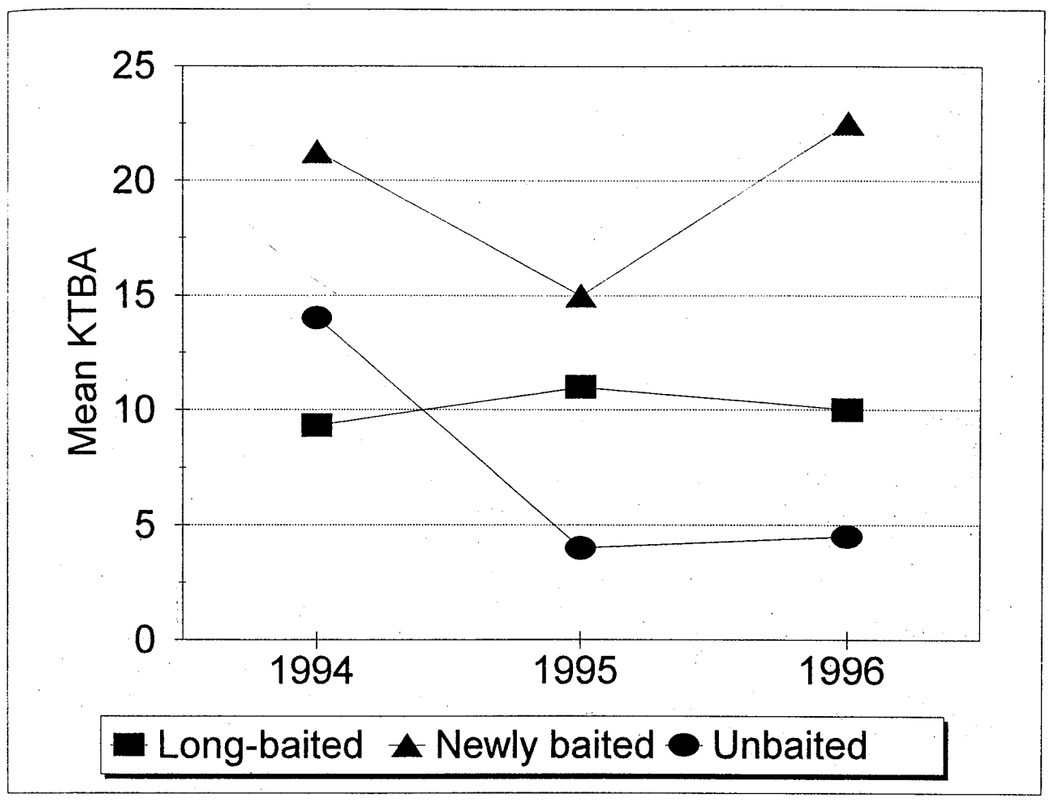

Figure 5. Mean number of red-tailed phascogales known to be alive on both trapping grids per reserve under each of the baiting treatments. 1994-5 data is the KTBA at the second of three trapping sessions; 1996 data is the number of individuals caught at the second trapping session. Baiting commenced on four of the reserves in October or December 1994.

Table 5. ANCOVA table for red-tailed phascogale KTBAs on reserves under differing baiting treatments.

Source	DF	Type III SS	Mean Square	F Value	Pr > F
SITE (TREATMENT)	6	11.55900148	1.92650025	10.63	0.0001
YEAR	1	0.51939708	0.51939708	2.87	0.1112
TREATMENT	2	0.55685469	0.27842735	1.54	0.2472
YEAR*TREATMENT	2	0.91786100	0.45893050	2.53	0.1129
Contrast					
LONG VS NEWLY BAITED	1	0.00403718	0.00403718	0.02	0.8834
BAITED VS UNBAITED	1	0.90140376	0.90140376	4.97	0.0414
Error	15	2.71883746	0.18125583		

Discussion

Effect of baiting on red-tailed phascogale populations

After less than two years' baiting on the newly baited reserves, a difference in the population dynamics between treatments has emerged. This result should be viewed cautiously, as the third trapping session may result in increases in the population index, and these may affect the significance of the result. However, closer inspection of the population changes on individual reserves that have led to this result indicate that there are strong differences in the response of red-tailed phascogale populations under the different treatments.

Examination of Figure 5 shows that the mean number of animals known to be alive on the Newly-baited reserves showed a decline in 1995, but recovered in 1996, the numbers on the Long-baited reserves showed very little change, and the mean numbers on the Unbaited reserves dropped in 1995 but did not recover in 1996. Population changes on individual reserves can be seen in Figure 2. On the Long-baited reserves (Dryandra, Tutanning and Boyagin) there have been no dramatic changes. Amongst the Newly-baited reserves, there has been a variety of responses. At East Yornaning, numbers fell in 1995, but have shown some increase in 1996. At Dongolocking and Pingeculling, there was no change between 1994 and 1995, but a strong increase in 1996. At Jaloran, on the other hand, numbers crashed in 1995 and have not recovered. This response is very similar to the picture on the two Unbaited reserves, West Ashby and Yilliminning.

In summary, populations on the three reserves under the Long-baited treatment have all remained fairly stable, the two Unbaited populations have both declined and not recovered, and there has been a varied response amongst the four Newly-baited populations.

These data will be re-analysed when the third round of trapping is completed. There is now some indication that fox control is beneficial to *P. calura* populations, but it is highly desirable that the baiting and monitoring programs continue, for at least another two years, to provide four years' post-baiting data.

The heterogeneous response of red-tailed phascogale populations to the presence or absence of fox control indicates that other factors may be affecting this species' population dynamics. Rainfall in the previous year has been identified as one of these factors, but the spatial variation of rainfall is not sufficient to explain the variation in response by various populations. Another factor which has not been examined in this experiment is predation by feral and domestic cats. At the outset of the project, no methods for broadscale cat control were available, so it was not practicable to test any hypothesis that cat predation was affecting the population dynamics of this species. However, a recent operational trial of a cat bait on Peron Peninsula in Shark Bay (D. Algar and N. Burrows, pers. comm.) has given very promising results and the baits developed may be of use in such an experiment.

Implications for management

The early indication from this work that fox control is beneficial to red-tailed phascogale populations supports the current strategy that fox control should be part of the management of both large reserves and smaller vegetation remnants in the WA wheatbelt. Similar experiments should be conducted to determine whether other mammals of this size and smaller are also affected by fox predation. One of the difficulties encountered is the lack of areas where no fox control will be carried out during the life of the experiment, usually a period of five years or more. In order to overcome this problem, the use of long-baited controls is recommended in management-scale projects to monitor the effect of new baiting campaigns.

ACKNOWLEDGMENTS

We would like to thank Brian Macmahon, Mal Graham and other CALM staff at the Pingelly, Narrogin and Katanning offices for their help in implementing the new baiting programs and continuing to carry out the long-standing fox control programs on Dryandra, Tutanning and Boyagin. We are grateful to the many volunteers who assisted ably in the trapping program and to Matthew Williams who gave advice on statistical matters and carried out the analysis of the treatment data. This project received funding support from the Feral Pests Program of ANCA.

REFERENCES

Baynes, A. and Baird, R.F. (1992). The original mammal fauna and some information on the original bird fauna of Uluru National Park, Northern Territory. *Rangelands Journal* **14(2)**: 92-106

Baynes, A. and Jones, B. (1993). The mammals of Cape Range peninsula, north-western Australia. *Records of the Western Australian Museum, Supplement* **45**: 207-225.

Bradley, A.J. (1987). Stress and mortality in the red-tailed phascogale, *Phascogale calura* (Marsupialia: Dasyuridae). *General and Comparative Endocrinology* **67**: 85-100.

Bradley, A.J. (1995). Red-tailed phascogale *Phascogale calura.* Pp. 102-103 **in** R. Strahan (ed.) "The Mammals of Australia". Reed Books, Sydney

Burbidge, A.A., Johnson, K.A., Fuller, P.J. and Southgate, R.I. (1988). Aboriginal knowledge of the mammals of central deserts of Australia. *Australian Wildlife Research* **15**: 9-39.

CALM (1993). Fox control manual. Department of Conservation and Land Management, Perth.

Friend, J.A (1990). The numbat *Myrmecobius fasciatus* (Myrmecobiidae): history of decline and potential for recovery. *Proceedings of the Ecological Society of Australia* **1990, 16** : 369-377.

Friend, J.A. and Friend, G.R. (1992). Conservation of the red-tailed phascogale *Phascogale calura.* Final report to Endangered Species Program of the Australian Nature Conservation Agency on Project 22.

Friend, J.A. and Scanlon, M.D. (1994). Progress report for Phase 2 of ANCA Feral Pests Program Project 18 "Assessment of the effect of fox control on populations of the Red-tailed Phascogale". Unpublished report, Department of Conservation and Land Management.

Friend, J.A. and Scanlon, M.D. (1995a). Final report for Phase 2 of ANCA Feral Pests Program Project 18 "Assessment of the effect of fox control on populations of the Red-tailed Phascogale". Unpublished report, Department of Conservation and Land Management.

Friend, J.A. and Scanlon, M.D. (1995b). Progress report for Phase 3 of ANCA Feral Pests Program Project 18 "Assessment of the effect of fox control on populations of the Red-tailed Phascogale". Unpublished report, Department of Conservation and Land Management.

Friend, J.A. and Scanlon, M.D. (1996). Final report for Phase 3 of ANCA Feral Pests Program Project 18 "Assessment of the effect of fox control on populations of the Red-tailed Phascogale". Unpublished report, Department of Conservation and Land Management.

Friend, J.A., Scanlon, M.D. and Himbeck, K. (1994). Final report for Phase 1 of ANCA Feral Pests Program Project 18 "Assessment of the effect of fox control on populations of the Red-tailed Phascogale". Unpublished report, Department of Conservation and Land Management.

Finlayson, H.H. (1961). On central Australian mammals. Part V. The distribution and status of central Australian species. *Records of the South Australian Museum* **14**: 141-191.

Kinnear, J.E. (1990). Trappings of success. *Landscope* **5(3)**: 35-40.

Kitchener, D.J. (1981). Breeding, diet and habitat preference of *Phascogale calura* (Gould 1844) (Marsupialia: Dasyuridae) in the southern wheatbelt, Western Australia. *Records of the Western Australian Museum* **9(2)**: 173-86.

Kitchener, D. (1982). Red-tailed phascogale *Phascogale calura.* p. 36 **in** R. Strahan (ed.) "The Complete Book of Australian Mammals", Angus and Robertson, Sydney.

Smith, M. and Medlin, G. (1982). Dasyurids of the northern Flinders Ranges before pastoral development. Pp. 563-572 **in** "Carnivorous Marsupials" ed. by M. Archer, Volume 2. Royal Zoological Society of New South Wales.