TRANSLOCATION PROPOSAL

Thevenard Island Mouse: Thevenard Island to Serrurier Island

1. Summary

As part of the Interim Wildlife Management Guidelines for the Thevenard Island Mouse Recovery Programme, it is proposed to translocate a population of the Thevenard Island Mouse *Leggadina* aff. *lakedownensis* from Thevenard Island to Serrurier Island in early October 1995. Endemic to one island, the Thevenard Island Mouse is considered to be genetically unique to conspecifics on the mainland. The establishment of a second population is considered conducive for the long-term conservation of the species, particularly if there is no means of selectively removing or controlling recently-introduced House Mice on Thevenard Island.

It is believed that the Thevenard Island Mouse will establish a self-sustaining population on Serrurier Island. Serrurier Island is zoologically and floristically similar to Thevenard Island, and located within the same island archipelago. Ground surveys have revealed no threatened flora or fauna, and similar assemblages of both exist on Thevenard Island. The main difference is the presence of wedge-tailed shearwaters and one feral cat on Serrurier Island, and any translocation of native mice will be subject to the removal of the cat.

Up to 50 individuals will form the founder population, and will be transported to the release site by helicopter. Monitoring will initially be by radio-tracking, and the successful establishment and dispersal of mice will be gauged by grid-trapping and additional radio-tracking.

This translocation project forms part of a PhD, and funding is provided by the Australian Nature Conservation Agency, the Department of Conservation and Land Management, and The University of Western Australia. West Australian Petroleum will assist with transport and accommodation costs.

2. Name and affiliation of proponent

Mr Keith Morris — Senior Research Scientist, Department of Conservation and Land Management

Mr Dorian Moro — Department of Zoology, The University of Western Australia.

3. Background

The Thevenard Island Short-tailed Mouse *Leggadina* aff. *lakedownensis* is endemic to Thevenard Island, a sandy cay 20 km off the Pilbara coast of Western Australia. The introduction of House Mice *Mus domesticus* to Thevenard Island in 1985/86 - and their subsequent periodic plagues - are a concern for the future of the native mice. Morris (1989) reports that Thevenard Island Mice are absent from areas where House Mice have reached high numbers. Before any control of House Mice can be undertaken more information on the taxonomy and biology of the Thevenard Island Mouse is required, and Interim Wildlife Management Guidelines were prepared for the species (Morris 1993).

A recovery team was formed in 1994 to oversee the implementation of four actions specified in these guidelines. One of these actions was the establishment of a second and geographically-disjunct population of the Thevenard Island Mouse.

Recent genetic work has identified that the island population of *L. lakedownensis*, although similar to mainland populations, is genetically unique. Furthermore, all individuals sampled across the island are identical in the make-up of their mitochondrial DNA, suggesting that colonisation on Thevenard Island was either a single event or major genetic bottleneck. Population heterozygosity is also expected to be low because of the homogeneity of gene loci that were sampled (Adams unpubl. data). The Thevenard Island Mouse has been listed as Endangered in the Australasian Rodent Action Plan (Lee *et al.* 1995). It is likely that it will be classified as a sub-specific taxon.

A PhD is being undertaken by Mr Dorian Moro to determine a way to selectively control House Mice on Thevenard Island with little or no effect on the native mouse population. It is proposed to establish a second population of the Thevenard Island Mouse elsewhere as security for the single population on Thevenard Island should a general or selective baiting programme ensue.

4. Biology.

Thevenard Island Mice occupy sandy habitats dominated by *Acacia* shrubs and a herbaceous understorey of grasses and spinifex. Adults attain a mean weight of 24-30g. Females have four teats, suggesting that a litter of up to four young can be sustained at any one time. Thevenard Island Mice are strictly nocturnal and seek refuge from the daytime temperatures in communal burrows. Their diet contains herbaceous and invertebrate material (Morris 1989).

Information on the population dynamics of both Thevenard Island Mice and House Mice is being collected. The House Mouse:Thevenard Island Mouse ratio has consistently been high, and in 1994 population numbers were highest during the winter months (May to November), which coincided with the breeding season. Young were entering the population during the November to January period. Population numbers for *L. lakedownensis* and *M. domesticus* on Thevenard Island fluctuated from 1300 and 2300 animals respectively in May 1994, to a minimum of 100 and 350 animals respectively in April 1995.

5. The Translocation.

a) Land status.

Serrurier Island is a 'C' class Nature Reserve vested in the National Parks and Nature Conservation Authority and managed by the Department of Conservation and Land Management (LeProvost Environmental Consultants and Astron Environmental 1993).

b) Evaluating translocation costs and alternative strategies.

Preceding the translocation, trapping over four nights will estimate the current *Leggadina* population on Thevenard Island. A founder group of 3% of the population estimate will comprise mice of different age class and reproductive condition, and an equal sex-ratio will be given priority. Lactating females will not be removed. A minimum of 20 mice will be considered for translocation at any one time. If numbers for the initial translocation are as low as 20, it is proposed to booster numbers on Serrurier Island on subsequent trips if there is evidence that individuals comprising the founder population are surviving.

The introduction of the Thevenard Island Mouse to the mainland is not recommended as an option. Captive breeding is considered unsuitable because of the financial costs incurred towards the maintenance and facility set-up of a mouse colony and, more importantly, because breeding has been unsuccessful in one pair of mice that are currently held in captivity despite various husbandry techniques. The low success of re-establishing a captively-bred population to the wild compared to a wild population is also recognised (Griffith *et al.* 1989).

c) Target site/ reasons.

Serrurier Island has been considered to be the most appropriate site to provide suitable habitat for the translocation. It lies 35 km south-west of Thevenard Island and at 274 ha, is just over half the size of Thevenard Island.

From a botanical, zoological and geological perspective, both islands share almost identical features to satisfy shelter and food/water requirements for the Thevenard Island Mouse, and these features make Serrurier Island a likely contender as a translocation site. The floristic similarity between islands is 98% (LeProvost Environmental Consultants and Astron Environmental 1993). No native mammals exist on Serrurier Island. Five of the seven species of land-reptiles inhabiting Serrurier Island are also present on Thevenard Island. Although there are several islands within the surrounding archipelago, they differ considerably in their floristic similarity or size, or their usage as storage facilities by oil companies. The presence of one feral cat on Serrurier Island suggests that it is not in a pristine and unmodified state, and surveys have identified no significant species of flora or fauna.

Serrurier Island remains an unlikely candidate as a translocation option for many other threatened taxa because its' origin and therefore environment has closer affinities with those islands in the Thevenard Island archipelago than with islands further north or south.

d) Introduction/ re-introduction/ re-stocking.

The translocation of the Thevenard Island Mouse to Serrurier Island is an introduction as defined by the IUCN (1987). The introduction of Thevenard Island Mice to Serrurier Island is not expected to cause damage as both islands have similar floristic and faunal assemblages. Serrurier Island lies approximately 20 km from the nearest land mass, and it is considered unlikely that Thevenard Island Mice will spread beyond the island into which they were introduced.

Actions are underway to selectively remove House Mice with little or no impact on the Thevenard Island Mice. A second population is believed practical for the security of the extant population of native mice on Thevenard Island. The IUCN Position Statement on Translocation of Living Organisms (1987) recognises the importance of the removal or eradication of alien species from "areas in which a threatened endemic is jeopardized by the presence of the alien"; this scenario exists on Thevenard Island.

e) Existence of taxon on mainland.

Although *Leggadina lakedownensis* is sparsely distributed across northern Australia, the Thevenard Island form occurs only on Thevenard Island.

f) Genetic considerations.

Analysis of the mitochondrial DNA shows that all individuals screened on Thevenard Island are identical. At a nuclear level, one individual screened for 30 gene loci showed no evidence for heterozygosity. This information suggests there is little or no detectable variation within the Thevenard Island Mouse population. Tissues from individuals that are translocated between islands will be collected for future genetic records of the founder population.

g) Cause of original extinction at target site/ removed or ameliorated.

The colonisation of Thevenard Island by the Thevenard Island Mouse is believed to have occurred within the last 3000 years. Any mice that have colonised are believed to have come from the mainland (Morris 1989) and either adapted to an island environment or remain conspecific with a population that has yet to be discovered. Genetic evidence supports the contention of a single colonisation. House Mice were introduced in 1985/86 and plagued soon afterwards. Morris (1989) found that the Thevenard Island Mouse was absent in areas with high numbers of House Mice. In addition, up to 10% of the habitat of the Thevenard Island Mouse has been cleared by WAPET to accommodate its oil base on Thevenard Island, and recent proposals to construct an onshore oil well is expected to clear additional habitat.

h) Control of introduced predators.

There is believed to be one feral cat on Serrurier Island. The recovery team has agreed that CALM Karratha will remove the cat prior to the translocation date using poisoned baits and/or shooting. The translocation will only proceed once the cat is removed. No House Mice exist on Serrurier Island.

i) Post-release monitoring

Immediately following the initial release in early October, mice will be monitored by radio-tracking over a 12-15 day period which coincides with the length of the transmitter batteries. Only adult mice (mean weight of 25g) will be radio-tracked with collars; pregnant females will not be collared. An attempt to recapture individuals prior to this time will ensue to remove radio-collars. The day-locations of each individual will be recorded to ascertain patterns of dispersal and settlement. A second field trip to monitor the translocated population will proceed in mid-November 1995. Transmitter batteries will not be functional at this time and ground searches for mouse-tracks will be employed to identify areas of occupancy and use. Elliott traps can then be installed in an attempt to capture the mice and assess their physical condition and breeding status. Depending upon the health of each animal, radio-collars will be replaced, and additional monitoring will assess the current home ranges. Monitoring - employing track-searches, trapping, and radio-tracking - is expected to continue at least over the next two years to mid-1997 when additional funding needs to be sought. The progress of the translocation programme will be reviewed annually by the Thevenard Island Mouse Recovery Team. A Translocation Implementation Schedule summarising the post-release monitoring is attached.

The success of the translocation will be gauged to be a self-sustaining population that is breeding and increasing in number. Minimum populations of mice on Serrurier Island are predicted to fluctuate over the year in accordance with fluctuations of mice on Thevenard Island. Density per hectare estimates of native mice on Thevenard Island varied from highs of 2.6 and 4.4 in May 1994 and June 1995, respectively, to a low of 0.2 in April 1995. A density per hectare estimate for Serrurier Island will be 0.2 if 50 mice are initially released. This estimate can be used as an indicator of the fate of mice on Serrurier Island during future monitoring trips.

6. Funding.

The majority of operational costs associated with field equipment will be met by funding supplied by the Australian Nature Conservation Agency's Endangered Species Program for the Thevenard Island Mouse. Funding is expected to continue until mid-1997. Transportation to/from Thevenard Island and Serrurier Island will be provided by West Australian Petroleum whose oil storage facilities are located on Thevenard Island. The translocation project forms part of a PhD and the salary is funded through a Commonwealth Postgraduate Award to Mr Dorian Moro.

7. References.

IUCN (1987). *The IUCN Position Statement on Translocation of Living Organisms. Introductions, Re-introductions and Re-stocking*. IUCN, Gland, Switzerland.

Griffith, B., Scott, J.M., Carpenter, J.W. and Reed, C. (1989). Translocation as a species conservation tool: status and strategy. **Science 245**: 477-80.

Lee, A.K., Copley, P., Morris, K., Calaby, J.H. and Flannery, T.F. (1995). *Australasian Rodents - An Action Plan for their Conservation*. IUCN/SSC Rodent Specialist Group report to the ANCA Endangered Species Program.

LeProvost Environmental Consultants and Astron Environmental (1993). *Environmental Appraisal of Proposed TP/6 Transition Zone 2D Seismic Programme, Serrurier Island*. Report to BHP Petroleum Pty Ltd.

Morris, K.D. (1989). *The Conservation of Leggadina (Muridae) on Thevenard Island, Western Australia*. Unpublished report for the Australian Mammal Society Meeting, Alice Springs, 1989.

Morris, K.D. (1993). *Interim Wildlife Management Guidelines for the Thevenard Island Mouse Leggadina aff. lakedownensis*. Unpublished report, Department of Conservation and Land Management.

8. Animal Experimentation Ethics Committee approval

The translocation has the approval of the AEEC at the University of Western Australia (Approval No. UWA/153/94/94) and at CALM (CAEEC No. 8/94).

9. Proponents' signature.

Keith Morris	Dorian Moro	21-8-95
		Date

10. Endorsements.

The project has my endorsement: Bio-conservation Group resources committed here are available for this purpose.

..... 4 Sept 95.

Head, Bio-conservation Group
CALM Science and Information Division

Date

11. Approval.

This translocation proposal has been approved.

Subject to prior eradication of feral cats

K.J. McNamara 8/9/95

Director, Nature Conservation

Date

12. Attachments.

i) Morris, K.D. (1993). Interim Wildlife Management Guidelines for the Thevenard Island Mouse *Leggadina* aff. *lakedownensis*. Unpublished report, Department of Conservation and Land Management.

ii) Translocation Implementation Schedule

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

INTERIM WILDLIFE MANAGEMENT GUIDELINES FOR THE THEVENARD ISLAND MOUSE *Leggadina* aff. *lakedownensis*

May 1993

K.D. Morris
Wildlife Research Centre, Woodvale.

1. INTRODUCTION

Thevenard Island is located 20 km north of Onslow, off the Pilbara coast of Western Australia. It is essentially a sand cay which formed about 3 000 years b.p from the deposition of marine sediments on a shallow limestone platform (WAPET 1987). In this regard it is different to many of the other Pilbara islands which are remnants of the adjacent mainland, created when sea levels rose 8 000 - 10 000 years b.p.

The Thevenard Island Mouse *Leggadina* aff. *lakedownensis* is known only from Thevenard Island. It was originally known as *L. forresti* (Kitchener and Vicker 1981), a species with a wider distribution in central Australia, however recent electrophoretic analysis suggests a closer relationship to *L. lakedownensis* (Mark Adams, pers comm.). Weights and measurements of *L. forresti* and *L. lakedownensis* are shown in Table 1, and it is clear that the population on Thevenard Island is significantly larger than either of the other *Leggadina* and probably deserves recognition as a distinct taxon. Given the origins of Thevenard Island, it is likely that this *Leggadina* population is derived from a mainland source and has evolved its larger size over the last 3 000 yeas or so. The presence of *Leggadina* on Thevenard Island was one of the main reasons for the island becoming a nature reserve in 1975.

Concern over the conservation of this species increased in 1986 when the introduced House Mouse *Mus musculus* was discovered on the island. This discovery coincided with a seismic survey of the island. A tourist resort had also operated on the island for some time and either activity could have been responsible for the *Mus* introduction. Part of the island has since been developed as petroleum treatment and storage facility by West Australian Petroleum (WAPET) for the adjacent Saladin oilfield. The monitoring of *Leggadina* and *Mus* numbers is part of the Environmental Management Programme for this development (WAPET 1988). Some preliminary monitoring has also been undertaken on other parts of the island by the Department of Conservation and Land Management (CALM). There is some evidence to suggest that where *Mus* have attained high population densities, *Leggadina* have been excluded or occur at lower densities than previously (Morris 1989). In addition, approximately 10

percent of habitat suitable for *Leggadina* was lost when the oil base was constructed in 1989.

A recommendation has been made that *Leggadina* aff. *lakedownensis* be added as an endangered species to the ANZECC list of Threatened Vertebrate Fauna. The species has also been listed for Priority 1 action under the Rodent Action Plan (Lee et al 1994).

2. MANAGEMENT GUIDELINES

2.1. Aim:

To ensure the conservation of the Thevenard Island Mouse.

2.2 Strategies:

2.2.1 Determine the taxonomic status of the Thevenard Island Mouse.

2.2.2 Assess the current status of the *Leggadina* and *Mus* populations on Thevenard Island, and compare with data collected by CALM 5 years ago and by WAPET more recently.

2.2.3 Translocate *Leggadina* to Delambre Island in the Dampier Archipelago and monitor the population for at least two years.

2.2.4 Develop a technique to eradicate or control *Mus* on Thevenard Island.

2.3 Term of program:

This program will run for three years.

3. RESEARCH REQUIREMENTS

Some information on the biology of the Thevenard Island Mouse is already available, however the present status needs to be determined and compared with previous results. Determining the taxonomic status of the Thevenard Island Mouse should now be the priority for research. An assessment of the population size on Thevenard Island is also required before a translocation is undertaken. Delambre Island has been selected as a site suitable for translocation. No techniques are presently available to control/eradicate *Mus* in the presence of non target species and this will need to be researched.

4. IMPLEMENTATION

External funds will be sought to implement these management guidelines. An experienced graduate biologist will be employed to undertake the work required. WAPET will also be asked to assist with transport to and from Thevenard Island and accommodation while on the island. A management team comprising membership from CALM SID, CALM Pilbara Region, WAPET and Mackerel Islands Resorts will be established.

5. ACKNOWLEDGEMENTS

Previous work on Thevenard Island has been supported by Mackerel Islands Resorts and WAPET.

6. REFERENCES

Kitchener, D.J., and Vicker,E., (1981). Catalogue of modern mammals in the Western Australian Museum 1895-1981. Western Australian Museum Publication.

Lee, A.K., Copley, P., Morris, K., Calaby, J.H., and Flannery, T.F. (1994). Australasian Rodents - An Action Plan for their conservation. IUCN/SSC Rodent Specialist Group report to ANPWS Endangered Species Program.

Morris, K.D. (1989). The conservation of *Leggadina* (Muridae) on Thevenard Island, Western Australia. Australian Mammal Society Meeting, Alice Springs, April 1989.

WAPET (1987). Saladin Field Development - an Environmental Review and Management Programme submitted to the Environmental Protection Authority, W.A.

WAPET (1988). Environmental Management Programme for the Saladin Field Development.

Table 1. Weights and measurements of *Leggadina* from various locations.

	L. lakeda. QLD	*L. lakeda.* W.A.	*L. forresti*	*L.* aff. *lakeda.* Thevenard.
Body weight (g)	15-20	15-18	14-24	27-38
Head-body (mm)	64-72	76	82-90	90-94
Tail (mm)	41-45	49	54-72	73-77
Tail (% of HB)	63-65	64	69-75	79-83

Translocation Implementation Schedule

Thevenard Island Mouse: Thevenard Island to Serrurier Island

Task Description	Dates	Comments
Site selection	August 1994	Serrurier Island chosen as site to translocate Thevenard Island Mouse.
Site preparation	June-August 1995	Feral cat will be removed using poison-baits and/or shooting. Ground fauna surveys will be completed.
Translocation	early October 1995	Up to 50 Thevenard Island Mice will be translocated. Tissues for genetic records to be collected from individuals that are translocated.
Post-release monitoring (1)	October 1995	Mice monitored by radio-tracking for 12-15 days immediately following release. Invertebrate survey.
Post-release monitoring (2)	November 1995	Employ ground-searches for mouse tracks, trapping and radio-tracking to identify and assess progress of mice on island Invertebrate survey.
Post-release monitoring (3)	January 1996	Employ ground-searches for mouse tracks, trapping and radio-tracking to identify and assess progress of mice on island Invertebrate survey.
Post-release monitoring (4)	May 1996	Employ ground-searches for mouse tracks, trapping and radio-tracking to identify and assess progress of mice on island Invertebrate survey.
Assessment/review of translocation	June/July 1996	Progress of translocation operation to be reviewed by the Thevenard Island Mouse Recovery Team.
Post-release monitoring (5)	October 1996	Employ ground-searches for mouse tracks, trapping and radio-tracking to identify and assess progress of mice on island Invertebrate survey.

Post-release monitoring is expected to continue annually beyond October 1996 and an assessment of the translocation programme is to be made at least once each year by the Thevenard Island Mouse Recovery Team.

TO: Andrew Burbidge
FROM: Dorian Moro

RE: Ammendment to Translocation Proposal Thevenard Island Mouse: Thevenard Island to Serrurier Island

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The Thevenard Island Mouse Recovery Team has proposed to delay the translocation of the Thevenard Island Mouse from Thevenard Island to Serrurier Island from October 1995 to May 1996.

The Translocation Proposal was accepted with the requirement that the feral cat currently on Serrurier Island is removed. Baiting with 1080-poisoned meats and water, and spotlighting, over two nights during August 1995 failed to show evidence that the cat was present or that it had taken any of the baits.

Consequently, there is no evidence to suggest that the feral cat has been removed, and the proposed translocation will not proceed in October 1995.

A reconnaissance trip during November 1995 to Serrurier Island will look for evidence that the cat is still present; previous baiting may have been successful. If fresh tracks are found, an intensive effort to remove the cat using poison-baits and traps will proceed during March 1996 when wedge-tailed shearwaters are expected to leave Serrurier Island. If successful, it is proposed to begin the translocation during May 1996; the same translocation protocol that was described in the original Translocation Proposal will apply.

DORIAN MORO
The University of Western Australia

22 September 1995