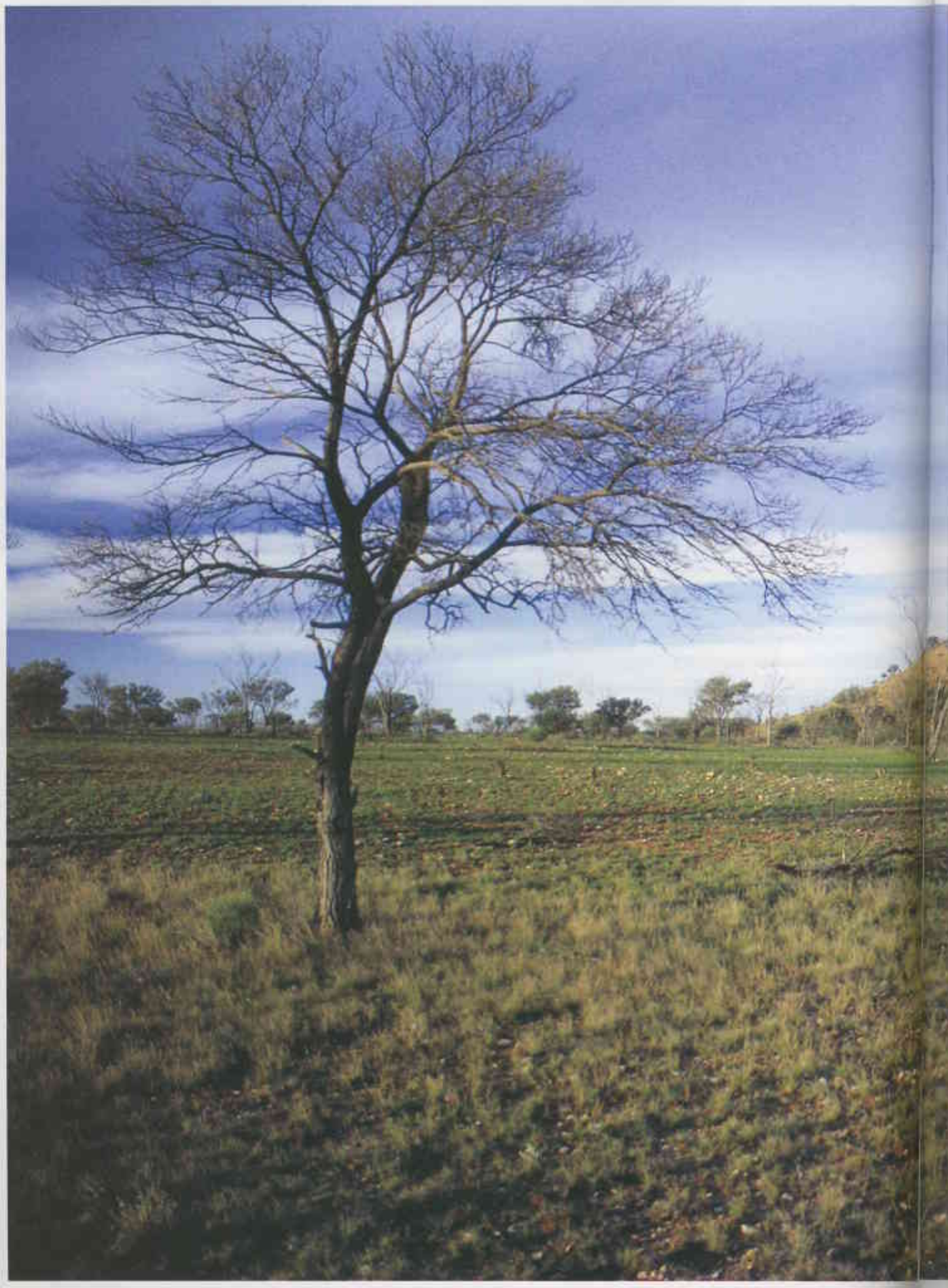
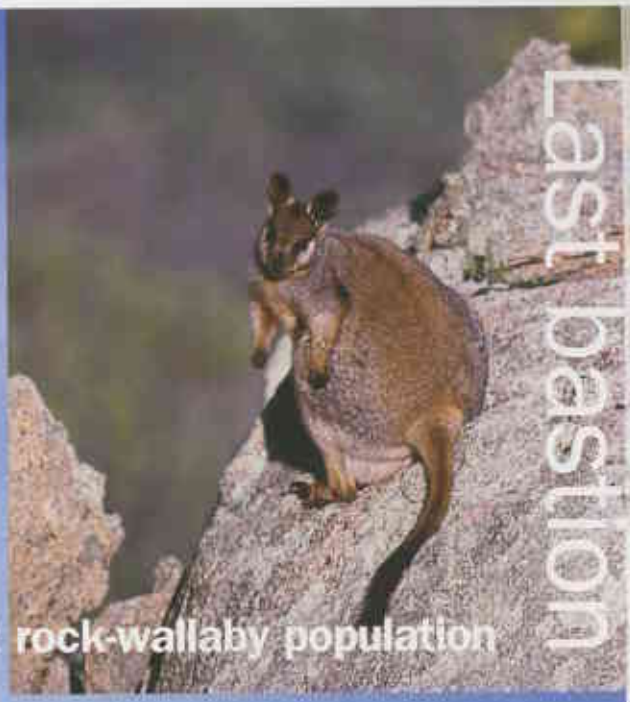
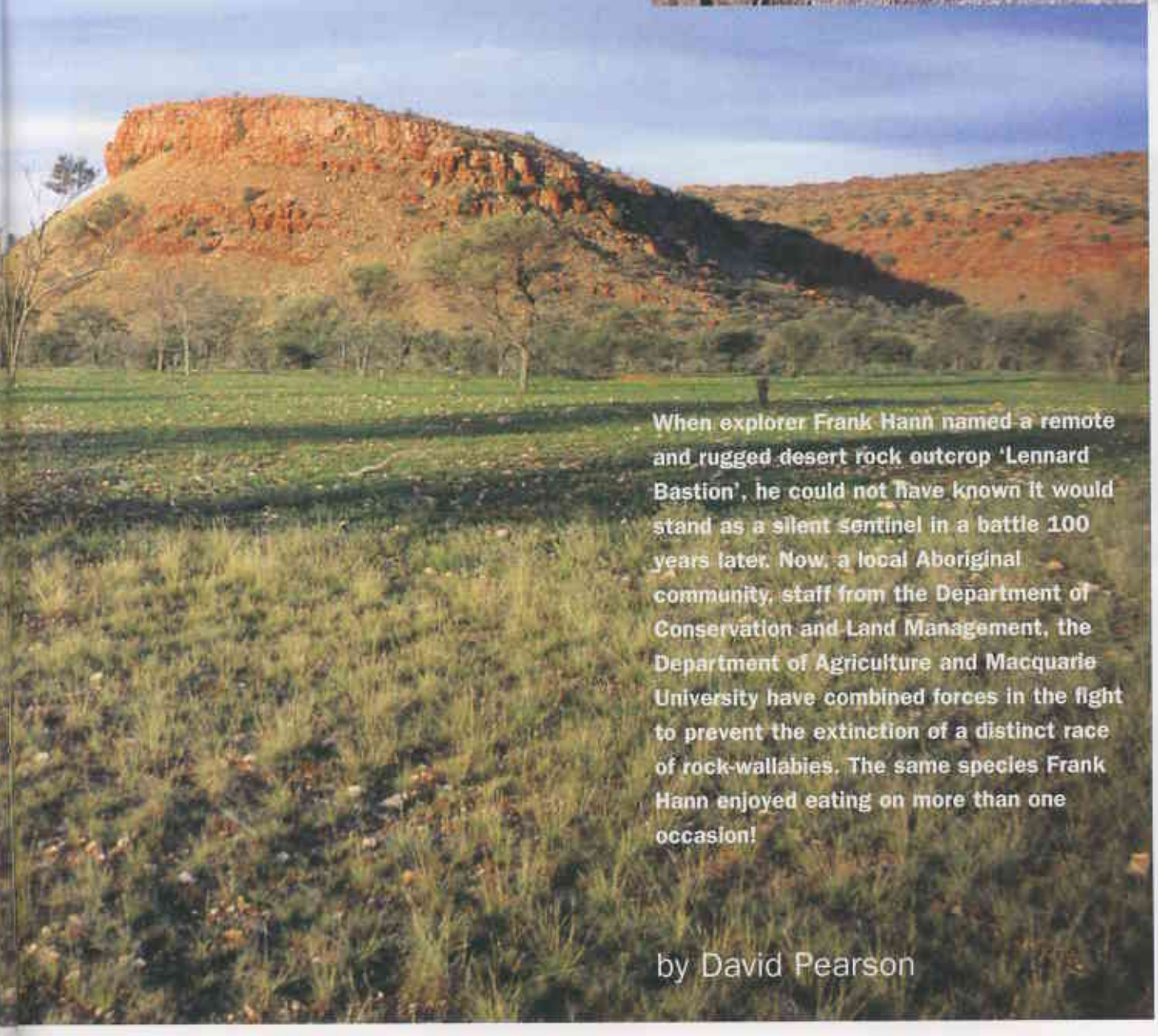


Last bastion

the battle to save a desert rock-wallaby population





When explorer Frank Hann named a remote and rugged desert rock outcrop 'Lennard Bastion', he could not have known it would stand as a silent sentinel in a battle 100 years later. Now, a local Aboriginal community, staff from the Department of Conservation and Land Management, the Department of Agriculture and Macquarie University have combined forces in the fight to prevent the extinction of a distinct race of rock-wallabies. The same species Frank Hann enjoyed eating on more than one occasion!

by David Pearson

Ribs Ward and Victor Lane, Pintupi and Ngaanyatjarra men from Warburton, walk deliberately along the edge of an immense quartzite cliff towering above a sea of red sand-dunes. Their eyes scan ahead looking for the tracks of foxes and dingoes attracted to a trail of 1080 poison baits encircling the last remaining colony of a distinct genetic race of the black-footed rock-wallaby or warru (*Petrogale lateralis*).

These two desert Aboriginal men form the front-line in a battle to prevent the extinction of the rock-wallabies. This task has brought together staff from the Department of Conservation and Land Management (CALM), the Ngaanyatjarra Land Management Unit (NLMU), the Department of Agriculture and Macquarie University to work alongside local Aboriginal communities. Of particular importance was the need to rapidly turn around the decline of rock-wallabies and to get the population growing again. This would prevent inbreeding and also help the animals to cope with unpredictable events such as drought.

A problem identified

Australian desert mammals have been decimated since European settlement. Eleven species are now extinct and a further 34 are threatened in Western Australia. A number of different factors have been implicated in these declines: competition from feral and domestic herbivores (rabbits, sheep and cattle), predation by foxes and cats, changes to fire regimes, and disease. Data available to analyse the cause and effect of many of these factors are typically old and of limited value. It is probable that these factors worked in synergy, and the relative influence of each factor depended on the nutritional, shelter and population characteristics of each mammal species. For instance, native herbivores living around rock outcrops and salt lakes were severely impacted upon by rabbits that invaded and denuded these productive habitats as they spread across Australia. This, in turn, reduced the ability of such habitats to support sizeable populations of native species and provide refuge during droughts.

Even though rock-wallabies suffered, they were one of the survivors of the wave of desert mammal extinctions that followed European colonisation. Their rocky habitats gave them some protection against introduced interlopers, but it was only temporary relief. During the last 50 years, desert rock-wallaby populations have been whittled away continuously, largely unnoticed. In a few areas, such as Heavitree Gap in Alice Springs, they remained conspicuously visible, giving the impression that they were surviving successfully throughout desert areas. The eminent mammalogist H H Finlayson noted, during his fieldwork in central Australia in 1932–3, that rock-wallabies were the most abundant mammal and described them as 'swarming' in some rocky ranges. However, by 1961, he observed that there had been a serious population decline.

Now-retired CALM researchers Andrew Burbidge and Phil Fuller conducted interviews with Aboriginal people in the 1980s (see 'Vanishing Desert Dwellers', *LANDSCOPE*,

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Main Lennard Bastion stands as a sentinel on the northern side of the Townsend Ridges.
Inset A black-footed rock-wallaby (*Petrogale lateralis*).

Above left Looking west along the western portion of the Townsend Ridges; a baiting trail is visible along the base of the cliffs.
Photos – David Pearson

Left Black-footed rock-wallaby.
Photo – Jiri Lochman

Above Researchers taking a blood sample from the base of a rock-wallaby tail.
Photo – CALM

Winter 1987). Their conversations indicated that rock-wallabies still survived in the desert ranges abutting the Northern Territory and South Australian borders. A survey of this region was undertaken between 1988 and 1992 by local Aboriginal communities and CALM. It found that rock-wallabies were present at only 14 of the 80 sites where Aboriginal people used to see them or where explorers had recorded them. But, even at these sites, populations were typically small, fragmented and confined to the most rugged rock-piles.

When I first visited the imposing Lennard Bastion in the Townsend Ridges in 1990, I was surprised to see a rock-wallaby (a rare event during the survey). There were enough fresh droppings on the rocks to convince the Aboriginal people with me that rock-wallabies were persisting in reasonable numbers. The following day another rock-wallaby and fresh droppings were seen on a nearby cliff.

Another search of the cliffs of the Townsend Ridges to the east and west of Lennard Bastion in 1992 failed to locate any other sign of rock-wallabies. It then became evident that this population was small and very isolated from the nearest known population in the Cavenagh Ranges, 100 kilometres to the east.

In 1992, Mark Eldridge and Jane Bell from Macquarie University began studies into the genetic identity of the WA desert rock-wallaby populations. Field trips in conjunction with CALM researchers and Goldfields regional staff were made to collect blood and tissue samples from as many populations as possible. Rock-wallabies were trapped with 'Bromilow' traps, baited with apples. Each rock-wallaby was weighed, its head and foot length measured, a numbered tag placed in the ear, parasites that live on the body collected and a blood sample taken from a vein at the base of the tail. A small biopsy of ear tissue was also collected before the rock-wallaby was released at the site of its capture.

The ear biopsy was incubated in a special solution to culture cells for later examination. These biopsies had to be kept warm for 12 hours, which meant those on the expedition were required to share their sleeping bag with test-tubes during cold winter nights! Back at the Macquarie University, blood and ear tissue samples were analysed by Mark and his team to look at the composition of their DNA. The ear biopsy was used to observe the number and arrangement of chromosomes and their configuration when they lined up during cell division (meiosis).

The surprising old male

The first rock-wallaby trapped in the Townsend Ridges was a gnarled old male who, judging by his ragged ears and facial scars, had been around for many years and survived numerous scuffles. He weighed a substantial 5.1 kilograms, a monster in local terms, and was referred to as '5.1' thereafter. He was captured on several occasions over subsequent years, but it was 5.1's

ear tissue sample that really excited researchers. When the tissue was cultured, stained and examined in the laboratory, it was found that this animal had 21 chromosomes, because one copy of chromosome 10 had fused with chromosome 9. This was a very unusual configuration because chromosomes are typically paired and an even number of chromosomes was expected (since they divide evenly between two cells during replication). Old male 5.1 was dismissed as a freak individual.

Further discoveries

Some months later, another three rock-wallabies were captured in the Townsend Ridges, and when Mark prepared their chromosome samples he was amazed to see that these three individuals shared exactly the same chromosome arrangement as 5.1. What did this weird chromosome arrangement mean? Several explanations were thought possible. Perhaps the rock-wallabies in the Townsend Ridges were hybrids between two genetic races of rock-wallabies, one possessing 20 chromosomes and the other 22. Rock-wallabies are known to have variable numbers of chromosomes that have evolved as they have spread to new habitats and become isolated from other populations. The black-footed rock-wallabies in the West Kimberley near Fitzroy Crossing, for example, are known to have 20 chromosomes and those in the ranges along the Northern Territory border have 22. However, this explanation appeared unlikely, as the nearest Kimberley population was more than 1,000 kilometres away and

Top left David Pearson and Ribs Ward with a Townsend Ridges rock-wallaby. *Photo – CALM*

Centre left Clearing a bait trail at the Townsend Ridges with a tractor and hand tools from the Warburton Community.

Left Jim Stevens from the Department of Agriculture explains 1080 bait laying techniques during a course in April 1995 at the Townsend Ridges.
Photos – David Pearson

Right Ribs Ward laying 1080 baits by attaching them to low shrubs to prevent them from being removed by birds. *Photo – David Pearson*

separated by the immense and predominantly sandy Gibson and Great Sandy deserts.

Or maybe there was a population, now extinct, to the west that had 20 chromosomes, and hybridisation had occurred in the Townsend Ridges where these two races interfaced. Since all the rock-wallaby populations have disappeared from the 1,000 kilometre-wide area to the west of Townsend Ridges, this hypothesis was impossible to test. A more likely explanation was that the unusual chromosome number arose from a rearrangement that occurred in the Townsend Ridges population that did not lead to any deleterious effects on survival or breeding. Consequently, this genetic variation was able to spread through the population. Until we are able to collect further samples, this tantalising situation will remain an unsolved mystery.

Need for urgent action

The work by the Macquarie University team indicated that the Townsend Ridges population was a unique genetic race of rock-wallabies and called for urgent action to prevent their extinction. Foxes are known predators of rock-wallabies, and research in the Wheatbelt by now-retired CALM scientist Jack Kinnear shows that foxes are able to strongly suppress rock-wallaby populations. Our hunch was that foxes, and possibly dingoes, were responsible for suppressing the tiny population of rock-wallabies at the Townsend Ridges, but we did not have the time to test this hypothesis because the rock-wallabies were teetering on the edge of extinction.

The use of sodium mono-fluoroacetate (1080) baits had been very effective in the control of foxes at other sites, so we decided to adapt these techniques for the Townsend Ridges. Baiting for foxes provides protection for a period of time, but eventually foxes reinvade from other areas, so baiting operations need to be regular and systematic. The remoteness of the Townsend Ridges posed major financial costs and logistical problems if CALM staff from the nearest office in Kalgoorlie (915 kilometres by road) were required to visit the site every few months.

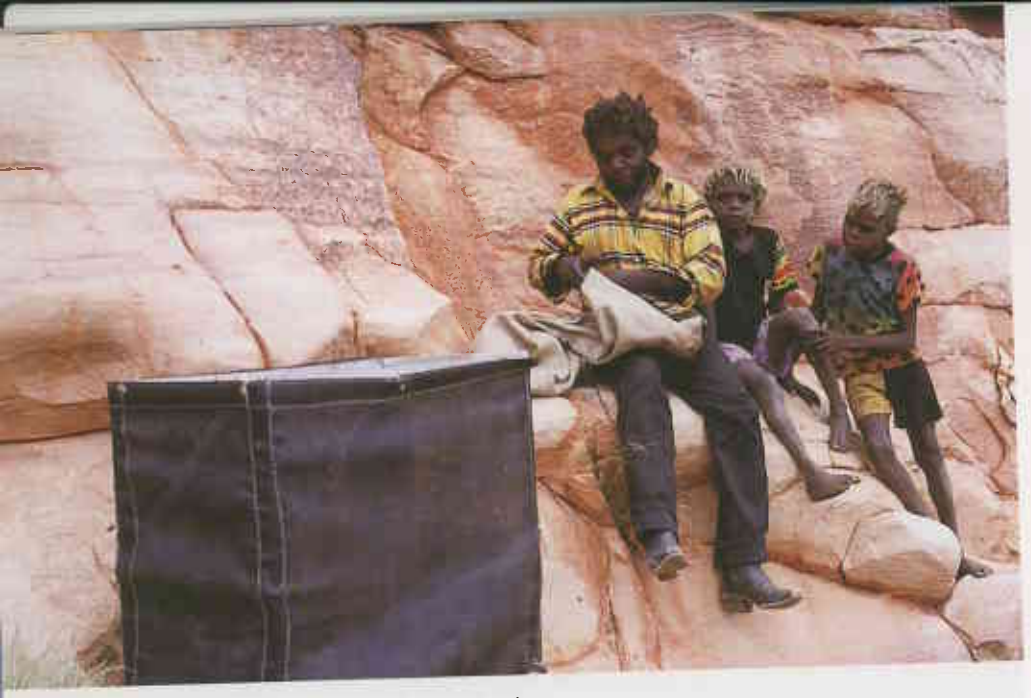
The situation was discussed with the Warburton community—an interesting process because the reasons that CALM scientists advanced for the disappearance of rock-wallabies did not concur with local Aboriginal explanations. Scientists believed that predation by foxes (and perhaps feral cats) was the problem, while Aboriginal people saw the disappearance of rock-wallabies as a consequence of a lack of specific ceremonial activity and altered management, especially the use of fire. Both viewpoints are valid and the issues were discussed around the fireplace late into the night.

However, the idea of baiting foxes raised a number of other issues. Many people in the Warburton community were concerned about the effects of baits on non-target species such as goannas and their pet dogs. It was important for them to establish whether they could be poisoned by eating a goanna that had eaten bait. Baits are attractive to dingoes and, at present, there is no reliable way to bait foxes without killing dingoes. Aboriginal people value both foxes and dingoes. Fox meat, despite its strong odour, is eaten as a powerful cure for colds, while dingoes are camp pets and important in the Dreaming (Tjukurrpa). They were also once a food source and economic item when people traded dingo scalps in exchange for tea, sugar and flour.

Once local Aboriginal people had seen that rock-wallabies had disappeared from most of their former haunts, they were willing to see foxes and dingoes removed to give the rock-wallabies a better chance. The remoteness of the Townsend Ridges made the employment of local Aboriginal people to conduct the baiting a sensible and cost-effective option. Staff from the Department of Agriculture and CALM flew up to Warburton and ran a 1080 handling and safety course with a practical field component at the Townsend Ridges. The course taught techniques to store, transport and lay baits safely, so as to minimise risk to people, camp dogs and wildlife.

Baiting school

Following the 1080 course, local Aboriginal people were contracted though NLMU to conduct fox baiting at monthly intervals. This work was funded under a variety of programs by the Commonwealth Department of Environment and Heritage. Contractors would revisit the site a few days after bait laying and use their tracking skills to determine how many foxes and dingoes were taking the baits. Refresher courses were provided every few years to renew skills and to train new contractors. A lockable freezer was transported to Warburton so that a supply of baits was always on hand, and this supply was regularly topped up by visiting CALM staff.



Above Ribs Ward, Amos Simms and Bruno Jennings prepare to release a rock-wallaby from a Bromilow trap. *Photo – David Pearson*

Baiting has now continued for 10 years, and the rock-wallaby population has grown from an estimated six to eight animals to around 30 to 40. Rock-wallaby numbers are monitored annually by trapping with Bromilow traps. Female rock-wallabies are almost always carrying pouch young when captured, indicating that breeding is still occurring and a rapid increase in rock-wallabies is possible if baiting is maintained. The area of habitat being used by the rock-wallabies is also calculated each year by mapping the distribution of fresh rock-wallaby droppings. The distinctive appearance of their droppings provides an easy technique to work out how far rock wallabies are moving along and away from the cliffs to feed.

Regular trapping provides valuable information on the biology of these little-studied rock-wallabies. For example, in July 2003, a female rock-wallaby, ear-tagged in 1993, was recaptured. She was an adult in 1993 with a pouch young and, when captured 10 years later, she again had a pouch young. Such records indicate that, for such a small mammal, rock-wallabies live comparatively long lives. The reliable recapture of adults suggests that the reason the population has not been growing quickly is that high rates of predation on juvenile rock-wallabies prevent them from being recruited into the adult population. Studies on other species of rock-wallabies have shown that feral cats may be destructive predators of juvenile rock-wallabies. The role of cats in the decline of rock-wallabies in the Townsend Ridges is unclear, as they seem to be relatively rare.

The project in the Townsend Ridges has shown that it is possible to reverse the decline of a rock-wallaby population by carrying out a program to reduce the number of their predators. The challenge is to continue baiting in the Townsend Ridges and expand the program to other desert areas where rock-wallabies, as well as other threatened species such as bilbies (or nirnu) and malleefowl (or ngarnamarra), persist. The involvement of local Aboriginal people in running the baiting operation and assisting with monitoring has been essential for the success of the project.

With the declaration of the 9.8-million-hectare Ngaanyatjarra Indigenous Protected Area in August 2002 (see 'Common Ground' in *LANDSCOPE*, Summer 1999–2000), CALM will be working with the NLMU to help conserve threatened species such as rock-wallabies, by promoting suitable fire regimes for nature conservation and providing employment opportunities in local communities.

Implications for other rock-wallaby populations

The management of rock-wallaby populations poses unique problems for CALM. These animals inhabit some of the most rugged and inaccessible country in the State, including offshore islands, desert ranges without road access and remote gorges in the Kimberley. CALM has neither the staff nor the resources to provide the level of management and monitoring necessary to maintain a close watch on more than a few rock-wallaby populations. By working with local landholders, it is possible to achieve better conservation outcomes for the rock-wallabies at a lower cost to the public. Furthermore, projects to conserve rock-wallabies provide an avenue for landholders to be directly involved in managing the wildlife resources on their land. Only through such cooperative arrangements can we hope to reverse the slide of rock-wallaby populations across Western Australia.

David Pearson is a principal research scientist at CALM's Wildlife Research Centre in Woodvale. He can be contacted on (08) 9405 5100 or by email(davidp@calm.wa.gov.au).

David thanks the Ngaanyatjarra Council for their ongoing interest and permission to work in the Central Australian Aboriginal Reserve. Many people in the Warburton community have assisted with the rock-wallaby project over the last 10 years by providing advice and accommodation, conducting baiting or follow-up predator surveys; especially Cyril and Queenie Simms, and the late T Simms, Ian (Riba) Ward, Damian McLean, Chris Paget, Gerald Porter, Victor Lane, John and Beth Winchbuist, Jan Turner and the late M Jennings. The Ngaanyatjarra Land Management Unit (Keith Noble, John Simmonds, Rodney Edwards, Madeline Hourihan and Andrew Drenen) has been very supportive of the project and assisted in obtaining funding, and organising and undertaking baiting.

CALM Goldfields regional staff helped with rock-wallaby survey work, the preparation of baiting lines, baiting and the transport of baits. Roger Armstrong (CALM Bunbury), Jim Stevens and the late Dennis King (the Department of Agriculture) ran courses for Ngaanyatjarra people on the safe use of 1080 poison. Many CALM volunteers have contributed to the program. Dr Mark Eldridge and Jane Bell of the Macquarie University undertook the collection of samples and their analysis.

Volume 19 Number 3 AUTUMN 2004

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Regulars

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Phone (08) 9334 0481 or (08) 9334 0437.
Prepress Colourbox Digital.
Printing Advance Press, Western Australia.

© ISSN 0815-4465

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Published by the Department of Conservation and Land Management, 17 Dick Perry Avenue, Kensington, Western Australia.