AUSTRALIAN NATURE CONSERVATION AGENCY
FERAL PESTS PROGRAM

PROJECT 18

AN ASSESSMENT OF THE EFFECT OF FOX CONTROL ON POPULATIONS OF THE RED-TAILED PHASCOGALE

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Responsible Institution: Department of Conservation and Land Management, Western Australia

Chief Investigator: Dr. J.A. Friend

INTRODUCTION

The red-tailed phascogale, *Phascogale calura*, is apparently restricted to the southern part of the wheatbelt and the south coast of Western Australia. Its range has declined markedly since European settlement, and it is now found in only a small fraction of its former distribution. Most surviving populations are found in remnant vegetation in a heavily cleared agricultural landscape. Prospects for retaining the species rely on an understanding of the processes affecting the viability of those populations, and an ability to manage the remnants to the benefit of their fauna.

Predation by the introduced European red fox *Vulpes vulpes* has been shown to regulate populations of several medium-sized mammals in the south-west, including the black-flanked rock-wallaby, numbat, woylie, tammar and brush wallaby. These mammals all fall within the Critical Weight Range (CWR) of Burbidge and McKenzie (1989), defined as the interval of adult body weight characterising Australian mammal species which have shown the greatest declines of overall range in post-european times. It might be surmised that in the south-west at least, fox predation was a major cause of decline of CWR mammals. The red-tailed phascogale has shown such a decline, but in terms of adult body weight, falls on the lower limit of the CWR. In addition, the species is largely arboreal (Kitchener 1983) and might thus be expected to have some immunity from a non-arboreal predator such as the fox. Decisions about whether to bait wheatbelt reserves to protect their red-tailed phascogale populations should be based on stronger evidence than is currently available.

The present project was designed to test the hypothesis that fox predation is regulating red-tailed phascogale populations. A proposal was put to ANPWS (now ANCA) Endangered Species Program in June 1992, but was funded under the Feral Pests Program, set up that year.

Funding became available in April 1993, although the first year's work was scheduled to begin in February 1993. Red-tailed phascogale populations display a die-off of all males in July, so the annual trapping program was intended to be completed by early June.

By the time that project personnel were employed, only 2.5 months remained before the male die-off. This was insufficient time in which to carry out all work proposed for the first year, that is, to select sites and set up permanent trapping grids, then carry out the planned two to three trapping sessions on each of the 18 grids. The schedule for the project was changed so that the pre-baiting population assessment would be carried out in March-June 1994, and baiting would then commence in July 1994.

Methods

Experimental design

Red-tailed phascogale populations are to be monitored over three years on nine reserves. Fox control by 1080 baiting has been undertaken on three of these reserves at least since 1989, and in one case since 1982. The baiting history of these reserves is shown in Table 1. No significant fox control has been carried out on the other six reserves. On three of these reserves, however, 1080 baiting is to be commenced after the first year's trapping, but no fox control is to be carried out on the remaining three reserves.

Monitoring of red-tailed phascogales will be carried out by a trapping program involving three trapping sessions each year between February and mid-June. Male red-tailed phascogales disappear from the population in July, and although juveniles are independent by late October, few are caught in Elliott traps until February.

The number of individuals known to be alive (KTBA) on each grid at the first of two or the second of three trapping sessions is used to assess the population level on the reserve in question. This method is intended to overcome problems caused by poor trap success on one of the trapping sessions due, for instance, to bad weather.

Selection of reserves and grid placement

While the presence of red-tailed phascogale populations on a number of wheatbelt nature reserves had been recorded or confirmed in 1990-92 through the Endangered Species Program project "Conservation of the Red-tailed Phascogale", further trapping was necessary before the location of the two grids on each reserve could be decided. All grids were to be placed in woodland with greater than 70% canopy of *Allocasuarina heugeliana*. It was necessary to find patches of such

Table 1. History of fox control by baiting with 1080 on reserves used as baited controls in this project.

Reserve	Total area	Baiting commenced	Area baited (ha)	Comments
Dryandra	28000	1982	2000	Part of main block only
		1989	18000	Whole of main block and next largest block
Boyagin	5000	1985	2000	East block only
		1989	5000	East and west blocks
Tutannning	2000	1984	2000	Whole reserve

vegetation that were firstly, inhabited by red-tailed phascogales and secondly, large enough to encompass a 280m x 200m grid. Trapping surveys were therefore conducted on 10 nature reserves, from which six were chosen to constitute the unbaited and newly baited reserves.

Traplines of 10-25 medium Elliott traps were placed through stands of suitable vegetation. On each reserve, one of two alternate strategies was employed. Where high trap success was anticipated, traplines were operated for three nights from the day that they were established. On other reserves, traps were baited but locked open using clothes pegs and left for 4-7 nights before the trapping session, when the pegs were removed and the traps re-baited and set. This strategy has been found to result in higher trap success.

Monitoring phascogale populations

Two 6 x 8 grids of forty-eight medium Elliott traps (300 mm x 100 mm x 80 mm aluminium collapsible box traps) at 40m intervals are used to monitor the red-tailed phascogale populations on each reserve. These grids cover an area of 2.8 ha. Grids are placed at least 500m apart, and located in *Allocasuarina heugeliana* woodland or mixed *A. heugeliana-Eucalyptus wandoo* woodland. During each trapping session, the traps are placed on the ground, baited with a mixture of peanut butter, rolled oats and sardines and set for three consecutive nights. They are checked as soon as possible after dawn each morning. After the beginning of June and if rain threatens, each trap is placed in a plastic bag (open at the trap door) or wrapped in plastic clingwrap. Phascogales captured are weighed, head length, pes length and male scrotal width are measured, and female reproductive condition noted according to Friend (1985). They are individually marked by ear-clipping according to a system which allows 99 distinct patterns using up to three marks per ear. One set of numbers is used for each reserve, regardless of the grid on which the animals are caught.

During the 1993 trapping season, one trapping session was completed on each of the grids.

This project has been approved by the CALM Animal Experimentation Ethics Committee (CALM AEEC approval no. 22/92).

Results

Selection of reserves

The reserves chosen for each category for the experiment are listed in Table 2, with their area and tenure.

Table 2. Reserves chosen for each category of the experiment. Reserve area indicates the area of land under CALM control. This corresponds closely to the total area of the vegetation remnant, as most adjacent private land is cleared.

Reserve	Tenure/purpose	Area (ha)	Treatment
Dryandra (main block)	State forest	~28000	Long-term baited (~13000 ha baited)
Tutanning	Nature reserve	2127	Long-term baited
Boyagin (east block)	Nature reserve	~2000	Long-term baited
Pingeculling	Nature reserve	243	Newly baited
Dongolocking	Nature reserve	1232	Newly baited
Jaloran	Timber reserve	453	Newly baited
East Yornaning	Nature reserve	247	Unbaited
West Ashby	State forest	104	Unbaited
Yilliminning	Nature reserve	323	Unbaited

Table 3. Cumulative total of individual red-tailed phascogales captured in three nights' trapping during 1993 on two 6 x 8 grids (288 trap-nights) on each of the nine reserves selected for the experiment. Baiting had only been carried out on the reserves in the "long-term baited" category.

Reserve	Treatment	Trapping dates	Individuals captured
Dryandra	Long-term baited	30/6-2/7/93	5
Tutanning	Long-term baited	23-25/6/93	25
Boyagin	Long-term baited	16-18/6/93	19
Pingeculling	Newly baited	16-18/6/93	22
Dongolocking	Newly baited	26-28/5/93	7
Jaloran	Newly baited	30/6-2/7/93	6
East Yornaning	Unbaited	5-7/5/93	58
West Ashby	Unbaited	6-8/7/93	10
Yilliminning	Unbaited	6-8/7/93	16

Monitoring of phascogale populations

The cumulative total of individuals caught on each grid during the trapping session on each reserve (i.e. the number known to be alive after one trapping session) is shown in Table 3.

Discussion

The results of three nights' trapping on the each of the nine reserves selected indicates great disparity in capture rate of red-tailed phascogales between reserves. This may be partly due to the dates on which trapping was carried out. Some of the trapping sessions were extremely late in what may be regarded as the trapping season, and may have fallen within the period of male die-off in July (Bradley 1985). This would have had the effect of reducing capture rate as population numbers would have been starting to fall rapidly. The trapping sessions at Dryandra, Jaloran, West Ashby and Yilliminning may have been subject to this effect.

Interestingly, the capture rate at Dryandra is the lowest on any of the sampled reserves, despite its long history of baiting. Survey trapping, carried out well before July, also gave the impression of low phascogale abundance. Dryandra is the only one of the nine reserves on which the mardo (*Antechinus flavipes*) occurs. It is also the most westerly of the reserves, and is on the extreme edge of the range of the species. Dryandra may, therefore, provide only sub-optimal habitat for *P. calura*. The importance of the experimental design in separating the effect of baiting from other factors affecting capture rate is emphasised by this result.

In 1994, it is proposed to finish the grid trapping by early June. The completion of three trapping sessions on each trapping grid should remove the effect of seasonal behavioural differences.

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