FERAL PESTS PROGRAM

AUSTRALIAN NATURE CONSERVATION AGENCY

PROJECT NUMBER 48

ERADICATION OF FERAL GOATS AND SHEEP

PERON PENINSULA

WESTERN AUSTRALIA

PROGRESS REPORT, JANUARY 1996

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

Project Supervisor: Ron Shepherd

SUMMARY

Approximately 30 000 feral goats and sheep have been removed from Peron Peninsula (105 000 hectares) over four years from 1990 to 1993 utilising mustering, trapping on stock water points and opportunistic shooting techniques. This effort has reduced goat numbers to a low level (one per 30 hectares) on the Peninsula. The objective for FPP48 was to establish whether the feral goat population could be taken from a low level (estimated at 3 500 animals at August 1993) to complete eradication in an arid coastal shrubland. The majority of feral goats remaining avoided management infrastructure, surviving on coastal brackish water. Aerial shooting from a helicopter is considered the most cost efficient method to destroy these animals.

The first phase of the project was from September 1993 to June 1994. A helicopter shoot was conducted in February 1994 destroying 1 479 animals, estimated to represent between 50 to 70% of all animals. A higher percentage kill was not obtained as large mobs of goats (in excess of 100 individuals) were located in several 'hot spots'. Helicopter shooting is unable to achieve eradication of such large groups as a significant number of animals are able to evade and hide in the scrub. The cost per feral animal destroyed was $11.81, representing an overall cost of 17.5 cents per hectare. A further 1 085 feral goats and sheep were removed in Phase I utilising trapping on water points and opportunistic shooting techniques. Following the helicopter shoot, there has been no evidence of feral goats utilising stock water points. Two successful techniques have been employed since February 1995 to target the low and dispersed goat population. Assistance has been provided by the Australian Army which is utilising the project for troop training. Sand access roads are dragged (raked) at night and Army personnel the next morning track and destroy the mobs that cross the road during the night. In addition to this method, 'Judas' goats have been utilised on the Peninsula. Fitting radio transmission collars to both young male and female goats has been successful in locating and destroying small mobs in remote pockets of the Peninsula. Every two months, the 'Judas' goats are tracked, located and associated goats destroyed.

The nature conservation benefits of feral goat control are already clearly visible on the Peninsula. The natural vegetation has significantly regenerated in the last five years. The small scrub-bird population has increased, including the threatened Thick-Billed Grasswren. The Euro population, restricted to two small coastal pockets, has spread into inland areas of the Peninsula. Other ecological changes are being recorded.

Recruitment of feral goats and sheep onto the Peninsula has been prevented by the construction of an electrified feral barrier fence across the narrow isthmus (3 kilometre wide) connecting the Peninsula to the mainland.

In addition to Project FPP48, a significant initiative, known as Project Eden, commenced on Peron Peninsula in January 1995. Project Eden aims to reduce all feral animals (cats, foxes, rabbits) to a low level and, if successful, re-introduce a number of threatened and endangered native mammals. Control programs are currently occurring (fox population has been reduced by 95%) and re-introductions may occur as soon as late 1996.

At the end of 1995, the goat population on the Peninsula was estimated at 500 animals. For Phase III (1996) of Project FPP48, the objective is to achieve a 'zero goat' population by the end of the year.

INTRODUCTION

A report in November 1994 provided the background to Project FPP48 - Eradication of Feral Goats and Sheep, Peron Peninsula. The project's objective is to establish whether a feral goat and sheep population can be taken from a low level (estimated at 3 500 animals at August 1993) to complete eradication in an arid coastal shrubland of 100 000 hectares. In addition, the project will assess the effectiveness of aerial helicopter shooting as a technique for goat control, and facilitate public education in regards to the

environmental impacts of feral goats. It is anticipated that as a result of this project, in association with other feral animal control programs, Peron Peninsula will become a suitable refuge for the re-introduction of threatened native animals.

The November 1994 report detailed the results of the first twelve months of this project, including the initial aerial helicopter shooting trial. This report details results during 1995 for Phase II of the project.

Additional funding for a further Phase III in early 1996, was provided by ANCA during the year. This will allow for a final aerial helicopter shoot to be conducted between 2 to 6 February 1996. A final report for Project FPP48 will be prepared in April 1996.

Achievement of Project Objectives

1. Attempt at zero goat population on Peron Peninsula by June 1996.

   A zero goat population on Peron Peninsula may be achieved during 1996. In Phase II of the project, 1 474 feral goats and sheep have been removed from the Peninsula. At the completion of the February 1995 aerial shoot (1 086 animals removed) it was estimated that there were 500 feral goats and sheep remaining. Since then, 273 animals have been removed and at the end of 1995, from track counts and visual observations, the population estimate was 300 to 500 animals. This population appears to be concentrated in about five pockets on the Peninsula, and these will be the areas targeted in 1996.

   It is anticipated that the February 1996 helicopter shoot will reduce the population to less than 100 animals. The residual population will be targeted utilising opportunistic shooting, following animal tracks and shooting (particularly by Australian Army troops), and tracking of Judas goats that join with small mobs.

2. Creation of a goat free refuge zone for the re-introduction of threatened native species

As yet, it has not been established that a 'goat free' refuge can be achieved. However, the project has illustrated that minimum goat numbers can be maintained.

In October 1995, an electrified Feral Barrier Fence was completed at the Taillefer Isthmus adjacent to the existing large herbivore barrier fence. To date, in association, the two fences have prevented the recruitment of feral goats, sheep, rabbits, foxes and feral cats onto Peron Peninsula.

In January 1995, a larger conservation operation, titled 'Project Eden', was started on Peron Peninsula. This operation complements and expands the objectives of FPP48. The initiative is being funded by CALM with approximately $500 000 for the first two years. Control programs for other key feral animals - fox, cat and rabbit - have been implemented, and if successful, re-introduction of threatened and native mammal species to occur within two years. Fox baiting has achieved reduction in the fox population by 95%. Feral cat and rabbit programs have started, however, will receive greater focus in early 1996.

A re-introduction plan has been prepared by mammal scientists, which identifies a select group of threatened and endangered species that are suitable candidates to be relocated onto Peron Peninsula. It is likely that the first re-introductions will occur as soon as late 1996. The trial re-introduction candidate may be the Woylie, Bettongia penicillata.

3. Assess aerial helicopter shooting as a technique for goat eradication.

The project has demonstrated that aerial helicopter shooting is a cost efficient tool in goat eradiation programs and this project has refined the technique in areas where there is a low population density. Phase I demonstrated that aerial helicopter shooting could remove feral goats that were unable to be targeted through traditional methods. These animals were trap shy, human shy and known to be able to survive on coastal brackish water and never enter an artificial watering point. Phase II demonstrated that a low density goat population (1 animal:67 hectares) could be effectively reduced by 70% through helicopter shooting.

The current goat population is located in pockets remote from management infrastructure and tracks. The overall density is estimated to be extremely low, being one animal:210 hectares. Phase III will establish what residual population level can aerial helicopter shooting achieve, and whether this residual population can be 'cleaned out' utilising on-the-ground techniques.

4. Foster public education regarding the impact of feral goats, and other feral animals, on the environment, efforts being undertaken to control feral goats and how these efforts assist covering threatened native species in Australia.

The Western Australian community is becoming increasingly aware of the damage feral goats are doing to our arid rangelands. This issue is receiving diverse media attention, to which this project has directly contributed through coverage on Regional television, statewide radio and written press. Project Eden has received considerable State, National and International media interest since its launch. As an integral component of Project Eden, this project will receive media coverage, further educating the public on the environmental impacts of feral goats.

1994/95 PHASE II ACTIONS AND OUTCOMES

1. Number of Feral Goats and Sheep Destroyed

The following details the monthly returns for Phase II of the Project:

Month	Numbers Destroyed	Method
July-September 1994	0	
October 1994	40	Trapped/Opportunistic shooting
November 1994	20	Trapped/Opportunistic shooting
December 1994/January 1995	55	Trapped/Opportunistic shooting
February 1995	1086	Aerial Helicopter shoot
March-June 1995	61	Opportunistic shooting
1-5 May 1995	25	Army Exercise
July 1995	19	Opportunistic shooting
August 1995	18	Opportunistic shooting
September 1995	19	Opportunistic shooting
October 1995	14	Opportunistic shooting
November 1995	30	Opportunistic shooting
31 October/November 1995	87	Army Exercise
December 1995	0	
Total	1474	

In the winter months of 1994, feral goats were highly dispersed on the Peninsula and it was not practical to allocate resources to target the small groups.

There was a continuing decrease in the number of feral goats and sheep that would enter traps in the 1994/95 (being the fifth) summer of destocking.

Since the helicopter shoot, there has been minimal evidence (tracks) of sheep and goats entering artificial watering points, and there has been no animals caught in trapyards since February 1995. All watering points have been closed except for two, being overflow dams of two artesian bores. There have been less than 20 feral goats and sheep that have been opportunistically shot at these points since

February. This outcome demonstrates that once the population has been reduced to a low level (say 1 goat:200 hectares), the provision of artificial watering points and trapping becomes an inefficient control method.

A concerted effort has been made since the February shoot to opportunistically shoot all feral goats and sheep discovered. This has included shooting all animals observed on Park patrols (including tracking down), follow up on visitor observations and reports, and the utilisation of Judas goats to locate small mobs.

Phase I and II of the project have been successful in significantly reducing the goat numbers on Peron Peninsula. At October 1993, it was estimated that there was a population of 3 000 animals (results from Phase I indicate that this was an underestimate). The 1994 helicopter shoot removed 1 479 animals, approximately 50% of the entire population. A further 1 085 animals were taken in Phase I, the total of 2 564 estimated at being approximately 73% of the feral goat and sheep population prior to the start of this project. Phase II of the project reduced the population by a further 1 474 animals, from visual observations, an estimate of 85% of the population. It is estimated that there is less than 500 animals remaining to be eradicated in Phase III.

2. Helicopter Shoot

The aerial helicopter shoot was conducted from the 31 January to 4 February 1995. Figure 1 illustrates the GPS location (taken at regular intervals) of the fixed wing plane used for aerial spotting, and demonstrates that the entire Peninsula was searched in the program (note that the GPS map poorly represents the real coastline). The dark patches reflect the 'hot spots' for goats. It demonstrates that the majority of feral goats that remain on the Peninsula continue to occur on remote coastal locations where natural brackish water may be found.

In 31.2 hours of flying, the helicopter shoot was successful in destroying 996 goats, 90 sheep, 2 cows (the last wild cattle on the Peninsula) and 1 fox. Figure 2 details the results of each flight. The success of the project is reflected in the decreasing density of animals, 68.3 hectares per animal in the 1994 shoot, compared to 109 hectares per goat in the 1995 helicopter shoot. From visual observation, it was estimated that approximately 80% of feral goats and sheep were removed, leaving less than 500 animals on the Peninsula at the completion of the February shoot.

The number of feral goats destroyed in a flight session significantly reduced from the beginning to the end of the program. On the first day (31 January) it averaged 101 animals per session, compared to an average of 22 animals per session on the last day (4 February). It is unlikely helicopter shooting is a cost efficient method when the result drops below 20 animals per flight session. On February 4, feral goats were highly dispersed and, thus, difficult to locate. There was a significant degree of search time during which time the helicopter was not fully utilised. This situation will be monitored carefully in Phase III of the project. It is anticipated that following the February 1996 helicopter shoot, the goat density will be at such a low level that it will be uneconomic to conduct further helicopter shoots. A cost evaluation at the completion of Phase III will provide further information on this matter.

As population density decreases, the cost in destroying each goat continues to increase (figure 3.) The cost per feral animal destroyed in the 1995 program was $12.84 compared to $11.81 in 1994, an increase of 8.7%. Importantly, this is balanced by the overall reduction in the cost of the program on an area basis for the Peninsula. The cost for the 1995 program was 14 cents per hectare compared to 17.5 cents hectare in 1994. As the overall objective of the project is habitat protection, the per hectare cost represents accurately the management benefits of the program.

The learnings from the first helicopter shoot in February 1994 were implemented in Phase II with success. It was concluded that there was no further refinement required to the techniques and policies that were previously developed.

3. Involvement of the Australian Army

The SAS Sniper Squadron (approximately 20 men) of the Australian Army were utilised on the feral goat control program in May and November, 1995. This exercise provided real benefits both to the project and as training exercises for the squadron (stalking, tracking, patience, camouflage, night work and shooting skills). In May, the exercise included night spotlighting in known 'hot spots' (identified by presence of tracks), and personnel 'in hiding' at hot spots and in the vicinity of artificial watering points. These methods produced limited results with only 25 feral goats being destroyed in a 5 day period.

In November, an alternative technique of access roads being raked at night, and Army personnel the next morning tracking mobs that crossed the roads during the night, proved to be highly successful. In an eight day period, 84 goats and 3 sheep were destroyed. The Army is keen to continue its involvement in the project, and the plan is to utilise this method in April to target small groups that mob together after the helicopter shoot in February. If required to assist in final eradication, a second exercise may be conducted in November 1996.

4. Use of 'Judas' Goats

To be able to locate small mobs of feral goats in remote locations on Peron Peninsula, a decision was made to utilise 'Judas' goats. In the 1995 autumn

two goats were captured, fitted with radio transmission collars and released. Every two months these goats were tracked and located, and the other goats in the mob destroyed. This technique appears to be effective in cleaning up the residual population and will continue to be used (and potentially expanded) following the February 1996 shoot.

Male and female goats have different social behaviours, and it was thought that this may impact on their efficiency as a 'Judas' goat. To determine if there was a difference between the sexes, both a young male and a young female goat were collared. Throughout the exercise, both animals demonstrated that they were able to locate and join with small mixed sex mobs. Therefore, if the 'Judas' goat component of the project is expanded, animals of both sex will continue to be utilised.

5. Project Eden

The operational component of Project Eden began in 1995. This involved monitoring of fox and feral cat numbers, aerial baiting for foxes, trial of various cat bait mediums, research on cat behaviour, introduction of European and Spanish fleas to assist in the spread of myxomatosis, construction of fire buffers in the Francois Peron National Park, erection of a electrified feral barrier fence at Taillefer Isthmus and monitoring of native mammal populations. In 1996, further buffer baiting for foxes will aim at keeping the fox population at a low level, a strong focus will be given to feral cat control and a more virulent strain of myxomatosis will be introduced to assist in keeping the rabbit population at a low level. Regular maintenance of the feral barrier fence should ensure that there is no recruitment of feral animals onto Peron Peninsula. If populations of all feral animals can be reduced to a significant level by late 1996, an assessment will be made on the feasibility of a successful re-introduction

of threatened and endangered native mammal fauna at this time.

6 Publicity

A range of positive public attention was obtained in relation to the helicopter shoot and goat eradication program. Media activities during the year included a news item on GWN television, articles in regional newspapers in Geraldton and Carnarvon, articles in agricultural newspapers and newsletters, and radio interviews on ABC regional and Perth radio stations.

Project Eden has received considerable media interest (two leaflets on the Project are enclosed) and the importance of the goat eradication component of the Project has been included in these educational opportunities. Examples include coverage on ABC 7.30 Report, Western Australian Earth 2000 Supplement, Australasian Post, BBC National History Program, international television (Japan, France, England, Korea) and Channel 7 Wildwest Program, and Landscope Magazine (article enclosed). If re-introductions proceed and are successful, it is inevitable that there will be increased media attention, with Peron Peninsula providing a key educational flagship for the critical arid land nature conservation issues in Australia.

Current Nature Conservation Benefits from the Project

The natural vegetation of Peron Peninsula has significantly regenerated in the last five years with the removal of the majority of feral goats and sheep., A key indicator has been a significant increase in abundance of native seedlings younger than 5 years. In particular, in previously degraded areas, there is a profusion of plant growth and, thus, stabilisation of the ground surface. There has been a decrease in disturbance site weeds on the Peninsula particularly in previously high concentration areas for feral goats and

sheep, such as around watering points. Vegetation monitoring sites have been installed to monitor these changes.

Of particular interest, acacia shrubs have re-established a canopy of foliage over the shrub (this was previously grazed off by feral goats and sheep). This appears to have provided important habitat protection (camouflage) for small scrub nesting birds, with a resulting increase in breeding success for these species. For example, the threatened Thick-Billed Grasswren (Amytornis textilis) has significantly increased in abundance on the Peninsula in the last four years. These findings are being investigated by a PhD student from Murdoch University.

In 1990, only two small coastal pockets (less than 20 animals) of the Euro (Macropus robustus) were known on Peron Peninsula. In the last two years, the numbers have increased with evidence of animals occurring at inland sites. The evidence suggests that in this situation, the Euro population was displaced from a large section of its habitat by the large number of sheep and feral goats that were on the Peninsula when it was run as a pastoral property.

The small native mammal population has increased since the successful fox baiting in April 1995. In addition, despite below average winter rainfall, there has been an explosion in the first year emu chick population on the Peninsula. The conclusion is that prior to 1995, there had been a high fox predation on emu eggs and young emu chicks.

Financial Situation of ANCA Funds

ANCA funds of $18 750 were provided for Phase I of the project, and $12 750 for Phase II. These funds were provided to complete the aerial helicopter shoot component of the project. Figure 3 details costs of $14 020.68 associated with helicopter hire, spotter plane hire, Avgas fuel, and ammunition for the February 1995 shoot.

ANCA Funds used as at 30 June 1995

Helicopter Shoot	Allocated	Actual Expenditure
Phase I - Feb 1994	18 750	17 477.76
Phase II - Feb 1995	12 750	14 020.68
Total	31 000	31 498.44
	Deficit	498.44

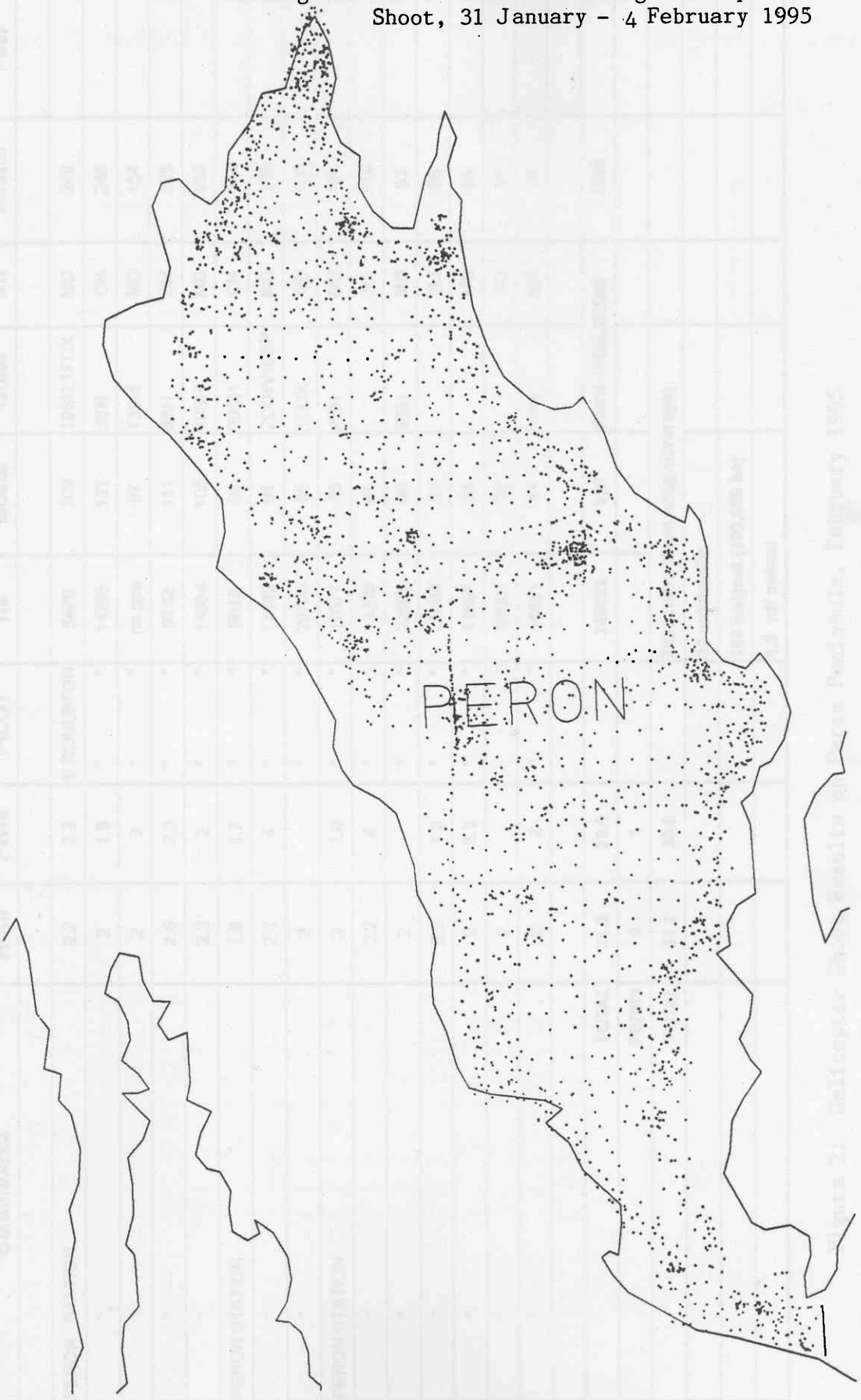
The overall shortfall of $498.44 has been met by the CALM Gascoyne District budget. For the 1995 Helicopter shoot, CALM Gascoyne District salary costs were $4 050.28 and vehicle running costs of $803.69.

ANCA has provided funds for Phase II of the project, being $12 750 to cover costs associated with the helicopter shoot in February 1996.

Planned Actions 1996

January:	Monitor location of populations of feral goats on the Peninsula to be targeted in the helicopter shoot.
	Determine approximate location of Judas goats to identify potential hot spots.
February 2-6:	Helicopter Shoot (ANCA funds).
Ongoing:	Once every two months track Judas goats and destroy the other feral goats in the mob.
	Assess the need to expand the Judas goat program
	Maintain opportunistic shooting
	Follow up sightings by park visitors
	Maintain electrified feral barrier fence
April:	Army 'track and destroy' exercise
	Prepare final report on Phases I, II and III for ANCA
November:	Army 'track and destroy' exercise (if necessary).

Figure 1: GPS Plotting of Fixed Wing Aerial Spotting Coverage of Peron Peninsula during Helicopter Shoot, 31 January - 4 February 1995



				FERAL GOAT ERADICATION CAMPAIGN								
		PERON										
Date	Flt	Station/Area	HChr	FWhr	PILOT	Ha	Goats	Other	Sh	Ammu	Fuel	
31-Jan-95	1	PERON STATION	2.2	2.2	E.ROULSTON	8470	109	19SH,1FOX	MD	249		
	2	"	2	1.8	" "	14355	101	3SH	CH	248		
	3	"	2	2	" "	no gps	87	13SH	MD	154		
1-Feb-95	4	"	2.5	2.3	" "	9742	111	8SH	CH	285		
	5	"	2.3	2	" "	14834	108	10SH	MD	192		
	7	PERON STATION	1.6	1.7	" "	9619	64	20SH	CH	174		
2-Feb-95	8	"	2.1	4	" "	17882	91	2COW10SH	MD	208		
	9	"	2		" "	29706	55	1FOX	MD	105		
	11	PERON STATION	2	1.9	" "	17077	48	4SH	MD	101		
3-Feb-95	12	"	2.2	4	" "	18269	61		RJ	119		
	13	"	2		" "	22990	45	3SH	MD	83		
	14	"	2.3	1.8	" "	21664	51		RJ	86		
4-Feb-95	15	"	2	3.9	" "	11867	34		MD	55		
	16	"	2		" "	33596	20		RJ	34		
	17	"	2	2	" "	14951	11	1 fox	MD	16		
		TOTAL	31.2	29.6		245022	996	90SH,4FOX,2COW		2109		
		FERRY	0	1								
		TOTAL	31.2	30.6		7853 ha/hr (fixed wing coverage)						
						32 animals/hr						
						109 ha/goat (100,000 ha)						
						1.9 rd/ animal						

Figure 2: Helicopter Shoot Results on Peron Peninsula, February 1995

FERAL GOAT ERADICATION PROGRAMME
HELICOPTER SHOOTING

PROGRAM: PERON PENNINSULA, C.A.L.M. DATE: 31 JAN - 4 FEB 1995

STATION	AREA (ha)	ANIMALS SHOT (number)	HELICOPTER (hours)	Goats per Hour
PERON	245022	1092	31.2	32
PERON	100000	1092	31.2	32

Helicopter	Type BELL 47				
	Hire-Ferry	hours	@ $	per hour	$
	-Shoot 31.2	hours	@ $220.00	per hour	$ 6864.00
	Fuel	drums	@ $	per drum	$ 3000.00
Spotter Plane	Type CESSNA 150.				
	Hire 30.6	hours	@ $100.00	per hours	$ 3060.00
	Fuel	litres	@	per litre	$
Ammunition	Type 7.62mm 130g				
	2109	rounds	@ $0.52	per round	$ 1096.68
				TOTAL	**$14020,68**

COST PER FERAL ANIMAL DESTROYED $ 12.84

COST PER HECTARE COVERED (100 000) 14c

COSTINGS

	HOURS	COST ($)
Budget		
Actual	31.2	14020.68
Difference		

Figure 3: Expenditure of FPP48 Funds, Phase II