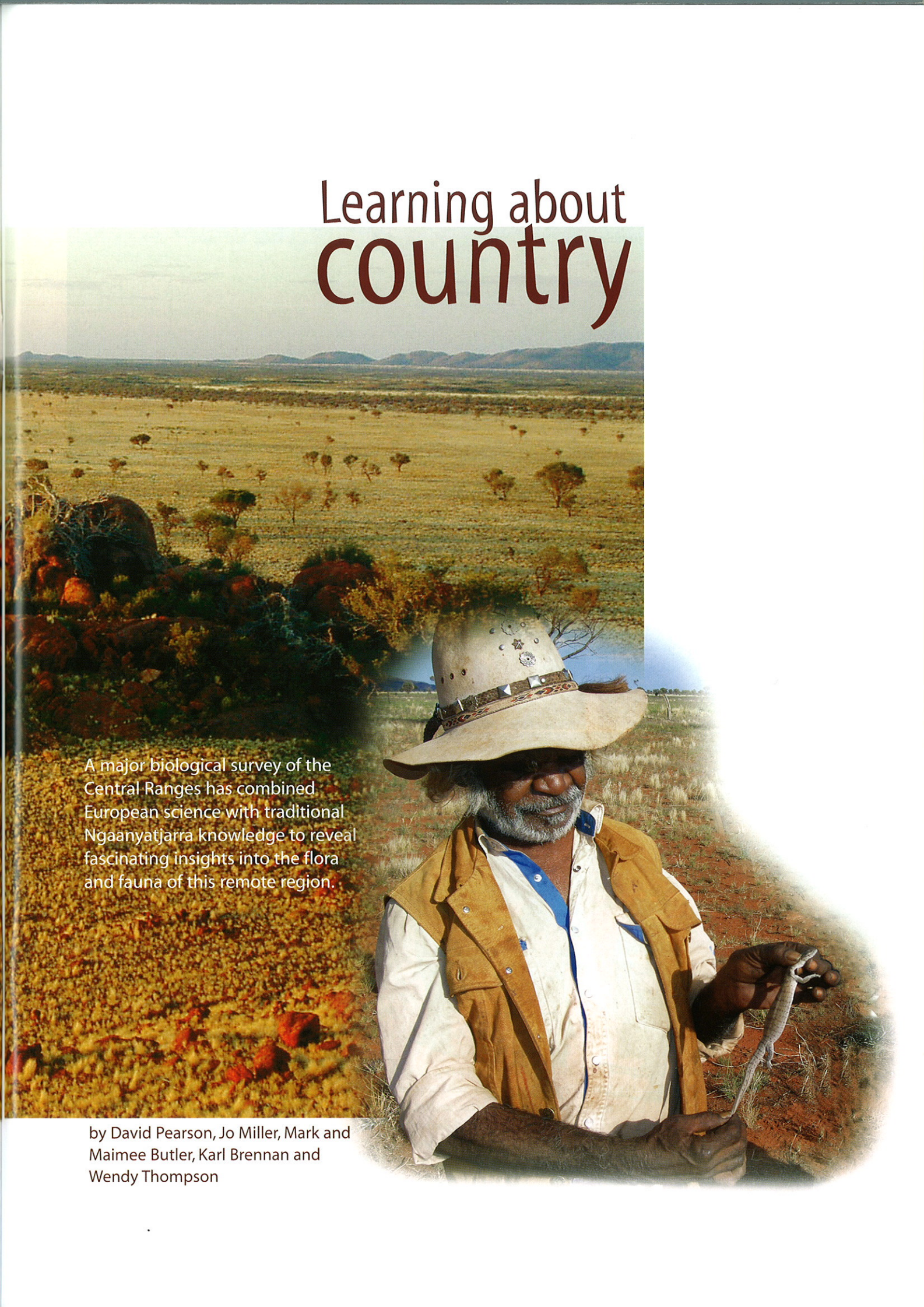


Learning about country

A photograph of a man with a grey beard and mustache, wearing a wide-brimmed hat and a tan vest over a light-colored shirt. He is holding a small, light-colored lizard in his hands. The background is a vast, arid landscape with sparse vegetation and distant mountains under a clear sky.

A major biological survey of the Central Ranges has combined European science with traditional Ngaanyatjarra knowledge to reveal fascinating insights into the flora and fauna of this remote region.

by David Pearson, Jo Miller, Mark and Maimee Butler, Karl Brennan and Wendy Thompson

If you sweep your eyes across a map of Western Australia starting at Exmouth and heading east, you traverse a vast area of desert, firstly the Little Sandy and then the Gibson. Near the Northern Territory border a jumble of ranges appears, prefaced with very English names like Warburton, Jamieson, Rawlinson and Walter James. These ranges were named by early explorers such as Ernest Giles as they staggered westward, ever searching for water.

Still today many people see Australia's western deserts as a great remote wilderness, a place to discover and explore.

However, if you spend any time here with the Ngaanyatjarra people who have lived here across the millennia, there is no mistaking that you are in a place that is extremely well known. The 250,000 square kilometres of Ngaanyatjarra land is a rich social and cultural domain, filled with signs of birth, life, death, stories, people and spirit beings. Traditional culture and law is followed in a practice that has been unbroken by European influence. English is spoken, but for many people it is a second or third language.



To live here successfully takes considerable skill, knowledge and understanding. The Aboriginal people who live on Ngaanyatjarra land have an intimate relationship with their country, its features, flora, fauna and seasons, and a strong cultural tradition centred on ecological skills used to manage and renew the land and its resources.

Change

In the 150 years since Europeans first infiltrated the Central Ranges, little has changed visually—there are now a few roads and small Aboriginal communities but no mining or pastoral operations. However, exotic plants and animals brought to Australia by Europeans have spread right across the landscape. Weeds arrived on

camels, domestic stock and during the construction of roads and towns. For instance, buffel grass (*Cenchrus ciliaris*) originally introduced as fodder for stock is now a major environmental weed, choking creek-side native grasslands and carrying frequent hot fires.

Feral cats were present in the area by the 1890s. Rabbits swarmed through in the early 1900s and were closely followed by the fox. These three species, combined with drought and wildfire, had tremendous impacts on the mammal fauna of the region, resulting in the extinction of many species.

The impact of these past pressures and possible future land-use changes in the Central Ranges has made it important to understand more about the flora and fauna of the region. Such an understanding would enable existing disturbances and any further developments to be managed to reduce their environmental impacts.

Project genesis

The idea of conducting a wildlife survey incorporating European science and traditional Ngaanyatjarra knowledge had been proposed in the late 1980s. In 2005, the Commonwealth Department of the Environment and Water Resources provided funds for the Western Australian Museum and South Australian Museum to jointly conduct a survey to 'fill in the gaps' in museum collections and improve knowledge about the flora and fauna of the Central Ranges. Western Australia's Department of Environment and Conservation (DEC) staff were to provide scientific expertise and liaison with Ngaanyatjarra people.

DEC and the Ngaanyatjarra people already had a history of collaborative work on the management of the Gibson



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Main View across open mulga woodland from Amy Giles Rocks in the Central Ranges.

Photo – Helen Vonow

Inset Winston Mitchell with a pygmy mulga monitor or pinakunyjtjinytji (*Varanus gilleni*).

Photo – David Pearson

Left Ngaanyatjarra ladies returning to camp.

Photo – Wendy Thompson



Desert Nature Reserve and efforts to save rock-wallabies (see 'Last Bastion', *LANDSCOPE*, Autumn 2004). This relationship and history of cooperation were major factors in the Ngaanyatjarra people's support for the project.

Building a project

The Central Ranges region was claimed under native title and handed back to its Aboriginal custodians in June 2005. While they now have legal ownership, Ngaanyatjarra people never felt as if their responsibilities and associations to the country had been severed. The region is also part of the Ngaanyatjarra Indigenous Protected Area, proclaimed in August 2002, which included one of only two of Australia's 80 biogeographic areas without land managed for conservation.

Ngaanyatjarra people follow strict codes of conduct on country and take their responsibility for the safety and welfare of visitors or strangers to

their country very seriously. While scientists might be eager to wander unrestricted in search of new and rare species, such behaviour could have dire consequences. Places in the landscape contain dangerous spirits, while other areas are sacred sites that should be visited only by initiated men, or by women. Such places are numerous and are certainly not signposted! So when outsiders travel in such areas they should do so with the people who know and speak for those areas.

But this posed some questions. How could scientists collect the data they were interested in? How could Ngaanyatjarra people ensure the scientists did not stray into places they shouldn't and how could the survey benefit local people?

The answers came from extensive liaison between the scientists and the Ngaanyatjarra people. The Ngaanyatjarra people expressed a vital interest in preserving the flora and fauna on their

Top Collecting insects at Bell Rock Range.

Photo – Wendy Thompson

Above from left Wolf spider (*Hoggicosa* sp.), butterfly bush (*Petalostylis cassiodes*) and a western blue-tongue lizard or nyarlamira (*Tiliqua occipitalis*).
Photos from left – Karl Brennan, Vanessa Clarke and Karl Brennan

country, hunting, collecting plants for food, medicine and artefacts, burning and performing ceremonies for ongoing productivity. Senior people expressed their desire to pass on knowledge about wildlife to their children and to see land management employment opportunities for current and future generations. Such desires paved the way for the survey to proceed.

Desert logistics

The scientists and Ngaanyatjarra people were keen to involve as many people as possible in the survey. This included elders who knew where and



how to catch certain species and who could guide scientists safely through the landscape. Other community members and school-aged children were encouraged to come to learn more about their country from elders and the scientists.

A Memorandum of Understanding spelt out the responsibilities of the scientists and Aboriginal people involved in the survey, the costs, employment opportunities and how data would be stored and reported. The composition of the survey team was selected to ensure a range of expertise, without overwhelming local people with too many scientists. It included arachnologists, entomologists, botanists, herpetologists and mammalogists from DEC, the Western Australian and South Australian museums and the South Australian Department for Environment and Heritage. Sampling was to focus on vascular plants, non-vascular plants (such as lichens), small mammals, reptiles, frogs and invertebrates, especially spiders, pseudo-scorpions, beetles, sucking bugs and stygofauna (invertebrate fauna living in underground water bodies).

Diverse techniques

In October 2006, the scientists from Perth and Adelaide set out in four-wheel drive vehicles with trailers laden with a mass of camping equipment and sampling gear for the first sampling sites near the Walter James Range. Over the next three weeks they used a variety of techniques for sampling. The botanists (Helen Vonow, Vanessa Clarke and Wendy Thompson) set up quadrats to record the plant species occurring in



Top left Botanists Wendy Thompson and Vanessa Clarke explain how they collect plants.

Centre left Karl Brennan collecting insects attracted to a mercury vapour light.
Photos – David Pearson

Centre right 'Fishing' for stygofauna.
Photo – Karl Brennan

Left Mark Hutchinson conducts his daily 'show and tell' for local schoolchildren.
Photo – David Pearson

Right Installing pitfall traps and drift lines.

Photo – Karl Brennan

dunefield, sandplain and rocky outcrops. With the Ngaanyatjarra women, they collected opportunistically while visiting distant gorges and creeklines. The women demonstrated the use of local plants for food or medicine and dug up tubers that could be used to assist their identification. Wendy Thompson from DEC's Goldfields Region was on the lookout for cryptogams (mosses, liverworts and lichens), as they are important elements in ecosystem function and are rarely sampled during biological surveys.

Mammals were captured in Elliott traps (small collapsible metal traps) and pitfall traps (20-litre plastic buckets buried into sand linked by flywire fences which direct the fauna towards the buckets), while reptiles and even some frogs were captured in pitfalls, in funnel traps and by hand. The Ngaanyatjarra women proved to be particularly adept at locating and digging up goannas, while the Ngaanyatjarra men followed tracks of pythons and other fauna seen when driving, catching many species by hand.

In addition to vertebrates, an inventory of arthropods (insects, arachnids and centipedes) was carried out as these animals make an incredible contribution to Australia's biodiversity (there are an estimated 253,000 species of terrestrial arthropods in Australia). Scooping dip nets into rocky gorge pools caught an array of aquatic beetles. At night, torchlight illuminated the numerous eyes of wolf spiders hunting for prey, while hand-held ultraviolet lights located scorpions, betrayed by their fluorescence, which were of particular interest to arachnologist Julianne Warnock from the Western Australian Museum.

Hanging a mercury vapour lamp next to a calico sheet at camp attracted a bewildering array of beetles, cicadas, lacewings, leaf hoppers, mantids, midges, moths, plant hoppers, stink bugs and stoneflies. Each morning a myriad of ants, beetles, centipedes and spiders greeted those inspecting the pitfall traps.

The most intriguing survey technique of all became known as



'fishing for nirri-nirri' (the Ngaanyatjarra word for beetles). It was employed by entomologist Chris Watts to sample stygofauna and aroused great interest (and considerable mirth) among local people as he lowered a fine mesh net down bore holes with a short rod and fishing reel. No survey of stygofauna in Central Ranges aquifers had been conducted previously. These aquifers occur in friable limestones (calcretes) deposited by groundwater flowing through ancient valleys. Such aquifers occur widely across much of arid Australia and contain a significant component of Australia's biodiversity (see 'Beasts of the Underworld' *LANDSCOPE*, Autumn 2006).

The Ngaanyatjarra people's local knowledge of their homeland was critical in locating bores, many of which were long abandoned, not marked on maps and hidden by vegetation. Despite the best efforts by seasoned scientists and Aboriginal elders, the first to catch a nirri-nirri was local boy, Rasjad Butler. A quick check by Chris Watts that evening under the microscope back at camp revealed it to be a species new to science and most likely endemic to the Central Ranges.

Explaining European scientific techniques

Biological surveys are reliant on the collection of specimens so that species identifications can be checked back in the laboratory against descriptions in books and reference collections. Since the Central Ranges region has had so little collecting, it was highly probable that we would collect new species.

The need to take specimens, particularly of vertebrates, to assist with identification and for lodging in museums for future reference, is often difficult for a scientist to explain to the public. The idea that scientists working for a conservation agency like DEC would kill fauna seems an anathema. However, the correct identification of species captured in a biological survey is essential to understand the biodiversity of a region, and in turn leads to the discovery of new species.

Genetic techniques using small samples of tissue have led to the identification of new species that looked similar to others (so-called 'cryptic species'). Specimens sent to museums are valuable to understand many other aspects of an animal's biology, including its diet (by looking at



the stomach contents), its reproduction (by examining ovaries and testes), its anatomy and even the sorts of parasites that colonise it. Identification books on most species are written using museum specimens so they have immense value to European science.

Explaining the need to take specimens to Aboriginal people was sometimes difficult, particularly when the species concerned might be a fat goanna ideal for eating! Ngaanyatjarra people often have different views to scientists about what constitutes a species and the link between themselves, the living animal, and the 'tjukurrpa', or creation period. Added to that, is the incredible notion that the animal will be stored in an alcohol-filled bottle in

the basement of a distant building for perhaps many hundreds of years!

So many ranges, so little time

The first segment of the survey concentrated on quartzite ranges close to the Northern Territory–WA border, especially the Rawlinson and Walter James ranges. People from the nearby communities of Warakurna and Tjukurla camped with the scientists and made daily forays to check traplines.

Each morning, herpetologist and Curator of Reptiles at the South Australian Museum, Mark Hutchinson would conduct a 'show and tell' to display the animals captured overnight. Groups of schoolchildren travelled from the communities to see the animals

being caught as well as listen to elders talk about Ngaanyatjarra knowledge of these species. In addition, the school group from Tjukurla worked with the elders and the scientists to clear vegetation that had grown up and almost obscured a thorny devil (nyigari) 'tjukurrpa site'.

The second part of the survey focused on rugged ranges of black dolerite that occur further south alongside the South Australian–WA border and close to the communities of Wingellina and Blackstone. The team camped alongside the Morgan Range in a mulga patch with close access to the dolerite, a sand-dune and isolated granite outcrops.

Amazing new finds

The survey greatly improved our knowledge of the distribution of many plants and animals. About 720 plant specimens were collected with 37 species found to be new records for the region or range extensions, some more than 400 kilometres from their previously known habitats. One species new to WA was discovered and it is likely that, over time when specialists examine the material, new species will be recognised and described.

The most exciting find for the vertebrate zoologists proved to be a new species of snake, although it was not noticed until some weeks after the expedition. When first collected by Mark Hutchinson, the thin active brown snake was thought to be a western brown snake (*Pseudonaja nuchalis*). However, while inspecting the specimen, Brad Maryan of the Western Australian Museum noticed something unusual. He checked the scales of the head and scale counts on the body and alerted the other herpetologists.

Genetic work by Steve Donnellan from the South Australian Museum confirmed that it was a new species of taipan, since named *Oxyuranus*



Above left Mintbush (*Prostanthera centralis*).

Photo – Vanessa Clarke

Left Perentie or ngirntaka (*Varanus giganteus*) in the Blackstone Range.

Photo – David Pearson

Right Newly discovered taipan (*Oxyuranus temporalis*).

Photo – David Pearson

Far right Northern spiny tailed gecko or pirurrpa (*Strophurus ciliaris*).

Photo – Paul Doughty

Below right Base camp in the Walter James Range.

Photo – Karl Brennan



temporalis. Its nearest relative, the fierce snake or inland taipan (*O. microlepidotus*) occurs many hundreds of kilometres away in western New South Wales, South Australia and Queensland. Perhaps this new species of taipan was isolated from its relatives by increasing aridity in central Australia.

Fishing expeditions in bore holes led to the discovery of a new species of aquatic beetle and many other interesting stygofauna including copepods (prawn-like crustaceans). More than 100 species of spiders were collected with most species unnamed and awaiting description by museum taxonomists. Of those spiders recognisable as described species, some have been collected only rarely. For instance the prodidomid spider (*Cryptoerithus nyetaui*) was known from only three specimens and was unknown from WA. Despite these initial exciting finds, it will be some years before the full significance of the entire catch of arthropods is understood. However, it is already obvious that there are many new species and some of these may be endemic to the Central Ranges.

In addition, several geckoes known from surrounding regions were found to have distributions that extended into the Central Ranges. A range of mammals was captured; of particular interest to Ngaanyatjarra people was the fat-tailed antechinus (*Pseudantechinus macdonnellensis*). This solidly built marsupial (up to 35 grams) lives in rocky areas and most people had not seen this species before and were intrigued by its amazing foot pads for travel on rocky surfaces.

Outcomes

The survey created an opportunity for both Ngaanyatjarra people and the survey team to experience a different perspective and approach to being on

country. It was fascinating to see two groups of people, both skilled and highly knowledgeable in their own fields, operate side by side in vastly different ways. Despite the differences, trust and relationships grew through mutual respect and goodwill towards resolving logistical issues.

The survey collected the first systematic biological data for the region and will assist the Ngaanyatjarra Council and DEC in their land management operations. Both DEC and the Western Australian Museum derived valuable information on the distribution and abundance of many species including several rare and threatened species. The

discovery of a new species of snake was obviously an exciting aspect of the survey.

For the traditional owners, the project created relevant employment as liaison officers, collaborators and guides to the survey team; opportunities for kids and younger people to participate and learn from both their own elders and the scientists; and an opportunity to visit country in a well-resourced way with safe, reliable vehicles that is often not otherwise possible.

Such was its success that the research team hopes for future opportunities to jointly survey other areas in this biologically and culturally rich region.



David Pearson is a Principal Research Scientist with DEC and has research interests in threatened reptiles and biological surveys. Jo Miller works for the Ngaanyatjarra Land Management Unit based in Warburton. Mark and Maimee Butler are Ngaanyatjarra Elders who have lived in the Central Ranges region all their lives. Karl Brennan is the DEC Regional Ecologist for the Goldfields. His research interests are biological surveys, particularly those involving terrestrial invertebrates. Wendy Thompson is a Flora Conservation Officer based at DEC's Goldfields Region office in Kalgoorlie.

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