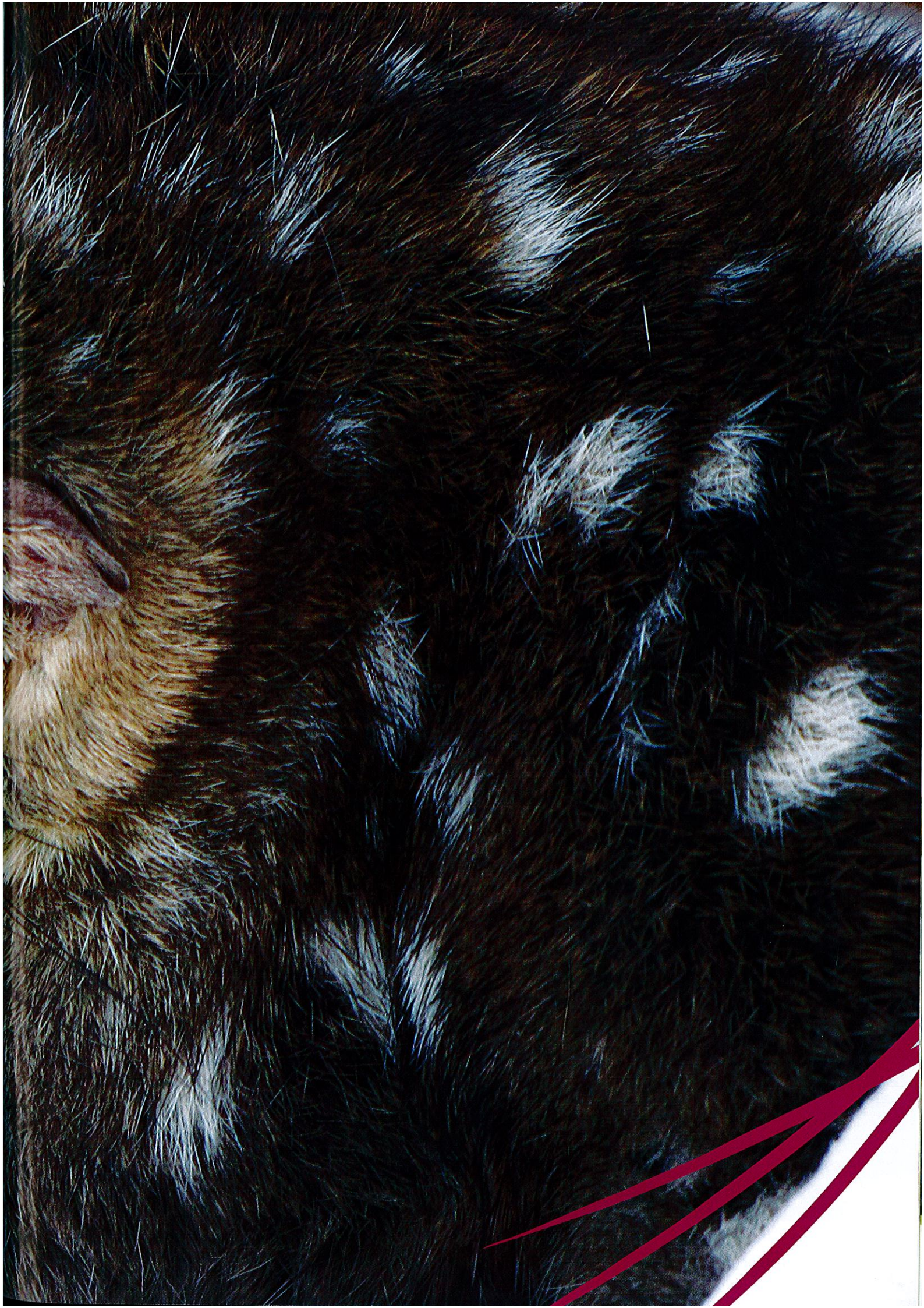
Spotting quolls in the Pilbara

Threatened by cane toads, habitat loss, predation and more, northern quoll populations are declining across much of their range. In the Pilbara, little is known about populations of these medium-sized marsupials. New studies seek to shed light on the Pilbara quolls so plans can be put in place to protect them.

by Annette Cook and Julia Lees

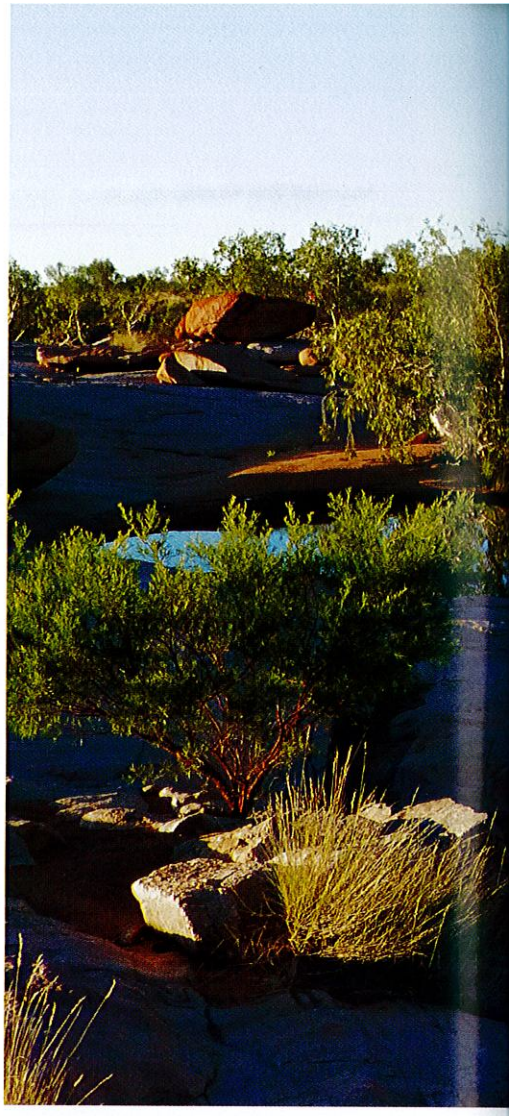


Quolls are the largest of the carnivorous marsupials to occur on the Australian mainland (the Tasmanian devil is larger) and four species occur in Australia. The northern quoll (*Dasyurus hallucatus*) is the smallest of these, weighing between 300 and 1,000 grams. They once occurred in a broad band across northern Australia but their distribution has become fragmented into several disjunct populations in north-east Queensland, the Top End of the Northern Territory, and the Kimberley and Pilbara regions in Western Australia. In the Northern Territory it appears that northern quolls have been declining for at least several decades, where introduced predators, cane toads (*Rhinella marina*), habitat degradation, disease, changed fire regimes and increased predation following fire are considered to be the probable causes.

Victims

In the past, northern quolls, along with the three other Australian quoll species, were shot for their night raids on domestic chickens. In recent years the rapid spread of cane toads has posed the greatest threat to northern quolls. Widespread decline across their mainland range has been exacerbated due to their susceptibility to poisoning by the toads' toxins when they prey on the exotic pest. In the Northern Territory, quoll populations were devastated by the arrival of cane toads. With the current spread of toads into the wetlands of the Kimberley region, heavy losses and localised extinctions are expected there too. This impact has tipped the balance for northern quolls and is the reason they have joined their larger relatives, the chuditch (*Dasyurus geoffroii*) and the spotted-tail quoll (*D. maculatus*), on the list of species threatened with extinction. The northern quoll was listed by the federal government in 2004 as a threatened taxon and is specially protected under both state and federal legislation.

Adding to their plight, northern quolls only breed once a year and have an extremely short lifespan compared with similarly sized mammals. Females rarely breed for more than two breeding seasons, most only breed for one year. They can rear up to eight young but only a small percentage survives to weaning age. In Northern Territory populations, all male quolls die after mating. However, while males from Kimberley and Pilbara populations undergo a major post-mating decline, a proportion survive the breeding season and may breed in a second year. In association with other impacts, these life history traits make this species more susceptible to local extinction.



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Main A northern quoll ready for release.
Photo – Annette Cook

Below Northern quolls are the smallest of the quoll species.
Photo – Jiri Lochman

Little-studied Pilbara quolls

Northern quolls are still considered common in the Pilbara by many who are familiar with their antics. They have a tendency to inhabit the roofs of buildings, occupy vehicle engine compartments and scavenge in rubbish bins. However, surprisingly little is known about northern quolls in the Pilbara region. Most of what is known about the species comes from studies on populations in the Kimberley, the Northern Territory and Queensland.

Although many surveys are conducted on behalf of the mining industry and other developers to detect the presence or absence of quolls, these studies do not address the gaps in our knowledge of the

Above Granite outcrops around Turner River provide suitable quoll habitat. *Photo – Annette Cook*

ecology of the Pilbara northern quoll populations, their population trends, and the impacts that mining and other development may have on them. What's more, information that has been collected is not readily available and, therefore, assessments of the trends and condition of Pilbara northern quoll populations cannot be made. Of particular concern is the possibility the cane toad could establish in the Pilbara once it has spread to the west Kimberley in the next five years or so. This, combined with other potential pressures from introduced predators and loss of habitat through mining and other developments, could lead to a significant decline in the Pilbara's northern quoll population.

Recent increased interest to learn more about Pilbara quoll populations stems from state, national and international obligations to ensure the species persists in the region and is guided by the objectives of the *National Recovery Plan for the Northern Quoll*. Specifically, the objective to halt northern quoll declines in areas not yet colonised by cane toads prompted the federal Department of Sustainability, Environment, Water, Population and Communities and the Department of Environment and Conservation (DEC)—now the Department of Parks and Wildlife (DPaW)—to bring together managers, researchers, mining company representatives, and environmental consultants to plan future conservation actions for the northern quoll in the Pilbara. A workshop involving representatives of these groups identified the need for a regional monitoring program and ecological study of the northern quoll, and this was documented in a project plan for the species.

The Pilbara's current rapid development and some apparent ecological differences between the Pilbara northern quoll populations and other populations further highlighted the importance of learning more about this threatened species.

Protection plans underway

In 2010 the then DEC took on the responsibility of developing and implementing the regional monitoring program, which is currently funded through offset funding from mining projects. The first priority in developing the program was to work out where to establish sites for long-term monitoring. A search for old records and assistance from the department's Pilbara region staff helped to identify focus areas for landholder consultation and a distribution study using motion sensor cameras.

Consultation with local landholders provides valuable historical and current information about changes in abundance and distribution of quoll populations, and will add to our knowledge of the northern quolls' ecology. Additional information has been gathered through consultation with park rangers, tourism operators, environmental staff from mining companies, and, perhaps surprisingly at first, a very knowledgeable grader driver: when you travel bush roads at such a slow pace you gain a valuable insight into the local wildlife.

Left A quoll fitted with a radio transmitter.

Below left Researcher Annette Cook weighing a quoll.
Photos – John Kelly

Bottom left Technical officer Fiona Carpenter releasing a quoll.
Photo – Annette Cook

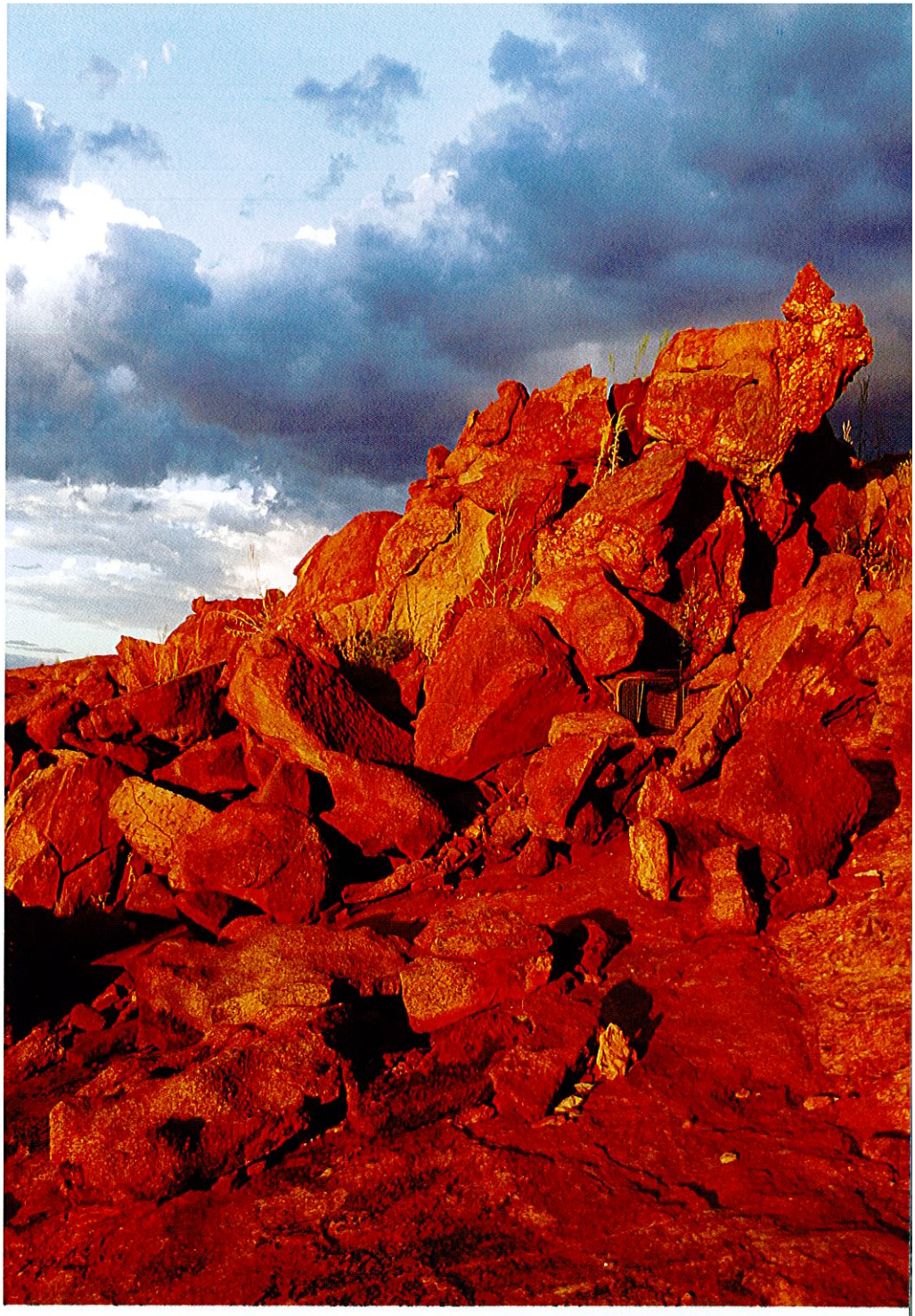
Up to 100 sites will be surveyed with motion sensor cameras to record the presence or absence of northern quolls and their pattern of distribution across the Pilbara. This survey will also help to locate populations that are of a suitable size to detect whether the population is increasing, decreasing or is stable over time. At least 10 long-term monitoring sites will be chosen to represent a wide geographical spread across the Pilbara region. They will be surveyed twice a year using a method known as 'capture, mark, recapture' to record demographic and ecological data.

Examining habitat

Another aspect of the camera study is to record the habitat characteristics at all the survey sites. Using habitat modelling, environmental factors recorded for sites where quolls are relatively abundant can be compared with those where they appear to be absent or low in numbers. This will provide a better understanding of quolls' habitat requirements and preferences, and help identify other areas where they are likely to occur.

In the Pilbara region, quolls are known to inhabit many different types of geological features such as mesas and ridges, breakaways, rocky gorges, isolated granite outcrops and ranges. Suitable quoll habitat is not continuous across the landscape and is often separated by vast distances, typically of stony plains dominated by spinifex (*Triodia*) hummock grasses and ephemeral tussock grasses with scattered shrubs and sparse trees. Therefore, the ability for individuals to disperse and the connectivity of populations is a puzzling aspect of the ecology of quolls in the Pilbara.

Radio telemetry is being used to see just how far these small mammals move. Radio tracking quolls during



Right A quoll monitoring site on a weathered granite outcrop.
Photo – Annette Cook

the day has revealed the use of multiple dens, and movements of more than 1.5 kilometres between individual 'denning' sites. Dens in granite outcrops were located up to 1.5 kilometres from the site where the quolls were initially trapped and radio collared. Accurate night-time locations are difficult to obtain using standard VHF radio transmitters because of the rocky terrain. GPS technology is being trialled to record where quolls go and how far they travel during nocturnal foraging forays. Tissue samples are being collected from each individual quoll captured to determine if subpopulations across the landscape are genetically related. Scats are being collected from all the survey sites for dietary analysis in an attempt to identify any connections between food resources and habitat requirements.

Quolls are more commonly encountered within 150 kilometres of the coast, which coincides with higher rainfall. There have been a few recent records as far inland as Karlamilyi (formerly Rudall River) National Park, and Nifty and Kintyre mines in the western Great Sandy Desert. It is uncertain whether these individuals indicate the presence of a breeding population at these remote sites or if they were males dispersing. They may even be hitchhikers—individual animals transported in a vehicle and inadvertently relocated. Proposed collaboration between DPaW staff and Western Desert Indigenous groups, who conduct annual monitoring at Karlamilyi National Park, will shed some light on the surprise quoll sighting in the park in late 2012.

Industry pitches in

As they have done in the past for other threatened fauna, mining companies are providing support for the Pilbara quoll monitoring program and other research. Consistent with the Commonwealth Environment Protection and Biodiversity Conservation Act's Policy Statement 3.25—Referral Guidelines for the Endangered Northern Quoll—mining companies are required to provide information on Pilbara quoll populations relevant to impacts identified in the guidelines. These impacts include adversely affecting habitat critical to the survival of the species, reducing the area of occupancy of the species, and modifying, destroying, removing, isolating or decreasing the availability or quality of habitat to the extent that the species is likely to decline.

Resultant offset funding has enabled DPaW to start the northern quoll research and monitoring program in the Pilbara. This is a long-term project so it is hoped that ongoing cooperation and funding from mining companies and input from other non-government stakeholders and land managers such as Rangelands Natural Resource Management group will ensure the future security and persistence of quolls in the Pilbara.

BHP Billiton Iron Ore (BHPBIO) has also contracted the department to conduct research with the aim of providing information about northern quoll ecology and demographics to mining companies and environmental

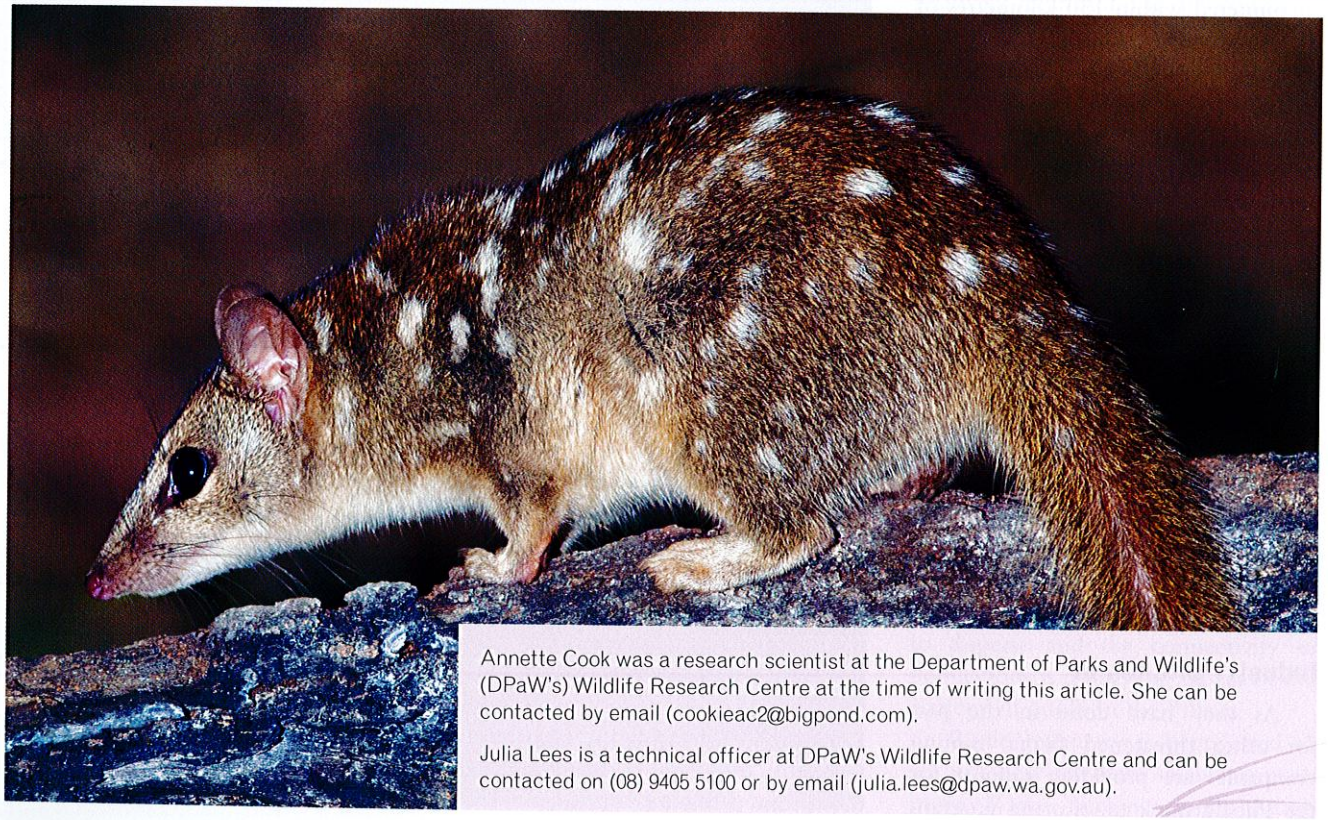
regulators. This information will enable mine sites to be appropriately managed to ensure the persistence of resident northern quoll populations. A trapping program to monitor populations at a number of sites identified by BHPBIO started in May 2011 and will be conducted twice annually over three to four years. Disused quarries and mines have been matched with reference areas located in undisturbed similar habitat for comparison. Reference areas at distances of more than five kilometres were chosen to reduce the likelihood of quolls moving between sites. With the support of BHPBIO, it is possible that some of these sites will be incorporated into the regional monitoring program.

Monitoring for BHPBIO has already provided some interesting results. It appears the Pilbara northern quolls are breeding later in the year and over a longer period than elsewhere in their range. They are, on average, larger than their northern counterparts, and, unlike those in the Northern Territory, some males survive after mating. Radio tracking has also provided some insight into habitat use and scale of movement in the landscape.

Building up our knowledge of the Pilbara's northern quoll populations through this monitoring is the first step towards ensuring their populations are protected. In this way we may be able to help them survive the host of threats afflicting their northern cousins.

Right Six-week-old young nestled in their mother's pouch.
Photo – Kelsey Malony

Below A northern quoll.
Photo – David Bettini



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