

Cat eradication on Hermite Island, Montebello Islands, Western Australia

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Abstract Feral cats (*Felis catus*) and black rats (*Rattus rattus*) became established on the Montebello Islands, an archipelago of about 100 islands, islets and rocks off the Pilbara coast of Western Australia, during the late 19th century. They were probably introduced from pearling vessels. The largest island in the group is Hermite at 1020 ha. Three species of native mammals and two of birds became extinct well before the British used the islands for testing nuclear weapons in the 1950s. *Montebello Renewal* (part of the 'Western Shield' fauna recovery programme) aims to eradicate feral animals from, and reintroduce and introduce threatened animals to, the Montebellos. Rats occurred on almost every island and islet when eradication was attempted in 1996. In 1999 small numbers of rats were detected on Hermite and two adjacent islands and work is under way to eliminate them. Feral cats occurred on several islands at various times, but by 1995 were naturally restricted to Hermite. Feral cat eradication took place in 1999 and comprised two stages – aerial baiting and trapping. Aerial baiting utilised recently developed kangaroo meat sausage baits with flavour enhancers and the toxin 1080. About 1100 baits were dropped by hand from a helicopter. Hermite Island has two main soil types – sand and limestone. Aerial baiting primarily targeted sandy soils. Four cats, all females, remained after baiting. These were trapped using Victor 'softcatch'® traps set either in association with phonic and odour lures or set in narrow runways. Eradication was achieved over a six-week period. Searches for evidence of cat activity in 2000 confirmed that cats had been eradicated.

Keywords cat eradication; islands; cat bait; cat trapping.

INTRODUCTION

The importance of islands to the conservation of Australian mammal species has been well documented (Burbidge and McKenzie 1989; Abbott and Burbidge 1995; Burbidge *et al.* 1997). One of the key factors in the historic importance of islands has been that most have remained free of introduced predators. Burbidge (1999) highlighted the current and future importance of islands to nature conservation and stated that 'Australian nature conservation agencies need to pay more attention to the eradication of exotic animals from islands'.

Feral cats (*Felis catus*) pose a serious threat to populations of small to medium-sized native vertebrates. Anecdotal evidence has indicated that predation by feral cats, either acting singly or in concert with other factors, has resulted in the local extinction of a number of species on islands and mainland Australia. Burbidge and Manly (2002) analysed the relationship between disturbances and native mammal extinctions on Australian islands and implicated feral cats in the extinction of these species on arid islands. They concluded that high estimated extinction probabilities are associated with ground dwelling, herbivorous, 'critical weight range' mammals of high body weight on islands of low rainfall, low to moderate presence of rockpiles and the presence of cats, foxes and rats.

Predation by feral cats also affects the continued survival of many native species that persist at low population levels (Dickman 1996; Smith and Quin 1996) and has prevented the successful re-introduction of species to parts of their former range (Gibson *et al.* 1994; Christensen and

Burrows 1995). Control of feral cats is recognised as an important conservation issue in Australia today and as a result, a national 'Threat Abatement Plan for Predation by Feral Cats' has been developed (Environment Australia 1999). The Department of Conservation and Land Management (CALM), through Project 'Western Shield', has been working over the past few years to develop an effective cat control strategy. *Montebello Renewal* (part of 'Western Shield'), which aims to eradicate rats and cats and to reintroduce locally extinct species, provided an opportunity to assess the effectiveness of these techniques to eradicate cats from an island.

The Montebello Islands comprise a group of over 100 islands, islets and rocks off the Pilbara coast of Western Australia. The archipelago has a tropical, arid climate. The nearest weather station is on Barrow Island, 30 km to the south, which has a median rainfall of 285 mm, and mean daily maximum and minimum temperatures of 30.3°C and 21.4°C respectively.

Montague (1914) conducted the first detailed biological survey of the islands in 1912. He observed the presence of cats and noted that they had probably established from a shipwreck 20 or so years before his visit. It seems more likely, however, that cats were introduced from pearling vessels that were active in the area from the 1860s. Montague attributed the recent extinction of the golden bandicoot (*Isodon auratus*) to predation by cats and predicted that the spectacled hare-wallaby (*Lagorchestes conspicillatus*) would suffer the same fate. Later surveys by Sheard (1950) and Serventy and Marshall (1964) found

that both species had become locally extinct on the islands, confirming Montague's prediction.

The above surveys recorded cats on Hermite Island, at 1020 ha the largest island in the group. However, cats were also observed on Trimouille Island in 1970 (Burbidge 1971) and tracks were recorded by K. D. Morris on Bluebell Island in 1985 (Burbidge *et al.* 2000). Surveys between 1994 and 1996 found that cats were then restricted to Hermite Island, indicating that populations on the smaller islands had died out without human intervention (Burbidge *et al.* 2000).

Montebello Renewal aims to eradicate feral cats and black rats (*Rattus rattus*) from the Montebello Islands to allow the successful re-introduction of native mammal species and also two species of locally extinct birds: spinifexbird (*Eremiornis carteri*) and the black-and-white fairy-wren (*Malurus leucopterus leucopterus*) (Burbidge 1997). The absence of cats and eradication of rats from Trimouille Island has allowed this island to be used for the introduction of species threatened with extinction on mainland Australia. The mala (*Lagorchestes hirsutus* unnamed central Australian subspecies), which is 'extinct in the wild'

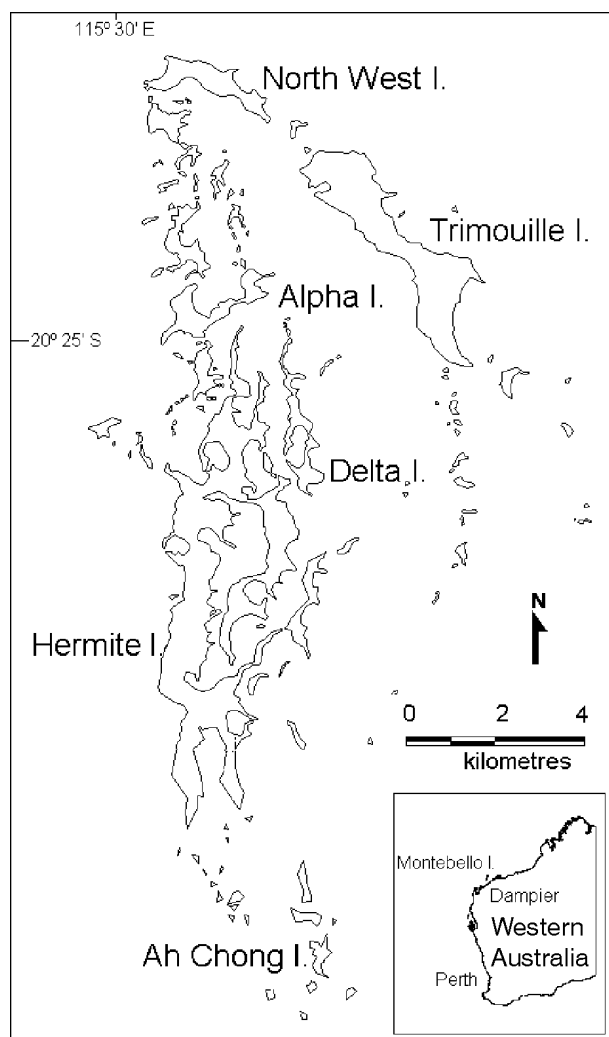


Fig. 1 Montebello Islands, showing the location of Hermite Island.

and is subject to predation by feral cats, has been successfully established on Trimouille Island (Burbidge *et al.* 1999, 2000; Langford and Burbidge 2001). The djoongari (Shark Bay mouse, *Pseudomys fieldi*), also threatened by feral cat predation, was introduced to North West Island in June 1999 and August and October 2000.

METHODS

Site Description

The Montebello Islands are located between 20°21' and 20°32' South and between 115°31' and 115°36' East, approximately 100 km off the Western Australian coast. The total area of the islands is approximately 2300 ha with Hermite Island being the largest at 1020 ha. Hermite Island is a difficult location on which to conduct a cat eradication campaign because of its isolation, rugged terrain and absence of vehicle access. The shape of the island is elongated and highly convoluted, with a number of sandy beaches, areas of mangroves, cliffs and limestone ridges and peninsulas (Fig. 1). Its interior is low, undulating and is vegetated with a dense mat of spinifex (*Triodia* sp.) with occasional *Acacia coriacea* thickets on deep sand. Access was via small boat along Stephenson Channel and then on foot, carrying the traps and trapping equipment.

Cat Eradication Strategy

The programme to eradicate feral cats on Hermite Island involved aerial baiting to remove the majority of the cats, followed by intensive trapping, if warranted, to remove the remaining individuals. A reconnaissance of Hermite Island was conducted prior to the baiting programme to assess cat abundance. Searches for evidence of fresh cat activity were conducted around most mangrove stands and sandy areas on the island. These were examined daily over a five day period. The location of fresh cat activity on swept areas, its extent and the distances between sites suggested that at least 20 cats were present prior to baiting.

Baiting Programme

CALM researchers have recently completed development of a bait to control feral cats. The bait is similar to a chipolata sausage. It is 20 g in weight and contains a number of flavour enhancers that are highly attractive to feral cats (Patent No. AU 13682/01). The baits were manufactured at the Department's Bait Factory and airfreighted to the island. At the island the baits (National Registration Authority experimental baiting permit No. 1213) were prepared for laying by thawing and then blanching (that is, placing in boiling water for one minute). The toxin 1080 (sodium monofluoroacetate) was injected into the baits at a rate of 3.0 mg/bait. A risk analysis concluded that there are unlikely to be any significant effects on non-target species on the island. All baits were treated with an ant deterrent compound (Coopex®) at a concentration of 12.5 g/l Coopex as per the manufacturer's instructions. Ant attack on baits rapidly degrades the bait medium, reducing palat-

ability, and the persistence of ants on the bait deters uptake by feral cats (D. Algar, pers. obs.).

About 1100 baits were dropped by hand from a helicopter on the 3 July 1999. The flight path followed the 140 km coastline and then through the centre of the island to maximise bait availability and the area covered.

Trapping Programme

It is unlikely that a single baiting campaign will achieve eradication of cats within an area of this size. Monitoring cat activity along a number of the beaches post-baiting indicated that several cats were still present. To remove the remaining cats a trapping programme was started ten days after the baiting campaign.

Trapping systems for cats have generally relied on food-based lures as the trap attractant (reviewed by Veitch 1985). A number of other olfactory scents or social odours to entice cats into traps or bait stations have also been used (Veitch 1985; Clapperton *et al.* 1994; Edwards *et al.* 1997). An alternative technique to these systems, using lures that mimic signals employed in communication between cats, has been developed by CALM researchers and proven highly successful. Cats are very inquisitive about other cats in their area; their communication traits are principally reliant on audio and olfactory stimuli. The trapping technique utilises padded leg-hold traps, Victor 'Soft Catch'® traps No. 3 (Woodstream Corp., Lititz, Pa.; U.S.A.), a Felid Attracting Phonic (FAP) that produces a sound of a cat call, and a blended mixture of faeces and urine (Pongo). Each trap site consists of a channel of approximately 40 cm wide and 80 cm in length, cleared into a bush to create a one-way (blind) trap set. Two traps, slightly offset (approximately 2-5 cm), are positioned at the entrance of the blind set, at each trap site. The free jaws of the two traps are aligned in the centre and almost touching. A trap bed is made so that when lightly covered with soil, the traps are level with the surrounding ground surface. A guide stick is placed in front of the traps to force animals to lift their foot then push down onto the pressure plate. Both traps are secured in position by a 30 cm length of chain to a 30 cm steel anchor peg. A 12 x 8 x 2 cm foam pad is placed below the pressure plate to prevent soil from falling into the trap bed and compacting under the plate. The traps are then lightly covered with soil.

Cats are lured to the trap set initially by the audio signal produced by the FAP. The FAP is located at the back of the trap set, either concealed under leaf litter or hidden within the bush. The FAP consists of a 36 x 25 mm printed circuit board with a microprocessor data driven voice ROM. As cats approach the trap set they are further enticed into the traps by the smell of 'pongo'. The pongo consists of a blended mixture of cat faeces and urine in a ratio of approximately 1:1. Approximately 20 ml of this mixture is placed in a shallow depression about 30 cm from the centre of the trap plates.

Trapping campaigns can sometimes induce trap-shyness in the target species; trapping for feral cats is no exception. Variations on the standard trap set were used towards the end of the trapping operation to capture remaining cats wary of the standard set. The most successful variation of the trap set was a 'road trap' that involved placing four traps in a set along pathways actively used by cats.

Five personnel (two professional trappers, two volunteer trapper assistants and a boat handler) were involved in the trapping programme after the first week. Personnel were rotated every two weeks; however, three of the trappers stayed longer. The entire trapping exercise took six weeks to complete.

The difficult terrain and distances to be walked every day precluded trapping the entire island simultaneously. The island was therefore divided into four zones: east, north, west and south. Each of these zones terminated in a sandy narrow-necked peninsula that could be used to assess cat movement into the area once trapping had been terminated. The trapping programme was initially conducted on east and south Hermite and as traps were removed, trapping commenced on west and north Hermite. Traps are normally placed at 1 km intervals along tracks; however on Hermite more effort was put into providing broad-scale trap coverage and maximising trap success. Traps were located strategically on all areas of perched sand sheet and dunes across each zone. Additional 'road traps' were located in areas where cats had not entered the standard set. In total, 180 trap sets, totalling 1544 trap-nights, were placed over the island during the trapping period.

The traps were left in position for a minimum of seven days and if no cat activity had been recorded in the zone, the traps were removed. Evidence of fresh cat activity was recorded for each trap site and intensive searches were conducted *en route*. Once trapping in each zone was completed, the area was searched carefully to ensure that all cats had been removed. The sandy areas that terminated each zone were monitored on a regular basis to ascertain whether cats had moved into previously trapped zones.

Trapped cats were humanely destroyed; then sexed and weighed. Stomach contents were collected for diet analysis and the females were examined for placental scarring.

RESULTS

The intensive searches showed that cats had been active across much of the island, mostly along the sandy beaches, mangroves and *Acacia* thickets where 'highways' of tracks and numerous scat piles were observed. Some evidence of cat activity was observed along the limestone ridges and in the spinifex plains, but these areas were understandably less favoured habitat and were used as pathways to the more preferred sites.

Four cats were captured during the trapping programme. Two cats were trapped on the standard audio and scent

lure and the remaining two in 'road traps'. All four cats entered the standard trap set on first encounter, although on two occasions the traps did not trigger. These two animals did not enter standard trap sets again and their capture required the placement of road traps. Since this trapping programme, improvements in trap maintenance and modification of the trap set have resulted in capture of all cats entering the standard audio and scent trap set. The modification to the trap set involves making the channel slightly wider than the width of one trap and then positioning the two traps one in front of the other at the entrance of the blind set.

No evidence of fresh cat activity was observed across the island once the four cats had been trapped and it was concluded that eradication had been successfully completed. This was confirmed by searches for cat activity in August 2000. The fact that only four cats remained after baiting indicates that it was responsible for removing at least 80% of the cats from the island.

DISCUSSION

Cat eradication programmes on islands are usually conducted using a combination of baiting, trapping and hunting (Veitch 1985; Rauzon 1985; Bloomer and Bester 1992; Bester *et al.* 2000). These eradication programmes have met with varied success, their success and time to completion having been limited in part by lack of effective bait and trap lures.

Bait acceptance by feral cats is in part related to the abundance of prey species (D. Algar and J. Angus pers. obs.). The major prey items available to cats on the island would have been rats, birds, reptiles and insects. The baiting campaign on Hermite Island was conducted when rat numbers were very low after an unsuccessful rat eradication project and when the availability of natural prey items, particularly reptiles and insects, was likely to be at its lowest (mid-to late-winter). Further research being conducted on the timing and frequency of baiting programmes should improve their effectiveness and cost efficiency. The cat eradication programme on Hermite Island was achieved in a matter of weeks and could have been completed sooner with the subsequent modification to the trap set. Elsewhere in the world, cat eradication projects on islands have often taken months or years, or are still ongoing. However, it is difficult to compare the efficacy of our baiting and trapping programme with others, which have taken place on islands of different climate, terrain, shape and size and with different prey availability. Some islands, for example, Macquarie Island of 11,800 ha, where eradication has not been achieved, are much larger than Hermite Island.

Feral cat eradication programmes for a number of islands off the Western Australian coast are now being planned. Targets for the future include Faure Island (5200 ha – reconstruction of original fauna plus marooning), Garden Island (1050 ha – protection of native animals including tamar wallabies (*Macropus eugenii*) and carpet pythons

(*Morelia spilotos*)) and Dirk Hartog Island (58,600 ha – reconstruction of the original fauna). The advances in cat control strategies developed by the Department may also be useful in assisting eradication of feral cats from many islands around the world. Eradication of feral cats has already commenced on the Cocos (Keeling) Islands (1400 ha) in the Indian Ocean.

Black rats are still present on Hermite Island (although eradicated from all other islands in the group). Once they have been eradicated the reconstruction of the original fauna of Hermite can commence.

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