GILBERT'S POTOROO RECOVERY TEAM

ANNUAL REPORT

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by Tony Friend

for

The Gilbert's Potoroo Recovery Team

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Natural Heritage Trust
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DEPARTMENT OF
Conservation
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SUMMARY

Gilbert's Potoroo is the most endangered mammal in Australia. The tiny single population is restricted to the slopes of Mount Gardner, at Two Peoples Bay. Although 23 individuals were captured during 2001, the total population is unlikely to number much more than 30.

A captive colony was established in December 1994 when the species was rediscovered. Eight animals (five adults, a juvenile and two pouch young) comprised the founder group. Despite rising to 14 individuals in 1998, the captive colony now numbers only 8 individuals. Breeding has not been frequent enough to keep pace with the loss of animals, especially now as the founders are growing old. Kidney failure due to renal oxalosis (oxalate crystals forming in the kidney tubules) has caused the death of four captive animals. The evidence points to an inherited condition that increases the rate of synthesis of oxalates within the animal. Two deaths during 2001 were due to infections by different soil-borne organisms. It must be concluded that the conditions of captivity are not adequate and that changes need to be made before successful breeding and growth of the captive colony will occur.

Breeding occurs routinely in the wild population, however, and females are rarely without young either in the pouch or at heel. Established adult animals show a high survival rate. At this stage the wild population shows the greatest potential to provide the growth in numbers necessary for recovery. The population is given protection from predation by introduced red foxes through aerial and ground baiting with 1080 meat baits.

One of the most important questions at this stage is whether it is possible to improve control of introduced predators, especially feral cats, to achieve sufficient growth in the population to provide surplus animals for translocation. Alternatively, an investigation under way into the possibilities offered by the technique of cross-fostering could point to another way to increase the output of young.

Lack of funding is one of the greatest difficulties now facing the effort to save Gilbert's Potoroo. Corporate funding sources are being approached in an attempt to keep the program running at its current level.

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INTRODUCTION

After the discovery of a population of potoroos at Two Peoples Bay, it was quickly proved that not only were they the same as those collected by John Gilbert from the south coast of WA in the 1860s, but also that they represented a potoroo species distinct from eastern Australian forms (Sinclair *et al.,* 1996, Sinclair and Westerman, 1997). Since then, a concerted effort has been made by CALM staff, volunteers and collaborating workers from other organisations to improve the conservation status of *Potorous gilbertii*.

During 2001, as in other years, the effort has been split between captive breeding, survey for additional colonies and populations, and learning about the biology and requirements of the species. The emphasis has always been on the production of more individuals in order to establish the additional populations required to remove the species from the brink of extinction.

These efforts were guided and coordinated initially through the Interim Wildlife Management Guidelines for Gilbert's Potoroo (Start and Burbidge, 1995) and later through the Gilbert's Potoroo Recovery Plan (Courtenay *et al.*, 1998). The Gilbert's Potoroo Recovery Team was formed in 1995 to oversee the writing of these plans and their implementation.

MEMBERSHIP

The membership of the Gilbert's Potoroo Recovery Team at the beginning of 2001 was as follows:

Alan Danks (Chair)	CALM South Coast Region
Andrew Burbidge	CALM, WATSCU
Jackie Courtenay	Wildlife biologist
Anne-Marie Horwitz	Consulting Veterinarian
Tony Friend	CALM/Science Division
Alan Needham	ECU Applied Science
Vic Smith	South Coast community member

MEETINGS

The Recovery Team met once during 2001. Meeting 15 was held at the WA Wildlife Research Centre, Woodvale, on 7 December 2001.

RECOVERY PLAN STATUS AND FUNDING

The Gilbert's Potoroo Recovery Plan (Courtenay *et al.* 1998) replaced the Interim Wildlife Management Guidelines for Gilbert's Potoroo (Start and Burbidge 1995) and was submitted in March 1998 for funding under the Endangered Species Program. The Plan was not funded by Environment Australia to the amount requested ($40 000 rather than $84,700) in 2001/02. The Scope Items relating to Recovery Plan (RP) Actions were as follows:

2001.02 Continue to maintain health of captive potoroos by conducting fortnightly monitoring utilising 10 volunteers by 28 February 2002.
2001.03 Increase, if possible, number of captive individuals by at least 2 by 28 February 2002.
2001.04 Continue monitoring wild Potoroo numbers at three sites at three monthly intervals by 28 February 2002.
2001.05 Continue research into the distribution and resource requirements of Gilbert's Potoroo prior to 28 February 2002.
2001.06 Continue habitat management and threat abatement activity involving fire/feral pest control for 100% of known range by 28 February 2002.
2001.07 Complete at least 2 products (eg brochures/displays/articles/field guides or protocols etc) by 28 February 2002.
2001.08 Involve at least 10 volunteers in recovery activities by 28 February 2002.
2001.09 Maintain the recovery team including appropriate stakeholder involvement and conduct at least 2 recovery team meetings by 28 February 2002.

During 2001, the Team received notice that Environment Australia's contribution to the Gilbert's Potoroo Recovery Plan in 2002/03 would again be $40 000, less than half of the $82 500 requested.

IMPLEMENTATION OF RECOVERY PLAN ACTIONS

1. Appoint a scientist and a technical officer to implement the Recovery Plan

Supervision of the Recovery Plan implementation is the responsibility of Science Division within the Department of Conservation and Land Management. Principal Research Scientist Tony Friend has been Project Leader, Gilbert's Potoroo Recovery Program, since January 1999. From March 1998 until March 2000, external funding for the Recovery Program from Environment Australia had supported the employment of a full-time Technical Officer on the potoroo project. Tania Butler had held this position until she resigned in March 2000 to pursue further studies. Environment Australia had informed the Department that the Recovery Plan would be funded at a lower level in 2000/01, so rather than appointing another full-time person, a part-time casual position was created with primary duties comprising the care and maintenance of the captive colony. Sara Hands was appointed to that position in April 2000. The fieldwork component of the program was then carried out by the Project Officer alone, or with assistance from volunteers.

In May 2001, the Director of Science Division agreed to fund a full-time Technical Officer to support the potoroo program. In the long-term the position was to be transferred from existing staffing within Science Division, but in order to provide support fro the program rapidly, funds were made available by the Director, Nature Conservation within the Department. Linda Reinhold, who was holding the position of Forest Zoologist in the Queensland Department of Natural Resources, was appointed in June 2001 for three-months and then extended to 12 months.

2. Develop and maintain a breeding colony of at least 30 potoroos plus surplus animals pending translocation.

Size of captive colony

The captive colony of Gilbert's Potoroo at Two Peoples Bay was established in 1994, immediately after the rediscovery of the species. Five adult (one male, four female) and one juvenile (male) animal were taken from the wild during the first six months after the rediscovery. At time of capture, two of the females had pouch young that were subsequently raised to independence. These eight animals were the founders of the breeding colony.

By the beginning of 2001, only seven captive-bred young had been born in the colony. The size of the breeding colony stood at 10 individuals (5 males, 5 females). No young had been produced since 1999, when a male young, #46, was discovered in #27's pouch on 5 August 1999. #27 had also produced the previous pouch young, although it was dead when first seen, on 4 December 1998. Both of these young were sired by #11.

Breeding success

The only birth recorded during 2001 was another young born to #27, sired by #6. These animals were paired for five weeks then separated. The pouch young was found on 7 February 2001, at the next routine check, 27 days after the pair had been separated. It had not been present in the pouch a week earlier. The young was a female (#57) and was first seen outside the pouch on 16 June 2001.

Table 1. Attempted breeding combinations in Gilbert's Potoroo captive breeding colony, showing all pairings established during 2001 (some combinations involved more than two animals).

Female	Preferred males ("unrelated")	Pairings Attempted		
		Male	Dates	Outcome
#1	#3, #6, #11, #28, #46	#11	8/11/00 -11/1/01 27/3/01 -31/5/01 30/7/01 -5/9/01 30/10/01 -26/12/01	No py No py No py No py
#10 Died June 2001	#3, #6	#3	27/3/01-16/5/01	No py
#18	#3, #11, #28, #46	#46	30/12/00 – 21/3/01	No py
#27	#3, #6, #11, #28	#6	**8/11/00 – 11/1/01**	**Py found in pouch 7/02/01. Pouch exit May 2001**
#32	#6, #46	#11 #46	27/3/01 – 31/5/01 24/7/01 – 5/9/01	No py No py

Deaths in the captive colony

Three captive potoroos died during the year. #6 was euthanased after his condition deteriorated and he did not respond to treatment. On post mortem he was found to have a disseminated granulomatous inflammatory disease caused by *Mycobacterium intracellularis*. This organism is found in the soil and could infect other animals housed in the pen. On recommendation of the veterinarian at Perth Zoo, the pen in which #6 was last housed will be rested for a year.

#27 died while her young at heel, #57, was unweaned. After #57's exit from the pouch, #27 became unusually nervous and spent very little time at the food bowl. Her food intake declined dramatically and one morning she was found dead in her nest. Post-mortem resulted in no clear indication of any disorder that might have caused her death. #57 was lodged with a local wildlife carer, Eunice Daubert, who looked after the young one for a month and attempted to wean her. On her return to Two Peoples Bay, #57 was still given milk by bottle and teat every day, but eventually showed her displeasure and this was discontinued. By December 31, #57 had reached 700 g in weight.

#10 was one of the oldest animals in the colony. She was one of the animals expected to succumb to renal failure due to high urinary oxalate and glycolate levels. This potoroo was receiving potassium supplementation in an attempt to inhibit the formation of oxalate crystals in her kidneys. She had developed a lesion on one of her nipples, which required surgical removal. Kidney function tests taken just before surgery were slightly elevated only although urine samples taken in the last 2.5 weeks of life were isosthenuric (inability to change the concentration of urine). This is highly suggestive of poor renal function. Surgery to remove this lesion was performed and histopathology showed this lesion to be a squamous cell carcinoma. This animal's appetite deteriorated one week after surgery and she showed signs of hyperkalemia (high blood potassium) immediately prior to her death on 5 June 2001, two weeks after surgery. Post mortem showed widespread oxalate crystal formation indicating that severe renal dysfunction was occurring or would occur soon.

In November 2001, two potoroos were sent to Perth Zoo for the application of artificial insemination techniques. On 31st December 2001, six animals remained in the colony at Two Peoples Bay and two were present at Perth Zoo.

Artificial insemination research at Perth Zoo

Since the establishment of the captive breeding colony at Two Peoples Bay, an attempt has been made to promote breeding under "natural conditions". While some young have been born, the rate of production of young has not been sufficient to sustain the breeding colony. This may be because of incompatibility between different individuals. Artificial insemination (AI) offers a way around such incompatibilities. Terry Fletcher, Director of Research at Perth Zoo, is an expert in marsupial reproductive biology and has experience in AI techniques with marsupials. A male and a female Gilbert's Potoroo (#3 and #18) were transferred from Two Peoples Bay to Perth Zoo in November 2001 and have settled in to the accommodation there. A group of long-nosed potoroos is also established at the Zoo and will be used as analogues to develop handling techniques before they are applied to the Gilbert's Potoroos.

If AI becomes routine, it has the potential to provide a means to genetically manage small captive populations, as well as to produce more individuals of species that are hard to breed.

Cross-fostering program, Adelaide University/Adelaide Zoo/CALM

Since the 1960s it has been well known that very small marsupial pouch young can be removed from their mother's teat and transferred to the teat of another female. The transfer of pouch young has been carried out many times and a high survival rate achieved. This method could be used to increase dramatically the rate of production of young of an endangered species if a surrogate female of a common species is used to suckle the young of the endangered species (Smith 1997). The young are taken at quite a small size and the donor female then quickly produces another pouch young.

In 2000, Dr David Taggart and colleagues at Adelaide University and Adelaide Zoo were successful in their application for ARC SPIRT support for a project investigating the feasibility of cross-fostering in the Gilbert's Potoroo Recovery Program. They have established captive colonies of long-nosed potoroos, woylies and boodies in Adelaide to trial cross-fostering in those species and select a surrogate species that would be suitable to use with Gilbert's Potoroo. The establishment of the colonies and initial pouch swaps occurred during 2001 and the growth of the transferred pouch young is being monitored.

As Gilbert's Potoroo pouch young are rarely being produced in the captive colony, it is unlikely that cross-fostering technique could increase the production of young significantly. However, young are being produced continually in the wild population. If it is possible to remove small pouch young from the wild without a significant effect on the population, this could be the way in which a surplus of potoroos could be acquired for translocation.

Difficulties with the maintenance and breeding of Gilbert's Potoroos in captivity, whether due to incorrect diet, stress of captivity or social incompatibility, require the development of alternative means to manage captive potoroos, including new animals produced by AI or cross-fostering. This might take the form of a new diet, developed with the benefit of nutritional analysis of native "truffles" now under way. Alternatively, the solution may be provided by the construction of large fenced enclosures in suitable habitat where potoroos can be sustained by their natural diet.

3. Write and implement a Working Plan to oversee hygiene, husbandry and genetic integrity of the captive colony.

The Captive Management Plan for Gilbert's Potoroo (Courtenay 1998) was written as draft by Jackie Courtenay before her departure from the project. This document has been used as a working draft, but has not been substantially modified since its completion. It will continue to be used in the operation of the breeding colony until there is a clear need to update it.

4. *Investigate and document the distribution and resource requirements of Gilbert's Potoroo at Two Peoples Bay NR.*

Survey trapping

In order to better define the distribution of potoroos at Two Peoples Bay NR, survey trapping was carried out at five new sites during 2001. No potoroos were captured.

Table 2. Survey trapping at Two Peoples Bay NR.during 2001

Site	Dates	Trap nights	Species trapped
Upper Shelter	20/02/01 – 23/02/01	80	Bush rat.
"No" Trapline	21/02/01 – 23/02/01	33	Bush rat.
Quokka Central	23/03/01	10	Bush rat.
Lower Tick Flat	22/02/01 – 27/07/01	105	Quokka, quenda, bush rat.
Upper Tick Flat "above trap #38"	15/02/01 – 27/11/01	48	Quokka, quenda, bush rat, King's skink.

Radio-tracking

In February 2001, a group of potoroos in Firebreak Valley were radio-tracked in order to provide information about their habitat use and social organization. Four potoroos were captured and fitted with tail transmitters (small transmitters attached around the base of the tail with Elastoplast). Three tracking stations equipped with a mast-mounted antenna array were set up and team of 12 volunteers was recruited to staff the stations 24 hours a day for two weeks.

The tracking data revealed that an adult male, an adult female and a juvenile female occupied almost the same home range. The females rested together every day while the male lived more independently. Core habitat was the tall dense heath dominated by *Melaleuca* but with sedges (*Lepidosperma*, *Anarthria*) beneath, forming a dense mass of vegetation that the animals need to tunnel through.

Another male was captured in the same valley and fitted with a transmitter but he was not detected by the trackers until halfway through the second week. Tracking on foot showed that this male was spending more time in the next valley. Subsequent trapping near the site where he was relocated resulted in the capture of a female that not been caught since her initial capture at East Firebreak in December 1998. This site has now been adopted as one of the regular population monitoring sites.

Nutritional analysis of fungi

An application for a grant of $2500 under the Landscope Conservation VisaCard scheme was successful. The funds will pay for the nutritional analysis of two samples of native truffles. Linda Reinhold has been collecting truffles for analysis and is well on the way to acquiring the 150 g of each species needed to analyse for a basic list of constituents including protein, carbohydrate, fat, fibre, some vitamins and minerals. This will be a first step in putting together a nutritional profile of the potoroos' natural diet so that captive diets can be better designed.

Pedigree analysis of wild and captive populations

Liz Sinclair (Brigham Young University) has been working on the technicalities of determining familial relationships in the wild potoroo population. 143 clones were amplified, sequenced, and screened for microsatellite repeats. Liz has designed primers for five microsatellite repeat regions. PCR conditions were optimized and fifteen animals were genotyped for variation at four of these loci. Variation at these loci is low (2-7 alleles/locus so far) and they alone cannot be used to differentiate full siblings. This low level of variation is not entirely unexpected as the population (species) has been through a fairly extreme bottleneck (Sinclair *et al.*, in press). Liz had hoped to isolate between 10 to 15 polymorphic microsatellite loci. However, it appears that there are few long microsatellites within the *P. gilbertii* genome - or at least she has not been able to find them at this stage.

5. Establish a quantitative monitoring program to record changes in population density and area of occupancy of wild potoroo populations.

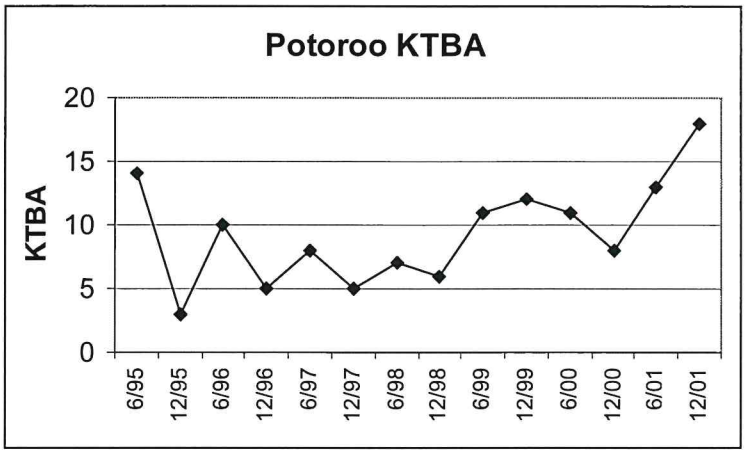
In 1996 a trapping transect along the Mount Gardner access track was established. A cage and an Elliott trap were placed beside the track at 100 m intervals and this trapline was run for three nights in spring each year. Between 1996 and 2000, only three potoroo captures were made. It seems that road trapping is particularly inefficient in catching potoroos and it may be that they don't come out onto the road very often. In 2000, a regular monitoring program based on the potoroo traplines was trialed. Each of the traplines where potoroos were often caught was trapped over a one-month period. This procedure was carried out at four-month intervals (March, July and November). This interval was chosen because it is the least frequent trapping interval that allows recording of the same individual young potoroo (eg, small pouch young, then young-at-heel).

As well as providing a quantitative measure of population numbers, this trapping regime provides a greater insight into the production of young and the loss of individuals between pouch life and adulthood. With considerations of cross-fostering from the wild, it is essential to have a good understanding of the potential impact of the removal of pouch young and of programs of various intensities.

Table 4 shows the trapping effort and capture details from monitoring trapping carried out during 2001. A total of 23 individual potoroos (including 3 young at heel) were recorded during 2001.

One of the simplest statements of population numbers is a count of the animals known to be alive (KTBA). While this is parameter is dependent on trapping effort, it is particularly relevant to a small closed population such as this one (no immigration or emigration). Figure 1 shows a rough KTBA history of the Gilbert's Potoroo population since rediscovery. Although it is essentially an expression of trapping effort, when coupled with a knowledge of the location of the trapping grids, distribution of habitat and home range size, it will give a fairly accurate idea of the likely size of the population on Mount Gardner. The graph shows the number of individuals known to be alive at some time during the six-month period before the month shown. If an interval of three months were used, the numbers would be slightly lower (as fewer new and old individuals would overlap). If the current four-monthly trapping regime continues, it would be most logical to use a four-month interval for this analysis.

Figure 1. Numbers of Gilbert's Potoroos known to be alive (KTBA) since the rediscovery in December 1994.



6. *Abate processes that may threaten or limit area of occupancy and/or population density of potoroos.*

Predation by cats and foxes

Due to the importance of Two Peoples Bay NR as a haven for remnant populations of threatened birds and mammals, the fox control regime is relatively intensive. A combined aerial and ground baiting operation is carried out at three-monthly intervals, and further ground baiting is carried out about halfway between the aerial baiting dates, so that baits are laid approximately every six weeks. This fox control regime is supplemented by localised ground baiting as a response to the detection of fox sign.

The high rate of survival of known potoroos on East Firebreak trapline, where most information has been gathered, indicates that predation of adults is a relatively rare event. This may not be true in relation to young potoroos, especially during their dispersal phase.

Plant diseases

Dense vegetation is clearly a vital attribute of potoroo habitat. Where this density is provided by dieback susceptible species, this disease threatens the extent of available habitat. Dieback hygiene is practised in vehicle movements and fieldwork on foot in all parts of Two Peoples Bay NR.

Detailed mapping of *Phytophthora* affected areas on Mount Gardner is about two-thirds completed and should be given high priority in 2002.

7. Search for potoroos outside Two Peoples Bay NR.

Less emphasis was placed on this activity during 2001 than in earlier years. This was due both to cost constraints and to the increased effort being put into gaining a detailed knowledge of the population at Two Peoples Bay. Significantly greater effort will be put into survey outside Two Peoples Bay NR during 2002.

Survey trapping

Cage trapping was carried out during 2001 at sites where apparently suitable habitat for potoroos was found. These areas were between Norman's Inlet and the eastern end of Norman's Beach.

Table 3 Survey trapping outside Two Peoples Bay NR during 2001

Site	Dates	Trap nights	Species trapped
Normans Beach	27/03/01 – 30/03/01	80	Bush rat.
Normans Inlet	27/03/01 – 30/03/01	40	Bush rat, skink.

8. Establish new populations by translocation.

Work on this Action is still well in the future, as there is no source of animals for translocation at present. Investigation of potential sites will continue as survey sites outside Two Peoples Bay are visited. Better knowledge of habitat use by Gilbert's Potoroo is needed, in order to select translocation sites. Radio-tracking of individuals at Two Peoples Bay is providing new insights into the variety of vegetation associations utilised by this species. Documentation of this information will allow much more accurate assessment of potential release sites in future.

9. Review the conservation status of Gilbert's Potoroo according to IUCN criteria in 2007

Information to be used in this review is currently being collected, but it is hoped that by that stage, significant extensions of range will have occurred.

10. Review the Recovery Plan

Review of the recovery plan will be an ongoing process. At this stage it has been revised only so that it meets EA's new guidelines for recovery plans.

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Friend, J.A. (2001). Radio-tracking of Gilbert's Potoroo. Report on Bankwest Landscope Conservation VisaCard project. Department of Conservation and Land Management, Albany.

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Table 4. Results of trapping at monitoring sites in Two Peoples Bay NR during 2001.

Site	Dates	Trap nights	Potoroo captures#	Individual potoroos caught	Other species trapped
Waterfall Beach	27/02/01 – 26/11/01	165	1 adult male capture (first caught at North Fire Break); 4 adult female captures (2 individuals – 1 new, 1 first caught at East Fire Break); 1 young at heel/pouch young female capture (new – implanted).	Adults 37M, 38F, 63F. Young at heel/pouch young 56F.	Quenda, bush rat, *Varanus gouldii*, king skink, bobtail.
North Fire Break	06/02/01 – 06/11/01	320	2 adult male captures (2 individuals); 2 subadult male captures (1 individual); 1 adult female capture (with pouch young); 1 unknown capture.	Adults 24M, 37M, 53F. Subadult 65M.	Quokka, quenda, mardo, bush rat, *Varanus rosenbergi*, king skink, bobtail, Australian raven.
South Fire Break	28/08/01 – 30/08/01	45	3 adult male captures (1 individual – first caught at East Fire Break)	Adult 26M.	Quenda, bush rat, Australian raven.
East Fire Break	30/01/01 – 06/11/01	380	17 adult male captures (2 individuals); 14 adult female captures (2 individuals, both with pouch young); 7 juvenile/subadult captures (1 new individual).	Adults 24M, 25F, 26M, 50F. Juvenile/subadult 53F.	Quokka, quenda, mardo, bush rat, *Varanus rosenbergi*, king skink, bobtail, carpet python.
Robinsons	17/07/01 – 16/11/01	112	2 subadult female captures (1 individual – first caught at West 6).	Subadult 61F.	Quokka, quenda, mardo, bush rat, *Varanus rosenbergi*.
Hakea	30/01/01 – 16/11/01	547	8 adult male captures (2 individuals – 1 first caught at East Fire Break); 10 adult female captures (3 individuals – 1 new, all with pouch young); 2 subadult female captures (1 individual – new).	Adults 42F, 44M, 45M, 51F, 62F. Subadult 58F.	Quokka, quenda, mardo, bush rat, *Varanus rosenbergi*, western bristle bird.
Hill 700	18/07/01 – 28/11/01	35	nil	nil	Quenda, mardo, bush rat.
West 6	06/04/01 – 28/11/01	269	3 subadult/adult male captures (1 individual – new); 1 juvenile male capture (new, implanted); 10 adult female captures (2 individuals – 1 new, both with pouch young); 3 subadult female captures (1 individual – new); 2 young at heel/pouch young female captures (2 individuals – both new, both implanted).	Adults 33F, 54F. Subadult/adult 60M. Subadult 61F, Juvenile 55M, Young at heel/pouch young 59F, 64F.	Quokka, quenda, mardo, bush rat, cat, king skink.