



**by Dave Algar, Neil Hamilton, Mike Johnston and Mike Lindeman**



New tools for **fighting  
ferals**



Trials of a new cat bait and delivery device have achieved success in targeting feral cats on Christmas Island, sparking new hopes for protecting the island's iconic wildlife.



There is extensive evidence that the introduction of domestic cats (*Felis catus*) to islands around the world can adversely affect populations of endemic land animals and birds. Animals that have evolved for long periods in the absence of predators are particularly susceptible to cat predation.

On Christmas Island, four of the five mammal species which were present at settlement by European people have become extinct. The bulldog rat (*Rattus nativitatus*) was a diurnal species and was common at the time of settlement while Maclear's rat (*R. macleari*) was highly arboreal, nocturnal and extremely abundant. The Christmas Island shrew (*Crocidura attenuata trichura*) has not been seen since 1985 and is believed extinct and, most recently, the Christmas Island pipistrelle (*Pipistrellus murrayi*) is also thought to have become extinct.

While several causes are likely to have contributed to the demise of these native animals, including disease, habitat destruction (land clearing and natural catastrophes such as cyclones) and the proliferation of exotic crazy



ants (*Anoplolepis gracilipes*), a major culprit is the introduction of exotic competitors and predators such as the feral cat.

A recent Parks Australia report lists five threatened species which are vulnerable to cats on Christmas Island—the emerald dove, Christmas Island hawk-owl, Christmas Island thrush, Lister's gecko (*Lepidodactylus listeri*) and pink blind snake (*Typhlops exocoeti*). Other species considered at risk from cat predation include the blue-tailed skink (*Cryptoblepharus egeriae*) and forest

skink (*Emoia nativitatis*). A recent study of red-tailed tropicbirds on Christmas Island has shown predation, primarily by cats, has resulted in no chicks surviving nesting during the past three years. It has also been demonstrated that cats are hunting adult birds. This provides a clear message that increased management of cats is required to improve the survival prospects of these species.

## Christmas Island

Christmas Island covers an area of 135 square kilometres and is located in the Indian Ocean about 360 kilometres south of Java and 900 kilometres north-east of the Cocos (Keeling) Islands. Major land uses are phosphate mining and conservation, with 63 per cent of the island reserved as national park. More recently, the island has become known as the location of a detention centre for asylum-seekers.

The island rises steeply from the surrounding ocean and consists of a series of fringing limestone terraces, separated by rugged limestone cliffs and scree slopes, rising to a central plateau at about 200 metres and extending to 360 metres above sea level. Christmas Island has an equatorial climate with a distinct wet (December–April) and dry season. The mean annual rainfall is 2,154 millimetres with most falling in February and March and least in August to October. Temperature varies little from month to month. The mean daily maximum is 28°C in March and April and the mean daily minimum is 22°C in August and September. Humidity also varies little between months and usually ranges from 80 to 90 per cent. The conserved areas on



Previous page

**Main** Deans Point, Christmas Island.

Photo – Alex Steffe/Lochman

Transparencies

**Inset** Feral cat.

Photo – Neil Hamilton/DEC

**Above** Dave Algar setting a bait station.

Photo – Mike Lindeman/DSE

**Left** Dolly Beach, Christmas Island.

Photo – Alex Steffe/Lochman

Transparencies





the island are mostly vegetated with tropical rainforest.

Cats were taken to Christmas Island at the time of first settlement in 1888 and it didn't take long for a significant feral population to develop. Initially, cats were concentrated around the settlement and mining areas where they had access to discarded human food. Feral cats are now abundant and widespread across the island. The Department of Environment and Conservation (DEC) and collaborators have launched a new bait and bait delivery device to combat feral cats at this tropical site.

### Curiosity killed the cat

Baiting is recognised as the most effective method of controlling feral cats but requires an understanding of the risk posed to non-target species. The toxin used in Western Australia (and select other sites) for feral cat baiting is known as 1080. Most WA native animals have a natural degree of tolerance to the 1080 poison because it is derived from native plants called gastrolobiums or 'poison peas' with which they have evolved.

Conventionally, poison baits intended for feral cats are laid on the ground. This can present a significant hazard to wildlife species, particularly in the eastern states of Australia where tolerances to 1080 are significantly lower than in the west. To provide a technique for broadscale feral cat baiting campaigns where 1080 may pose a risk, a collaborative project for the development of a 'humane, felid-specific toxin and bait delivery system' was initiated. The project is a collaboration between the Australian Department of the Environment, Water, Heritage and the Arts, the Victorian Department of Sustainability and Environment (DSE) and DEC.

The project involves bringing together the feral cat bait (*Eradicat*®) and an encapsulated pellet known as the 'hard shell delivery vehicle', which contains the toxicant. The toxin is known as a 'para-aminopropiophenone' (PAPP), which works by converting healthy haemoglobin into methaemoglobin that cannot transport oxygen. Independent veterinarians and animal welfare groups consider the death of a cat from PAPP toxicosis to

be humane. The use of an acid-soluble 'hard shell delivery vehicle' ensures that the toxin does not disperse throughout the bait but releases in the cat's stomach where it quickly overwhelms the cat's physiological processes.

This method of delivering the bait also plays a key role in reducing the potential exposure of non-target species. When feeding, feral cats simply shear food items into manageable portions and swallow those portions whole. Thus, they will reliably swallow a pellet that is implanted into a bait. Conversely, most wildlife species process food items more thoroughly in the mouth. This means animals other than cats tend to reject the pellet as they eat. Direct injection of PAPP toxin into the bait (without the delivery device pellet) is not appropriate because it is more likely to present a risk to non-target wildlife species and also requires more toxin.

This bait delivery and toxicant combination is soon to be registered and will be known as the Curiosity Feral Cat Bait. Registration involves meeting specific requirements and approvals from the Australian Pesticides





and Veterinary Medicines Authority (APVMA). Field trials to demonstrate the effectiveness of the bait and toxin combination are required and these will occur across climatic zones where feral cats are a threatening process. To start with, these trials were conducted on islands where non-target species risks could be ameliorated or are non-existent. An earlier trial in Victoria's French Island National Park resulted in a significant baiting efficacy at a low cat density in the temperate site. A significant baiting efficacy was also demonstrated on Dirk Hartog Island off the WA coast, a semi-arid site, where at least 80 per cent of feral cats consumed toxic baits during a recent baiting program. The results of the Christmas Island study and those from French and Dirk Hartog islands will be included as part of the dossier submitted to the APVMA when seeking registration of this product as an agricultural chemical.

### Getting the technique right

Previous baiting trials on Cocos (Keeling) and Christmas islands highlighted the potential problem of certain non-target species removing ground-laid baits. On the Cocos (Keeling) Islands, land crabs (*Cardisoma carnifex*), which dominate the forest floor, hermit crabs (*Coenobita perlata*), black rats (*Rattus rattus*) and feral chickens (*Gallus domesticus*) readily

consumed baits placed on the ground. Similarly on Christmas Island, robber crabs (*Birgus latro*) readily removed ground-laid baits. Any baits consumed by non-target species are not available to feral cats resulting in lower baiting efficacy.

However, scientists found that suspending baits from a 'gantry' device, about 30 to 40 centimetres above the ground, prevented most non-target animals from removing the baits. And, significantly, the baits were still attractive to the feral cats. This baiting strategy was adopted to test the new bait delivery and toxicant combination.

The feral cat baits used were manufactured at the DEC bait factory in Harvey. The bait is similar to a chipolata sausage in appearance—weighing about 20 grams before drying and about 15 grams after drying, before it is blanched and then frozen. The baits are made of 70 per cent kangaroo meat mince, 20 per cent chicken fat and 10 per cent digest and flavour enhancers. The delivery device contains about 78 milligrams of PAPP toxin in pellet form and, importantly, there is no risk of secondary poisoning.

Each of the 524 bait stations consisted of two joined non-toxic cat baits suspended from a gantry using six to eight pound fishing line. The bait stations were located at 100-metre intervals along most of the road and track network on the island. A 'sand

**Above left** A robber crab climbing a bait station.

Photo - Neil Hamilton/DEC

**Above** The pipistrelle is thought to have become extinct.

Photo - Lindy Lumsden/DSE

pad' of crushed rock phosphate dust was placed beneath the baits to detect cat activity.

Non-toxic feral cat baits were placed at each bait station until removed by a cat. After the baits were removed, toxic baits were then placed at the bait station. This ensured a strategic deployment of toxic baits in areas where cat activity was observed rather than across the entire island. Each bait station was examined daily, over a 15-day period, to see whether the baits had been taken and whether evidence of cat activity could be seen on the sand pad. Bait removals by non-target species were also identified by tracks on sand pads and recorded. Baits were replaced following removal and all bait stations were re-baited with fresh non-toxic baits at least every four days.

### Cat abundance before and after baiting

To find out how efficient the baiting was, cat activity was surveyed at a number of monitoring plots before and after the baiting program.



To supply a measure independent of food (in this case baits), active plot stations containing an audio lure known as a 'Felid Attracting Phonic' and a felid scent lure were used to attract cats to monitoring plots in each survey. Fifty of these plots were located at half-kilometre intervals along a transect of five kilometres, with five transects across the baited zone. Cat activity at the plots was recorded during five consecutive nights during the two survey periods.

Cat activity was recorded on 96 of the 524 individual bait stations during the 15 days of baiting. Of the 96 stations with activity, 55 stations were visited on more than one night, sometimes multiple times during the baiting period, and 41 stations were visited only on the one night. A total of 183 baits were removed by cats during this period, of which 78 were toxic. It was not possible to determine how many stations an individual cat visited on a given day. As bait station activity could not be ascribed to individuals, a value for the maximum and minimum number of cats poisoned over the survey route was determined.

Although the sand pad method could not detect multiple visits to bait stations on the same night, it seems unlikely that this occurred because the bait would typically be removed by the first cat. So, the total number of toxic baits consumed was considered to indicate the maximum number of individuals poisoned (78 cats) over the 52.4-kilometre baited route. The minimum number of individuals poisoned (38 cats) was calculated by ascribing bait removals from consecutive bait stations to the same animal, even if more than 10 stations were involved. Realistically, the number of feral cats poisoned during this program will be somewhere between the two extremes.

The comparison for the pre- and post-baiting monitoring periods indicated a significant reduction in cat activity following the baiting program.

An 87 per cent decline in cats was recorded, indicating a highly effective baiting program.

### Into the future

Both the community and authorities on Christmas Island are concerned about the abundant feral cat population in the national park, as well as the cat population in the settlement. Many have raised concerns about the threat of the cats to the survival of a number of endangered fauna. Previous research has demonstrated that the cats on the island also have a very high

prevalence of *Toxoplasmosis*, a parasite that can lead to serious human health complications.

Organisations responsible for the management of Christmas Island have recently tendered for the preparation of a feral cat management plan for the island. A collaborative project between DEC and DSE has been endorsed to write this plan that will hopefully lead to an effective cat control campaign in the very near future. A baiting program using Curiosity Feral Cat Bait will play a significant role in this control campaign.



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**Above right** A walk to Margaret Knoll on Christmas Island.

Photo - Alex Steffe/Lochman  
Transparencies



- 46 Captivating Kalbarri  
Take a journey to this remarkable place, which features river and ocean views as well as stunning gorges.
- 54 The ant, the butterfly, the leafhopper and the bulldozer  
An amazing story of three species cohabiting in the Wheatbelt.
- 59 Conserving roadside vegetation  
Roadside plant communities play an important role in conserving native flora and providing wildlife corridors.

## Regulars

- 3 Contributors and Editor's letter
- 15 Bookmarks  
*The Nature of Ice*  
*Kalbarri*  
*Find that Flower*
- 30 Feature park  
Porongurup National Park
- 39 Endangered  
Meelup granite community
- 62 Urban Antics  
Real muppets

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