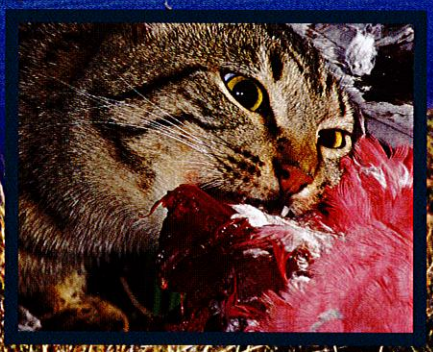
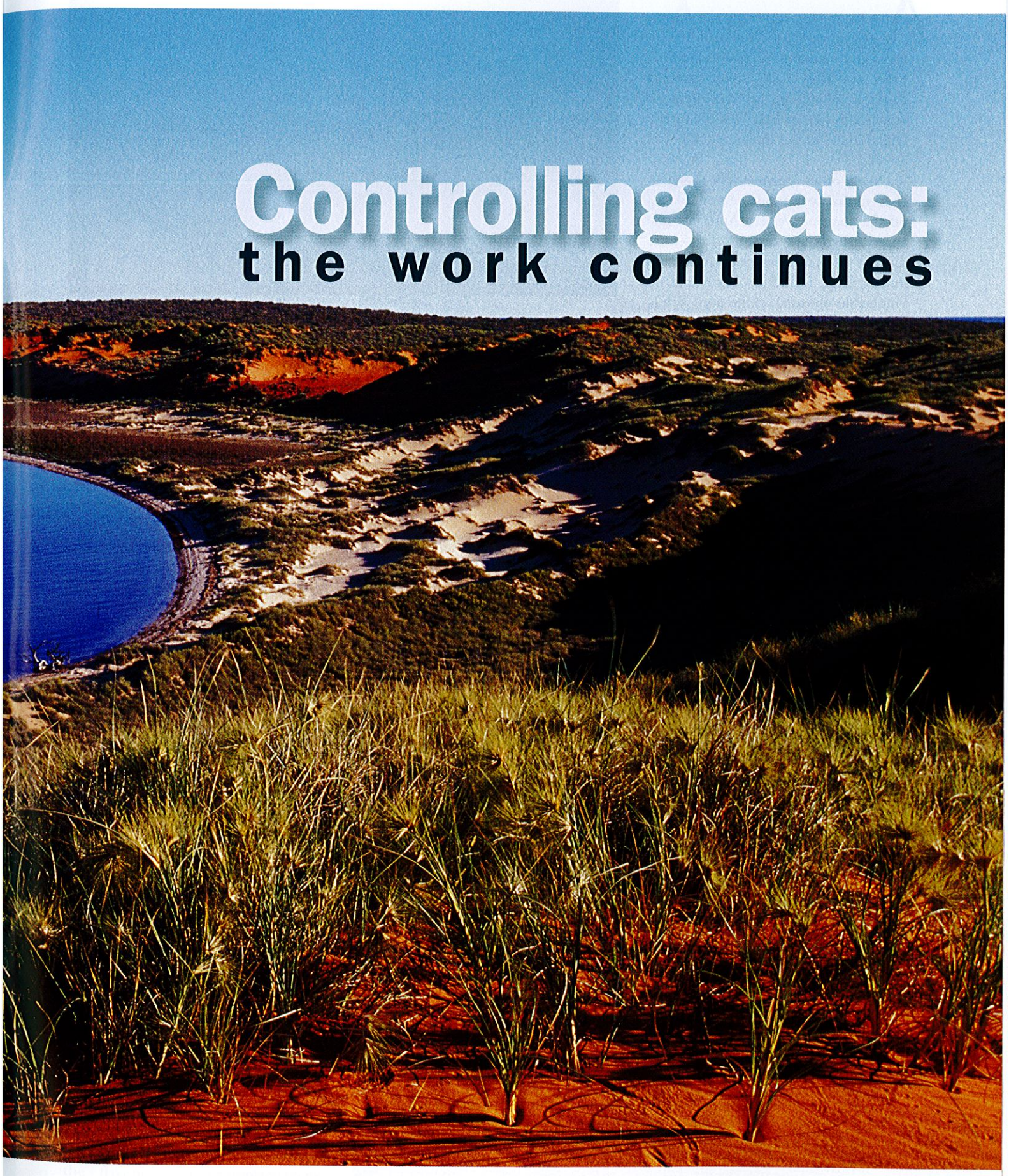
Cats have long been recognised for the destruction they wreak on native wildlife, particularly medium-sized mammals teetering on the brink of extinction. Despite our knowledge of this, cats remain a formidable threat to our most vulnerable mammal and bird species. So where is cat control at these days and is there any hope on the horizon?



by Dave Algar and Samille Mitchell

Controlling cats:
the work continues



Australia has one of the worst extinction rates in the world. Since European settlement many medium-sized mammals have either suffered dramatic reductions in the areas in which they live, or have become totally wiped out—entire species gone, lost forever.

Many other species occur nowhere else in the world but several islands off the coast of Western Australia. The animals here are lifelines for entire species, yet their small populations and limited range mean they are particularly vulnerable to total extinction. While there are myriad reasons for such a dire situation, one culprit stands out as particularly harmful—the introduced cat *(Felis catus)*.

Killer cats

Not only do cats threaten the continued survival of many threatened native species, they are also one of the major obstacles to successfully reintroducing species to parts of their former range. Additionally, it has been suggested that competition by feral cats with native carnivorous species, including mammals, predatory birds and larger reptiles, may also prove harmful to these populations. Cats are also the hosts and reservoirs for a number of diseases such as toxoplasmosis that can affect wildlife and threaten human health.

As a consequence of these impacts, control of feral cats is regarded as one of the most important fauna conservation issues in Australia today. The impact of feral cats on native fauna is acknowledged by federal legislation outlined in the *Environment Protection and Biodiversity Conservation Act 1999*. The national *Threat Abatement Plan for Predation by Feral Cats* lists 38 threatened species as potentially benefiting from effective feral cat control.

Controlling cats

Historically, a range of techniques has been used in attempts to control feral cats, including shooting, trapping, poison baiting, biological control, hunting and exclusion fencing. However, the federal threat abatement plan dismissed these control techniques as generally being expensive, labour intensive and requiring continual application to be effective at controlling feral cats even over small areas—in short, unsuitable for broad scale control of feral cats over most of Australia.

The threat abatement plan presents a number of potential techniques which might offer effective feral cat control including various means of reducing reproductive success, biological control and development of new bait types with improved ability to target specific species. However, reducing reproductive

Previous page
Main Baiting for feral cats has successfully eradicated them from Faure Island in Shark Bay.
Photo – Marie Lochman
Insets Feral cats.

Above Feral cats.
Photos – Jiri Lochman

Left The cat bait *Eradicat®* is sweated before deployment.
Photo – DEC

success through development of an immunocontraceptive agent was dismissed as a viable control option because the concept has not been successfully applied to a free-ranging population of any species. The use of chemical sterilising agents was considered inappropriate, as there are no effective compounds that produce permanent sterility in cats. In addition, fertility control does not address current cat numbers. No benefit was expected from the release of endemic pathogens to control cats and the possibility of creating a new felid pathogen was likely to be unacceptable because of the risk to domestic cats, and possibly to *Felidae* species outside Australia.

But the plan did identify the development of an effective broad scale baiting technique and the incorporation of a suitable toxin for feral cats as high priorities with the greatest chance of success. However, cats are fussy when it comes to bait consumption—earlier baiting programs for feral cats were ineffective, principally because cats simply would not eat the standard dried meat baits used for other introduced predators. So work began to find an alternative bait.

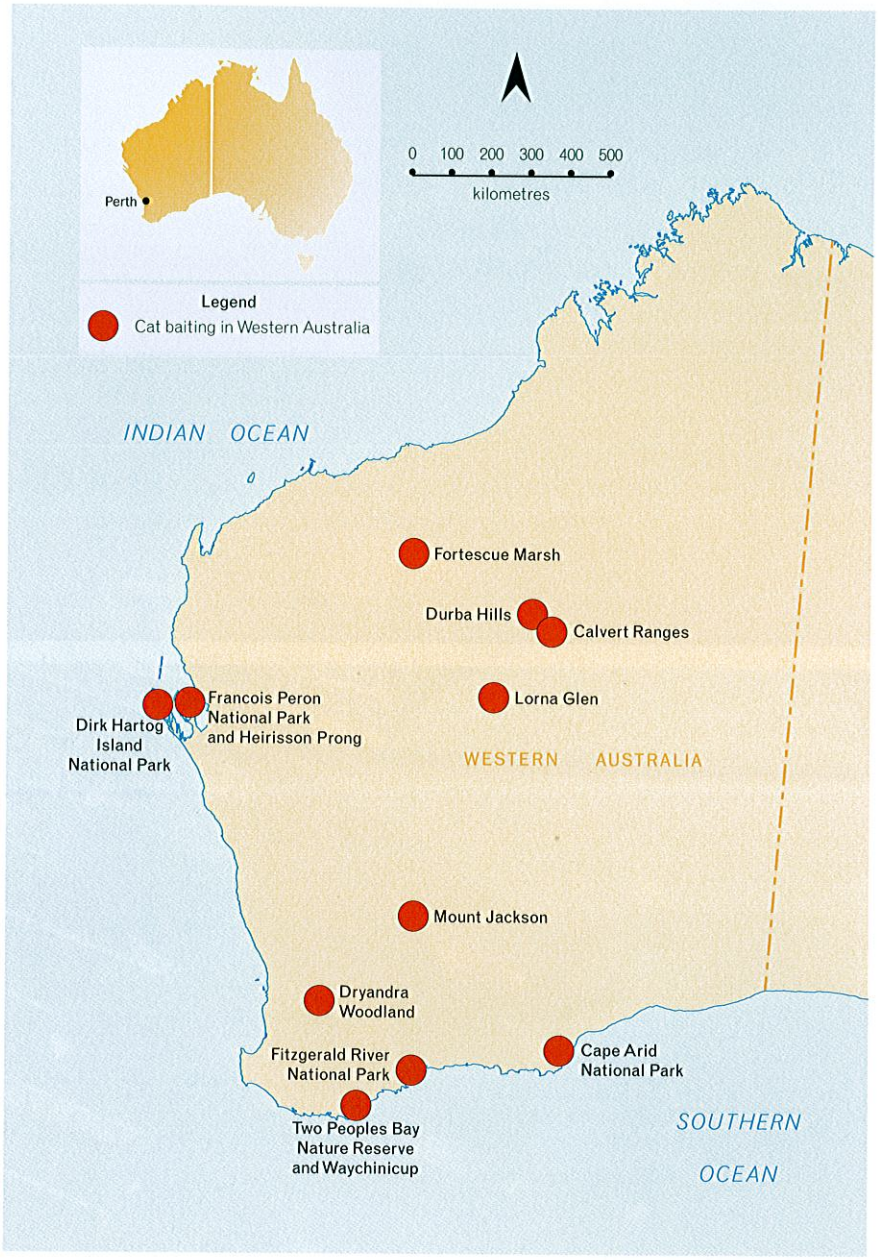
Developing a bait

Department of Environment and Conservation (DEC) researchers took the lead in bait development in the mid 1990s, starting with a series of pen trials and subsequent field trials in an endeavour to find a bait that was to feral cats' liking. The medium had to have the capacity to carry a toxin; be relatively simple and inexpensive to manufacture; be easily and safely handled and transported; and be applicable to aerial deployment over large areas. After much work, cats were found to be most partial to the taste of kangaroo meat, made further palatable with flavour enhancers.

However, using diced kangaroo meat as baits came with its own set of difficulties. Firstly, kangaroo meat had to be cut manually, making the process labour intensive and wasteful. The lack of appropriate machinery also meant the toxin had to be applied manually.

The bait coating which contained the flavour enhancer also proved troublesome. It was difficult to provide a uniform coating on the surface of baits and, if it rained, the coating would wash off. The coating also made it extremely difficult to avoid baits clumping together when deploying them in the field. In addition, the lean kangaroo meat would dry quickly in the sun, even during the cooler months, and, within a short time frame, become too hard to be acceptable to feral cats.

To overcome these problems, DEC has developed and patented a novel feral cat bait—*Eradicat*®, a bait 'sausage'. The department has also developed an automated bait manufacturing process including the incorporation of a toxin, enabling the routine manufacture of consistent standard and quality baits at its bait factory in Harvey.



The bait is similar in appearance to a chipolata sausage, approximately 20 grams wet-weight, dried to 15 grams, blanched and then frozen. This bait is composed of 70 per cent kangaroo meat mince, 20 per cent chicken fat and 10 per cent digest and flavour enhancers. Toxic *Eradicat*® baits are injected with 4.5 milligrams of sodium monofluoroacetate (compound 1080) per bait. The toxin is based on one found naturally in the gastrolobium pea, to which some native animals (mainly the herbivores) have built up a tolerance but which is deadly to introduced species.

Unfortunately, native fauna in the eastern states are not as tolerant as their western counterparts to the 1080 toxin. Development of a feral

Left Baits are deployed from a plane across targeted areas.

Below left The *Eradicat*® baits are similar in appearance to a chipolata sausage.
Photos – DEC

Bottom left Bilbies (*Macrotis lagotis*) are among several native mammal species to have benefited from cat control at Lorna Glen former pastoral lease.
Photo – Babs and Bert Wells/DEC

cat bait that can be used in the east is being undertaken in a collaborative program involving DEC researchers with colleagues at the departments of Sustainability and the Environment (Victoria) and Sustainability Environment, Water, Populations and Communities (federal). This bait, known as *Curiosity*®, is a modified version of *Eradicat*® and contains the toxin para-aminopropiophenone or PAPP. Unlike 1080, some native fauna species do not have a tolerance to PAPP and may be killed if they consume the toxin. *Curiosity*® is still in the development phase and work is underway to encapsulate the PAPP toxin within the bait to reduce the risk of native species consuming the toxin.

Taking the bait

There appear to be three major factors critical to the outcome of baiting programs for feral cats—how much bait is available, how likely cats are to encounter it, and how much other food is available. Cats, despite being opportunistic predators, will only eat if they are hungry. Thus, for cats to consume baits they must encounter them when they are hungry, no matter how tasty the bait may be. If there is abundant prey in an area, which can depend on factors such as the season and rainfall, the likelihood of cats taking bait is diminished.

So DEC set out to study the relationship between baiting success and the season, the number of baits laid and the frequency of baiting. Following development of *Eradicat*®, DEC scientists found the drier autumn and early winter months the best time

Above Red-tailed tropic bird (*Phaethon rubricauda*) populations have improved from cat control work on Christmas Island.
Photo – Jiri Lochman

to bait in semi-arid areas, particularly where rabbits (*Oryctolagus cuniculus*) are abundant. This is when young, predator-vulnerable prey are not present but before the onset of winter rains. As predator-vulnerable young prey become more abundant, bait uptake is likely to decline. In the arid zone, where rainfall is unreliable, the time and intensity of rain and season determines the overall abundance of prey.

Research in the interior arid zone has suggested that the best time to bait is generally under cool, dry conditions in winter. At this time, rainfall, which will cause degradation of feral cat baits, is less likely to occur than during the summer months, and the abundance and activity of all prey types, in particular small mammals, reptiles and birds, is at its lowest. Feral cats are therefore more likely to be hungry and more willing to take alternatives to live prey. Bait degradation due to ants and to hot, dry weather is also significantly reduced.

A series of trials aimed at determining the optimum baiting intensity has been conducted across various climates and habitat types. For feral cat baiting programs to be efficient and cost-effective, baits must be delivered at a level that maximises their uptake by feral cats but minimises the number of baits required. Minimising the number of baits also decreases the potential risk posed to non-target species. These trials demonstrated that the optimum baiting density was 50 baits per square kilometre.

Based on this research, current aerial baiting programs are conducted annually, during the 'baiting window' when the prey resource is at its lowest and environmental conditions most favourable. There is scope to increase baiting effort during this period by deploying baits along tracks and roads, or by increasing the size of the baited area with a buffer zone to protect the core conservation area. At present, DEC's *Western Shield* fauna recovery program aerially baits more than 600,000 hectares for cat control research across the state.

In addition to determining the best time to bait and how much bait to lay, DEC conducts comprehensive risk assessments of the potential impact of feral cat baiting programs on other animal species. These assessments are part of the high standards for the safe use of 1080 that not only assures the protection of native fauna but is also a requirement to gain registration for the new bait.

Bait registration

To be able to use the bait on a broad scale, DEC must first gain registration from the Australian Pesticides and Veterinary Medicines Authority (APVMA) which has indicated that the key determinants to achieving registration are baiting efficacy and the risk posed to non-target species.

It is expected that two to three years' work is still required to complete the research necessary to gain bait registration. Once registered, *Eradicat*® is not expected to be widely available—its use will be limited to fauna conservation programs. In the meantime, APVMA has provided a restricted experimental permit to DEC to use *Eradicat*® for research purposes at specific sites. Additional sites can be applied for as part of the annual submission for permit extension. As a result, it is not currently possible to use *Eradicat*® for general operational purposes.

Successes

While baiting is not a 'silver bullet' for cat control—no single technique is—it has certainly helped reduce feral cat numbers and enabled wildlife to recover in a number of areas. Baiting with *Eradicat*® with follow-up targeted trapping was the primary technique used in the successful eradication of cats from Hermite Island in the Montebellos (see 'Isle of cats',) *LANDSCOPE*, Autumn 2000) and the only technique required to eradicate cats on Faure Island in the Shark Bay World Heritage area. The foundation of cat eradication programs on Dirk Hartog and Christmas islands will also be built upon the effective deployment of *Eradicat*® baits (see 'New national park to be cat free', *LANDSCOPE*, Autumn 2011 and 'New tools for fighting ferals', *LANDSCOPE*, Autumn 2009), followed by targeted trapping programs if warranted.

Above Christmas Island will be subject to a cat baiting program.
Photo – Alex Steffe/Lochman Transparencies

Above right Southern brown bandicoots (*Isoodon obesulus*) are one of the few mammals able to persist in the presence of feral cats providing adequate habitat is available.
Photo – David Bettini

Baiting success is not limited to islands. Baiting campaigns conducted on the mainland have shown that baiting for feral cats can achieve highly effective control, especially in semi-arid and arid areas (see 'Controlling introduced predators in the rangelands: the conclusion', *LANDSCOPE*, Winter 2010). However, baiting efficacy can be variable; when broad scale baiting has been less successful, it can generally be attributed to unfavourable weather conditions at the time of baiting or an abundance of prey. The bait has also been shown to be readily consumed by foxes (*Vulpes vulpes*) and therefore potentially suitable for the control of both introduced predators.

The future

Although bait development has essentially been completed, testing continues to identify new compounds that could potentially further improve bait consumption. An example of this research is the recent discovery of a plant species that, when offered to cats, causes them to chew the roots and rub and roll over the plant until they become dazed. The chemicals in the roots that cause this reaction have been identified and DEC is now attempting to synthetically manufacture the compounds and add them to the bait formulation.

Further research will focus on gaining bait registration and assessing and reducing risks to non-target species. Current research, such as that being conducted on the South Coast, is also aimed at designing bioregionally appropriate baiting regimes with respect to season, intensity and frequency of baiting. It is unlikely that blanket baiting across the landscape is the most effective and cost-efficient way of controlling cats in all areas. Differences in climate and habitat may require different baiting regimes to optimise their success. Recent advances in new technologies, such as GPS radio-collars and remotely deployed cameras, are providing vital information that will enable baiting campaigns to be more strategic and effective. There is also considerable debate about the benefits, or otherwise, of maintaining dingo populations in the rangelands and their role in controlling feral cat populations through direct predation or indirect avoidance behaviour.

If further declines in our animal species are to be averted and fauna recovery programs are to succeed, feral cat control strategies must be a core component of integrated management programs. Existing research has gone a long way towards demonstrating that long-term, sustained control of feral cats can be achieved in some areas. If this can be achieved over large areas, it will open the door for a number of animals to be reintroduced to their former range, and help build resilience in the populations of many native species. There is hope yet for our medium-sized mammals and ground-nesting birds.

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