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RECOVERY PLAN FOR THE SHARK BAY MOUSE

(*Pseudomys fieldi*)

A report submitted to
Australian National Parks and Wildlife Service
Endangered Species Program (Project 149)

by

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SUMMARY

Current Species Status:
Endangered (ANZECC 1991);
Threatened species (W.A. Wildlife Conservation Act 1950).
The Shark Bay Mouse is currently restricted to Bernier Island in Shark Bay, Western Australia. Population size is unknown. The species occupied most of the south-west quadrant of Australia prior to European settlement.

Habitat Requirements and Limiting Factors:
On Bernier Island, the Shark Bay Mouse inhabits coastal dune vegetation dominated by spinifex and coastal daisy bush but also occurs at lower densities in inland *Triodia/Acacia* heath. Its preferred habitat on the mainland, especially inland, is not known. Reasons for the decline of the Shark Bay Mouse and its extinction on the mainland are also unknown but the process may have begun prior to European settlement due to a subtle climatic change. No burrows have ever been recorded for the species but tunnels and runways in piles of seagrass have been observed. It has been speculated that the apparent lack of deep, complex burrow systems has made the Shark Bay Mouse vulnerable to the physical effects of overgrazing and trampling by domestic and feral stock and to predation by foxes and feral cats. These may be the primary factors responsible for its decline.

Recovery Plan Objective:
Downlisting to vulnerable (ANZECC) in 10 years.

Recovery Criteria:
(1) Distribution and abundance retained on Bernier Island.
(2) A self-sustaining population established on another offshore island.
(3) Two self-sustaining populations established on the Shark Bay mainland.

Actions Needed:
A Recovery Team comprising members from CALM, CSIRO, Useless Loop Salt, Agriculture Protection Board and ANPWS will be established to coordinate and supervise the following actions:
(1) Research into abundance, distribution and biology of the Shark Bay Mouse on Bernier Island.
(2) Experimental translocation to Heirisson Prong.
(3) Translocation to an offshore island.
(4) Eradication of introduced predators, rabbits and goats at mainland translocation site.
(5) Translocation to mainland.

Estimated Cost of Recovery: 1991 prices in $000's/year.
Total cost (TC) and Endangered Species Program (ESP) funds required (= TC - CALM contribution).

Actions	(1)		(2)		(3)		(4)		(5)		Total	
	TC	ESP	TC	ESP	TC	ESP	TC	ESP	TC	ESP	TC	ESP
1992	71.6	62.1									71.6	62.1
1993	2.2	2.2	57.3	49.8							59.5	52
1994	2.2	2.2	54.4	46.7							56.6	48.9
1995	2.2	2.2	2.6	2.6	57.4	49.5	190	40			252.2	94.3
1996	2.2	2.2	1.3	1.3	53.4	45.3	45.4	40			102.3	88.8
1997	3.3	3.3	1.3	1.3	2	2	7.4	2	61.1	53	75.1	61.6
1998	2.2	2.2	1.3	1.3	2	2	7.4	2	58	49.9	72	58.5
1999	2.2	2.2	2.4	2.4	3.1	3.1	7.4	2	58.6	50.2	72.6	58.8
Total	88.1	78.6	120.6	105.4	117.9	101.9	257.6	86	177.7	153.1	761.9	525

Biodiversity Benefits: Control programs for introduced predators and feral animals will enable re-introductions of other rare fauna. Translocations of the Shark Bay Mouse will become part of the reconstruction of the original mammal fauna on the Shark Bay mainland.

1 INTRODUCTION

1.1 Description of Species

The Shark Bay Mouse *Pseudomys fieldi* Waite 1896 (= *P. praeconis* Thomas 1910) is a robust, long-haired pseudo-mouse of about 30-50 g in weight (Ride and Tyndale-Biscoe 1962; Watts and Spencer 1978; Watts and Aslin 1981). The dorsal fur is a mixture of pale yellow-fawn underfur and dark guard hairs, giving a grizzly appearance, and the coat colour grades from a delicate buff shade on the sides to white underneath (Watts and Aslin 1981). The feet are white and the tail is slightly longer than head and body, and is bicoloured grey and white with a dark tuft of hairs at the end (Watts and Aslin 1981).

P. fieldi was first described by Waite in 1896 from a specimen collected near Alice Springs during the Horn Expedition in 1895 (Watts and Aslin 1981). The skull was badly crushed and until recently this was thought to be the only record of *P. fieldi*. Thomas (1910) described *P. (Thetomys) praeconis* on the basis of a specimen collected at Herald Bight on Peron Peninsula in Shark Bay, Western Australia, in 1858 and a skull collected on Bernier Island, also in Shark Bay, in 1906. Mouse specimens collected from the Victoria Plains near New Norcia, Western Australia, in 1843 were identified by Mahoney (1969) as *P. gouldii* but have since been re-identified by Baynes (1990) as *P. praeconis*. Though *P. praeconis* has been trapped on Bernier Island on several occasions since (Watts and Aslin 1981), these were the last specimens to be collected on the mainland. *P. fieldi* and *P. praeconis* have recently been synonymised following many years of examining sub-fossil remains from cave surface deposits at sites from Shark Bay across to Uluru in the Northern Territory (Baynes 1987b; Baynes 1990).

1.2 Distribution

P. fieldi once had an extensive distribution (Fig. 1), occupying much of the south-west quadrant of Australia. Examination of cave surface deposits have indicated that the species once occurred across the upper Gascoyne, northern goldfields and Gibson Desert (Baynes 1990), at Uluru (Baynes 1987b), and the Nullarbor Plain (Baynes 1987a), as well as in the Shark Bay region, including Dirk Hartog Island (Baynes 1990), and south along the west coast to Cape Leeuwin (Archer and Baynes 1973; Chapman and Kitchener 1977).

At present, *P. fieldi* is known to be extant only on Bernier Island, 50 km west of Carnarvon in the Shark Bay region. There has been no estimate of the population size on Bernier Island, however they appear to be abundant in their coastal habitat (Morris *et al.*, unpublished). A search for mainland populations of *P. fieldi* was carried out in 1989 with funding from World Wide Fund for Nature Australia, but failed to confirm any presence of the species at selected mainland survey sites in the Shark Bay area (Sanders and Harold 1990).

1.3 Habitat

On Bernier Island, *P. fieldi* inhabits coastal dune vegetation dominated by *Spinifex longifolius* and *Olearia axillaris* (Ride and Tyndale-Biscoe 1962; Robinson *et al.* 1976). Recent surveys suggest that the species occurs in most coastal sandy areas around the Island (Morris *et al.* unpublished). It also occurs at lower densities in inland *Triodia/Acacia* heath (Robinson *et al.* 1976). Nothing is known of the preferred habitat on the mainland, though it is likely that it was from the coastal *Spinifex longifolius* habitat at Herald Bight that the species was first collected (Morris *et al.* unpublished).

No burrows have ever been recorded for *P. fieldi*, however they make tunnels and runways in heaps of seagrass piled up at the tops of the beaches during winter storms (Robinson 1983).

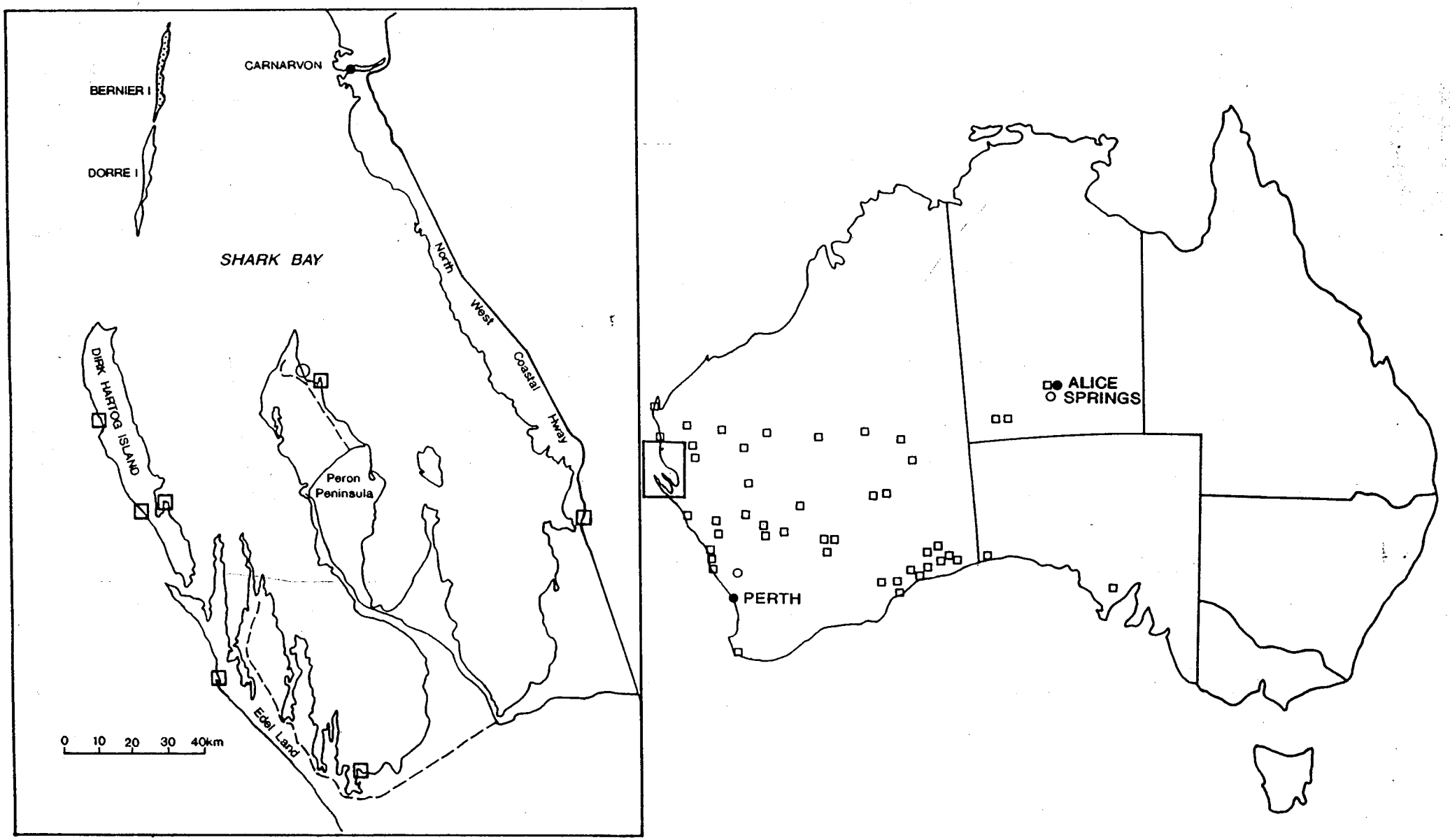

Figure 1

Past distribution of Pseudomys fieldi based on subfossil remains from cave surface deposits and museum specimen collections. Present distribution is limited to Bernier Island, indicated by shaded area. Data from A. Baynes.

1.4 Life History/Ecology

1.4.1 Diet

Not a lot is known about the diet of the Shark Bay Mouse. Scats collected from four individuals on Bernier Island contained petals and anthers from flowers, possibly of *Olearia*, leaf fragments of *Olearia*, leaf or stem parts of a fleshy dicotyledonous plant and insect fragments (Robinson *et al.* 1976). Stomach contents from a single specimen collected by Ride and Tyndale-Biscoe (1962) contained plant material and an insect fragment. It has also been observed eating spiders (Morris, personal observation).

1.4.2 Reproduction

The limited information on the reproduction of the Shark Bay Mouse has been obtained from observations of a captive male and female which produced two litters, one of four and one of three, in the laboratory (Watts and Spencer 1978). The oestrus cycle appears to be less than 14 days and the gestation period is about 28 days. The young are born hairless and with ears folded down. At 11 days of age they are well furred and the ears are free but their eyes are still closed. The eyes open after 15 days and by 30 days the juveniles are weaned. They are attached to their mother's teats for the first 16 days from birth. The upper and lower incisors erupt by day three. By 100 days the mice have reached full adult size. The male was observed to share the nesting box with the female and young when the young were four weeks old. He also behaved protectively towards the young when the female was absent. Limited observations suggest that the Shark Bay Mouse breeds in late winter/spring (Robinson *et al.* 1976; Morris *et al.* unpublished).

1.5 Conservation Status

The Shark Bay Mouse is one of Australia's rarest mammals, and is now the only Australian mammal restricted to one island (excluding Tasmania). It is a declared Threatened species (W.A. Wildlife Conservation Act 1950) in Western Australia and is currently listed by ANZECC (1991) as Endangered.

The reasons for the decline of the Shark Bay Mouse are not known. It is possible that cats became established on the mainland prior to European settlement, from 17th century shipwrecks on the west coast (Burbidge *et al.* 1988). They may have been responsible for the decline and extinction of the species on the mainland. Burbidge and Fuller (1979) report that the Aborigines in the Warburton area blame the cat for the disappearance of native animals, however, many Aborigines of the central deserts regard the cat as always having been present (Burbidge *et al.* 1988).

The advent of the pastoral industry is closely associated with the date of last collection of specimens of *P. fieldi* both in central Australia and Shark Bay. A decrease in environmental productivity and loss of nutrients caused by grazing and trampling by domestic stock has been suggested as a mechanism for the extinction of Australian fauna (Burbidge and McKenzie 1989) and this mechanism may have been involved in the extinction of *P. fieldi* on the mainland. Morton (1990) suggests that the rabbit has been a major factor in mammal extinctions in the arid zone. Both native and exotic mammals in the arid zone depend on pockets of fertile and productive habitat to survive droughts. Competition and habitat degradation caused by increases in rabbit numbers are exacerbated by successive droughts which eventually leads to the destruction of drought refuges and inevitably to extinctions. Altered fire regimes and predation by foxes and feral cats are cited as secondary factors.

The construction of deep, complex burrow systems may be an important factor in the survival of native rodents and this attribute is shared by all surviving species on the Shark Bay mainland. It appears that the Shark Bay Mouse does not construct burrow systems but rather builds tunnels and runways amongst vegetation (Robinson 1983; Watts and Aslin 1981). This behaviour would make it particularly vulnerable to cat and fox predation and the physical effects of stock grazing and trampling.

1.6 Existing Conservation Measures

Currently, the Shark Bay Mouse is protected from the above threats on Bernier Island which is part of the Bernier and Dorre Islands Nature Reserve. Feral goats were eradicated in 1984 and the island is free of exotic predators. Public access to Bernier Island is limited to day visits.

However, due to its restricted occurrence the species is highly vulnerable to extinction and protection of a single population on Bernier Island is not considered sufficient to ensure long term survival.

1.7 Strategy for Recovery

To achieve the recovery objectives of this Plan (see 2 Recovery Objective and Criteria, p. 9), it will be necessary to re-establish populations of the Shark Bay Mouse on the mainland and other islands through translocations. The recovery will be undertaken in four phases over a period of 8 years from 1992 to 1999.

Phase 1 Initiate research into population size, distribution and biology of *P. fieldi* on Bernier Island, 1992. This is an important first step in the recovery of *P. fieldi* as it will determine whether the population is large enough to support a translocation program and determine some habitat requirements and assist in site selection for translocations.

Phase 2 Undertake an experimental translocation to Heirisson Prong, 1993. This is important as it will provide added security for the species through an additional population, and provide information for subsequent translocations.

Phase 3 Undertake translocation to an offshore island, 1995. This will not involve the expense of exotic animal eradication or control and will result in a further security for the species. The island will be chosen by the Recovery Team (see below) at a later date.

Phase 4 Undertake translocation to mainland site, 1997. This will initially involve a program to eradicate rabbits, goats, foxes and cats (1995-1996) followed by a translocation (1997-1999) as part of a program to re-establish the former fauna of these areas.

A Recovery Team will be appointed to coordinate and supervise the recovery process and will comprise representatives from the Department of Conservation and Land Management (CALM) Research Division and Greenough/Gascoyne Regions, CSIRO Division of Wildlife and Ecology, Useless Loop Salt, the Agriculture Protection Board, the Australian National Parks and Wildlife Service and any other organisations that become involved with the recovery process in the future.

2 RECOVERY OBJECTIVE AND CRITERIA

The objective of this Recovery Plan is to achieve downlisting of the conservation status of the Shark Bay Mouse status to Vulnerable (ANZECC) within 10 years by

(i) retaining current distribution and abundance on Bernier Island,

(ii) obtaining further information on population size, distribution and biological requirements on Bernier Island and

(iii) re-introducing the species to other sites within its previous distribution in the Shark Bay region.

Achievement of the above objective will be assessed on the following criteria:

(1) Distribution and abundance maintained on Bernier Island. This is difficult to assess as the population may fluctuate considerably. However, if monitoring indicates there is no steady decrease in numbers and distribution over the recovery period, then this criteria will be considered to be fulfilled.

(2) A self-sustaining population established on an offshore island by 1997 with densities similar to those on Bernier Island.

(3) Two self-sustaining populations established on the Shark Bay mainland by 1999 with densities similar to those on Bernier Island.

3 RECOVERY ACTIONS

Recovery actions for the Shark Bay Mouse are presented below. Costings have been calculated at 1991 prices. It is proposed that a contract zoologist be employed to undertake the prescribed actions as indicated. Unless otherwise stated, CALM contributions include supervision of the contract zoologist (one tenth of a Research Scientist's salary) and vehicle standing fees ($2 500/year).

3.1 Research and Monitoring of P. fieldi on Bernier Island

3.1.1 Research into Population Size, Distribution and Biology of *P. fieldi* on Bernier Island

Before translocations can be undertaken, information is required on population size and distribution on Bernier Island, nesting habits and requirements, diet, genetic variation and reproduction. As well as aiding the appropriate management of Bernier Island Nature Reserve, this information will enable the Recovery Team to determine whether the population on the island can support a translocation program or whether captive breeding will be required. It will enable better habitat assessments for translocation sites based on dietary and nesting requirements and preferred habitat on Bernier Island. Knowledge of the genetic variation and relatedness of *P. fieldi* from various locations on the island will be important when trapping mice for translocations. Knowledge of reproductive biology will be important for the translocation program as it will help to determine the most appropriate timing for translocations and aid in the subsequent monitoring.

This research will be undertaken in 1992 by a contract zoologist with the assistance of volunteers and will require four trips to Bernier Island, each of three weeks duration. The research will involve systematic trapping using Elliott traps, radio-tracking radio-collared individuals to find nest sites or burrows, scat analysis to determine diet, and taking blood samples from mice at four separate locations on the island for DNA fingerprinting to determine genetic relatedness.

CALM's contribution will include $2 000 for camping equipment plus supervision and vehicle standing fees. ESP or other funds are required for contract zoologist's salary and equipment and support including a portable HF 2-way radio, radio telemetry equipment, DNA fingerprinting, 200 Elliott traps, travel expenses, boat hire, field allowance and consumables.

CALM Contribution:	$9 500
ESP Funds Required:	$62 100
Total Cost of Action:	$71 600

3.1.2 Monitoring Bernier Island Population

Monitoring of the *P. fieldi* population on Bernier Island will be undertaken annually following the culmination of the above research to provide information on the well-being of the population and on long-term population dynamics. This will be undertaken by a contract zoologist and volunteers and will require one week per year on Bernier Island for trapping and survey work. Genetic sampling will need to be done in 1997 to measure changes in genetic variation within the population(s).

ESP funds are required for the cost of annual monitoring. This will be $2 200 but does not include salaries as this component has been included in other Recovery Actions (3.2.1, 3.3, 3.4.1 and 3.5.1). The cost in 1997 will be $3 300.

3.1.3 Captive Breeding

Captive breeding of *P. fieldi* will only be undertaken if the above research indicates that numbers are too low on Bernier Island to support a translocation program. The cost of setting up captive breeding facilities would be $2 500 plus annual maintenance costs of $500. These costs have not been included in the Recovery costs as recent observations suggest that *P. fieldi* is locally abundant (Morris, personal observation) and it is unlikely that captive breeding will need to be undertaken.

3.2 Experimental Translocation to Heirisson Prong

3.2.1 Undertake Experimental Translocation

Translocation will be undertaken initially as an experimental trial on Heirisson Prong (Fig. 2). Heirisson Prong is currently the site of a Boodie (*Bettongia lesueur*) translocation experiment being undertaken by CSIRO Division of Wildlife and Ecology with support from Useless Loop Salt. The coastal habitat is similar to that found on Bernier Island and rabbit and predator control is currently being implemented. Once completed, this area will provide an ideal translocation site.

The translocation will be undertaken from 1993 to 1995 by a contract zoologist with the assistance of volunteers. It will involve trapping *P. fieldi* on Bernier Island, transporting the mice to the translocation site, releasing them at selected sites and then monitoring using radio telemetry and standardised trapping techniques. It will probably be necessary to do this several times over the translocation period as only a limited number of mice should be removed from Bernier Island in any one year, depending on the population size on the island. Probably 40 mice would be translocated each time and ten of these will be fitted with radio collars. DNA fingerprinting will be carried out on all mice before translocation to provide genetic records of the founder population. Several monitoring trips will be required after each translocation. Methodology will be determined in more detail when further information on *P. fieldi* becomes available.

ESP funds are required for the contract zoologist's salary for two years, travel expenses including boat charter, radio telemetry equipment and consumables.

	1993	1994
CALM Contribution:	$7 500	$7 700
ESP Funds Required:	$49 800	$46 700
Total Cost of Action:	$57 300	$54 400

3.2.2 Monitoring of Established Population

The successful establishment of the new population will need to be monitored twice in 1995 and then once each year thereafter. Monitoring will be undertaken by the contract zoologist with volunteer assistance and will require one week of trapping per year at the translocation site. An assessment of genetic variation and changes in the new population through DNA fingerprinting will be required in 1998. ESP funds are required for field allowance, vehicle operating costs, consumables, and, in 1998, DNA fingerprinting.

	1995	1996-97	1998	1999
CALM Contribution:	0	0	0	0
ESP Funds Required:	$2 600	$1 300/year	$2 400	$1 300

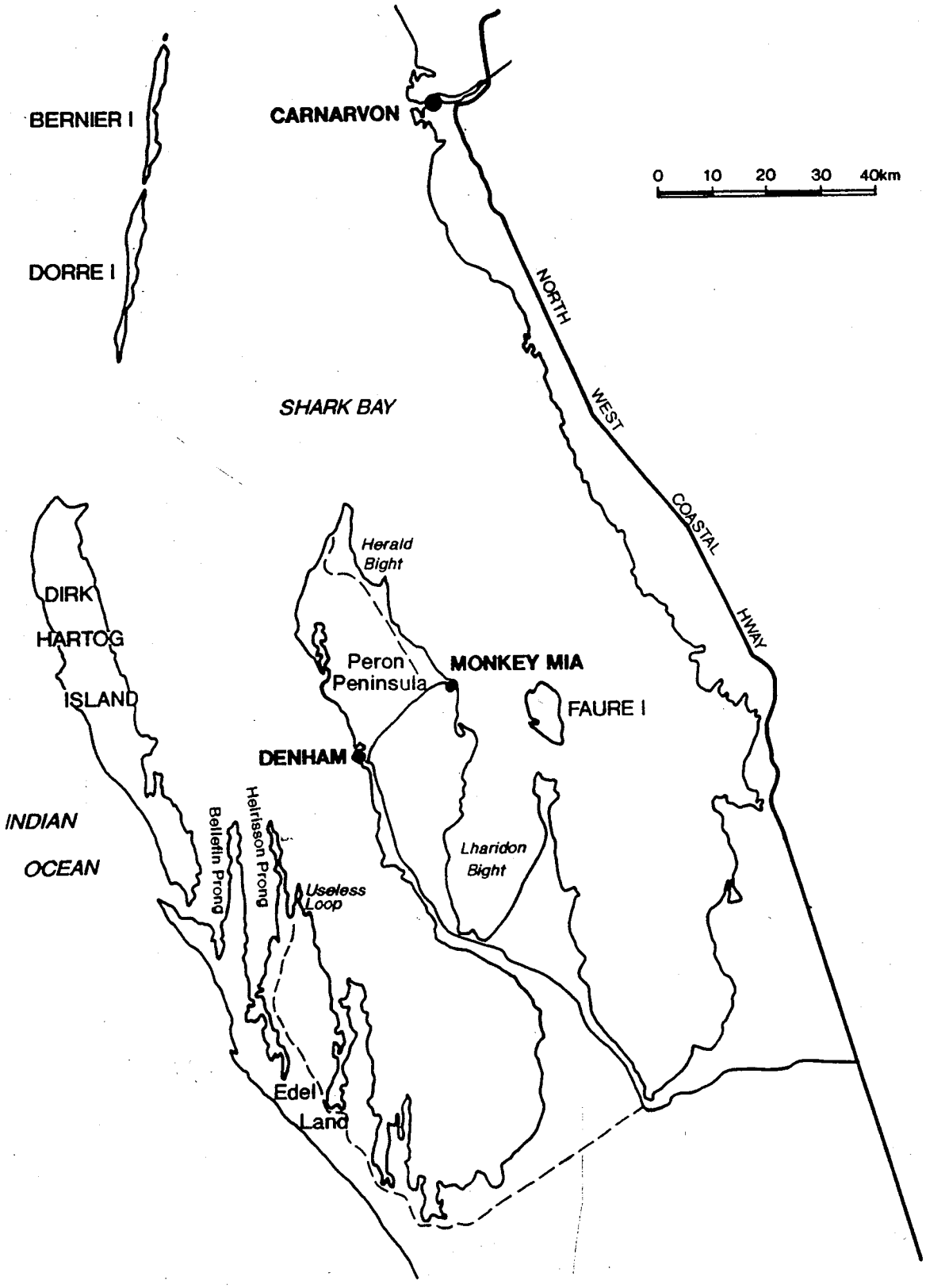

Figure 2

Locations of potential translocation sites in the Shark Bay area.

3.3 Translocation to an Offshore Island

3.3.1 Undertake Translocation

Although re-introduction to the mainland is considered important, a translocation to another offshore island free of exotic mammals will provide much needed security for the Shark Bay Mouse. The translocation can be undertaken without the risks and expense of vermin control or eradication. A recent translocation of Greater Stick-nest Rats (*Leporillus conditor*) to Salutation Island in Shark Bay has proven very successful (Morris unpublished data). There are a limited number of suitable islands in the Shark Bay region or elsewhere within the former range of the species and the choice will be made by the Recovery Team before 1995.

The translocation will be undertaken by a contract zoologist using procedures developed in the experimental translocation to Heirisson Prong. ESP funds are required for the contract zoologist's salary for two years, travel expenses including boat charter, radio telemetry equipment, DNA fingerprinting and consumables.

	1995	1996
CALM Contribution:	$7 900	$8 100
ESP Funds Required:	$49 500	$45 300
Total Cost of Action:	$57 400	$53 400

3.3.2 Monitor Established Population on Island

The successful establishment of the new population will need to be monitored once each year following the translocation. Monitoring will be undertaken by the contract zoologist with volunteer assistance and will require one week of trapping per year on the island. An assessment of the genetic variation of the population through DNA fingerprinting will be required in 1999. ESP funds are required for field allowance, travel costs and consumables. Funds for DNA fingerprinting are required in 1999.

	1997-98	1999
CALM Contribution:	0	0
ESP Funds Required:	$2 000/year	$3 100

3.4 Control of Introduced Predators, Rabbits and Goats

The next translocation will be undertaken to the mainland, possibly to a Shark Bay peninsula (Fig. 2). CALM acquired Peron Station in 1989 and the northern half of the peninsula is now a National Park. However, foxes, feral cats, rabbits and goats all occur on Peron Peninsula and these animals are considered to be a serious threat to the Shark Bay Mouse, as well as to other threatened fauna which could be re-introduced. It would be necessary to greatly reduce the numbers of these animals before a translocation can be undertaken. The peninsula is large and at present there is no certainty that exotic animals can be reduced sufficiently to allow the re-introduction of the Shark Bay Mouse.

CALM has been granted funds by the Commonwealth and State Governments for the management of the World Heritage Area of Shark Bay. The construction of a vermin proof fence across the narrow neck of Peron Peninsula (Taillefer Isthmus) is being considered by CALM, and it is possible that it will be completed before 1995. A program to reduce and control exotic animals present on Peron Peninsula should commence when the fence, which will prevent the re-

invasion of exotic animals onto the peninsula, is completed. This program should target rabbits and goats first.

Peron National Park, formerly Peron Station, is currently being destocked. Sheep and goats are being trapped at watering points and this method will be most effective during the hotter months of summer. However, goats may also need to be located and shot from a helicopter. The use of `Judas' goats fitted with radio collars will help to locate and eliminate smaller remnant flocks. Rabbits can be controlled by ripping warrens and poisoning with 1080 oats.

The reduction and control of foxes will be achieved by aerial baiting with meat baits injected with `1080'. Effective methods for feral cat control are yet to be developed. Cyanide transects (Algar and Kinnear 1990) could be run prior to baiting to estimate the densities of foxes and cats so that the intensity of baiting required can be determined. Baiting will be carried out in August/September when vixens are pregnant or have litters in the den and will be followed by cyanide transects to determine the effectiveness of the baiting. A second baiting will probably be necessary in the initial phase of the program. Subsequent monitoring will determine if and when further baiting is necessary.

Alternative areas will also be considered, e.g., Bellefin Peninsula and Cape Lesueur (Fig. 2), and a decision on the site will be taken by the Recovery Team and CALM at a later date.

ESP funds are required for `1080' bait (meat and oats), aircraft hire, helicopter and shooter, radio collars, contract labour and consumables. Following the completion of the eradication program, the area will need to be monitored once every three months to ensure that there are no vermin and that the fence is operational. This may be undertaken by Regional staff.

	1995	1996	1997-99
CALM Contribution:	$150 000	$5 400	$2 000/year
ESP Funds Required:	$40 000	$40 000	0
Total Cost of Action:	$190 000	$45 400	$2 000/year

3.5 Translocation to mainland

Translocation to the mainland will be undertaken from 1997 to 1999 by a contract zoologist with the assistance of volunteers following the reduction and control of foxes, feral cats, rabbits and goats. This translocation will involve the same steps as outlined for the translocation to Heirisson Prong using techniques developed from that translocation.

ESP funds are required for the contract zoologist's salary, travel expenses and vehicle operating costs, radio telemetry equipment and consumables.

	1997	1998	1999
CALM Contribution:	$8 100	$8 100	$8 400
ESP Funds Required:	$53 000	$49 900	$50 200
Total Cost of Action:	$61 100	$58 000	$58 600

4 IMPLEMENTATION SCHEDULE

Task # 3.*	Task Description	Priority	Feasibility	Responsible Party		Cost Estimate ($000's/year) 1992	1993	1994	1995	1996	1997	1998	1999	Total
1	**Research & monitoring of P. fieldi on Bernier Is.**													
1.1	Undertake research	1	100%	CALM Research Division	a	9.5								9.5
					b	62.1								62.1
					c	71.6								71.6
1.2	Monitoring Bernier Is. population	2	100%	CALM Research/ Region	a		0	0	0	0	0	0	0	0
					b		2.2	2.2	2.2	2.2	3.3	2.2	2.2	16.5
					c		2.2	2.2	2.2	2.2	3.3	2.2	2.2	16.5
2	**Experimental translocation**													
2.1	Undertake translocation	1	90-95%	CALM Research Division	a		7.5	7.7						15.2
					b		49.8	46.7						96.5
					c		57.3	54.4						111.7
2.2	Monitoring established population	2	100%	CALM Research/ Region	a				0	0	0	0	0	0
					b				2.6	1.3	1.3	1.3	2.4	8.9
					c				2.6	1.3	1.3	1.3	2.4	8.9
3	**Translocation to Island**													
3.1	Undertake Translocation	1	95-100%	CALM Research Division	a				7.9	8.1				16.0
					b				49.5	45.3				94.8
					c				57.4	53.4				110.8

a: CALM Contribution; b: ESP Funds required; c: Total cost

Task # 3.*	Task Description	Priority	Feasi-bility	Responsible Party		Cost Estimate ($000's/year) 1992	1993	1994	1995	1996	1997	1998	1999	Total
3.2	Monitor established population	2	100%	CALM Research/ Region	a						0	0	0	0
					b						2	2	3.1	7.1
					c						2	2	3.1	7.1
4	Control of introduced predators, rabbits & goats	1	95-100%	CALM Research/ Region	a				150	5.4	5.4	5.4	5.4	171.6
					b				40.0	40.0	2.0	2.0	2.0	86.0
					c				190	45.4	7.4	7.4	7.4	257.6
5	Translocation to Peron Peninsula	1	95%	CALM Research Division	a						8.1	8.1	8.4	24.6
					b						53.0	49.9	50.2	153.1
					c						61.1	58.0	58.6	177.7
				Total	a	9.5	7.5	7.7	157.9	13.5	13.5	13.5	13.8	209.9
					b	62.1	52.0	48.9	94.3	88.8	61.6	58.5	58.8	525.0
					c	71.6	59.5	56.6	252.2	102.3	75.1	72.0	72.6	734.9

ACKNOWLEDGEMENTS

Information on the distribution and taxonomy of the Shark Bay Mouse was supplied by Alexander Baynes, Honourary Associate, Western Australian Museum. Comments on the draft were provided by Ron Shepherd (CALM District Manager, Shark Bay) and CALM Research Division staff. The maps were prepared by staff at CALM Land Information Branch. Many thanks to these people for their input in the Recovery Plan.

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