



- EDUCATION
- REHABILITATION
- ENDANGERED SPECIES BREEDING PROGRAM

BILBY MAGIC - KANYANA STYLE

by
JUNE BUTCHER, AM

SCIENTIFIC NAME: *Macrotis lagotis*

COMMON NAMES: Dalgyte, Greater Bilby, Rabbit-eared Bandicoot, Ninu, Walpajirra

STATUS: Vulnerable

INTRODUCTION

Why do we need to Captive Breed the Bilby when it's Status is only considered *vulnerable* ?

When viewing a map of Australia consider that 70% of Australia was inhabited by Bilbies and that they now inhabit only 20% of the country in the Tanami Desert in the Northern Territory, the Great Sandy Desert in the Kimberley, the Gibson Desert, the Pilbara in WA and in the Mitchell grasslands of south-west Queensland; it is time to start breeding in captivity for there to be any hope of Australians to see this charismatic animal in their lifetime.

A national recovery plan is being developed which aims to ensure the survival of the Bilby, despite its ongoing decline. Dalgytes, as they were known, disappeared quickly from the south west of Western Australia in the early 1930s with the arrival of rabbits and foxes.(see attached map on observational records)

In Western Australia, the Ngaanyaljarra Council is working with the Department of Conservation and Land Management (CALM) staff in the Gibson Desert to record current populations and undertake patch burning to protect local Bilby populations. In the Great Sandy Desert a Threatened Species Network works with Aboriginal communities to protect remnant Bilby populations from wild fire threats, and fox and feral cat predation.

Bilbies bred at Kanyana have been reintroduced into the Dryandra Woodland, southeast of Perth. Bilbies have also been reintroduced onto the Peron Peninsula near Shark Bay as part of the Project Eden program. Founding Bilbies in the Peron colony were also bred at Kanyana – illustrated so beautifully in the documentary “Return to Eden”, shown on ABC-TV last year.

Kanyana is in a unique situation – a community group given the responsibility and privilege of captive breeding a vulnerable species under the supervision of CALM scientist, Dr Tony Friend, who established a breeding colony for the Western barred Bandicoot at Kanyana in 1994. The Bilbies followed in 1997. Nicki Marlow has now taken on this role as Tony Friend now devotes his time to the critically endangered Gilberts Potaroo at Two Peoples Bay (near Albany in WA)

UNIQUE BILBY CHARACTERISTICS

Based on experiences both at Kanyana and Dryandra, Bilbies have shown themselves to be the most intelligent of our marsupials.

Catherine Aresse from the Department of Zoology at the University of Western Australia discovered that in the Bilby, unlike any of the other marsupials, the pupils appear fixed for the period of daylight hours. This feature renders the adult Bilby vulnerable if it is stranded outside the burrow in daylight hours. However, this same feature means that the young are safer as they won't venture out of the burrow in the middle of the day. It has been observed that on bright moonlight nights the Bilby food intake is reduced; they spend more time in the nest boxes and appear less confident when out in the enclosures.

The Bilby has a dramatic black and white tail which has, in the past, been used by indigenous people as a head adornment. However, the usual feature is a nail, approximately 1cm in length, at the tip of the tail. The significance of this is speculative but having watched Bilbies behaviour when agitated, the tail is arched with only the tip touching the sand leaving a dot pattern trace. When relaxed, the tail leaves a long pattern in the sand similar to a kangaroo. Perhaps the dots are a message to other Bilbies to be aware.

HOUSING

Kanyana's housing was designed to take into account the variety of Perth weather conditions. In Summer temperatures can, periodically, range between 30-40c for six months of the year. Winter temperatures can drop to 5c at night. Wooden nesting boxes contain shredded office paper and sit on a thick base of clay bricks. 15cm diameter thick industrial poly pipe forms a 6.5 metre U shaped *tunnel* from the nesting box, around the perimeter of the enclosure, opening into the sand. The poly pipes are covered with 20cm of coarse, washed river-sand cover to maintain a constant temperature. In extreme heat the use of demisters and fans has been necessary. To prevent fungal or bacterial growth in the sand, ensure that the sand doesn't become too wet; that it can be quickly dried by the fan through evaporation to achieve maximum cooling. The enclosures are equipped with red lights to allow night time viewing and monitoring of the Bilbies. Food is contained in vermin-proof metal containers with flip top lids. Water is provided in lick-drip bottles. The sand in the enclosures is sieved every day to remove faeces and any food remnants. The sand then only needs to be replaced every 12 months.

DIET.

Bilbies are fed a mixture fresh fruit (3 varieties), vegetables (3 varieties including a green vegetable) and root vegetables. Meatballs (see recipe) are used as a vehicle for vitamins, insectivore, calcium, etc. Note: For our meatballs we use for-human- consumption mince which must be frozen for one week to prevent toxoplasmosis being transmitted to the Bilbies. Egg or cheese is given three times a week. Live food in the form of mealworms or crickets is given daily. Marsupial Omnivore Diet pellets from Glen Forrest Manufacturing Stockfeeders (see references) mixed with aviary seed, in a flip-top metal feeder are available at all times.

MONITORING.

The Bilbies are *viewed* twice daily; in the morning when the nest boxes are cleaned and at night, by torchlight, when they are digging in the enclosures. The Bilbies are caught up, for a physical check once a fortnight . This includes

- a) Checking the pouch and/or young
- b) Overall fur and skin condition
- c) Condition of teeth
- d) Weighing: All animals are weighed fortnightly. Males in the colony may weigh over 3 kilos, females are generally 1.5 –2 kilos. The young leave the pouch between 150 – 200 grams in weight and can increase their weight by 100 grams in the first week after they emerge from the pouch!

All handling and transportation of bilbies is done in a dark green or black pouch to keep stress to a minimum. All food is weighed – before and after eating - and recorded on a food sheet for each pair of Bilbies. In the mornings, the uneaten food is weighed to calculate how much has been eaten. This information together with the twice daily viewing of the animals is an extremely valuable monitoring system which alerts us to the first signs of ill health or misadventure in the enclosures

BREEDING CRITERIA

Within Kanyana's captive breeding colony, the aim is to produce healthy animals with the most diverse genes for release into the Dryandra woodland where it is no longer possible to manipulate the gene pool in the 20 hectare enclosure. Exchanging animals with the other captive-breeding colonies ensures the continuation of new blood. Bilbies are paired for 3-4 matings with resulting young before they are moved on to another mate. (see attachment *The Bilby Health Project* by Kristen Warren)

VETERINARY CARE.

Since the Bilby Health Project, headed by Dr Kris Warren from Murdoch University Veterinary School, veterinary involvement continues: particularly, in the older Bilbies (over 5 years) regular teeth checks are essential. These checks are carried out under Isoflurane anaesthetic, and descaling is carried out if found to be necessary. Bilbies in captivity are prone to dental problems including tooth abscesses. Faecal samples are collected every 6 weeks and checked for parasites and bacterial infections both of which have been found to be uncommon in Kanyana's animals. All Bilbies at Kanyana are micro-chipped for identification. On release they wear radio-transmitters fixed to their tails which permits radio tracking for 4-6 weeks, this being the life of the transmitter battery.

This summarises the information that has been collected at Kanyana over the last six years. Data collected from captive breeding colonies of endangered species is vital to their survival.

REFERENCES

Landscape January, 2003 Bilbies by Rianna Moonie including distribution map by Ian Abbott CALM publications, Department of Conservation and Land Management, Perth, Western Australia
Phone 08 9334 0333, www.naturebase.net

The Bilby Health Project

Dr Kristen Warren, BSc BVMS (Hons) PhD, Lecturer in Wildlife and Zoo Medicine, Murdoch University, Murdoch, Western Australia
Phone 08 9360 6000, <http://www.murdoch.edu.au>

Threatened Species and Communities, Environment Australia, Canberra, ACT
Freecall 1800 803 772, e-mail ciu@ea.gov.au, <http://www.ea.gov.au/biodiversity/threatened/>

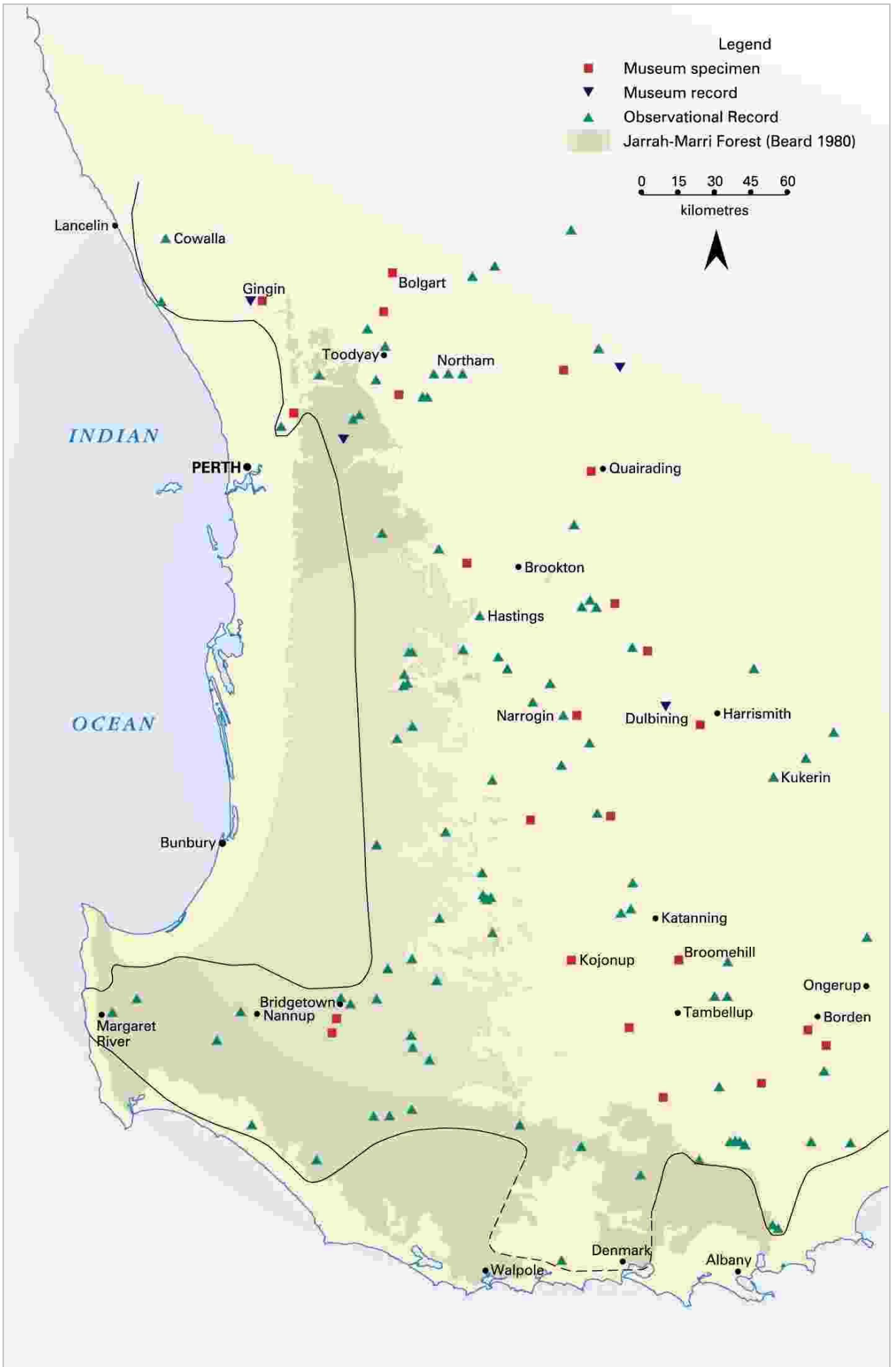
Glen Forrest Manufacturing Stockfeeders, 3150 Great Eastern Highway, Glen Forrest, WA.
Warren Potts, Nutritionist
Phone 08 9298 8111, Fax 08 9298 8700

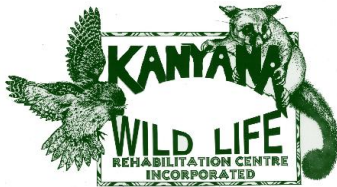
Kanyana Wildlife Rehabilitation Centre Inc, Gooseberry Hill, Western Australia
June Butcher AM, Chairman
Phone 08 9293 1416, e-mail kanyana@kanyanawildlife.org.au, www.kanyanawildlife.org.au

Return to Eden. Artemis International Films, Victoria Park, WA
Celia Tait Filmmaker
Phone 08 9 470 3435, 9470 2936, www.artemisfilms.com

Bilby Mating and Birthing

Jenni Hood, BVSc Hons BVMS PhD, Journalist for *The Veterinarian*
Lectures on *Animals in Society* at Murdoch University





- EDUCATION
 - REHABILITATION
 - ENDANGERED SPECIES BREEDING PROGRAM
-

THE BILBY HEALTH PROJECT

BY

Dr Kristen Warren, BSc BVMS (Hons) PhD

The Bilby (*Macrotis lagotis*) is endangered, the lesser Bilby is already extinct. Once found across 70 per cent of Australia, Bilby territory has shrunk to 20 per cent of the original size with populations marginalised to remote desert habitats due to agricultural practices, competition with rabbit populations and predation by feral cats and foxes.

There has been very limited research conducted on infectious diseases and their implications on the threatened native species in WA. Investigation and surveillance of infectious diseases is an important aspect of endangered species recovery programs.

In January 2000, the Bilby Health Project, a collaborative research project involving June Butcher from Kanyana, Dr Tony Friend from the Department of Conservation and Land Management (CALM), Professor Ralph Swan and myself from Murdoch University, started. The project is funded by the Australian Research Council and BHP-Billeteon. We like to think of BHP-Billeteon supporting the Bilbies as *The Big Australian* helping the Little (and endangered) Australian! The research is focusing on disease investigation to determine how disease affects the survival chances of the wild bilbies and captive bred animals. These health studies play an important role in the recovery of this endangered species.

We are now in the final year of the project and it is time to update you on how the project has progressed.

The research team studies the health and survival of Bilbies at Kanyana Wildlife Rehabilitation Centre, at Dryandra Woodlands and in the wild. The Bilbies that are bred at Kanyana are released into two 10 hectare predator-proof enclosures in the Dryandra Woodlands, located 170 km south-east of Perth. From these enclosures, Bilbies are released into the fox-baited sections in outer Dryandra Forest.

The research team aims to determine the prevalence and importance of parasitic, bacterial and viral diseases in captive and released Bilby populations, as well as in wild populations in the Pilbara. This will enable comparison of health and disease burden between captive-bred and wild individuals. The researchers aim to determine the normal values for health indicators, such as blood cell counts, to help unravel the immediate and long-term impacts of diseases in these populations.

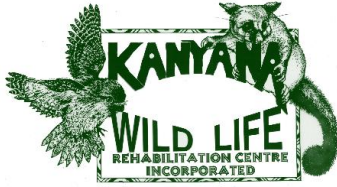
Predation is considered a major problem affecting successful reintroduction of native species. Prior to this study the role of diseases in predisposing animals to predation was unknown.

The study also aims to establish whether certain diseases are endemic to Bilbies, or are being transmitted from other wildlife species.

Disease research on native species has been limited and studies in the past have mainly involved incidental observations with no continued monitoring to understand the implications of these diseases on health, reproduction and survival of local populations of endangered marsupial species.

The research team spent 8 days in the Pilbara in 2000 in order to track and collect samples from wild Bilbies. The research team was based at the BHP-Billiton iron ore Yarri site. Great assistance was provided by BHP-Billiton staff. The research team explored Shay Gap and Yarri environs for Bilbies. The team drove over 1000 km on the sandy tracks looking for the distinctive Bilby tracks and active burrows. The team was successful in identifying a few sites where there was evidence of Bilby activity. Unfortunately, at almost every site where the research team stopped there was evidence of feral cat tracks, indicating the severity of the feral cat problem in Australia.;

The results of this research project will be important for determining the management policies for the conservation of Bilbies and the project will serve as a model for health management for other endangered species recovery programs in Australia



- EDUCATION
 - REHABILITATION
 - ENDANGERED SPECIES BREEDING PROGRAM
-

BILBY MATING AND BIRTHING

by

Jeni Hood

The extraordinary and, until recently, secret sex life and birthing process of the endangered Bilby (*Macrotis lagotis*) has been captured on film in a world-first in Western Australia. In footage that puts Tommy Lee and Pamela Anderson to shame, Yennandah and his female mate, Sharka, were captured using infrared film in their man-made burrow in a marathon mating frenzy that lasted 18 hours.

During this time, the male Bilby mated with the female repeatedly, with some couplings lasting 2 hours. The footage, which was included in a documentary film, shown on ABC-TV last year, called *Return to Eden* by filmmaker Celia Tait of Artemis Films, shows Yennandah becoming so exhausted that he falls off his mate *in flagrante dilecto* on several occasions.

So engrossed in mating were the pair that neither ate, drank, urinated or defecated over the entire 18 hours. Prior to the sudden onset of this period of submissive sexual receptivity by the female, she was shown repeatedly trying to escape the amorous attentions of the male. During this time, which probably corresponds to pro-oestrus, the male made several attempts to mate with the female who sustained deep scratches to her flanks from his sharp claws as he unsuccessfully tried to grasp and mount her.

By the end of the 18 hours, the female Bilby appears quite dishevelled, with fur loss and deep scratches over her flanks. Both Bilbies are then shown to exit the burrow briefly for food and water and to urinate and defecate. Immediately after this, the pair returns to their burrow where the exhausted male dozes off, awaking periodically to check the pouch of his mate. The male's sexual interest in the female has been replaced with what appears to be *fatherly concern*.

Prior to this video monitoring, it had been assumed that birth in the Bilby was much like that of the Kangaroo with the full-term joey falling almost effortlessly from an open pouch. What was discovered in the Bilby is that within 24 hours of the strenuous mating process, the female goes into *labour* to expel the 78 day old joey from her tightly closed rear-facing pouch.

While her mate dozed nearby, the female became increasingly agitated and licked at the stretched, but still closed, opening of her pouch. The joey was also agitated and was captured on film struggling to escape. At various times, different body parts of Milbindi (Message Stick) as she was named, were seen to protrude from the pouch. The male who was also Milbindi's father, continued his cycle of waking and checking the pouch.

In other unique footage, the somewhat *new-age* father is shown physically supporting his mate who is in an upright position leaning against his flank with her forelegs in what looks like an attempt to use gravity to help expel the joey. In the final birth sequence, Sharka is seen to almost run in the opposite direction to the emerging Bilby in a last-ditch *birthing* effort. The expulsion of her joey took approximately 24 hours and has never been filmed before.

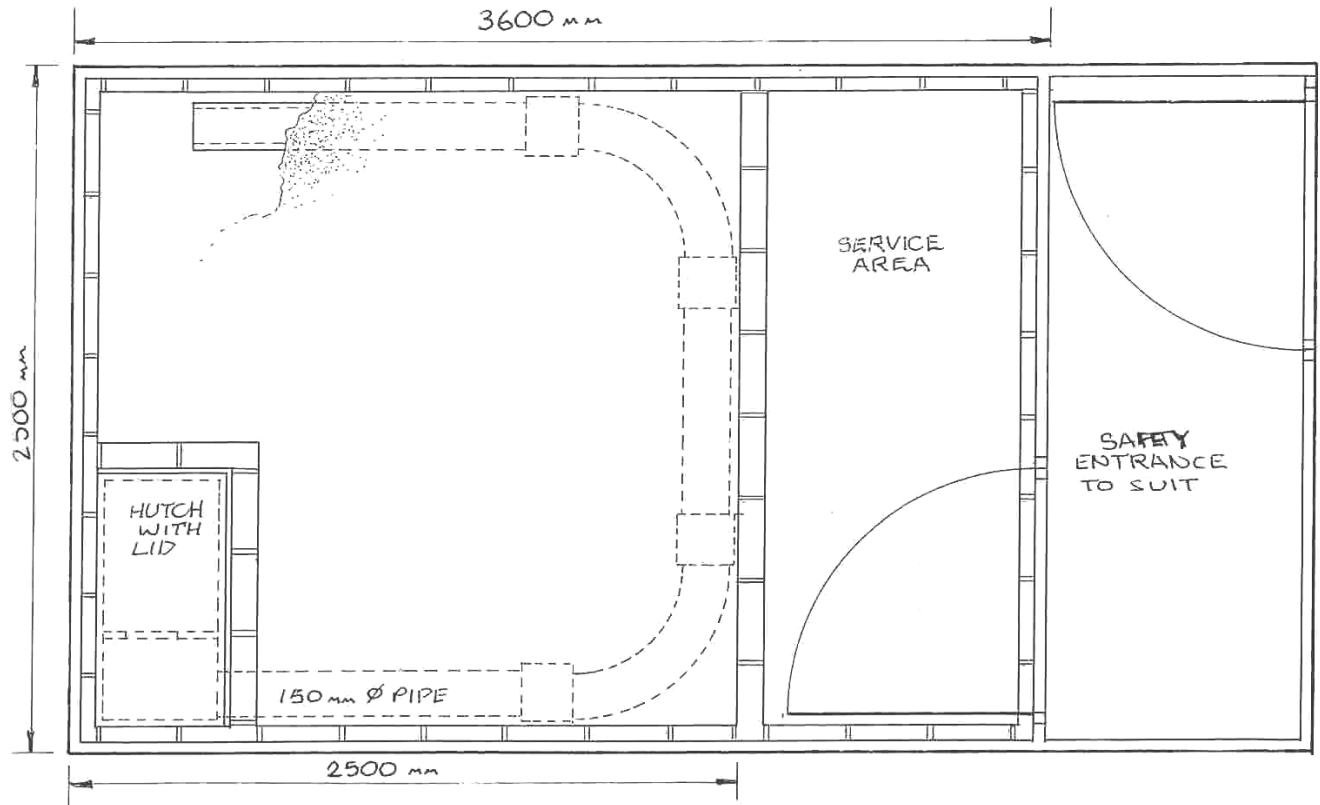
The female joey drank from her mother almost straight away from the same teat that had nurtured her in the pouch and which now dangled outside the pouch. Another unique aspect of the Bilby life cycle seen for the first time was the involvement of the father in the cleaning and toileting of the joey. The three Bilbies were also filmed sleeping in a close group. This discovery is at odds with the common belief that the male Bilby should be removed from the mother and offspring and may lead to different management practices in relation to captive breeding of this endangered species.

In an attempt to capture the birth of the offspring produced from the Bilbys recent mating, the marsupials were constantly filmed for another 14 days until 2 immature young (about 1cm in length) were seen to crawl from the birth canal to the pouch. This birth was accompanied by more classic signs of labour: the mother was agitated and abdominal contractions were visible. Her facial expression was *fixed* and she moved in circles, licking at her now slack and open pouch.

Very little was previously known about the mating behaviour of the Bilby because most sexual activity takes place in the darkness and safety of burrows. To discover exactly what these marsupials got up to, filmmaker Celia Tait constructed a nesting box that was connected to the buried PVC pipes that form part of the captive Bilbies' burrows at Kanyana. A camera box with a 1.2 metre focal length was attached and three video cameras using infrared film were placed to capture the Bilbies from three angles. The film was then relayed automatically to a television set in the Butcher's lounge room where the action proved so exciting that June confessed to staying up one night until 2.30am! A lipstick-sized surveillance camera attached to a tiny TV screen was used to simultaneously record any movement outside the burrow.

Kanyana received its first Bilby, an orphaned female, in 1996. At about the same time an early and unsuccessful captive-breeding program folded in Broome and CALM offered Kanyana an adult male Bilby. To the surprise of everyone, the pair produced a joey on Good Friday in 1997. Since then, Kanyana has bred 72 Bilbies and has a resident colony of 19. The Kanyana-bred Bilbies have been released to the Dryandra Woodland which is a CALM reserve 30 kilometres from the wheatbelt town of Narrogin. The 20 hectare enclosure is the release and monitor site not only for the endangered Greater Bilby, but also the Western Barred bandicoot (*Perameles bougainville*), Mala (*Lagorchestes hirsutus*), Banded Hare Wallabies (*Lagostrophus fasciatus*) and Boodies (*Bettongia lesueur*).

- EDUCATION
- REHABILITATION
- ENDANGERED SPECIES BREEDING PROGRAM



- To prevent burrowing into the sandpad, 2.5cm x 1.25cm weldmesh is laid on compacted sand. Clay bricks are laid to form 2.5m x 2.5m well and a well for a bilby nestbox which indexes with the 15cm diameter x 1.5 cm thick high density black poly pipe
- 3 lengths of 15cm diameter industrial density black poly pipe are laid in a “U” shape to give 6.5m access tunnel to the nextbox. Note: Two 15cm x 5cm wide collars are fitted to join the 3 sections of poly pipe together and to aid removal of the pipes when necessary.
- Dry clay-free river sand is placed in the 2.5m x 2.5m well to a depth of 23cm, and in the service and play area 5cm
- When the outside air temperature exceeds 35c an overhead fan and mist sprinklers are turned on for short periods to allow the surface of the sand to be cooled by evaporation without wetting the sand. Under these conditions the temperature in the poly pipes may rise to 29c depending on the duration of higher outside air temperatures.
- Infra-red lighting is used to allow night time photography and the monitoring of the Bilbys' behaviour