Dreaming of a Future: The Re-introduction of Rare and Endangered Animals to the Gibson Desert. N. BURROWS 1988

Introduction

In 1988 an Endangered Species Advisory Committee was established to develop a national strategy for the conservation of species and habitats threatened with extinction. Senator Graham Richardson, in his foreword to the draft national strategy, noted that; "Since 1788, 18 species of Australian mammals have become extinct; this is half of all the mammal species that have become extinct worldwide in recent historical times - the worst record of any country in the world".

The central Australian deserts in particular have suffered a massive and sudden loss of mammal fauna, unparalleled in any relatively undisturbed area any where else in the world. Some 33% of the mammal species are extinct and 90% of all mammal species with an adult body weight between 35 grams and 5500 grams (critical weight range) are either extinct or endangered (Burbidge et al 1987, Burbidge et al 1988). Most species persisted in the desert until as recently as 30-50 years ago. Mammals which have declined, become totally extinct or locally extinct from the arid region include Golden Bandicoot (*Isoodon auratus*), Desert Bandicoot (*Perameles eremiana*), Pig-footed Bandicoot (*Chaeropus ecaudatus*), Greater Bilby (*Macrotis lagotis*), Lesser Bilby (*Macrotis leucura*), Brushtail Possum (*Trichosurus vulpecula*), Brush-tailed Bettong (*Bettongia pencillata*), Burrowing Bettong (*Bettongia lesueur*), Spectacled Hare-wallaby (*Lagorchestes conspicillatus*), Rufous Hare-wallaby (*Lagorchestes hirsutus*), Central Hare-wallaby (*Lagorchestes asomatus*) and Numbat (*Myrmecobius fasciatus*).

Three main hypotheses have been proposed to explain mammal decline; changes in fire regimes, the effects of exotic predators and competition from exotic herbivores. (Burbidge et al 1987).

Aborigines used fire for hunting, the regeneration of food plants, signalling, and many other purposes. This extensive use of fire by Aborigines resulted in a tight mosaic of areas of different age since fire. The resultant environmental diversity probably favoured the desert mammals and certainly prevented the development of large wildfires.

As Aborigines moved to European settlements and the deserts became depopulated, a fire regime of infrequent but very extensive hot summer wildfires, mostly started by lightning, became established. This has resulted in a relatively homogenous landscape with large areas of vegetation of the same age since fire. The current fire regime is thought to have had a profound effect on the mammals, particularly those in the critical weight range (CWR), depriving them of diversity of food and shelter and leading to rapid decline and local or total extinction.

The second hypothesis suggests that indigenous mammals could not cope with exotic predators. Feral cats and foxes are now widespread and abundant in the deserts. It is not known when cats first became established, since they were present when European explorers first entered the desert in the latter half of the 19th century. Most Aborigines in the central deserts regard cats as always having been present. They may have established from 17th century shipwrecks on the west coast. Foxes entered later, becoming first established in parts of the centre by the 1930's.

The third hypothesis involves competetion from introduced herbivores. Two introduced herbivores are common in the interior. Rabbits entered from the south-east, becoming widespread after the 1890's. The camel became feral from escapes from pack animals first used in the latter half of the 19th century. While rabbits may have contributed to the decline in native mammals it is unlikely that camels have had a major impact.

This project in the Gibson Desert Nature Reserve, which aims to restore some of the former range of mammals now locally extinct in deserts on the Australian mainland, will be a benchmark in the long term process of conserving species threatened with extinction and will receive national and international attention.

Research Project Objectives

The ultimate goal is to improve the conservation status of particular arid zone mammals by establishing mainland colonies on desert reserves. The objective of this research project is to determine whether or not specific mammal species which once existed in the arid zone but are now locally extinct, can be successfully re-introduced to the Gibson Desert Nature Reserve, and later, to other desert reserves. Specifically the project will aim to test the hypotheses that, in deserts, a diversity of interlocking fire-induced vegetation stages to provide a fine-grain mosaic of resources, together with feral ~~animal~~ predator control, ~~predators,~~ (the fox and cat) and herbivores (the rabbit) is necessary for the survival, breeding and dispersal of critical weight range mammals currently endangered or locally extinct.

Methods

The project is a part of a larger programme of research by CALM Research Scientists into the role of fire in desert plant and animal communities.

In the Gibson Desert Nature Reserve the programme comprises a team of CALM scientists and technical assistants investigating various aspects of fire ecology. Research topics and scientists involved in the programme are:

Program Co-ordinator - Mr Neil Burrows

Mammal re-introductions - Dr Per Christensen and Mr Graeme Liddelow

Fire behaviour - Mr Neil Burrows and Mr Alex Robinson

Fire effects, reptiles - Mr David Pearson and Ms Janet Gardner

Fire effects, birds - Dr Andrew Burbidge and Mr Phil Fuller

Fire effects, vegetation - Mr Neil Burrows and Mr Alex Robinson

Feral predator control - Dr David Algar and Mr Tom Leftwich.

Communications plan - Ms Carolyn Thomson

In addition, complementary studies by CALM scientists are ongoing in other reserves. David Pearson and Janet Gardner are studying the effects of fire on reptiles and small mammals in the Queen Victoria Spring Nature Reserve (Great Victoria Desert) and Karan Maisey and Bruce Ward are monitoring vegetation response following fire on the Plumridge lakes Nature Reserve (Great Victoria Desert). David Pearson is liaising with local Aboriginal communities and gleening Aboriginal knowledge of the deserts. This approach to research on CALM lands is in keeping with the *modus operandi* of the Fire Program, which is to undertake integrated and complementary research into major vegetation types on a systematic basis. Further details regarding the individual research projects associated with the desert programme are readily available. The programme in the Gibson Desert commenced in 1987 and at this stage, techniques for aerial patch burning have been developed and successfully tested. The various fire effects studies mentioned above are established and yielding information. A preliminary survey of fox and cat densities and some baiting has already been carried out. The programme has now reached the stage of selecting and preparing sites for mammal re-introductions and actually re-introducing locally extinct, rare and endangered mammals.

<u>Re-introducing rare and endangered mammals to the arid zone.</u>

Initially, three decisions had to be made with regard to the re-introduction phase of this program.

1. Are we ready to commence this project? - do we have sufficient information?

2. Where is the ideal place to conduct the research?

3. Which species of mammals should be selected for study?

In relation to the first question we considered that there is enough information on the biology of the species and on fire behaviour to carry out the project successfully.

In relation to the second question, where should a re-introduction project be attempted?, a number of criteria were set:

i) It must be within the known former range of the species to be re-introduced.

ii) Land tenure must be secure.

iii) Human impact should be negligible.

iv) The area should be close to resources so that predator control and fire management are practical.

v) Feral predator pressure should be low.

vi) The area should be accessible to researchers and management staff.

In relation to the third question on which species should be studied, the following criteria were set:

i) There should be a reasonable knowledge of their biology and ecology.

ii) They should have been fairly abundant in the area selected for re-introduction.

iii) They should be available in reasonable numbers without deleteriously affecting the viability of existing populations.

iv) They should be species that are likely to remain near the place of release (i.e. territorial).

v) They should be endangered, so that re-introduction will further species conservation.

Obviously, not all areas within the arid zone meet all criteria and not all animals met all criteria. After lengthy consideration, a decision was made to study the re-introduction of Burrowing Bettong or Boodie (*Bettongia lesueur*) and Golden Bandicoot (*Isoodon auratus*) to the Gibson Desert Nature Reserve (GDNR).

The choice was based on the following rationale:

- CALM has management control over GDNR
- There is definite evidence of the former presence of these species from local Aborigines, from historical journals (e.g. Giles 1898) and from museum records in the 1930s. The burrow systems of Boodies are still present.
- Many mammals are still present in the area, including critical weight range mammals such as the Dalgyte (*Macrotis lagotis*), Mulgara (*Dasycercus cristicauda)* and at least 10 other native mammals.
- The decline of Boodies and Bandicoots was relatively recent (1940's).
- Feral animal numbers in the GDNR are low.
- Techniques for aerial patch burning have been developed and operational burning commenced in 1988.
- There is a low risk of extensive wildfires disrupting the experiment.
- The GDNR is well buffered from the effects of farming and grazing such as feral animal and plant invasions.
- The GDNR is reasonably accessible and has a number of serviceable airstrips nearby.
- Boodies and Golden Bandicoots are relatively robust and adaptable and are abundant on offshore Islands. Animals for re-introduction will come from Barrow Island which has a climate broadly similar to GDNR. The climate of GDNR is more arid than Barrow Island, but rainfall is less variable on the GDNR. The vegetation structure of Barrow Island and GDNR is broadly similar, with many common genera, but few common species. Whether or not re-introduced animals can cope with these differences in climate and vegetation will be revealed by this project.

A significant disadvantage of the GDNR is that it is a considerable distance from management resources and researchers, as are most of the desert reserves. This can be overcome to some extent by the use of aircraft and by establishing a permanent field station on the Reserve.

The re-introduction program will progress in stages. Having selected the study area, the species for re-introduction and the source of animals, a pilot study will preceed the major program of re-introduction of animals to the GDNR.

Pilot Study

The pilot study has two primary aims:

i) To develop a highly effective and practical feral animal control program.

ii) To determine whether a small number (4-5) of "pioneer" animals of each species are able to locate suitable habitat and survive in the Gibson Desert Nature Reserve.

Methods

In relation to the first aim the study area (see Figure 1) will be surveyed to establish the distribution and density of fox, cat, dingo and rabbits. Details of methodology are not presented here, but are available on request. Based on these findings, an aerial baiting prescription using 1080 poison will be prepared and implemented, followed by a post treatment survey of feral predator density.

In relation to the second aim, Dr Per Christensen and Graeme Liddelow will visit Barrow Island to inspect habitat and to observe animal behaviour. In consultation with Dr Geoff Short, a CSIRO scientist studying the biology and ecology of the Boodie on Barrow Island, Dr Christensen will finalise release site locations within the GDNR study area.

Following the feral animal control program, 4-5 pioneer animals of each species will be flown from Barrow Island to the GDNR and released near sites which have been selected using the best available information on the species biology. The animals will be fitted with radio collars and will be tracked continuously. Local Aboriginal people will be invited to assist with tracking and observing animal behaviour. Radio tracking and detailed observation of animal activity will provide information about their behaviour in their new environment and their selection of sites on which to live. Information obtained on site selection by these pioneer animals will be used in the final choice of sites for the main release of animals in the next stage of the project. This technique has been used successfully on woylies (*Bettongia penicillata*) re-introduced to forest areas of the south-west by Dr Christensen.

The pilot study will also attempt to obtain information on the importance of a fire mozaic to the animals. This will be done by providing a choice of unburnt and patch burnt habitat at the release site. Observations will be made on the animals choice and use of these two different habitats.

The release site and surrounds will be baited to control feral predators. This is seen to be absolutely necessary for the pilot study. Lack of resources and logistical problems prevents replication of treatments. Any strong preferences for either the burnt or the unburnt treatment should be obvious from close observations of the animals.

The following is a schedule of events for the pilot study:

1. March/April 1990 - Dr Christensen and Mr Liddelow to visit Barrow Island. Individuals from local Aboriginal communities may also visit Barrow Island.

2. May/June 1990 - Dr Christensen, Dr Algar, Mr Liddelow and Mr Leftwich to decide on precise locations of release sites within the GDNR study area and to survey density and distribution of feral predators. Baiting prescription to be prepared.

3. September 1990 - Aerial baiting according to above prescription to be implemented. This will involve assistance from CALM staff based at Kalgoorlie. Additional hand burning to be done around release sites. Rabbits baited.

4. May 1991 - Pioneer animals for re-introduction flown from Barrow Island to GDNR and released. Study area baited again. Intensive radio tracking and monitoring of pioneer animals. This will continue for 12 months after release or until animals are lost or transmitters cut out. Where possible Aboriginal people from nearby communities will be involved at their discretion.

5. September 1991 - Aerial patch burning and baiting of study area.
6. May 1992 - air lift of 30-40 animals of each species, pending outcome of pilot study.

The next stage of the re-introduction program will depend largely on the outcome of the pilot study and on the fate of the pioneer animals. In brief, should animals successfully colonize the areas, then the project will be expanded. Some thirty to forty animals of each species will be re-introduced at two or three locations throughout the study area. This will necessitate ongoing patch burning and feral animal control programs. Should the pioneer animals perish, then the project will be re-assessed and new proposals developed with the benefit of experience. The study will further investigate the importance of both patch burning and predation by feral animals in the survival of re-introduced species. These results will be used to develop management prescriptions for further re-introductions in other areas.The following is a cost estimate for the program. This assumes re-introduced animals will survive. If this is not the case, then a second attempt will be made with the benefit of experience.

NOTE: At this stage WAPET have not been approached. Contributions shown below are what might be expected from WAPET.

Publicity

Conservation of rare and endangered mammals will attract considerable attention from the scientific community and the community at large. Already, several journalists have expressed an interest in the project, including journalists from the major newspapers, Beyond 2000, Australian Geographic and Malcolm Douglas Films.

As CALM considers the support of the public is an essential part of conservation and land management, this project will be supported by an effective communications program, which is appended.

Television networks will be invited to cover the project, either as news items, as documentaries or as special features. This project has strong media appeal, given the high profile of conservation, the fact that the project deals with rare and endangered animals, the harsh beauty of the desert landscape, and Aboriginal people and their culture.

As well as newspaper and television coverage, the project and organisations involved, will be widely publicised through technical reports, scientific journals, conferences, workshops, and through LANSCOPE, Western Australia's leading conservation and wildlife publication.

Acknowledgements

Material contained in the Introduction has been taken from "Vanishing Desert Dwellers" by Andrew Burbidge *et al*, LANDSCOPE Vol. 2, No. 4, 1987.

Cost Estimate

Mammal Re-introduction Program

Financial Year 1989/90

1. Visit Barrow Island (2 people, 7 days)

	Salaries	Plant	Materials	Total
CALM contribution	2,583	-	-	2,583
WAPET expect.contribution	Ruturn air fare Perth-Barrow Island. Accomodation of Barrow, Vehicle use.			2,000

2. Field Trip, GDNR (4 people, 10 days)

CALM contribution	6,532	3,720		10,252
WAPET expected contribution			2,000	2,000
	Total CALM 1989/90			12,835
	Total WAPET			4,000
	TOTAL 1989/90			$16,835

Financial Year 1990/91

1. Aerial baiting program

	Salaries	Plant	Materials	Total
CALM contribution	6,532	3,720	16,000	10,252
Federal grant		20,000	~~1,600~~	36,000
WAPET expected contribution			2,000	2,000

2. Establish field station GDNR

CALM contribution	3,690	3,500		7,190
WAPET expected contribution			6,700	6,700

3. Purchase radio tracking equipment

	Salaries	Plant	Materials	Total
CALM contribution			1,500	1,500
WAPET expected contribution			2,500	2,500

4. Transport animals Barrow to GDNR (Islander VH-ESA)

CALM contribution	1,480		400	1,880
WAPET expected contirbution		3,500		3,500

5. Field work, radio tracking animals (cost estimate for 6 months).

CALM contribution	38,880	13,500		52,380
WAPET expected contribution			8,000	8,000
	Total CALM 1990/91			73,203
	Total WAPET expected contribution			22,700
	Federal grant			36,000
	TOTAL 1990/91			$131,903

Financial Year 1991/92

1. Aerial baiting program

	Salaries	Plant	Materials	Total
CALM contribution	7,054	4,017	2,000	13,071
Federal grant		10,000	8,000	18,000
WAPET expected contribution			1,500	1,500

2. Aero-burning program

CALM contribution	4,000	10,000	200	14,200
WAPET expected contriubtion			2,500	

3. Air-lift second batch of mammals

	Salaries	Plant	Materials	Total
CALM contribution	2,400		600	3,000
WAPET Expected contribution		3,800		3,800

4. Field Work

CALM Contribution	12,960	4,500		17,460
WAPET expected contribution			5,000	5,000
	Total CALM 1991/92			47,731
	Total WAPET			12,800
	Federal grant			18,000
	TOTAL 1991/92			78,531

GRAND TOTAL: CALM 133 769
WAPET 39 500
FEDERAL 54 000

Summary

Australia's arid zone has suffered an alarming loss of native mammal fauna over the last 30-50 years. Total and local extinctions are probably due to the combined effects of predation by foxes and cats, changed fire regime associated with modification of traditional Aboriginal lifestyle and competition from feral herbivores such as rabbits and camels.

A team of scientists from CALM's Research Division is studying fire behaviour, fire ecology and feral animals in the Gibson desert. The aim is to improve the conservation status of rare and endangered fauna in the arid zone. This will culminate in the re-introduction of Burrowing Bettongs and Golden Bandicoots from thriving populations on Barrow Island.

This important, unique and exciting project will require the support of Federal and State governments, Aboriginal communities and private corporations. Over the next three years, the Federal government, through the Endangered Species Program, will provide $54,000 for fox and cat control. The State government, through CALM, will need to spend a total of $133,769 on the re-introduction project. WAPET are invited to participate in this project by providing funds and resources to assist with the translocation of animals from Barrow Island to the Gibson Desert Nature Reserve, and with subsequent monitoring.

Summary to go at beginning.

Contributions by WAPET would be by way of:

i) Sponsoring a field trip by two CALM scientists to Barrow Island in March/April 1990 to observe Burrowing Bettongs and Golden Bandicoots. Scientists would fly from Perth and spend 5 days on the Island

ii) Sponsor the air lifting of animals from Barrow Island to the Gibson Desert Nature Reserve in May 1991.

iii) Assist with the purchasing of radio tracking equipment and with costs associated with field work during the project.

iv) Assist with the establishment of a field station on the Gibson Desert Nature Reserve.

The total estimated cost of the project is:

CALM	$133,769
WAPET	$39,500
Federal Government	$54,000

As a participant in this project, WAPET will benefit from considerable positive media exposure. A detailed communications plan is attached and involves high media profile events such as a media launch on Barrow Island, newspaper and television coverage, articles in popular magazines and journals, poster displays throughout Perth such as at the zoo, Museum and major shopping centres.

Neil Burrows
Project Co-ordinator