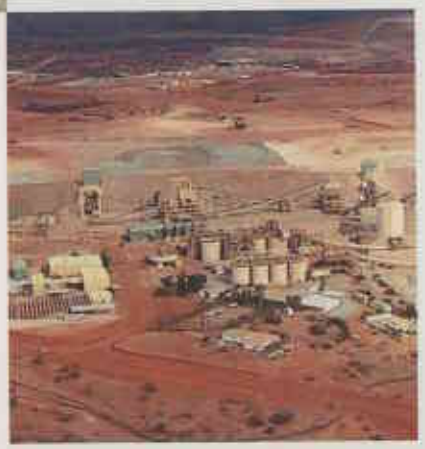
Mulgaras and mining

Mulgaras—small carnivorous marsupials with attitude—are now considered threatened. Their presence on proposed minesites could have caused a clash between their conservation and mining activities worth many millions of dollars. Ways to avoid or minimise the impact of mining needed to be found. But was it possible?

by David Pearson

It's easy to become mesmerised by the enormity of Western Australia's north-eastern Goldfields region and its low, subdued landscape. With its patchwork of mulga groves, spinifex plains and the occasional 'breakaway' cliff, the land drifts away in all directions to the horizon. Scattered through this vast landscape are some of the world's most productive gold and nickel mines. From the air, the mines are visible as deep pits in the ground, surrounded by multi-toned overburden heaps and strange-coloured tailing ponds. Hardy people work at these mines: they fly in from Perth, work long shifts for several weeks then race home for some 'R and R'.



It is a seemingly tough and unforgiving environment, covered in stunted and thirsty-looking vegetation, with infamously variable rainfall. At first glance, this landscape appears unable to support even a handful of animals. But, if you look on the ground, the tracks of the previous night bear testimony to the busy activities of the area's small mammals. The region contains many species of native rodents and dasyurids (insectivorous and carnivorous marsupials), including hopping-mice, dunnarts and some rarer and little known species.

In recent years, government regulations and efforts by the mining industry to reduce environmental impacts have resulted in numerous biological surveys being conducted prior to the exploration and development of new mines. Several such surveys in the north-eastern Goldfields have captured mulgaras (*Dasycercus cristicauda*), small marsupials about the size of rats (although much more attractive) that weigh up to 130 grams.

Pocket-sized hunters

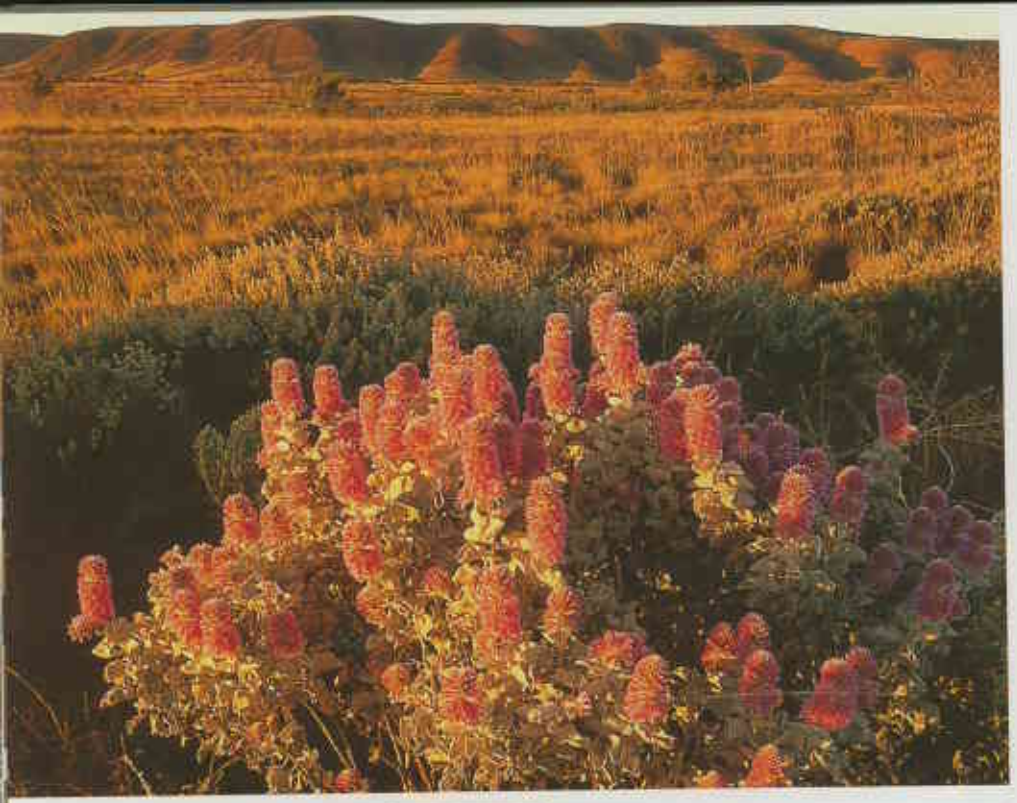
Mulgaras are remarkable inhabitants of spinifex country. By day they rest in burrows, but at night they venture out to seize and devour small vertebrates and insects. Their large eyes provide good forward vision and their pointed snout concentrates power at the end of the jaws like a pair of forceps. Their characteristic black-tipped tail is trailed in the air when they run.

Little was known about mulgaras until Professor Wood Jones, a legendary figure in the study of Australian mammals, published observations of live individuals in 1949. He was impressed with their intelligence, and marvelled at their behavioural transformation when hunting mice. The body would stiffen, their tail would quiver and prey would be subdued with a few quick bites to the head. Then, with the precision of a taxidermist, the skin was peeled back, the skull crushed, the brain eaten and the rest of the body consumed, working from the head to the tail. Mulgaras certainly waste nothing of their prey!

Left facing page
Main Mulgaras are proficient hunters.
Photo – Babs and Bert Wells/CALM
Background An open cut gold mine near Meekatharra viewed from the air.
Photo – Jiri Lochman

Top left Aerial photo of Plutonic minesite in the north-eastern Goldfields.
Photo – Barrick Gold

Left A female mulgara *(Dasycercus cristicauda)* with suckling babies attached.
Photo – Jiri Lochman



Despite their sublime hunting skills, mulgaras have fared poorly in the last 60 years. They were once distributed across most of arid Australia, and in WA they ranged from the Nullarbor up into the southern Kimberley and from the mid-west coast to the eastern border.

Fire practices

Aboriginal burning practices that maintained mosaics of burnt and unburnt vegetation of different ages appear to have favoured mulgaras (see 'Restoring the red centre' on pages 40–46). These mosaics included areas of mature spinifex grassland, with their shelter and burrow sites, and provided ready access to recently burnt areas, where regenerating plants attracted many insects.

The move of Aboriginal people into communities changed fire patterns. Now, larger summer wildfires burn for many weeks, removing spinifex and shrub cover over thousands of hectares. Such fires decimate insect prey for several months, until vegetation can recover. The loss of vegetation can also expose mulgaras to predation from owls, feral cats, foxes, goannas and dingoes.

Cause for concern?

Otto Lipfert, a collector with the WA Museum, accompanied parties maintaining wells on the Canning Stock Route in 1930 and 1931. He caught more than 50 mulgaras, referred to by the workers as Canning's little dogs, which suggested that the species was abundant at that time. However, by the 1940s few specimens were being sent to museums, and the species appeared to be in decline.

Top left Collier Range National Park, where a survey in 1993 found mulgaras for the first time.
Photo – Marie Lochman

Centre left Geneticist Peter Spencer with a mulgara at Mt Keith.

Left A mulgara fitted with a radio transmitter is released at Barrick Gold.
Photos – David Pearson

Above Drivers on a haul road at the Plutonic minesite are warned of the presence of mulgaras.
Photo – Melissa Hansen/Barrick Gold

Deciding whether or not populations of small mammals in the arid zone are declining over the long term is a real problem for conservation, as numbers of such creatures usually fluctuate naturally, according to 'boom-bust' cycles experienced in the deserts. However, there is sufficient evidence, from Aboriginal people and trapping studies in areas where mulgaras did occur, to indicate the species has declined. Almost all other mammals in the 'critical weight range' of 35 grams to five kilograms have disappeared in desert areas, leading Department of Conservation and Land Management (CALM) researchers Norm McKenzie and Andrew Burbidge to identify them as mammals of great conservation concern. Mulgaras have not been reported on the Nullarbor Plain since 1929, and there have only been sporadic and scattered captures in WA in the last 20 years. All located populations have been small, in contrast to the abundance encountered by Lipfert on the Canning Stock Route in the 1930s.

Marymia mulgaras

In 1993, an environmental consultancy company, *ecologia*, caught several mulgaras during a wildlife survey on Marymia Station, about 200 kilometres north of Meekatharra. They undertook this on behalf of Resolute Resources, who were exploring for gold in the area. By mid-1993, more than 40 individuals had been captured, making the population the largest then known in WA. Resolute Resources funded a combined CALM and *ecologia* survey of the surrounding area to search for other mulgaras and, hence, determine the regional importance of the Marymia population.

Possible mulgara habitat was identified using geological and vegetation maps and satellite imagery. Then, in October 1993, four teams searched for mulgaras at 128 sites within a 150-kilometre radius of the Marymia Gold Project. The teams walked slowly through the spinifex at each site, looking for the distinctive mulgara burrows, droppings or diggings. Elliott traps, baited with a peanut butter concoction, were set in areas where these were discovered. Only two sites had active mulgara populations. One of these was in Collier Range National Park—the first time the species had been reported in that reserve. The survey concluded that the Marymia population was very important for the regional conservation of mulgaras.

A monitoring program was initiated to research the impact of mining activities on the mulgara population and its habitat. Trapping grids were established in both 'impact' and undisturbed 'control' areas by *ecologia* and run over several years.

Disappearing act

The abundance of mulgaras at Marymia offered a chance for some detailed research. In 1994, Wes Manson, an Honours student from The University of Western Australia, began a study there, but immediately encountered one of the cruel vagaries of studying arid zone mammals. Though mulgaras had been easily captured in 1993, by the time Wes arrived in 1994 they were becoming scarce. In 1993, trapping and radio-tracking indicated that male mulgaras were travelling long distances to locate females for breeding, but in 1994 they were staying near their burrows and there was no evidence of breeding. The reason appeared to be seasonal conditions. Above average rains in the early 1990s had led to a flush in

Above Distant view of Mt Keith nickel operations.
Photo – David Pearson

vegetation growth and resulted in abundant invertebrate prey (including grasshoppers, beetles and spiders), which stimulated breeding in 1993.

Further monitoring at Marymia showed that mulgara numbers remained low in 1995 and 1996. In 1997, trapping grids failed to capture any at all. Where did they go? Did they die out or move somewhere else? Such population fluctuations remain an important and unexplained feature of the ecology of mulgaras and other desert dasyurids. CSIRO ecologist Steve Morton has suggested that mammals retreat to, or persist in, more productive refuge habitats, such as near salt lakes, then recolonise other areas in good times. However, many areas occupied by mulgaras in the north-eastern Goldfields are a long way from salt lakes, so possible refuge sites remain a mystery.

More mulgaras appear

In December 1994, biological surveys by *ecologia* turned up two adult female mulgaras on the Jundee Gold Project (Great Central Mines), 55 kilometres north-east of Wiluna. Subsequent trapping in 1995 and 1996 only captured the same two females, neither of which showed any signs of breeding. It seemed these females had become isolated from other mulgaras, possibly due to the proximity of mining activities. Consequently, it was decided to translocate the two females to Wanjarri Nature Reserve, where mulgaras were known to occur. This translocation was successful and one of the pair was seen some months later.

During the mid-1990s, further trapping was conducted around numerous prospective gold deposits in the north-eastern Goldfields. Mulgaras were captured on Plutonic, Barwidgee and Mt Keith prospects. CALM worked with wildlife consultants, the mining companies and the then Department of Minerals and Energy to develop a series of protocols for exploration and mining projects, so as to minimise disturbance to mulgara populations. These protocols included using 'softer' techniques to carry out exploration drilling, such as clearing fewer tracks, using rubber-tyred machinery rather than bulldozers, reusing existing gridlines where possible and erecting fencing and signs to protect mulgaras and their habitat. Where mining infrastructure was close to mulgaras, changes were made to the positioning of overburden heaps and haul roads.

Barrick Gold—which manages several gold deposits in the north-eastern Goldfields—developed a management plan to protect mulgara populations around their 'Exocet' gold deposit. Staff must attend an induction course about mulgaras and learn techniques to reduce habitat disturbance. Access to drill sites is carefully planned to minimise clearing of vegetation and to avoid running over burrows. No drilling or vehicle movements are undertaken at night, to avoid disturbing mulgaras, and drill pads are promptly rehabilitated after use. Feral cat control on the lease area has begun. A claycrete dust suppressant is spread on haulage roads, to prevent dust from vehicles settling on vegetation in the mulgara habitat zones. Mulgara populations in the drilling area, and in undisturbed 'control' areas, are monitored by trapping and searching for burrows.

Despite all of these efforts, mulgara numbers continue to fluctuate widely in areas adjoining mining activities, but also in areas well away from any mining disturbance. Clearly, we still need to understand the factors responsible for the profound changes in mulgara populations, so that the impacts of mining or other activities can be assessed and monitored.

Mt Keith study

In an effort to unravel the dynamics of mulgara populations, a CALM study—funded by Western Mining Corporation (WMC) on Mt Keith Station, 90 kilometres south of Wiluna—began in 2000. This study also aimed to examine population fluctuations in other dasyurid species, specifically the kultarr (*Antechinomys laniger*) and long-tailed dunnart (*Sminthopsis longicaudata*), both of which are rare species recorded from the Mt Keith area. Perhaps the peaks and troughs of mulgara populations were similar to those in other species?

Left CALM's Andy Williams and volunteers Jacqui Purvis and Katie Tripp weigh and measure a mulgara prior to its release.
Photo – David Pearson

Below left A sandy inland mouse, feeding on a mulla-mulla flower.
Photo – Jiri Lochman

However, even the best-laid plans do not always succeed. Despite intensive trapping for both species, including sites where the kultarr was found during the 1980s, neither was captured! The conservation of both these species is now of concern, although recent captures of kultarrs near a minesite in Leinster are encouraging.

Work on the mulgaras was more successful, and two populations were located and trapped regularly. Female mulgaras were found to be very sedentary. Males were trapped less frequently and travelled long distances to find females or to disperse to more favourable habitats. Both populations inhabited long unburnt spinifex grassland, and the significance of this habitat became even more apparent when much of the spinifex within a 50-kilometre radius of the site was burnt by wildfires in 2001. Such was the concern for the population of mulgaras near the main road to Wiluna that staff from CALM's Goldfields Region and WMC burnt a protective strip along the road to prevent ignition of the habitat by passing motorists.

The population fluctuations of mulgaras observed by Wes Manson, and others who have attempted to monitor the species, also affected this study. Above average rainfall was experienced during the late 1990s, but dry conditions returned by 2000, and captures began to reflect the difficult circumstances that the mammals were enduring. In 2001, 99 mulgaras, 241 sandy inland mice and a whopping 563 introduced house mice were removed from traps. By 2002, only 33 mulgaras, 34 sandy inland mice and just nine introduced mice were caught! Rodents were dramatically affected by the dry conditions and, because they formed part of the mulgaras' diet, mulgara numbers also fell sharply.

This capture data also illustrates the difficulty of working on small mammals in the arid zone. Efforts to study any sort of disturbance, such as fire, feral animal predation or mining activity, are complicated by seasonal variation driven by rainfall. Typically, rodent population eruptions lag six to 12 months behind good rain. In turn, mulgara populations respond more slowly as they follow changes in the abundance of their prey.

What now?

Mulgaras are still distributed across a wide area of Australia, but populations are small and fragmented and continue to fluctuate markedly. To ensure their conservation, and to monitor the impacts of potential disturbances such as mining, detailed research is needed on the cyclical and seasonal changes to populations, and the likely impacts of predators such as foxes and feral cats. Mining companies in the north-eastern Goldfields have cooperated with CALM to locate mulgara populations, to minimise disturbance to the animals and their habitat and to fund research into their ecology and the control of feral animals. Hopefully, such collaborative efforts will enable mulgaras to remain a feature of landscapes across the region, without jeopardising the mineral exploitation so important to WA.

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