Looking after the land at ULURU

A combination of Aboriginal knowledge and scientific research is providing a sound basis for managing this World Heritage land.

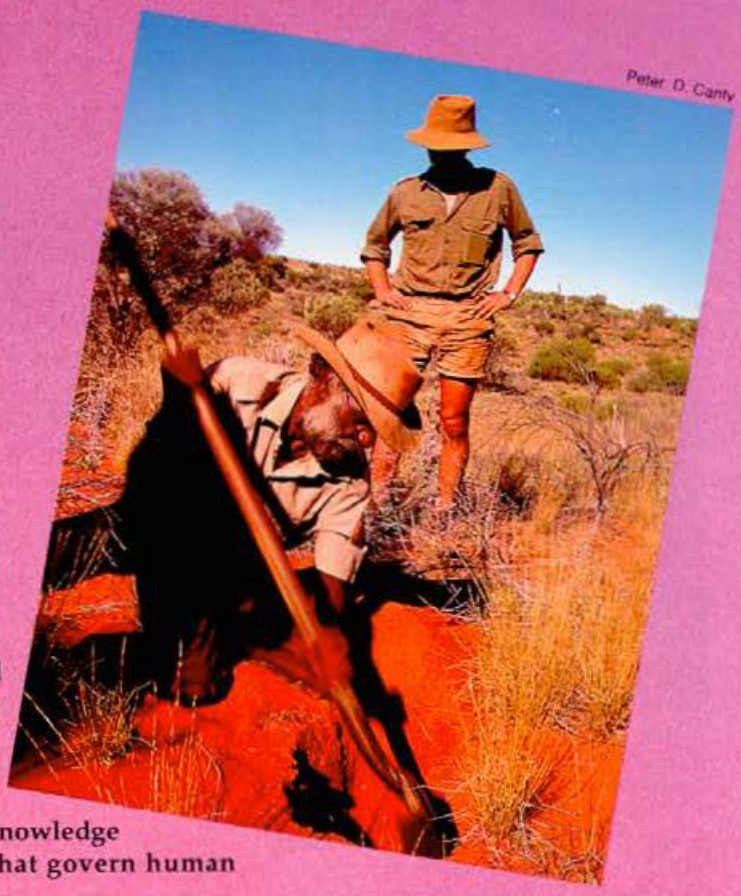
Peter D. Carrty

Central Australia's desert country seems, unless you look closely, to be the dead heart of an arid continent: a sere, forbidding landscape where nothing living can be seen but the occasional kite, soaring in the vast dome of the sky. But beneath the apparent barrenness, those who know where and how to look can detect signs of life; here, the presence of living things is revealed most often through their tracks or their scats.

It is a landscape that gives up its secrets only grudgingly. To the untutored eye it can appear empty and incapable of supporting life, but its Aboriginal inhabitants have learned to use the land's resources so well over tens of thousands of years that they have established a culture of astonishing richness. Their myths, songs and art celebrate the ordered dimensions of the land — its timelessness as much as its spectacular blossoming after rain — and reveal the depth of their knowledge of the plants, the animals and the very land itself.

That depth of knowledge stems from a need to know not only the natural history of the desert but also how to manage it. Indeed, the Anangu people who are the traditional owners of Uluru (Ayers Rock) and Kata Tjuta (the Olgas), now contained within Uluru National Park, regard their role in life as 'looking after the land': a task that lies at the centre of the Tjukurpa, the religious philosophy that binds Anangu to the land.

Kata Tjuta, about 40 km from Uluru, is criss-crossed by domes, gorges and valleys. Run-off from these supports a diverse community of plants and animals.



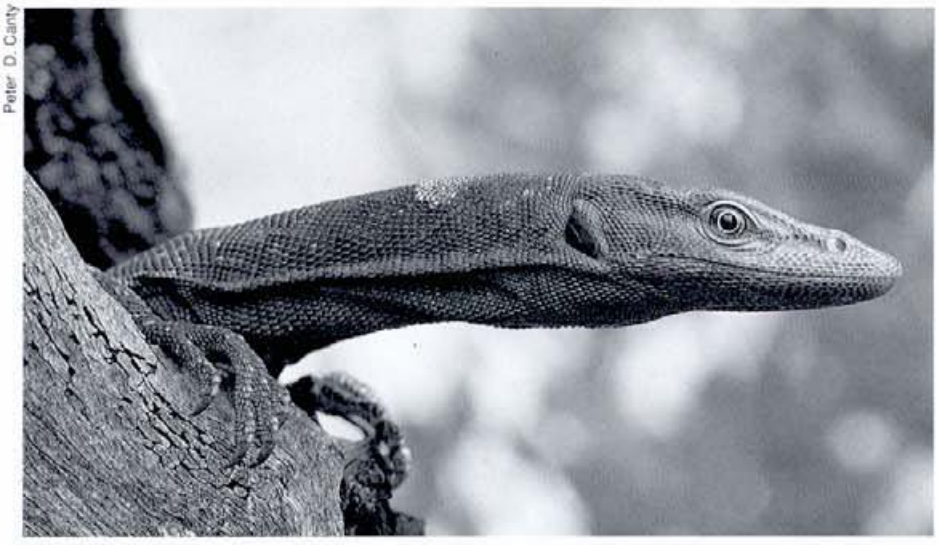
The involvement of Anangu men and women with expert knowledge of Uluru National Park's environment was central to the CSIRO fauna survey. Here Mr Alan Wilson, a senior member of the Mutitjulu community, unearths a lizard for watching scientists.

The Tjukurpa provides answers to the fundamental questions of existence, explaining the creation of the world and the shape, behaviour and meaning of all plants and animals. Much of what scientists would term biological or ecological information is considered by Anangu to be a part of the Tjukurpa — knowledge that, to them, is inextricably bound up with rules that govern human behaviour so that this does not harm the land.

Anangu culture was never static. Songlines — routes along which traditional obligations and activities were carried out — criss-crossed the desert, and trade routes connected the people of the central desert with tribes living in the lush coastal areas of the Top End. But nothing could have prepared Anangu for the impact of the white man.

The arrival of people who held a profoundly different view of the land swept aside the land management skills codified in the Tjukurpa. The pastoral industry's fences, cattle, sheep and horses changed the face of the country forever — and the white settlers' inability to recognise that controlled fire was integral to the maintenance of the landscape they found so attractive meant that patterns of plant dominance and change over time were suddenly interrupted. Many of the animals that depended on those plants (and on which Anangu depended for survival) disappeared, replaced by rabbits, foxes, feral cats, feral donkeys and camels.

Peter D. Canty



Despite its sere appearance, Uluru National Park supports the Australian arid zone's most diverse reptile fauna. The black-headed goanna *Varanus tristis* is one of six species of monitor lizards collected from the Park.

When freehold title to Uluru National Park was handed to its traditional Anangu owners in October 1985 a new era of land management began. Paradoxically, the new management structure is based on traditional ideas of stewardship, of looking after the land rather than exploitation.

The Park has such outstanding value that it is listed both as a Biosphere Reserve — as part of the UNESCO network of examples of major ecosystems — and on the World Heritage List. As one of the natural wonders of the world, Uluru National Park also plays a pivotal role in the Australian tourism industry.

At 'handback' in 1985, the traditional owners leased the Park to the Australian National Parks and Wildlife Service (ANPWS), which employs rangers who operate it according to the primary aim set out in the Plan of Management: to 'ensure that the outstanding natural scenery and other cultural and natural values of the Park are maintained, and that the national and international significance of the Park is not compromised'. Tourism operators at Uluru National Park have thus been required to include the Park as a whole, not just the spectacular monoliths that are the focus of visitor interest, in their own management and development strategies.

Anangu recognise that it is vital for them, and for Australia, to manage a natural and cultural resource of such global importance. Over recent years they have become increasingly concerned by the gradual disappearance of animals they have known for millennia, by increases in the number of feral animals and by environmental degradation as a result of past changes in management practices, especially fire management.

In 1987 the Uluru Kata Tjuta Board of Management, through ANPWS, commissioned CSIRO's Centre for Arid Zone Research (an Alice Springs-based facility of the Division of Wildlife and Ecology) to conduct a survey of the vertebrate fauna of Uluru National Park. The main goals of the 3-year survey were to provide:

- information that would help maintain the full complement of animal species within the Park
- information on visitor impact on the distribution and abundance of animals
- an information resource that would enable visitors to gain a deeper appreciation of the Park's environment
- an opportunity to combine Anangu and scientific knowledge of ecological relationships

These goals were to be met through a detailed ecological survey that emphasised the processes involved in the distribution of animals, and also looked at assemblages of plants and animals in order to identify management units.

Invertebrates were not considered in the survey. Australia's invertebrates are generally poorly known, and information on those that form the foundation of plant and animal systems in the arid lands making up so much of the continent is so sparse that they could not be used as indicators of environmental stress.

The fourth goal of the survey contains the key not only to its significance in cultural and scientific terms for all Australians, but also to its conduct and its importance as a management tool for Uluru National Park. Because so much of the animal life found within the Park is essentially invisible — in hiding, at least during daylight hours, from heat, desiccation and predators — a conventional survey would not have revealed anything like the full picture it might in, say, coastal areas.

As an example, during a 3-day visit to the Park with Arid Zone Research Centre scientists (and survey team members) Dr Stephen Morton, Dr Anne Kerle and Mr Julian Reid, I saw one rabbit and a 10-cm-long dragon lizard: only two terrestrial animals. However, during a brief walk one afternoon with Ms Edith Richards, an Anangu ranger employed by the Park, I was shown tracks and traces of dragon lizards, small skinks, giant skinks, bluetongue lizards, legless lizards, thorny devils, grass-wrens, mulgara, dingos, feral cats and rabbits: a total of 12 terrestrial animals.

The involvement of Anangu experts was therefore central to the survey's success; Anangu have honed their naturalists' skills over centuries, primarily in the search for food, and have consequently developed a deep familiarity with the lives of the animals on which their own survival depends. Their involvement in the survey also offered a unique opportunity for people from vastly different backgrounds and cultural perspectives to combine their knowledge, to teach and to learn from each other and to share their commitment to the preservation of Uluru National Park and its environment.

The CSIRO researchers discovered that Anangu knowledge extends well beyond the natural history of animals that are important in cultural or dietary terms, and that Anangu recognise landscape types and gradations within those types, classifying them in a similar way to scientists. For example, they classify *ulpuru*, or red kangaroo (*malu*) habitat, as a subdivision of *puti* — flat rainfall run-off fans and alluvial deposits. *Ulpuru* is distinguished by open areas with few obstacles to wind flow, no spinifex and no prickles (*tjilka*) because kangaroos don't like prickles. It supports substantial amounts of green, moist grass.

In fact, the survey confirmed that the Northern Hemisphere convention of classifying ecological associations

according to which animals inhabit particular plant communities is not relevant to Uluru, since many vertebrate animals in this — as in other Australian arid environments — move from one habitat type to another depending on the availability of water and plant growth.

Anangu's knowledge of the Park's natural history and their uncanny skill at 'reading' the landscape for signs of its cryptic inhabitants were also integral to planning the scope and design of the survey.

Uluru National Park covers 1325 square kilometres and encompasses a surprising variety of landscape types, all of which are subject to highly variable, unpredictable and unreliable rainfall. Temperature regimes are more regular (ranging from an average summer maximum of 39·2°C to an average minimum of only 4·3° in winter, when frosts are not uncommon), and play an important role in determining where many of the Park's animals are to be found and — especially in combination with rain — what they will be doing.

As is to be expected in arid land, the rare good rainfalls combine with appropriate temperature variations to maximise plant growth and to stimulate breeding in many animals.

Uluru (at 3 × 2 km, the world's largest monolith) and the domes of Kata Tjuta (12 × 6 km) rise from a sandy landscape that is dominated by spinifex, with scattered communities of mallee, mulga and open eucalypt woodland.

Fire is central to the balance of those plant communities, and to the distribution of animals within the Park. Prior to the arrival of Europeans, Anangu practised so-called fire-stick farming to maintain a supply of green feed for the animals they hunted. The establishment of a pastoral industry in the region eliminated fire management and substituted accidental wildfires at random intervals... with disastrous consequences for many plant and animal species. Park management now includes a patch-burning strategy to minimise the build-up of fuel and hence the potential for highly damaging wildfires, to maintain a diversity of plant successions and thus to provide a variety of habitats for fauna.

In consultation with ANPWS and Anangu, the CSIRO researchers chose a total of 13 survey sites, eight of which were monitored for the duration of the survey. Selection of sites depended on their representativeness of landscape, soils, vegetation and fire succession zones, on their proximity to areas of high visitor impact and on their habitat types, and at all of them birds, reptiles, frogs and mammals were observed or collected over seven field trips between September 1987 and March 1990.

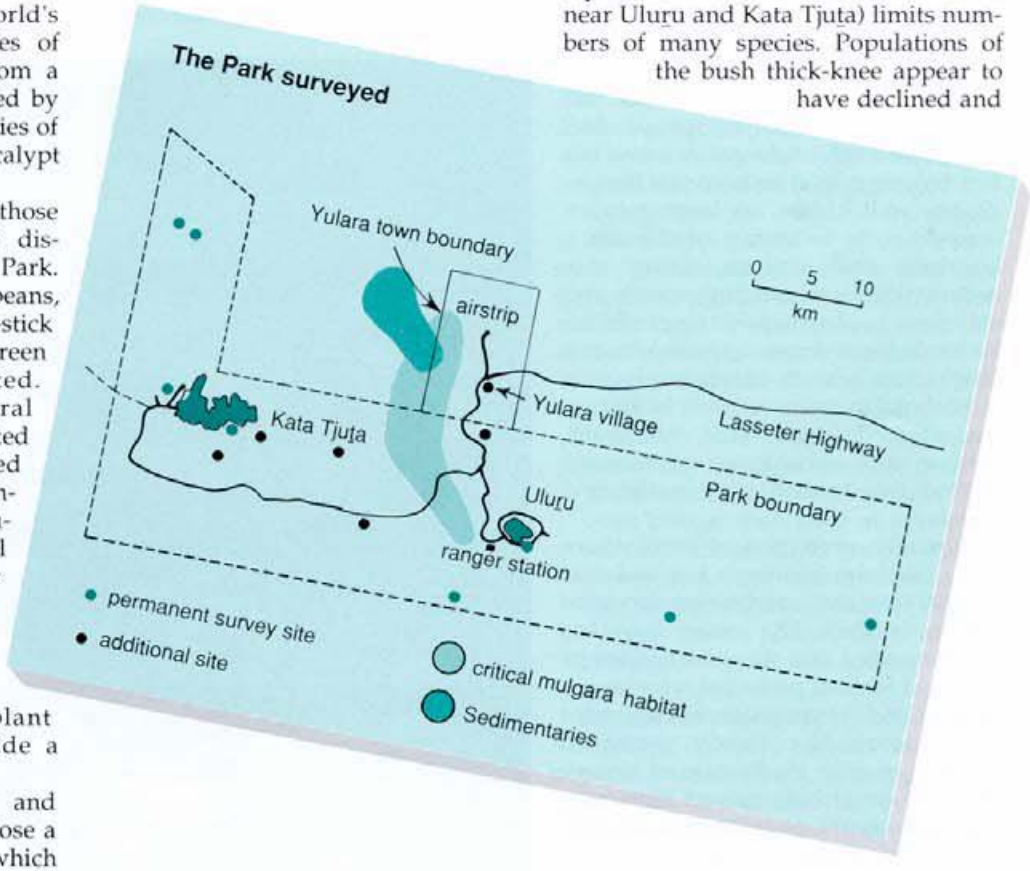
The survey sites reflected six major habitat types, which Anangu also recognise as distinct types: the Kata Tjuta monoliths (*puli* in Pitjantjatjara); flat, sometimes stony rainfall run-off fans and alluvial deposits (*puti*); mulga (*wanari*); transitional, flat to undulating plains dominated by spinifex (*pila*); sandy landscapes supporting a plant community of spinifex and shrubs (*tali*); and mallee.

At all survey sites Mr Reid and Dr Kerle set up permanently marked bird transects 2·4–2·5 km long and conducted censuses at regular intervals. The researchers walked along each transect immediately after sunrise and immediately prior to sunset, recording birds seen and heard together with their position, their distance from the transect line and their activity (whether the birds were flying over, perching or flitting within the habitat). They also noted breeding, feeding or unusual behaviour, habitat use and other observations.

Of the 178 bird species known in Uluru National Park, 117 were recorded during the survey; most of those not found were water-birds or other vagrant species. Several rare birds, including scarlet-chested parrots, striated grass-wrens and grey honeyeaters, were seen, but other rare species for which there are historical records were not. Since 104 of the 115 non-vagrant species known in the Park were recorded during the survey, the apparent absence of others with high conservation status could indicate that effective conservation of such highly mobile species may not be possible within the confines of a national park.

Many birds found in central Australia are extremely nomadic, moving in response to localised rainfall and food, so number of birds recorded during the survey fluctuated widely: diamond doves, for example, were seen at only one of the eight survey sites during the first field trip, but were recorded at six sites during the third.

Although Uluru National Park has a moderately diverse bird fauna, the absence of wetlands or permanent water (apart from a few waterholes on or near Uluru and Kata Tjuta) limits numbers of many species. Populations of the bush thick-knee appear to have declined and



mallee fowl have become extinct in recent times, probably as a result of predation by foxes and feral cats.

Bird species were most diverse, and numbers highest, in mulga habitats and on the rocky domes and scree slopes around Kata Tjuta, which have the most reliable food supplies. As a result, these habitats mainly support sedentary species, but short-term increases in food supplies — for example, when mistletoes flower — attract wide-ranging nomadic birds.

Naturally, fire also played a major role in the variety and numbers of birds found at most sites: bird populations were more stable at sites where fire had been absent for long periods. Following fire, nomadic insect-eating birds favour open country such as spinifex plains, or the grassy alluvial plains around the monoliths, which produce abundant plant life after heavy rain.

Some species, however, are found only in areas where fire is infrequent. The striated grass-wren, a small, cryptic bird that prefers to hide when disturbed rather than fly, depends on mature spinifex for both shelter and nesting... and mature spinifex only occurs in areas that are not burned on a regular basis.

Little information is currently available on the distribution of striated grass-wrens within the Park, and the researchers believe Anangu could provide invaluable assistance in any future survey. One scientist who visited the Park during the survey period had studied this species for many years, but had only managed to locate its nest — always well hidden in large spinifex tussocks — by following adult birds, a laborious and time-consuming procedure. With astounding speed and efficiency, Anangu ranger Edith Richards located one nest for him and taught him how to use barely visible indications in spinifex tussocks and on the ground (signs that, she said, were as well marked as a tarred road) to find two further nests in the next few days.

Certainly, protection of areas where these birds are known to live and nest is vital for the species' preservation within the Park. The survey team has recommended that this rare species be searched for and protected wherever it occurs, and appropriate management (for example, by tightly controlled burning of only small areas of mature spinifex) could both protect the wrens and promote the growth of the spinifex in which they live.

Peter D. Canty

Infrequent rain stimulates Uluru's hardy plant life to bloom and set seed, creating a short-lived feast for insects, birds and mammals.

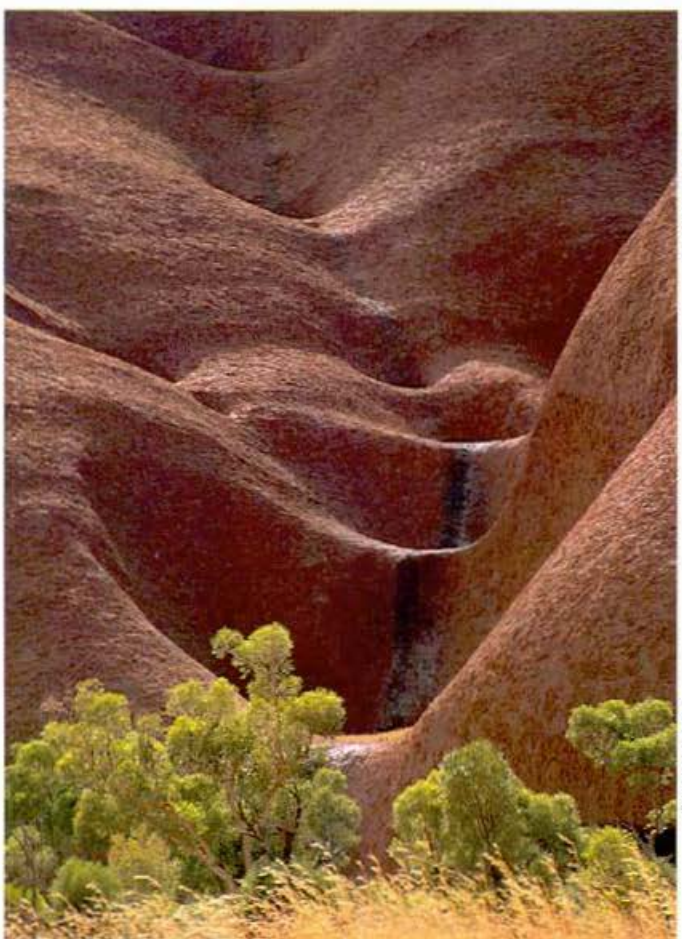
With the assistance of Uluru National Park rangers and Anangu from the Mutitjulu community (notably Ms Richards), Dr Morton, Dr Kerle, Mr Reid, Ms Lynn Baker — a project officer with ANPWS during the survey period — and Mr Kevin Jones prepared pitfall traps for mammals, reptiles and frogs and set out live traps for small mammals at each site.

They laid out pitfalls, made from 20-litre plastic buckets buried to the lips, at four locations within each site. Such traps, while efficient in sandy desert areas, are selective in terms of the varieties of reptiles they capture, being biased towards smaller, fossorial (tunnelling or digging) and cryptic species. For this reason, Mr Graham Armstrong, a specialist herpetologist, was employed during the September–November 1989 field trip to search for larger species and for (tree-dwelling) reptiles unlikely to be caught in the buckets.

Up to 250 collapsible live traps, baited with peanut butter and rolled oats, were deployed at each survey site: mammals (or, occasionally, reptiles) caught in these traps were weighed, measured, assessed for reproductive status, marked with tattoo ink and released.

The researchers also noted incidental sightings or tracks and traces of other mammals and reptiles, conducted searches for nocturnal animals and set out mist-nets for bats. As well, Anangu visited sites and provided information on the Pitjantjatjara or Yankunytjatjara name, the habits and the natural history of the small mammals and reptiles trapped. They then assessed each site for tracks and animal activity, and reported on the condition of the habitat.

The vertebrate fauna of Uluru National Park (as in most of arid Australia) is dominated by reptiles, which have expanded their range of niches here in comparison with deserts elsewhere in the world.



Peter D. Canty

Sculpted by wind, rain and sand, Uluru's valleys and buttresses funnel rainfall onto the rich run-on habitats that support the greatest variety and richness of plant and animal life in the region.

Peter D Canby

Shrubs and trees survive only where rain is channelled into waterholes or streamlets. A hardy bloodwood *(Eucalyptus terminalis)* has gained a foothold among the domes of Kata Tjuta.

Comparisons provide a dramatic illustration of reptile abundance at Uluṟu. The survey team recorded 66 species of reptiles at the eight permanent sites within the 1325 sq. km of the Park, and found a further six species subsequent to the survey — more than are known to occur in the northern Simpson Desert (45 000 sq. km) and the western Great Victoria Desert (384 000 sq. km). Indeed, the survey's *Final Report* comments, 'there is no comparably sized area within the Australian arid and semi-arid zones... known to have a fauna as rich in reptiles as Uluṟu National Park'.

These reptiles included: almost a dozen species of gecko; five legless lizards; eight dragon lizards; a remarkable 28 skinks, including the 40-cm-long giant skink *Egernia kintorsi*; six species of goannas; three blind snakes; two pythons; and eight front-fanged venomous snakes. Three species of frogs were abundant at the base of Uluṟu after heavy rain. *Delma pax*, a small legless lizard, is known in the Northern Territory solely in Uluṟu National Park: it is otherwise found only in the Hamersley Ranges of north-western Western Australia. A skink, *Ctenotus septenarius* (discovered by Mr Greg Fyfe, at the time an Uluṟu National Park ranger, in the 1980s) that was also recorded during the survey is apparently restricted to Kata Tjuṯa, the Sedimentaries immediately to the north of Uluṟu National Park, and Henbury Meteorite Crater, about 250 km to the east-north-east.

The sheer variety of reptiles within Uluṟu National Park is of profound interest to ecologists. While they cannot respond to changing weather patterns by moving, as birds can, reptiles can endure unfavourable periods by slowing down their metabolic processes in a manner akin to hibernation, or can take advantage of good conditions by producing multiple clutches of eggs. They are superbly adapted to take advantage of the sole reliable food source in the Park's environment — the diverse termite fauna that live on spinifex and other plants too low in nutrients to support many vertebrate consumers — and to feed on the spiders that are primary predators of termites. Most of the skinks within the Park eat termites, and in turn are eaten by larger reptiles such as goannas and snakes, by carnivorous mammals and by birds.

Given such a broad-based pyramid of predation, one would expect the greatest number of reptiles to occur in spinifex landscapes, and indeed this proved to be true: a few reptile species are confined to the monoliths and adjacent habitats; nine or so are largely confined to the hard soils of the alluvial fan and mulga plains; about nine generalist species occupy virtually all habitats; but 36 species — half the total number recorded in the Park — show a clear preference for spinifex landscapes.

Reptiles, especially those that prefer spinifex plains, appear to be less affected by fire than are mammals or birds, and any decrease in their numbers immediately following fire is temporary.

In 1894, Professor Baldwin Spencer mounted the first scientific expedition to central Australia. Recalling his experiences, he wrote of 'mounting one sandhill after another, all covered with porcupine grass amongst which the Kangaroo-rats (now known as burrowing bettongs) *Bettongia lesueuri* kept dodging in and out'.

The burrowing bettongs are long gone: indeed, of 46 species of mammals recorded in the region around Uluṟu, only 22 terrestrial mammals — including five introduced species — can still be found (a thorough survey of the Park's bat population could bring the total number of native mammals to 25 species). Many of the medium-sized marsupials and larger rodents are extinct: the black-flanked rock wallaby (*waṟu*) and brushtail possum (*wayuṯa*), once common, have disappeared within the past decade, leaving the echidna as the only medium-sized native mammal remaining in the Park. Red kangaroos (*maḷu*) and euros (*kanyaḷa*) are the only large ones. There are five dasyurids (marsupial insectivores and carnivores), four native rodents, three bats and the marsupial mole (*itjaritjari*).

The spectacular decline of so many native mammal species stands in marked contrast to the apparent health of bird and reptile populations. To a minor extent that decline resulted from a lack of coherent fire management prior to handback of the Park in 1985, but the main cause appears to lie with four introduced mammal species now widespread in the region: the camel, the rabbit, the cat and the fox.

Camels and rabbits have contributed to the decline and disappearance of native fauna through outright competition for food. While the researchers support a reduction in their numbers and commend the ANPWS rabbit-control program within the Park, they also acknowledge that rabbits represent a significant food item for Aṉangu.

Aṉangu are nevertheless concerned at the disappearance of native mammals, whether food items or not: one informant suggested presciently that native animals 'had all moved west because they had too many worries'.

Another recalled the arrival of feral animals:

> 'Someone was tracking and saw something strange, and it was a rabbit track. Rabbits came after the other things; they were at first considered strange, until people began eating them and found them good food. Rabbits then spread out everywhere: now there are rabbits everywhere and the others have gone.'

Rabbits have certainly contributed to the decline of native rodents and marsupials around Uluṟu, although it is impossible to estimate the severity of their impact. However, they are not controlled by myxomatosis in the same

A fresh start for 'old' animals?

Senior Anangu informants are all familiar with the animals that once inhabited the Uluru region, and regret that so many have 'finished up'. They are particularly concerned about the extinction of *wayuta* (the brushtail possum) and anxious to do everything possible to reintroduce this important species to the Park.

Wayuta was once common around Uluru and Kata Tjuta, and throughout central Australia generally: Baldwin Spencer wrote in 1898 that the species was 'ubiquitous' and 'everywhere amongst the eucalypts which border the river beds'. However, its numbers were in decline everywhere by the 1930s, and the last specimen was reported from Uluru in 1983.

Anangu regard *wayuta* as an ancestral creature of considerable religious significance, while white scientists and managers see it as an important element in the biodiversity of the arid zone. Its disappearance, apparently due to competition from rabbits and camels (see the main article), also has serious implications for the conservation of other rare medium-sized native mammals.

Following discussions by Ms Lynn Baker with senior Anangu representatives, Dr Anne Kerle and Mr Jeff Foulkes were granted enthusiastic approval to conduct a 3-year study of the diet of *wayuta*, as revealed by scats preserved around Uluru and Kata Tjuta, and to examine the factors — primarily nutrients and water availability — affecting its persistence in other central desert areas. They worked in consultation with Anangu custodians, principally Mr Kata Kura, Mr Peter Kanari, Mr Sam Protty and Ms Martha Protty, to gain information on habitats previously occupied by *wayuta* and on habitat utilisation by *wayuta* in other areas.

The researchers found that almost all of the plant species eaten by the now extinct Uluru population survive in the Park, so its possible reintroduction faces no food-based barrier. However, predation on juveniles and sub-adults by dingos, foxes and cats, especially during dry conditions, is an important element in *wayuta*'s survival, so any reintroduction would have to be very strictly managed. A further difficulty is that the ideal location at Uluru for reintroduction is also subjected to significant visitor pressure, so it is likely that a site at Kata Tjuta will be chosen for its remoteness from both predators and human disturbance.

Should the proposal for reintroduction proceed, the first step will be to seek the approval and assistance of the Conservation Commission of the Northern Territory to capture and breed *wayuta* from other arid parts of the Territory. If that program is successful, and if rabbit, fox and cat control programs in Uluru National Park can reduce competition and predation, both scientists and Anangu are hopeful that an integral part of the Park's previous character will once again add its religious and spiritual authority to the management of the land.

way as rabbit populations in less arid areas (see page 18), and sudden irruptions in favourable seasons could have a devastating impact on native mammals.

Dr Anne Kerle's research suggests that rabbits and, to a lesser extent, camels have played a significant role in the disappearance of the brushtail possum from Uluru. It appears that possum numbers in arid areas have always fluctuated according to climatic conditions, with only those populations in especially favourable (and often quite small) drought refuges able to survive prolonged dry periods. Habitat invasion by rabbits occurred at a critical time — the first severe drought following a number of good seasons — so competition pressure was concentrated in precisely those nutrient-rich and moist habitats, with the result that possum numbers were reduced to the point where they became highly vulnerable to predators.

She analysed well-preserved possum scats found in caves and rock shelters at Uluru and Kata Tjuta, and found that almost all the plant species represented were also eaten by rabbits and camels. However, while brushtails browse lightly, eating only part of each plant, both introduced species eat plants to the ground, causing severe damage at a time when plants have difficulty in recovering and therefore exacerbating the destruction of sensitive habitats.

Also unlike possums, camels are highly nomadic and, having stripped one area bare of vegetation, simply move on to fresh fields... leaving possums (and other native herbivores) with a dangerously depleted food supply.

The straws that, in this case at least, have broken the possum's back are that: first, rabbits occur in large numbers throughout the Park and can resist predation; and second, camels have no predators (apart from humans) and appear to have very low infant and juvenile mortality rates. Possums, already stressed by competition from camels and rabbits, are also subjected to predation from foxes and feral cats... with fatal consequences in Uluru National Park as well as throughout central Australia.

Feral cat (*ngaya* or *puti kati* in Pitjantjatjara) and fox (*tuuka*) numbers appear to be relatively stable, increasing after a run of good seasons and declining in bad times: one Anangu informant said that 'there were lots of foxes in the old days... at one stage they seem to have disappeared for a while, but then came back'. Cats at least are subject to some hunting pressure from Anangu, who regard them as a delicacy.

Together with the desert mouse (*Pseudomys desertor*) and the euro (*Macropus robustus*, or *kanyala*), the most significant native mammal in the Park is the mulgara (*Dasycercus cristicauda*) — called *murtja* in Pitjantjatjara — a small, robustly built and attractive carnivorous marsupial found in most of central Australia... and vulnerable throughout its range. Only three mulgara were trapped during the entire survey, but Anangu experts alerted the team to the presence of this (and other) species and provided explicit information on where mulgara could be found.

Anangu working with Ms Lynn Baker have significantly extended our knowledge of the distribution and status of mulgara within the Park, revealing that the species occurs most frequently in a boomerang-shaped area extending from Uluru to the Yulara leasehold — the visitor accommodation centre bordering the Park's northern boundary — and to the Sedimentaries (see the map on page 9). Its distribution is thus centred on what is both the richest fauna habitat in the district (encompassing spinifex landscapes, transitional sandplains and monolith run-on country) and the area in greatest need of protection from traffic and the further development of Yulara village.

The management of Yulara village recognises its responsibility with regard to this vulnerable species, and is prepared to design future expansion so as to preserve as much mulgara habitat as possible, which will have the additional benefit of providing a richer experience for visitors through education and interpretation of the landscape around the village.

Dr Peter Bridgewater, Director of ANPWS and thus the overall manager of Uluru National Park, regards the fauna survey as a 'terrific combination of Aboriginal knowledge and scientific investigation... and a confirmation of

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Trees, shrubs and clumps of herbs form the food supply for the termites that support all other animal life in the Uluru region. Growing above termite colonies — the termites do not build mounds like their cousins in wetter climates — they also protect the colonies from desiccation.

how much traditional owners know about Australia'. He says melding of Anangu knowledge and science provides a fantastic model for future management.

The report is very complex, which means ANPWS will have to examine it in detail to see how the information and guidelines it has produced can be incorporated into management plans, but some of the results have already validated management plans in which ANPWS is already engaged, primarily on the basis of Anangu knowledge it contains. For example, it validates the Park's fire management strategy, suggesting that techniques already in place are working to conserve both habitats and animals.'

According to Dr Bridgewater, the survey's most interesting elements are that 'it shows where rare species are concentrated, and that it emphasises the importance of relatively small areas of habitat as concentrations of species diversity or areas where rare or unusual species occur. It also vindicates the importance of boundary zones (whose importance isn't revealed by vegetation maps) between different types of habitats and landscapes.'

The management of Uluru National Park, he says, must dovetail with that of adjacent Aboriginal land leases and with the management and function of Yulara village, so it is essential to have a comprehensive management system — such as that provided by the survey — that goes beyond the Park itself. Reintroducing the brushtail possum now seems possible with appropriate management procedures, and would represent an important step in replacing some of the diversity that is presently missing.

One of the most important functions, and long-term implications, of the Uluru fauna survey was the opportunity it provided for combining Anangu expertise with scientific analysis. The two systems proved immensely complementary, and the survey team learned a great deal about Anangu attitudes and cultural perspectives as well as their natural history skills.

For Anangu, looking after the country has always been and continues to be a central tenet of existence. One of their functions as Park managers (and one of the essential aspects of the Park's philosophy of 'working together') is to teach non-Aboriginal staff to appreciate and manage the land from an Anangu perspective. In turn, they learn new management skills from non-Aboriginal staff.

Anangu rangers and representatives of the Mutitjulu community were involved at every stage of the survey, from design to execution and analysis, and contributed information that, in most cases where scientific observations have since been made, proved to be rich in detail and accuracy.

The survey team sought to learn about the Park from an Anangu perspective and to share as much as possible in a system of classification and information that stems from a lifelong process of practical and religious training.

Naturally, this was not without its difficulties. These stemmed mainly from differences in approach to the function of knowledge: while science seeks to elucidate in order to inform as widely as possible, Anangu believe that giving others information they should not have is wrong. Traditionally, taking responsibility for the sharing of information involves ensuring that restricted information is not made available to those who aren't entitled to have it or to use it — in other words, to manage information by protecting it. Thus the survey team had to proceed with care, developing a relationship based on trust that they would not misuse information or reveal it to people who were not qualified to 'own' it or to disseminate it.

Team members sought at all times to ensure that the information they were collecting had been 'cleared' for public knowledge. They waited for Anangu informants to provide what information they felt able to reveal, although the scientists' careful questioning sometimes provoked assurances that they had been too cautious.

During one field trip, a scientist was seeking Anangu information on perceived differences between native and introduced mice (*mingkiri*). As it is a gross breach of propriety to discuss sexual matters in mixed company, especially with reference to genitals, the scientist tried to skirt the issue of a captive male mouse's comparatively large testicles... only to have a senior Anangu man volunteer cheerfully that one of the differences between the house mouse and indigenous mice was that, 'whitefella *mingkiri* have big balls'.

At all stages of the survey, team members were acutely conscious that Anangu were sharing a way of 'seeing as well as information... and that Anangu believe a real depth of knowledge about the land can only be gained from familiarity with the land. Reminding the scientists that talking about the land is fundamentally a teaching exercise that can only properly take place on the land, a senior Anangu informant said:

> 'It is okay that you can put the names on this paper (notebook), keep them in this machine [tape recorder] and look at all these (illustrations in books) but they are all... just on the very surface. None of them is real; they are whitefella things, ideas about Anangu ideas. I can't properly talk about the country, teach about the country unless I am in it, walking on it, touching it, looking at it.'

Carson Creagh

More about the topic

'The Distribution and Abundance of Vertebrate Fauna of Uluru (Ayers Rock–Mt Olga) National Park: Final Report.' J.R.W Reid, J.A. Kerle and S.R. Morton. (CSIRO Division of Wildlife and Ecology Centre for Arid Zone Research: Alice Springs 1991.) For further information, contact Australian National Parks & Wildlife Service, GPO Box 636, Canberra ACT 2601.

'Dietary Analysis of Central Australian Brushtail Possum Scats from Uluru National Park.' J.A. Kerle and J.N. Foulkes. (ANPWS: Canberra 1988.)

'Feasibility Study for the Reintroduction of Brushtail Possums to Uluru National Park: Phases I & II.' J.A. Kerle and J.N. Foulkes. (ANPWS: Canberra 1990/91.)