New national park to be cat free

The opportunity to reconstruct the native fauna of Dirk Hartog Island will rely on the eradication of feral cats. An upcoming project to achieve this will be the largest feral cat eradication campaign attempted on an island in the world, and will include some unique challenges and interesting tools.

by Dave Algar, Steffi Hilmer, Mike Onus, Neil Hamilton and Joanna Moore

Dirk Hartog Island, within the Shark Bay World Heritage Area, became a national park in November 2009. With some 200 kilometres of coastline and an area of 620 square kilometres, it is the largest island off the Western Australian coast and could potentially support one of Australia's most diverse arrays of mammals.

This means that WA's newest national park could contribute significantly to the long-term conservation of several threatened species, such as the woylie (*Bettongia penicillata*), boodie (*Bettongia lesueur*) and chuditch (*Dasyurus geoffroii*). However, making the most of this opportunity to reconstruct the native mammal fauna of the island relies on the successful eradication of feral cats (*Felis catus*).

The cat problem

There is extensive evidence that the introduction of domestic cats to both offshore and oceanic islands around the world can seriously affect endemic land vertebrates and breeding bird populations. Insular faunas that have evolved for long periods in the absence of predators are particularly susceptible to cat predation.

Dirk Hartog Island is no exception, with 10 of 13 native terrestrial mammal species that previously occurred on the island now locally extinct. Predation by cats was a major factor in these extinctions. The 10 species are mainly medium-sized mammals and include the boodie, woylie, western barred bandicoot (*Perameles bougainville*), chuditch, crest-tailed mulgara (*Dasycercus cristicauda*), dibbler (*Parantechinus apicalis*), greater stick-nest rat (*Leporillus conditor*), desert mouse (*Pseudomys desertor*), Shark Bay mouse (*P. fieldi*) and heath mouse (*P. shortridgei*). Only three smaller-sized species—the ash-grey mouse (*P. albocinereus*), sandy inland mouse (*P. hermannsburgensis*) and the little long-tailed dunnart (*Sminthopsis dolichura*)—still occur on the island. It is possible that the banded hare-wallaby (*Lagostrophus fasciatus*) and rufous hare-wallaby (*L. hirsutus*) also occurred on the island, as they both occur on nearby Bernier and Dorre islands, and at one time occurred on adjacent mainland areas.

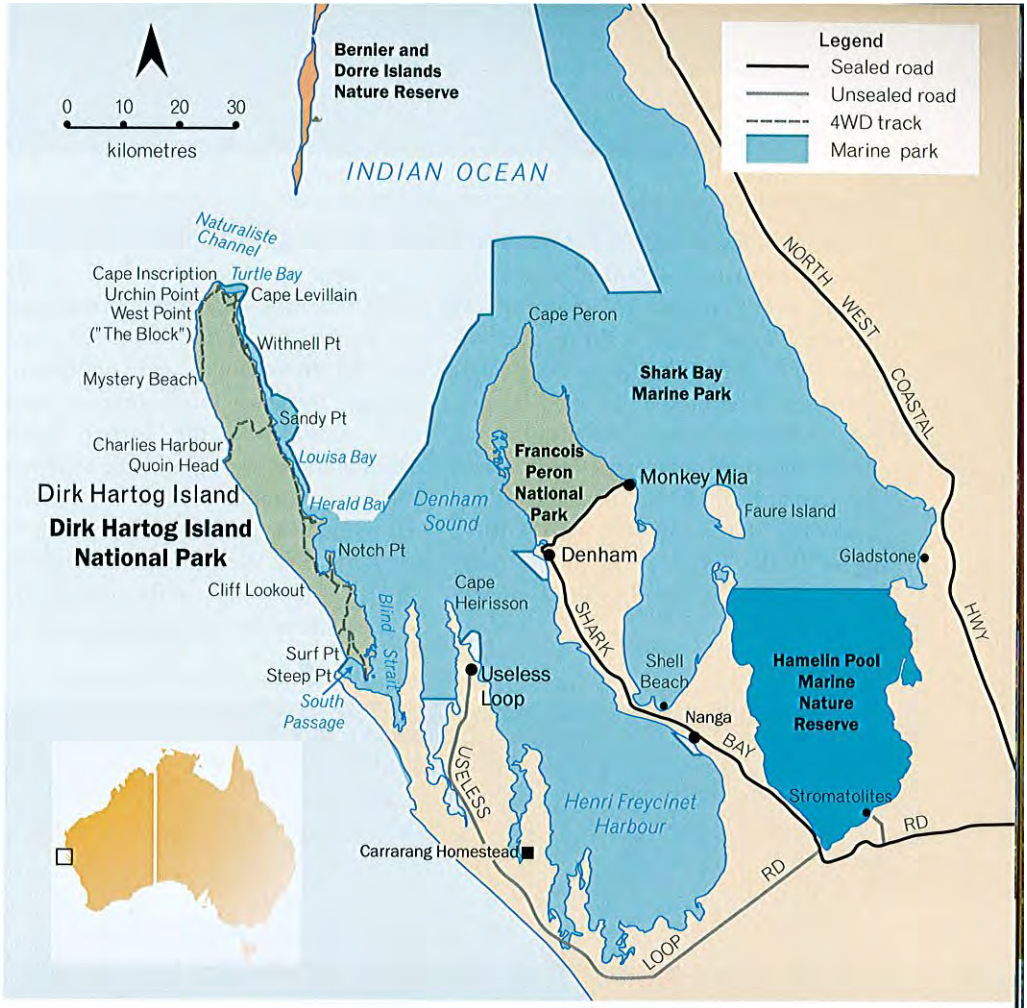
The island is also home to three threatened bird species—the Dirk Hartog Island white-winged fairy wren (*Malurus leucopterus leucopterus*), Dirk Hartog Island southern emu-wren (*Stipiturus malachurus hartogi*) and the Dirk Hartog Island rufous fieldwren (*Calamanthus campestris hartogi*). A population of the western spiny-tailed skink (*Egernia stokesii badia*) found on the island is also listed as threatened.

Dirk Hartog Island has a rich and multi-layered history. Shell middens

Previous page
Main Cat paw prints on sand track.
Photo – Neil Hamilton/DEC
Inset Feral cat with transmitter collar.
Photo – Steffi Hilmer/DEC

Above Coastal vegetation and bays.
Photo – Mike Johnston/DSE Victoria

Left Dunnarts are vulnerable to feral cat predation.
Photo – Jiri Lochman



Below right Lighthouse on Dirk Hartog Island.
Photo – Eva Boogaard/Lochman Transparencies

Bottom right A feral cat with kittens—successful eradication requires cats to be killed more quickly than they can breed.
Photo – Jiri Lochman

and stone artefacts dated at between 6,000 and 3,500 years old suggest that Aboriginal people lived on the island at times of lower sea levels. The island is also arguably one of the most significant places for early European contact in WA (see 'Dirk Hartog Island: inscribed in history', *LANDSCOPE*, Summer 2007–08). Since the 1860s, Dirk Hartog Island has been managed as a pastoral lease and grazed by sheep and goats. More recently, tourism has been the main commercial activity to occur on the island. Feral cats became established on the island during the late 19th century and were probably introduced by early pastoralists.

A major challenge

It is estimated that eradicating feral cats from Dirk Hartog Island National Park and confirming the program's success will cost some $2,300,000 over a three-year period. Globally, the Dirk Hartog project will become the largest feral cat eradication campaign attempted on an island.

Control of feral cats is recognised as one of the most important fauna conservation issues in Australia today and, as a result, the national *Threat abatement plan for predation by feral cats* has been developed. Under the plan, the goal is to protect affected native species and ecological communities, and to prevent further species and ecological communities from becoming threatened. The plan's first objective is to prevent feral cats from occupying new areas in Australia and eradicate feral cats from high conservation value islands.

The successful eradication of cats from an island relies on a number of requirements including that all cats are at risk from the baiting, that the population can be killed faster than it can be replaced, that the feral cats can be detected at relatively low densities to target residual pockets of individuals, and that reinvasion can be prevented. It is also important to have community support for the program and to make sure funding continues until a successful outcome is reached.

Planning logistics

There is a range of challenges in conducting an eradication campaign on Dirk Hartog Island, including the island's size, in particular its length. The island is 76 kilometres long and

between three and 11 kilometres wide, covering 62,000 hectares. As it is not practical to monitor cat activity over such a large area all at once, the eradication campaign will be conducted in two stages. A 10-kilometre-long cat-proof fence will be constructed east–west across the island at Herald Bay, effectively dividing the island into two, with a gate at the intersection of the main track across the island to allow vehicle movement.

The program will be carried out over three years, from July 2011 to July 2014. The first stage will be dedicated to putting the infrastructure in place for accommodation and equipment storage, installing monitoring transects and constructing the barrier fence. Baiting will then begin in the southern section in autumn 2012 with a follow-up monitoring and trapping program to eradicate feral cats through to autumn 2013.The following year the same process will be followed in the northern section.

Techniques and trials

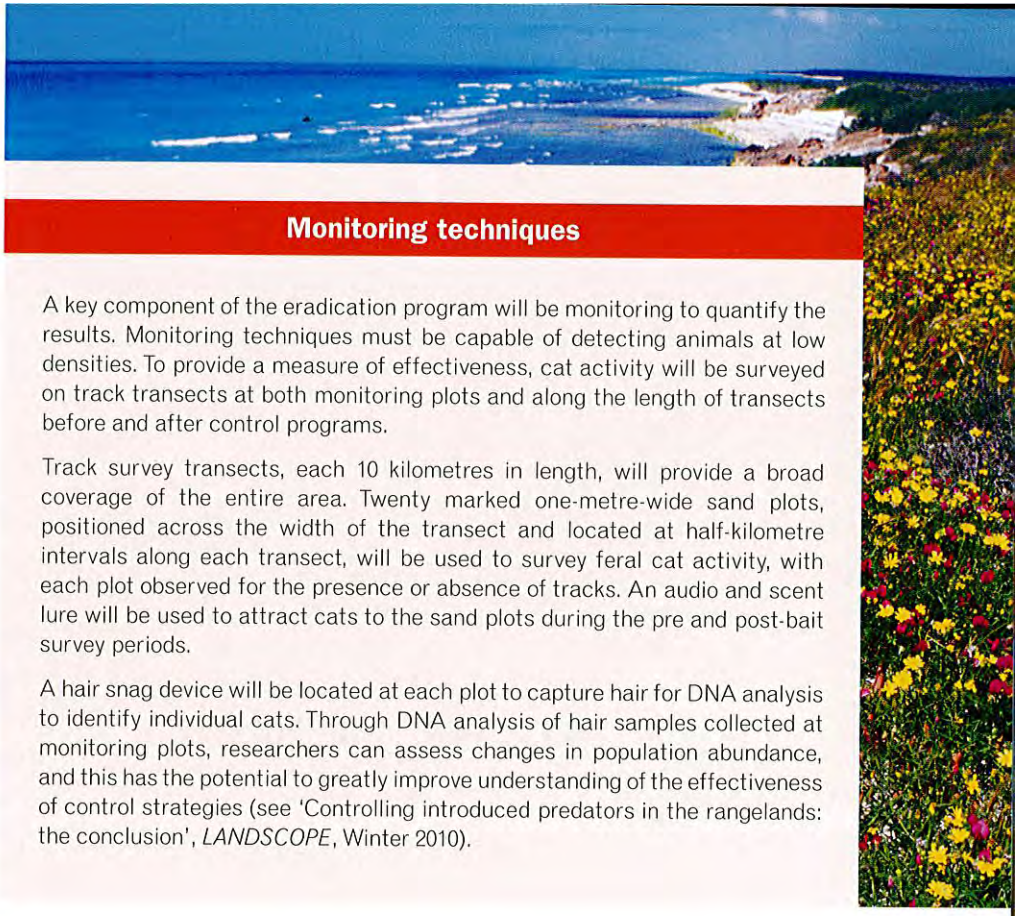
Baiting is recognised as the most effective method for controlling feral cats on mainland Australia, and has been used as the primary technique for eradicating cats on some islands. Worldwide, cat eradications on islands have tended to be successful when poisoning with toxic baits was the main element. The bait designed and developed by Department of Environment and Conservation (DEC) researchers for the successful control of feral cats is known as *Eradicat*®. The baits, manufactured at the DEC bait factory at Harvey, contain 4.5 milligrams of directly injected toxin 1080, or sodium monofluoroacetate, the same toxin that occurs naturally in native poison pea plants.

For the baits to be effective, it is essential that campaigns are conducted prior to the onset of late autumn or winter rainfall. For the Shark Bay area, this seasonal period usually begins in May. A 25,000-hectare pilot study was conducted on Dirk Hartog Island

Left Setting a cat trap.
Photo - Steffi Hilmer/DEC

Below left Bait preparation.
Photo - Katrin Koch

Below A released cat with transmitter collar on Dirk Hartog Island.
Photo - Steffi Hilmer/DEC



Monitoring techniques

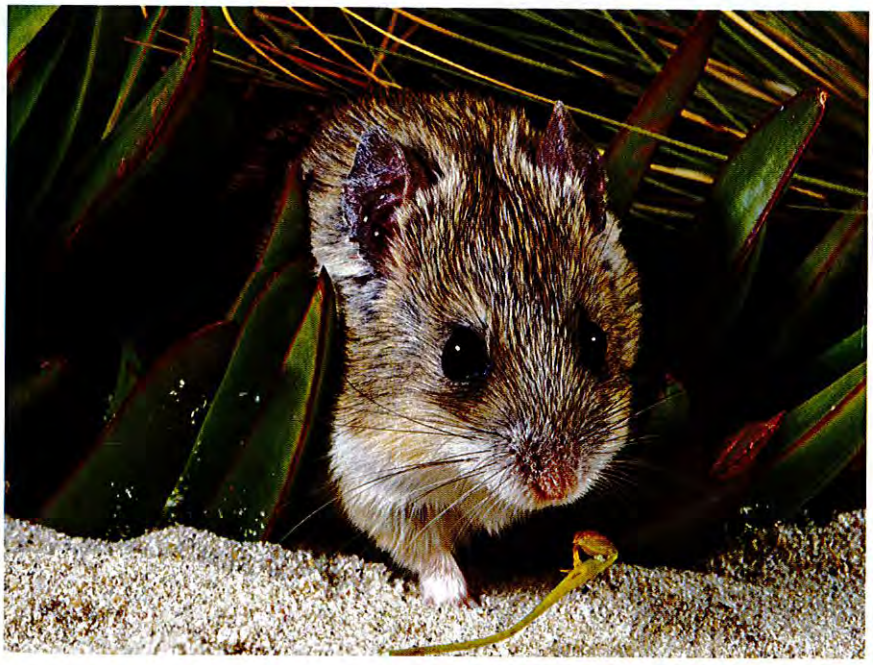
A key component of the eradication program will be monitoring to quantify the results. Monitoring techniques must be capable of detecting animals at low densities. To provide a measure of effectiveness, cat activity will be surveyed on track transects at both monitoring plots and along the length of transects before and after control programs.

Track survey transects, each 10 kilometres in length, will provide a broad coverage of the entire area. Twenty marked one-metre-wide sand plots, positioned across the width of the transect and located at half-kilometre intervals along each transect, will be used to survey feral cat activity, with each plot observed for the presence or absence of tracks. An audio and scent lure will be used to attract cats to the sand plots during the pre and post-bait survey periods.

A hair snag device will be located at each plot to capture hair for DNA analysis to identify individual cats. Through DNA analysis of hair samples collected at monitoring plots, researchers can assess changes in population abundance, and this has the potential to greatly improve understanding of the effectiveness of control strategies (see 'Controlling introduced predators in the rangelands: the conclusion', *LANDSCOPE*, Winter 2010).

between March and May 2009 to assess the effectiveness of the current aerial baiting strategy, which will be the main technique in the proposed eradication campaign. Prior to the baiting program, a number of cats were fitted with GPS data-logger radio-collars, in part to assess baiting efficacy and also to provide detailed information on cat activity.

The information gained from this pilot study has been used in the planning of flight transects for bait delivery across the island. The proposed modifications to the current baiting regime will maximise the likelihood of the entire cat population encountering a bait within the shortest possible time. This will make baiting more efficient and cost-effective. Unlike baiting campaigns on mainland sites—where baits are required to be laid annually to control cat numbers because of reinvasion—it is expected that single-site baiting will prove extremely effective on Dirk Hartog Island. However, a baiting program alone is unlikely to result in eradication, so an intensive monitoring and trapping campaign will also be conducted to remove the cats that survive baiting.



Monitoring, tagging and 'sentinel cats'

In conjunction with the monitoring surveys conducted pre and post-baiting, radio-collared cats will be used to determine the effectiveness of baiting. Three to four months before the start of the two baiting programs, a number of cats will be trapped and fitted with GPS data-logger radio-collars with a mortality signal. Feral cats will be trapped in padded leg-hold traps, using a mixture of cat faeces and urine as the lure. Sex and bodyweight of the captured animals will be recorded and a sample of hair and tissue taken for DNA profiling. Data collected on movement patterns of these animals during the monitoring programs will be used to help calculate occupancy and abundance estimates, and provide a measure of baiting efficacy.

Top left Radio tracking feral cats.
Photo – Steffi Hilmer/DEC

Top right background Dirk Hartog Island coastline.
Photo – Eva Boogaard/Lochman Transparencies

Left Shark Bay mouse.
Photo – Jiri Lochman

Above Coastal dunes.

Left A banded hare-wallaby.
Photos – Jiri Lochman

Guaranteeing the achievement

The significant expenditure and effort associated with the attempted eradication of exotic species on islands can be very quickly wasted if the target species are able to readily re-establish from other locations. Dirk Hartog Island is sufficiently isolated to preclude the arrival of cats swimming or drifting independently from the mainland. DNA samples will be taken from feral cat populations on Dirk Hartog Island, at Denham and Steep Point and stored as reference samples. These genetic profiles can then be compared with DNA samples from any cats that may be found on the island following the confirmation of eradication. Thus, in the event of cats getting onto the island post-eradication, this information will help determine where quarantine measures need to be improved.

Cats are social animals and when at low numbers are likely to actively seek other cats in the area, particularly during the breeding season. Researchers are considering the use of 'sentinel cats'—animals brought in from outside the control area and sterilised, not de-sexed. (De-sexing through removal of the ovaries and fallopian tubes or castration changes hormonal activity, whereas sterilisation through tubular ligation or vasectomy means the animals maintain normal hormonal activity and so will interact with other cats as they would normally.) These cats would also be fitted with radio-collars to enable their locations to be plotted and their subsequent removal. Information collected from the animals will, firstly, give further confidence in cat detectability, especially at low population densities. Secondly, once the sentinel cats have been removed, intensive searching of the area for subsequent signs of cats will indicate whether the sentinel cats had found other cats in the area or had been living alone.

Rapid detection of cats surviving the initial application of baits is critical to successfully eradicating cats from the island. The detection of any cat

sign during the monitoring programs will instigate an intensive ground baiting of the general location and the implementation of a trapping program at the site of the sign and surrounding area so any remaining cats can be removed.

Cats that survive the baiting programs will be removed by trapping. There are a number of different trap sets and lure types suitable for use on Dirk Hartog Island depending on the situation and location. Following the completion of the monitoring and trapping programs, detector dogs and their handlers will be contracted to further verify the absence of cats. At the conclusion of the program, an independent team of experts will be invited to the island to corroborate that eradication has been successfully achieved.

DEC will implement an ongoing cat monitoring program and a strict quarantine program to ensure that cats and others introduced species will not be reintroduced to Dirk Hartog Island.

Top left The knob-tailed gecko is a common island species.
Photo – S Wright/DEC

Top Sandy inland mouse.
Photo – Jiri Lochman

Above A white-winged fairy wren.
Photo – Babs and Bert Wells/DEC

Below Feral cat.
Photo – Jiri Lochman

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