

REDUCING FERAL CAT IMPACTS ON THREATENED SPECIES ON THE TIWI ISLANDS



GEORGINA NEAVE^{1,2}, HUGH DAVIES³, PAT HODGENS¹, JASON TURL¹, TIWI RANGERS⁴

1. Terrain Ecology, Kingscote, SA 5223
2. Research Institute for the Environment and Livelihoods, Faculty of Science and Technology, Charles Darwin University, Casuarina, NT, 0810, Australia
3. School of Environmental and Rural Science, University of New England, Armidale, NSW, Australia.
4. Tiwi Resources Pty Ltd, Casuarina, NT 0811, Australia

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ENQUIRIES:

Dr Georgina Neave
Charles Darwin University
T: 0438 729 333
E: georgina.neave@cdu.edu.au

Catherine Whitehead
Tiwi IPA & Ranger Program Manager
T: 08 8941 1162
E: admin@tiwiresources.com



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CONTENTS

PROJECT AND FUNDING DESCRIPTION	4
PROJECT DESIGN AND IMPLEMENTATION.....	5
BACKGROUND – THE TIWI ISLANDS.....	6
1. CONSULTATION, PLANNING AND APPROVALS	7
SELECTION OF PRIORITY AREAS	7
PROJECT PLAN.....	8
SELECTION OF CONTROL METHODS.....	9
PROJECT TIMELINE.....	9
2. ON-GROUND CAT CONTROL.....	10
THERMAL/NIGHT SHOOTING.....	10
FELIXER GROOMING TRAPS	11
CAGE TRAPPING.....	12
RESULTS OF CAT CONTROL METHODS	14
THERMAL/NIGHT SHOOTING.....	14
FELIXER GROOMING TRAPS	15
CAGE TRAPPING.....	16
COST-EFFECTIVENESS, METHOD COMPARISON AND CO-BENEFITS.....	18
3. MONITORING TO EVALUATE MANAGEMENT (BEFORE VS AFTER CAT CONTROL PROGRAM)	21
MONITORING METHODS	21
RESPONSE METRICS AND ANALYTICAL APPROACH	24
STATISTICAL ANALYSIS.....	25
MONITORING RESULTS	26
FERAL CATS.....	26
WUNINGA (NORTHERN BRUSHTAIL POSSUM)	31
OTHER NATIVE SPECIES INCLUDING THREATENED SPECIES	33
CAT DIET ANALYSIS – PRELIMINARY RESULTS.....	35
DISCUSSION OF MONITORING RESULTS.....	37
4. COMMUNITY ENGAGEMENT, INVOLVEMENT AND EDUCATION	38
ENGAGEMENT WITH TIWI DECISION-MAKING GROUPS	39
TRADITIONAL OWNER/CULTURAL ADVISOR EMPLOYMENT AND PARTICIPATION	41
SCHOOL AND YOUTH ENGAGEMENT.....	43
COMMUNITY COMMUNICATIONS.....	45
ON-GROUND AWARENESS MATERIALS	48
AWARENESS MERCHANDISE.....	49
RANGER EXCHANGE WITH NYANGUMARTA RANGERS.....	50
MEDIA AND OUTREACH.....	51
CONCLUSION	52
LIST OF DATASETS GENERATED FROM THIS PROJECT.....	53
REFERENCES:	53

PROJECT AND FUNDING DESCRIPTION

The Tiwi Islands are one of Australia's most important refuges for threatened species, many of which hold cultural significance for Tiwi people. However, predation by feral cats poses a critical threat to numerous Tiwi animals, including:

- Northern Brushtail Possum (*Trichosurus vulpecula arnhemensis*, EPBC VUL)
- Brush-tailed Rabbit-rat (*Conilurus penicillatus melibius*, EPBC VUL)
- Black-footed Tree-rat (*Mesembriomys gouldii melvillensis*, EPBC VUL)
- Butler's Dunnart (*Sminthopsis butleri*, EPBC VUL)
- Northern Brush-tailed Phascogale (*Phascogale pirata*, EPBC VUL)
- Water Mouse (*Xeromys myoides*, EPBC VUL)
- Partridge Pigeon (*Geophaps smithii smithii*, EPBC VUL)

Feral cats are identified as a Top Threat in the Tiwi Islands Indigenous Protected Area (IPA) Plan of Management (2023–2033), and their control is a priority for Tiwi Traditional Owners. Reducing the impacts of feral cats is therefore regarded as critical for the protection of Tiwi biodiversity.

This project aimed to reduce the impacts of feral cats in key areas on Melville Island through targeted, best-practice cat control. Activities were guided by Traditional Owners, and delivered by Tiwi Rangers, with support from contract ecologists and licensed shooters. Cat control was focused across three priority areas to maximise benefits for the Tiwi Wuninga (Northern Brushtail Possum) and other threatened species. In addition, this project also provided employment and training opportunities for Tiwi people and contributed to building local capacity for ongoing Tiwi-led cat control.

The project was funded through the Australian Government's Saving Native Species Program (Priority Species Grants), which supports actions that improve outcomes for nationally listed threatened species. The Northern Brushtail Possum, listed national as threatened in 2021, is a designated priority species under this funding program. Tiwi Islands represent a stronghold for this species, where it remains relatively widespread and abundant compared to mainland populations (Davies *et al.* 2018; Davies *et al.* 2021; Neave *et al.* 2024).

The project aligned strongly with program objectives by:

- reducing a key threatening process (feral cat predation), and
- contributing to improved population outcomes for a priority species.

Strategic feral cat control in priority areas was expected to reduce cat abundance and, in turn, reduce predation pressure on northern brushtail possums and other threatened species.

Total funding: \$471,198 (administered by Tiwi Resources Pty Ltd)

Project length: April 2024 – March 2026

PROJECT DESIGN AND IMPLEMENTATION

The project was designed as an integrated program to reduce feral cat impacts while building a foundation for long-term Tiwi-led cat control.

It comprised four key components:

1. Consultation, planning, and approvals
2. On-ground cat control
3. Monitoring for the ongoing refinement of management actions as well as evaluation of management outcomes
4. Education, community engagement, and involvement



BACKGROUND – THE TIWI ISLANDS

The Tiwi Islands are located north of Darwin in the Northern Territory and include Australia's second and fifth largest islands – Melville (5,786 km²) and Bathurst (1,639 km²) and numerous smaller islands. There has been an unbroken history of occupation and ownership of the islands by Tiwi people. Murrakupuni (land/Country) plays an important role in kinship and relationship networks, with each person belonging to a landowning group, and having connections to spatially defined areas. The islands are divided into eight clan areas, each belonging to a defined Tiwi landowning group: Malawu, Jikilaruwu, Wurankuwu, Mantiyupwi, Munupi, Marrikawuyanga, Wulirankuwu and Yimpinari. The Tiwi Land Council is the statutory authority administering the Tiwi Aboriginal Land Trust under the *Aboriginal Land rights (Northern Territory) Act 1976* and is comprised of members and trustees from each clan group. Tiwi Resources Pty Ltd was established to help Tiwi people benefit economically from land-use activities and is owned by the eight Tiwi landowner/clan groups. Since 2018, Tiwi Resources has managed the Tiwi Ranger program. In 2025 the Tiwi Islands Indigenous Protected Area was formally dedicated after years of consultation and planning. The three main communities on the Tiwi Islands are: Pirlangimpi and Milikapiti on Melville Island, and Wurrumiyanga on Bathurst Island with a total population of approximately 2,348 people (2021 Census). The Tiwi Rangers operate out of all three communities and have a remote ranger base situated centrally on Melville Island. The ranger team consists of around 18 permanent staff.

The Tiwi Islands are located in the monsoonal tropics, with some areas receiving the highest annual rainfall totals in the Northern Territory, ranging from 1400 mm (eastern Melville Island) to 2000 mm (northern Melville and central north Bathurst Island). Eucalypt (*Eucalyptus* and *Corymbia* spp.) open forest and woodland (both forms of the tropical savanna biome) cover approximately 75% of both islands. They are dominated by Woollybutt (*Eucalyptus miniata*), Stringybark (*E. tetradonta*) and Melville Island Bloodwood (*Corymbia nesophila*), over a grass or shrub-dominated understorey. Melville Island has northern Australia's largest forestry plantation. It involves 35,000 ha of short-rotation *Acacia mangium* plantations, representing ca. 5% of its land area. There are no managed plantations on Bathurst Island.



1. CONSULTATION, PLANNING AND APPROVALS

SELECTION OF PRIORITY AREAS

Priority areas for cat control were identified through consultation between Tiwi Resources, Tiwi Rangers, project staff, and Tiwi Traditional Owners during clan group meetings in May 2024. A range of ecological, cultural, and logistical factors were considered in selecting the final sites. Melville Island was chosen as the primary focus of the project. Previous research and monitoring on the Tiwi Islands have shown marked differences in feral cat abundance/density between islands, with very low and often undetectable feral cat activity on Bathurst Island (Davies *et al.* 2022; Neave *et al.* 2024). In contrast, Melville Island supports higher cat densities.

As the project aimed to reduce predation pressure on Wuninga (and other native species) and evaluate the effectiveness of different control methods, it was essential to work in areas where feral cats were present at measurable levels.

Additional considerations in site selection included:

- Presence of Wuninga (Northern Brushtail Possum) in the area
- Occurrence of other threatened species in the area that are also expected to benefit from cat control (e.g. Black-footed Tree-rats, Brush-tailed Rabbit-rats, and Northern Brush-tailed Phascogales), with Wuninga acting as an umbrella species for broader conservation outcomes
- Distribution of ranger effort across different clan group lands, recognising strong support for cat control by Tiwi Traditional Owners but limited resources
- Avoidance of culturally significant areas, including closed Country
- Accessibility/road network for shooting, trapping and Felixers, particularly during the wet season
- Logistically feasible distance from ranger bases and communities
- Landscape context, including variation in connectivity of priority areas (e.g. peninsula ends versus more connected central areas), to compare how immigration of cats may influence control outcomes

Based on these criteria, three priority areas were selected (Figure 1):

- **Rangini** (Munupi Clan land)
- **Taracumbi Three Ways** (Wulirankuwu Clan land)
- **Andranangoo/Goose Creek** (Yimpinari Clan land)

FIGURE 1. Map of the three priority areas on Melville Island.



PROJECT PLAN

The project followed a structured before–after design to evaluate the effectiveness of cat control and trends in Wuninga relative abundance. Activities were implemented sequentially within each priority area:

1. **Baseline monitoring to quantify cat activity and native species presence**
2. **Implementation of cat control over approximately 12 months**
3. **Post-control monitoring to assess changes in cat activity and native species response**

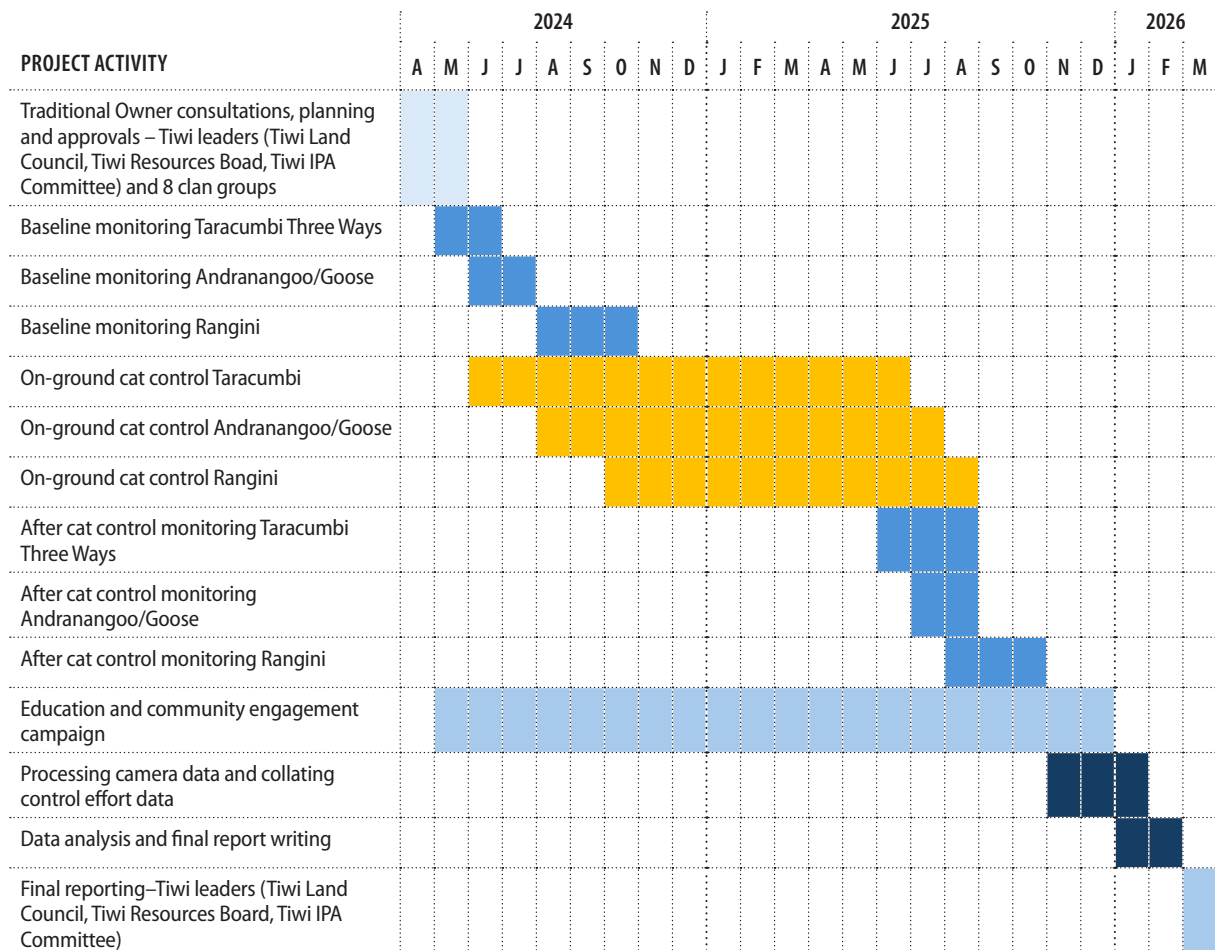
This design enabled comparison of conditions before and after cat control.

SELECTION OF CONTROL METHODS

Three control methods were used across all priority areas: night/thermal shooting, Felixer Grooming Traps, and cage trapping (Figure 2, 3 and 4). These methods were selected based on several key considerations, including the experience and proficiency of Tiwi Rangers, their suitability for ongoing long-term use, minimisation of risk to non-target species, and alignment with Tiwi community preferences and support.

Alternative control methods were considered but not implemented due to associated risks and limitations. The use of 1080 baiting was not considered appropriate due to the high likelihood of non-target impacts on dingoes, which readily consume baits and are widespread, abundant, and culturally important on the Tiwi Islands. There is also limited evidence for the effectiveness of 1080 baiting for feral cats in tropical environments, where cats are less likely to be food-limited and therefore less inclined to consume baits. Additionally, environmental conditions on the Tiwi Islands, including high humidity and occasional dry season rainfall, could reduce bait efficacy through rapid degradation of 1080 and reduced palatability of bait material. While 1080 baiting has been successful in achieving a near-eradication of cats on a small offshore island (West Island in Pellew Island Group the Gulf of Carpentaria), this context differs substantially from the Tiwi Islands, particularly due to the absence of dingoes and potentially greater seasonal resource limitation for cats, increasing bait uptake. To be effective, baits need to be encountered, available, attractive, palatable and lethal, which would be difficult to achieve on the Tiwi Islands.

PROJECT TIMELINE



2. ON-GROUND CAT CONTROL

Following completion of baseline monitoring in each priority area, a cat control program was implemented over a 13-month period.

THERMAL/NIGHT SHOOTING

The Tiwi Rangers do not hold a corporate firearms licence; therefore, licensed contract shooters were required to deliver this control method. Two shooters were contracted through Terrain Ecology, both with experience in island eradication programs. Thermal shooting was planned as monthly trips each involving a minimum of six nights; however not all priority areas were accessed each month. The first shooting trip was conducted in June 2024 and the last in August 2025. Commencement of shooting in each priority area was staggered to align with completion of baseline monitoring period and so that each area received approximately 12 months of control program.



Night shooting was typically undertaken by a team of four people operating from a single vehicle: a driver, a contracted shooter, and two spotlighters. Team size varied between two and five people, with a minimum of a driver and a shooter. Shooting teams comprised of Tiwi Rangers, a large pool of casually employed Traditional Owners, contractors, Ranger Coordinators, and Tiwi Land Council Environment and Resources staff. Each shooter primarily focused on a specific priority area, with Taracumbi used as a shared area. This approach allowed shooters to build familiarity with local conditions, including areas of higher cat activity and visibility, and to develop working relationships with Traditional Owners involved in spotlighting.

Night shooting was conducted in priority areas by driving vehicle tracks and plantation firebreaks at approximately 20–30 km/h, depending on vegetation density. Cats were initially detected using handheld white-light spotlights (Lightforce Striker halogen), with at least one spotlight directed on each side of the vehicle and the driver scanning ahead. When eye-shine was detected, headlights and spotlights were either turned off or one light maintained on the animal depending on conditions and discretion of the shooter. The shooter then switched to a thermal scope mounted on a rifle, while an additional team member sometimes used thermal binoculars (Hikmicro Raptor RQ50) to assist with tracking. Shooting was conducted using a .223 calibre rifle (Lithgow with metal magazine) fitted with a thermal scope (Pulsar Thermion 2 LRF XP50). Following a shot, a directed search was undertaken to locate and retrieve the carcass and confirm a successful kill. All retrieved cats were processed for morphological measurements, including assessment of breeding status and number of embryos if pregnant, as well as stomach content analysis. Tissue samples were collected for potential DNA analysis, and bladders (urine) and intestinal contents were retained for use as lures in cage trapping.

Shooting effort and observations were recorded using the Fulcrum field data collection application. Data collected included start and end times, team size, GPS tracks (to estimate distance travelled), number and location of cats sighted, shot, and missed, as well as environmental variables such as moon phase and weather conditions.

FELIXER GROOMING TRAPS

Five Felixer Grooming Traps (v3.2, AI camera-equipped) were deployed during the project under a lease arrangement with the Thylation Group. Three units were leased for 18 months (June 2024–November 2025), and an additional two units were leased for 12 months (December 2024–December 2025). At the time of the project, Felixers were only available under a lease model.

Precise positioning of Felixers is critical to their effectiveness.

Units were deployed along vehicle tracks and plantation firebreaks, with track widths ideally no greater than 5–6 m.

Fallen logs and branches were arranged near units to camouflage, funnel animal movement and increase the likelihood of cats passing directly in front of the Felixers.

Site selection also considered requirements outlined in the

“Directions for Use”, terrain flatness, drainage (to avoid water pooling during storms), minimising risk of vehicle damage (from accidental running over), and ensuring sufficient sun exposure for north facing panels.



Initial placement of Felixers was partially informed by cat detections from baseline camera grid surveys (see following section). Following these surveys, a subset of cameras was retained along roads in two of the three priority areas. These cameras were routinely downloaded and used to guide both thermal shooting and Felixer placement. Operational challenges were anticipated during the wet season, when rain and muddy conditions could obscure camera lenses and reduce the detection accuracy of AI systems. To mitigate this, shade cloth mats and coarse gravel were placed in front of units to reduce mud spatter, and corrugated iron sheets were installed over units (within crates) to limit direct rainfall exposure.

Felixers were checked approximately every 4–6 weeks and were not operated as “set-and-forget” devices. Maintenance checks included downloading data via USB for processing in the Felixer Management System (FMS), inspecting system logs (e.g. battery voltage), confirming solar panel connectivity and charging, clearing fallen debris and vegetation regrowth from in front of the units, cleaning lenses and ensuring units remained level. Maintaining level placement was particularly important, as vehicle traffic on dirt roads could alter the ground surface and affect the alignment of the LiDAR sensors.

Dry season fire posed a significant risk to Felixer units on Melville Island. From May to October each year, units were preferentially placed in recently burnt areas, or along road edges within mature plantations, which were less likely to burn. Where this was not possible, manual firebreaks were established around units using rakehoes and leaf blowers.

Felixers were operated in aggressive mode throughout the project, and audio lures were not used. The FMS was used to monitor firing events, system performance, and non-target passes. Active deployment locations, maintenance checks, cartridge refills, and unit issues were recorded using the Fulcrum field data collection application.

CAGE TRAPPING

Two sizes of wire mesh, treadle-activated cage traps (manufacturer: Wiretainers) were used during the project. Both trap sizes were treadle-operated (no hook-trigger traps were used). The two sizes deployed were:

- standard traps (710 × 310 × 310 mm) and
- custom longer traps (910 × 310 × 310 mm)

Hook-trigger traps using meat baits were trialled prior to this project but were found to be ineffective for cat trapping outside of communities, where cats are more accustomed to scavenging.

An assortment of lures was used to attract cats into cage traps. These included cat urine, cat faeces and soiled kitty litter sourced from pet cats in Darwin. Cat urine/bladders and cat faeces from small intestines were also used from culled feral cats on the Tiwi Islands and stored frozen until use. Where possible, urine was separated by sex, although this was not always feasible. Urine was applied either by soaking cotton wool or fabric and placing it at the rear of the trap, or by directly applying it to the soil at the back of the trap. Cat toys were also suspended inside the rear of traps as a visual attractant. Meat-based lures were avoided to reduce by-catch of non-target species (e.g. goannas) and to minimise interference from dingoes.

Traps were positioned in sheltered locations to reduce exposure to sun and heat. A layer of sand or light soil was spread across the trap floor to conceal the metal mesh and treadle mechanism. Vegetation was arranged over and behind traps to form a bower, preventing cats from accessing the lure from outside the rear of the cage and encouraging entry into the trap. Flagging tape was attached above traps to assist relocation. Traps were set in locations likely to maximise cat encounters, including track junctions, game trails, road edges near waterways, ecotones, and fire scar edges within and around priority areas. Traps were typically operated for one week at a time, with a checking roster established between rangers and project staff. Traps were checked daily, within two hours of sunrise. Lures were refreshed every two to three days, or more frequently following rainfall.

All cage trap deployment details, including location, trap type, lure type, dates of operation, and records of captures and by-catch, were recorded using the Fulcrum field data collection application. Captured cats were euthanised humanely using a firearm. As with cats culled during night shooting, individuals captured in cage traps were processed for morphological measurements, stomach content analysis and urine collection.



CONTROL METHODS USED ACROSS ALL PRIORITY AREAS

Showing locations where Felixer Grooming Traps (purple squares) and cage traps* (red circles) were deployed, and the spatial extent of night shooting effort (green lines).

FIGURE 2: Rangini priority area.



FIGURE 3: Taracumbi Three Ways priority area.

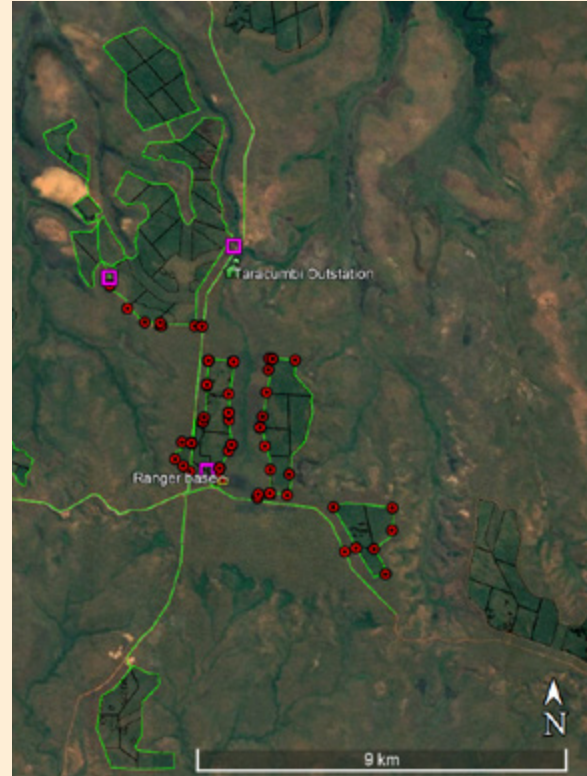
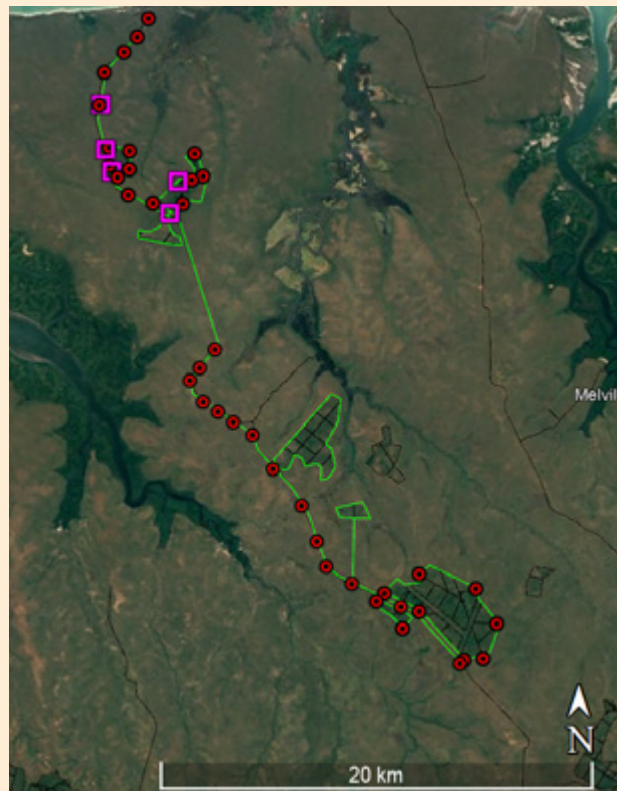


FIGURE 4: Andranangoo priority area.



- Felixer Grooming Traps
- Cage traps
- Spatial extent of night shooting effort

* Cage trapping was not undertaken at Rangini due to logistical constraints and low inferred cat density

RESULTS OF CAT CONTROL METHODS

THERMAL/NIGHT SHOOTING

Thermal shooting was conducted at night across all three priority areas, with effort and outcomes varying among locations. Cat observations during spotlighting were classified into three categories:

1. cats shot and retrieved (confirmed kills),
2. cats shot at but missed or body not recovered, and
3. cats observed but not shot due to factors such as vegetation obstruction, distance, or animals fleeing before a shot could be taken.

Because shooting effort was constrained by the availability and accessibility of vehicle tracks, the spatial extent of each priority area (i.e. the zone of influence) was defined flexibly for each location. This allowed shooting teams to operate effectively while still targeting cats associated with each priority area. For example, Andranangoo is on a long peninsula with a long main road with limited passable track availability off this main road and therefore a relatively long, linear zone of influence was defined. At Rangini, most cats detected during baseline monitoring were removed early in the program, and subsequent search effort was expanded beyond the initial core area (camera grid) following repeated nights with no cat observations. Previous GPS-collaring studies on Melville Island have shown that individual cats can have home range lengths of approximately 8–10 km when roads are present in their home range.

At Rangini, 36 nights of shooting were undertaken. A total of six cats were shot and retrieved, three cats were observed but could not be shot, and one cat was shot at but not recovered. At Taracumbi, 39 nights of shooting were conducted. Eight cats were shot and retrieved, eight cats were observed but not shot, and three cats were shot at but either missed or not recovered. At Andranangoo, 35 nights of shooting were undertaken. A total of 15 cats were shot and retrieved, 12 cats were observed but not shot, and three cats were shot at but not recovered (assumed not killed). Across all priority areas, 49% of cats observed during shooting operations were successfully shot and retrieved.

Additional shooting outside priority areas:

In addition to effort within priority areas, cats were also encountered and shot while travelling to and from these areas. Although these individuals were not included in the priority area tallies, they were processed for morphological measurements, diet analysis, and tissue sampling. Shooting was also conducted outside of priority areas for several reasons. These included requests from Traditional Owners to undertake cat control in other areas, the need to vary search effort when repeated nights in priority areas yielded few detections, and safety considerations during the wet season when access to remote areas was limited by weather conditions or vehicle reliability. On these occasions, shooting was conducted closer to ranger bases or communities.

Outside of priority areas, an additional 14 cats were shot and retrieved, 22 cats were observed but not shot at, and eleven cats were shot at but either missed or body not recovered. A further seven cats were shot opportunistically by community members and brought to the ranger base.

Encounter rate and search effort:

Shooting effort was primarily quantified as nights of effort, reflecting the payment structure for both contract shooters and casually employed Traditional Owners, who were paid a nightly rate rather than hourly. However, total search hours were also recorded although these included both time spent within and outside priority areas.

On average, teams spent approximately 4.5 hours per night actively searching and spotlighting (excluding travel and preparation time). Across the control program, this equated to approximately 185 search hours at Rangini, 194 hours at Taracumbi, and 146 hours at Andranangoo Goose Creek. The commute time to Andranangoo was the highest. When all search effort (both within and outside priority areas) was combined, a total of 598 search hours were recorded, during which 104 cats were encountered. This corresponds to a sighting rate of 0.17 cats per hour, or approximately one cat every 5.7 hours of active search effort.

FELIXER GROOMING TRAPS

Felixer Grooming Traps were deployed at 14 unique locations across the three priority areas (Figure 2, 3 and 4), with a total of 1,756 active Felixer days over the 12–13 month cat control program.

Across all sites, 29 cat passes were recorded, of which 18 resulted in firing events and 11 did not. This corresponds to a firing success rate of approximately 62% of cat passes. Instances where Felixers did not fire were attributed to several factors, including obscured or muddy lenses leading to misclassification of cats as non-target species, animals moving too quickly for the unit to fire accurately, or cats approaching at angles that did not allow for a safe flank shot. It is also possible that some cats not fired upon during an initial pass were subsequently detected and targeted during later passes, however the images of animal passes are not of sufficient resolution to be able to identify individual coat patterns.

At Rangini, Felixers were deployed at six locations for a total of 441 active days, resulting in two firing events and three cat passes where the unit did not fire (Figure 5). At Taracumbi, Felixers were deployed at three locations for 725 active days, resulting in 13 firing events and five cat passes without firing (Figure 6). At Andranangoo, Felixers were deployed at five locations for a total of 590 active days, resulting in three firing events and three cat passes where the unit did not fire (Figure 7).

A total of 3,411 non-target animal passes were recorded across all Felixer deployments. Of these, only three off-target firing events occurred (one bush stone-curlew and two agile wallabies), representing 0.09% of non-target passes. This is well below the acceptable threshold of 0.5% false-positive activation specified in the Felixer Directions for Use and cartridge label requirements. No dingoes or dingo pups were fired upon during the project from 809 recorded dingo passes.

Additional Felixer deployments outside priority areas:

Felixer units remained under lease beyond the completion of control activities within priority areas. During the final camera monitoring survey (which required a six-week period without active cat control to assess cat activity after control program had been implemented), all units were redeployed to other locations on Melville Island to continue feral cat suppression. Between 30 August and 30 November 2025, a total of 280 additional active Felixer days were recorded across nine locations. During this period, a further 20 cat passes were recorded, of which 11 resulted in firing events.

Across all deployments (priority and non-priority areas combined), a total of 49 cat passes were recorded. Of these, 29 resulted in firing events and 20 did not, corresponding to an overall firing success rate of approximately 60% of cat passes.

CAGE TRAPPING

A total of 828 trap nights were conducted across two priority areas, comprising 535 trap nights at Taracumbi and 293 trap nights at Andranangoo (Figure 3 and 4). Cage trapping was not undertaken at Rangini due to logistical constraints and low inferred cat density, based on baseline camera detections, shooting observations, and low Felixer detection rates. Only one feral cat was captured within the priority area Andranangoo, in August 2024 (Figure 7), resulting in a low capture success rate (0.12% trap success). Non-target captures were minimal, with only three recorded incidents: one bandicoot, one dingo pup, and one goanna. All non-targets were released unharmed.

Additional cage trapping outside priority areas:

In addition to trapping effort within priority areas, cage traps were also deployed outside of these areas as part of a research collaboration to GPS-collar feral cats. In 2025, an additional 618 trap nights were undertaken, resulting in the capture of 11 cats. This represents a higher trap success rate (1.78%) compared to trapping within priority areas and provides an informative comparison of trapping effectiveness under different conditions.

One of the research areas (Pickertaramoor) is known to support relatively high feral cat densities (approximately 0.2 cats km⁻²; Davies *et al.* 2022), which likely contributed to the higher trapping success observed outside priority areas. In contrast, lower success within priority areas may reflect reduced cat densities following control efforts from other methods. Additionally, cage trapping is known to preferentially remove naïve or highly exploratory individuals, after which remaining individuals may be trap-shy or less susceptible to capture with cages. This behavioural response may have further contributed to the low trapping success observed within priority areas.

TABLE 1. Number of cats removed in each priority area using each control method over 12–13 months.

	Rangini		Taracumbi		Andranangoo	
	Cats	Effort	Cats	Effort	Cats	Effort
Shooting	6	36 nights	8	39 nights	15	35 nights
Felixers	2	441 active nights	13	725 active nights	3	590 active night
Cages	0	0 trap nights	0	535 trap nights	1	293 trap nights
Total	8		21		19	



RESULTS OF CONTROL METHODS USED ACROSS ALL PRIORITY AREAS

Showing locations of cats seen (blue circle), cat shot confirmed (red circle), cats shot at but unconfirmed (yellow circle) during night shooting, cats fired at by Felixer Grooming Traps (purple square) and cats caught in cage traps (red triangle).

FIGURE 5: Rangini priority area.



FIGURE 6: Taracumbi Three Ways priority area.

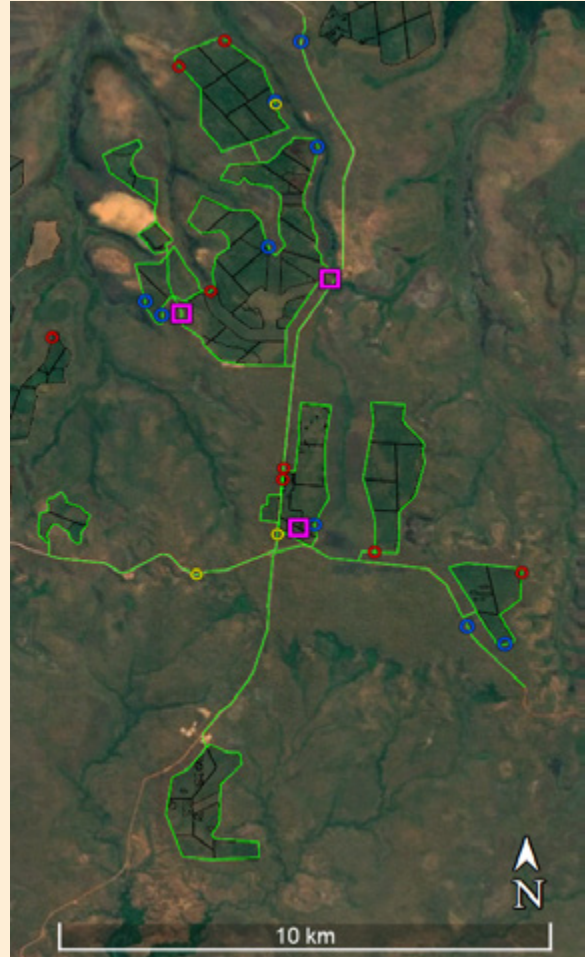
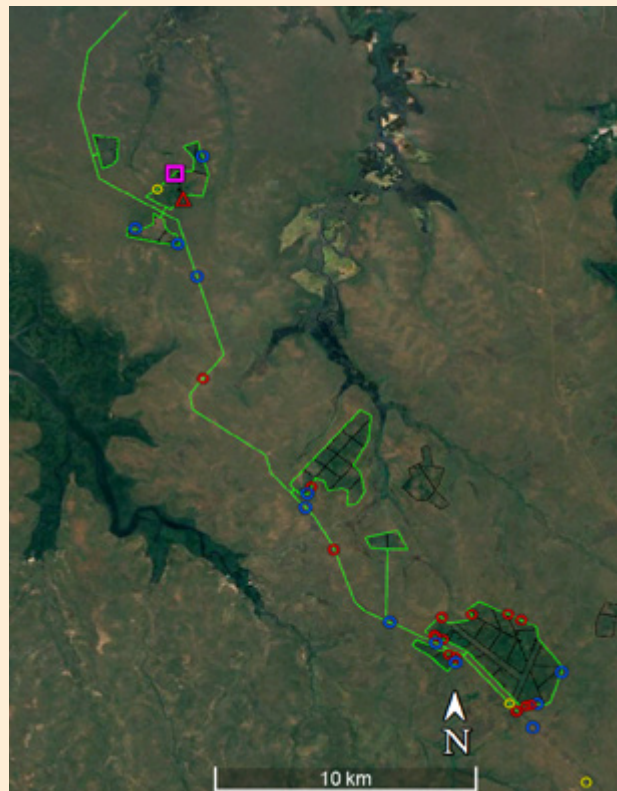


FIGURE 7: Andranangoo priority area.



-  Cats seen
-  Cats shot – confirmed
-  Cats shot– unconfirmed
-  Cats fired at by Felixer Grooming Traps
-  Cats caught in cage traps
-  Spatial extent of night shooting effort

COST-EFFECTIVENESS, METHOD COMPARISON AND CO-BENEFITS

A key objective of this project was to evaluate the effectiveness of three feral cat control methods and the operational costs associated with delivering each method (Table 2). To enable comparison, we calculated both catch per unit effort (CPUE) and cost per cat removed. In addition, we outlined the key limitations and co-benefits of each method within the unique Tiwi context. An alternative approach would have been to apply a single control method to each priority area (e.g. shooting at Rangini, cage trapping at Taracumbi, and Felixers at Andranangoo). However, all three methods were implemented across each priority area, reflecting how cat control programs are realistically delivered. As a result, comparisons among methods are made across a range of logistical conditions and landscape configurations present on Melville Island, providing a more representative assessment of method performance within the operational capacity of the Tiwi Ranger team.

It is important to recognise that both CPUE and cost per cat are influenced by prior control effort. In areas where multiple control methods have already reduced cat populations or are being applied concurrently, subsequent removal becomes more difficult and costly. Conversely, higher removal rates and lower costs per cat are often achieved in areas where little or no prior control has occurred. Overall, this approach provided insight into how different control methods complement one another and highlights the importance of integrated pest management for feral cat control. Feral cats exhibit high levels of individual behavioural variation, meaning that no single method is effective for all individuals, reinforcing the need for a multi-method approach.

TABLE 2. Summary of catch per unit effort and cost per cat for each control method inside and outside priority areas.

Method	Inside priority area/ Outside priority area	CPUE (cats / 100 effort units)	Cost per cat (\$)
Shooting	Inside	25.4	5,227
Shooting	Inside + Outside	35	3,721
Felixer	Inside	1.0	6,014
Felixer	Inside + Outside	1.4	4,058
Cage	Inside	0.12	26,896
Cage	Inside + Outside	—	NA

Costs include initial outlay of purchasing items such as thermal scope, and cage traps etc. They do not include staff time of project officer coordinating, record keeping and analysing data.

NIGHT SHOOTING

Across the priority areas, night shooting removed an average of 26 cats per 100 shooting nights. As with Felixers, catch per unit effort increased when cats removed outside priority areas were included, rising to 35 cats per 100 shooting nights.

Night shooting had the highest labour cost of all methods; however, it resulted in the lowest cost per cat removed (see Table 2). The total operational cost of delivering the shooting program within the priority areas over 12 months was approximately \$151,600 (inc. GST).

While high labour costs can be viewed as a limitation, they can also provide important benefits depending on project objectives. In this case, the program aimed not only to reduce feral cat

impacts but also to support training and employment opportunities for Tiwi people. The shooting program involved substantial contribution from casually employed Traditional Owners and provided opportunities for a wide range of skillsets. In general Tiwi people are more comfortable with night shooting as a cat control method. Spotlighting also allows people to observe native fauna on their Country. A key limitation of shooting is its dependence on licensed and skilled firearm operators to ensure safe and effective delivery. Currently, due to the absence of a corporate firearms licence for Tiwi Rangers, contractor shooters are required to undertake this work, and this is likely to remain the case in the near term. The cost of shooting is therefore largely dependent on contractor fees, and these can vary significantly. Shooting was undertaken across all seasons; however, its effectiveness was reduced during the peak wet season (January–March), when high rainfall and dense vegetation limited visibility, reduced access, and raised safety concerns for staff.

An additional advantage of shooting (and cage trapping), compared to methods such as Felixers, is that cat carcasses are retrieved. This allows for the collection of valuable ecological data, including information on breeding season, diet, and prey selection, helping to improve understanding of feral cat ecology and impacts on native species. It also provides opportunities for Traditional Owners, rangers, and junior rangers to directly observe feral cat morphology.

FELIXER GROOMING TRAPS

Across the priority areas, Felixer Grooming Traps removed an average of 1.0 cats per 100 Felixer days, based on deployment of five units across 14 locations. Catch per unit effort increased when Felixers were deployed outside priority areas—where no prior cat control had been conducted—to 1.4 cats per 100 Felixer days.

Felixers have relatively high upfront and lease costs, but low labour/time requirements compared to night shooting. Despite this, the cost per cat removed was higher than for cats culled through shooting (see Table 2). The operational cost of delivering the Felixer program inside the priority areas for 12 months was approximately \$108,200 (including GST). Direct comparisons of labour costs between methods are challenging, as Felixers operate continuously (24 hours per day, 7 days per week), whereas shooting effort is limited to discrete periods. A key limitation of Felixers is their restricted spatial coverage, as a small number of units could only be deployed at a limited number of locations. This contrasts with cage trapping, which can be deployed at high density across a site, and shooting, which can cover large areas in a single night.

However, Felixers provide important advantages for sustained cat control programs. Notably, they can operate continuously through the wet season and during periods when staff are unavailable (e.g. holidays), maintaining control pressure when other methods are not feasible. Their low labour requirements also free up staff capacity for other activities and allow involvement of personnel who are not available for night work but are trained in safe chemical handling. Felixers were successfully deployed throughout an average Tiwi wet season in this project, although suitable deployment locations became more limited due to environmental conditions. During Tropical Cyclone Fina in November 2025 we did have one unit flood under these exception circumstances. By operating passively, Felixers can target individuals that are less susceptible to other control methods, such as trap-shy or light-averse cats. However, some individuals may exhibit neophobia, and it may take weeks to months before these cats approach and pass within range of a unit.

Felixers were also effective in removing GPS-collared cats, with four individuals culled and carcasses subsequently located within approximately 600 m of the units using radiotracking.

CAGE TRAPPING

Cage trapping was the least effective method evaluated, with the lowest catch per unit effort (0.12 cats per 100 trap nights) and the highest cost per cat removed. This method was also the most limited by seasonal conditions, as it could not be implemented feasibly or ethically in areas away from the ranger base or community during the wet season (December–April). During the wet season, frequent storms reduce the effectiveness of scent-based lures, as rainfall rapidly washes them away. Flooding and boggy road conditions further restrict access to trap locations and increase the risk that traps cannot be checked daily, raising animal welfare concerns. Cage trapping is also labour-intensive, requiring time to set traps effectively and to conduct daily checks. While a more permanent installation of a trap array using a trap alert system (e.g. [Celium network](#)) could have reduced labour requirements, purchasing of a trap alert system was outside the scope of this project and would not eliminate the need for regular (typically every 2–3 days) trap visits to refresh lures. A further limitation of cage trapping is a commonly observed bias towards capturing bold or exploratory individuals, often resulting in a male-skewed sample. This reduces overall effectiveness, as females are more likely to remain in the population and continue to reproduce. Despite these limitations, cage trapping may still be useful in specific contexts on the Tiwi Islands, such as targeted control near communities and waste facilities, particularly where shooting and Felixers are unsafe or risky to deploy and where cats are more habituated to human-associated resources and more susceptible to trapping.

Left: Tiwi Rangers Henry Kerinaiaua and Dom Tipiloura with a cat shot during night shooting.

Right: Tiwi Rangers setting up a Felixer Grooming Trap.



3. MONITORING TO EVALUATE MANAGEMENT (BEFORE VS AFTER CAT CONTROL PROGRAM)

MONITORING METHODS

Monitoring was undertaken to assess: (1) changes in feral cat abundance, and (2) responses of native fauna, with a focus on the Wuninga (Northern Brushtail Possum). Remote camera trapping was used as the primary monitoring method. Camera surveys were conducted over six-week deployment periods before and after the cat control program at each priority area to enable evaluation of cat control outcomes. A grid of 60–63 camera stations was deployed in each priority area (Figure 8, 9 and 10), with cameras spaced 400–600 m apart. Each grid covered an area of approximately 7 km x 3 km. This design is consistent with methods previously used to estimating feral cat density on the Tiwi Islands (Davies *et al.* 2022). Cameras were positioned across three different microhabitats: roadsides, game trails and contiguous bush or *Acacia mangium* plantation. In each grid a combination of white flash and infrared Reconyx cameras were used (approximately one-third white flash and two-thirds infrared) due to equipment availability. White flash cameras are preferred for individual identification of cats, particularly for identifying ginger cats of which there is a high proportion on the Tiwi Islands. Camera types were randomly distributed across each grid to minimise sampling bias.

Cameras were mounted horizontally at 45 cm height on trees. Vegetation was cleared within 2–2.5 m in front of, and 50 cm behind each camera to reduce false triggers and fire risk. Cameras were programmed to operate at high sensitivity, capturing 10 images per trigger in rapidfire mode with no delay between trigger events. Two lure types were used and alternated among camera stations:

- (1) a standard mammal bait (peanut butter, oats, and honey), and
- (2) cotton wool soaked in tuna oil. Lures were housed in PVC cowlings, attached to steel fence droppers and positioned approximately 2 m in front of each camera.



Within each grid, an additional four cameras were deployed in a diamond formation around a central grid camera, with cameras spaced 50 m apart. These cameras were all baited with standard mammal lure. This design follows standardised monitoring protocol for small- to medium-sized native mammals in the Northern Territory and enables comparison with existing datasets from the Tiwi Islands and mainland for focal species the Wuninga.

Initially, the project aimed to implement feral cat control in the Aliu peninsula, where baseline Wuninga density had been established through intensive live-trapping surveys in 2022 and 2023, and to repeat these live-trapping following cat control. However, access to this area was subsequently restricted (Closed Country), and an alternative area was selected in discussion with the relevant clan group. As a result, the monitoring approach was revised to rely solely on remote camera trapping to assess both feral cat abundance and native fauna responses.

LOCATIONS OF REMOTE CAMERA GRID

A grid of 60–63 camera stations was deployed in each priority area with cameras spaced 400–600 m apart. Each grid covered an area of approximately 7 km x 3 km.

FIGURE 8: Rangini priority area.



FIGURE 9: Taracumbi Three Ways priority area.

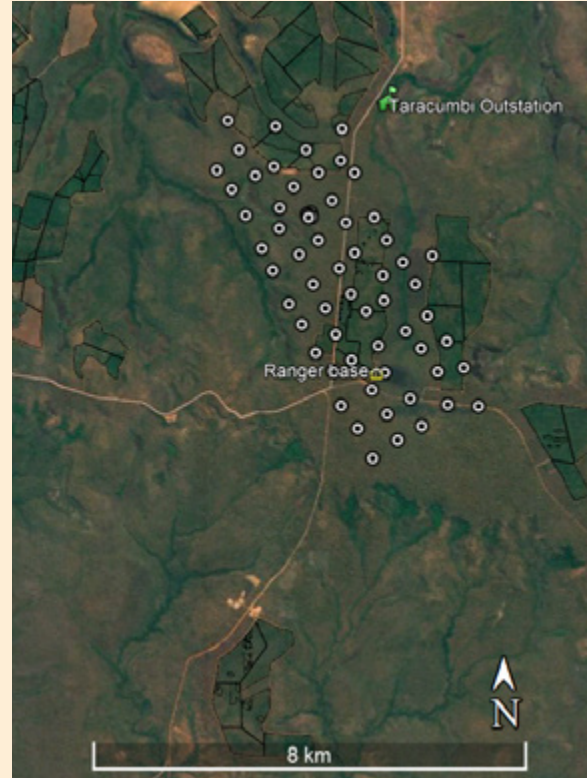
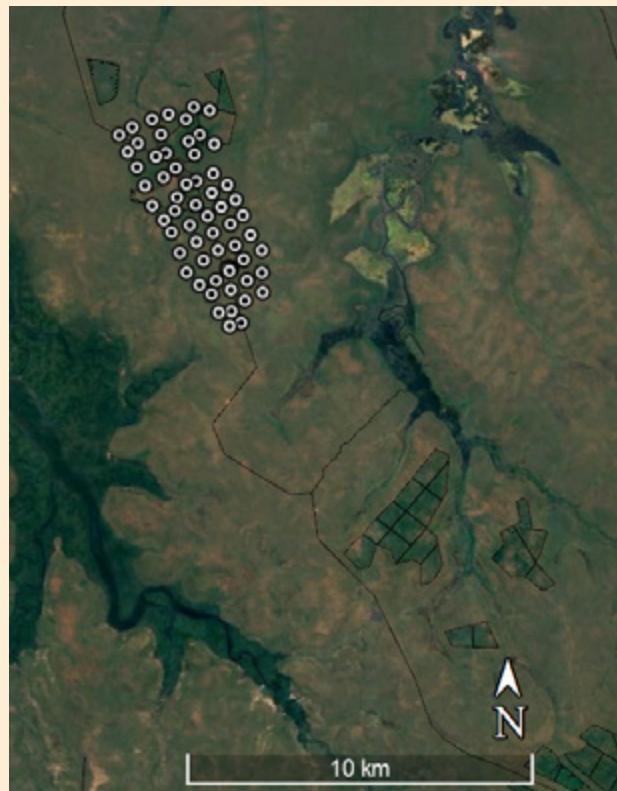


FIGURE 10: Andranangoo priority area.



● Camera



The camera grids were deployed and retrieved by Tiwi Rangers, casually employed Traditional Owners, ranger coordinators, project officer and contract shooters. For the grid located in the Andranangoo priority area, an on-Country camp was conducted annually to support deployment and retrieval activities. Following retrieval, images were downloaded from memory cards and stored on external solid-state drives (SSDs), organised into folders by year and site. Images were then processed using a semi-automated workflow implemented in *AddaxAI* (<https://addaxdatascience.com/addaxai/>), which integrates Microsoft's MegaDetector object-detection model. MegaDetector is a deep learning AI model trained to identify broad object classes (animals, humans, and vehicles) in camera-trap images, enabling rapid filtering of large image datasets. The output file generated from AddaxAI was subsequently viewed in the program 'Timelapse' (<https://timelapse.ucalgary.ca/>), where images classified as empty (i.e. false triggers) were separated from those images containing animals. Images containing animal detections were then manually reviewed and identified to species in Timelapse by Women Rangers and the project officer.

In total, 1.97 million images were generated from the camera grids, of which 351,000 contained animal detections.

Traditional Owners setting up a camera trap at the Rangini camera grid in July 2024.



RESPONSE METRICS AND ANALYTICAL APPROACH

To assess the response of feral cat populations to 12 months of sustained cat control, and the corresponding response of Wuninga, we analysed detections recorded on camera grids before and after cat control in each priority area.

DETECTION RATES (ACTIVITY INDICES)

As a descriptive measure, we calculated activity indices for cats and Wuninga. These were expressed as the mean number of nightly detections per 100 trap nights, which standardises for differences in survey effort among camera stations and between survey periods, including cases where some cameras failed before the end of the deployment period. Activity indices are commonly used in camera-trap studies as a measure of relative activity or relative abundance.

NAÏVE OCCUPANCY

In addition to activity indices, we calculated naïve occupancy, defined as the proportion of camera stations in a grid at which a species was detected in survey period. This metric was also calculated for additional threatened species detected on the camera grids. Naïve occupancy provides a simple measure of how widely a species is distributed across the priority area and complements detection rate data by indicating changes in local site use.

MINIMUM NUMBER OF INDIVIDUALS (KNOWN TO BE ALIVE)

The unique coat patterns (pelage) of feral cats allow individual identification from camera trap images. This approach has been widely used in studies of feral cats to estimate population density using spatially explicit capture–recapture (SECR) models, rather than relying solely on indices of relative abundance or activity. However, cats with entirely black coats are difficult to distinguish at the individual level unless distinctive markings (e.g. white patches) are visible.

Due to the high proportion of feral cats with black coats detected on camera grids in this project, it was not possible to reliably apply standard secr models to estimate cat density within the scope of this project. Further work is required to address this following the methods outlined in (McHugh *et al.* 2025) for incorporating black cats and other unidentifiable individuals into a Bayesian framework for estimating cat density.

As an alternative, we estimated the minimum number of individuals known to be alive within each grid during the before and after survey periods, based on uniquely identifiable cats. This provided an additional index of abundance to compare with activity indices derived from camera detections. While activity indices reflect detections of any individual (and therefore overall activity), counts of known individuals represent the minimum number of unique cats present. Comparing these two measures allowed us to assess whether trends in camera detections were consistent with changes in the number of individual cats.

Where possible, individual identification also enabled matching of cats detected on baseline camera grids with individuals subsequently removed through shooting, cage trapping, or Felixer Grooming Traps, as well as comparison with individuals detected in post-control camera surveys. However, matching success varied among priority areas and was limited in some cases by image quality, particularly for Felixer detections.

STATISTICAL ANALYSIS

To test whether observed changes in detection rates between surveys were statistically meaningful, we applied generalised linear mixed-effects models (GLMMs). The response variable was the number of camera nights with a detection relative to the number of camera nights without a detection at each camera station, modelled as a binomial error distribution. Models were assessed for overdispersion and zero inflation. This approach inherently accounts for differences in survey effort among camera stations and allows detection probability to be modelled while accounting for variation in environmental and survey design factors.

Fixed effects considered during model development included:

- survey period (before vs after cat control),
- priority area,
- camera placement (roads, game trails, or contiguous bush/plantation),
- lure type (standard mammal bait vs tuna oil), and
- flash type

Camera station (“site”) was included as a random effect to account for repeated observations at the same camera station. An information-theoretic approach (AIC) was used to guide selection of fixed effects for inclusion in the final models. Based on this process, camera placement was retained as a covariate in the final models, while other variables (e.g. lure type and flash type) were excluded where they did not improve model fit. Final models included survey period, priority area, and their interaction (year $\times$ priority area), allowing us to test whether changes in detection probability differed among locations following the cat control program.

Predicted nightly detection probabilities were derived from the final models and plotted for interpretation. Estimated marginal means (EMMs) were used to generate predicted detection probabilities for each survey period within each location and to test pairwise contrasts between years. This enabled direct evaluation of whether detection probability changed significantly following cat control.

To visualise these changes, odds ratio plots were produced. Odds ratios compared detection probability in 2025 (post-control) relative to 2024 (pre-control). Values less than 1 indicate that cat detection probability was lower in 2025 compared to 2024 (i.e. declined following control), whereas values greater than 1 indicate higher detection probability after control. Confidence intervals that do not overlap 1 indicate a statistically significant change.

MONITORING RESULTS

FERAL CATS

Mean detection rates ranged from approximately 0.3–0.9 detections per 100 camera-nights. Detection rates declined between 2024 (pre-control) and 2025 (post-control) at Rangini and Andranangoo, with a smaller decline observed at Taracumbi. The largest reduction occurred at Rangini, where mean detections approximately halved between survey periods. However, variability among camera stations was high, as reflected by overlapping standard error bars (Figure 11).

Counts of individual cats showed a similar pattern to activity indices, with fewer individuals recorded in 2025 compared to 2024 at Rangini and Andranangoo, and relatively smaller changes at Taracumbi (Figure 17). This consistency between activity indices and counts of known individuals suggests that reductions in detections were likely driven by changes in true cat abundance. Naïve occupancy (proportion of camera stations with detections) also declined between survey periods at Rangini and Andranangoo, indicating a reduction in the spatial distribution of cats across these grids (Figure 12). At Taracumbi, naïve occupancy declined only slightly.

Modelled nightly detection probability was generally low across all locations (<0.4% per camera-night). Detection probability declined significantly between 2024 and 2025 at Rangini (odds ratio = 2.92, $p = 0.011$), indicating a reduction in cat activity following control (Figure 13 and 14). In contrast, no statistically significant changes were detected at Andranangoo ($p = 0.50$) or Taracumbi ($p = 0.60$), although detection probabilities were slightly lower in 2025 at both locations.

Camera placement had a strong influence on detection probability, with cats detected more frequently on roads and trails than in off-road bush habitats. Detection rates were approximately five times higher on roads and three times higher on trails compared to bush camera stations. Flash type and lure type had negligible effects on detections probability of cats. Overall, results indicate a clear reduction in cat activity at Rangini, with weaker and more variable responses at Taracumbi and Andranangoo. The uneven response among locations suggests that the effectiveness of control varied spatially, potentially reflecting differences in initial cat density, removal effort, or immigration from surrounding areas.

IDENTIFIED CATS AND THEIR SURVIVAL BETWEEN BASELINE AND AFTER CAT CONTROL SURVEYS

At Rangini, six individual cats were identified on the baseline camera grid. Of these, five were removed during control efforts (four by night shooting and one by a Felixer). These individuals were readily matched using coat patterns from camera images, Felixer photographs, and flank images of shot cats taken by the shooting team. Of the three individuals detected on the post-control camera grid, one was likely to be a previously recorded individual (although identification was uncertain due to its black coat), while the remaining two were clearly new individuals.

At Taracumbi, it was less clear how many cats detected on the baseline camera grid were removed during the control program. This uncertainty was largely due to difficulties in confidently identifying individuals from camera trap images. A high proportion of cats in this area were ginger or black, both of which are challenging to distinguish at the individual level. In particular, ginger cats are difficult to differentiate in infrared (black-and-white) images, where coat patterns are often not visible. Identification was further complicated by the large number of cats removed using Felixer Grooming Traps. The cameras in Felixer units produce relatively low-resolution images, limiting the ability to distinguish individual coat patterns—especially for ginger cats, although tabby individuals could usually be identified.

MONITORING RESULTS FERAL CAT

FIGURE 11. Feral cat activity indices (number of nightly detections per 100 camera nights).

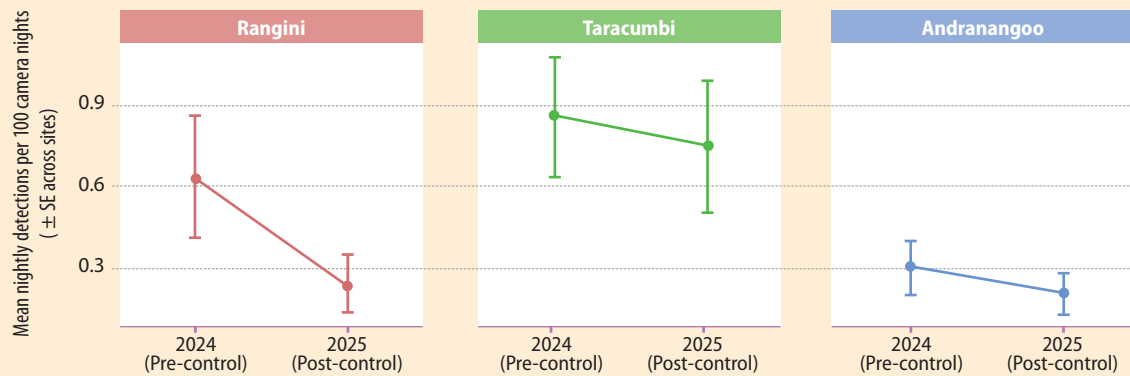


FIGURE 12. Feral cat naïve occupancy (proportion of camera stations where cats were detected on a grid).

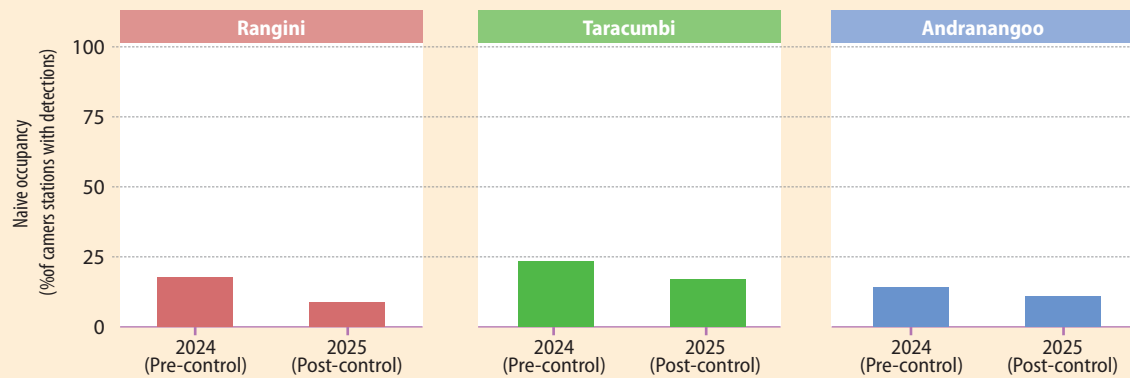


FIGURE 13. Feral cat predicted detection probability from GLMM with 95% confidence intervals.

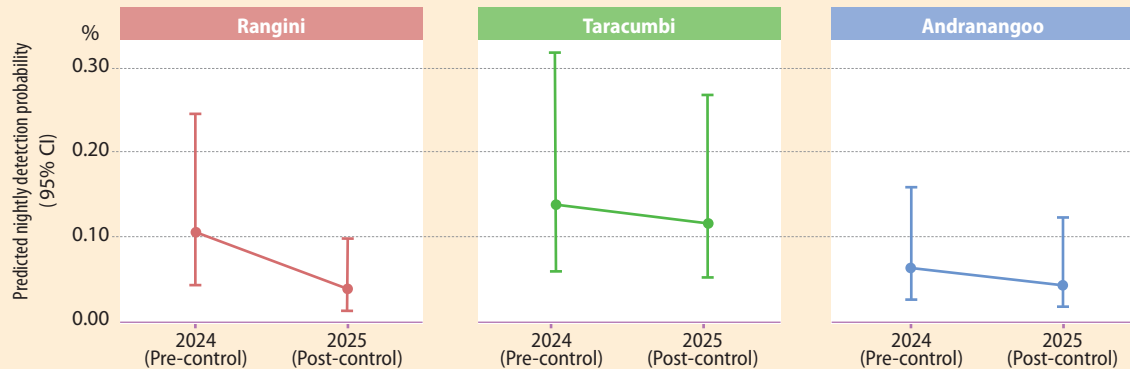
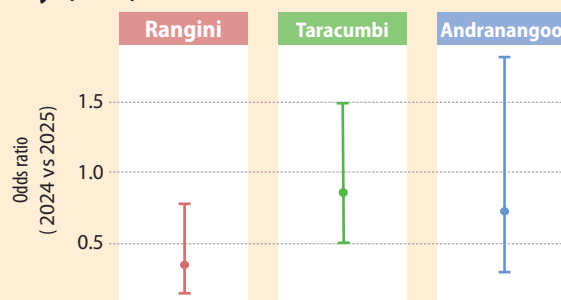


FIGURE 14. Relative change in cat detection probability between after cat control surveys (2025) and baseline surveys (2024).



Error bars are 95% confidence intervals.
If error bar entirely below 1 strong evidence of decrease

TABLE 3. Feral cat detection probability odds ratios and p-value.

	Rangini	Taracumbi	Andranangoo
2024 detection probability	0.003	0.004	0.002
2025 detection probability	0.001	0.003	0.001
Odds ratio (2024 vs 2025)	2.92	1.16	1.37
p-value	0.0106	0.597	0.497

SPATIAL VISUALISATION OF CAT DETECTIONS PER 100 CAMERA NIGHTS

FIGURE 15. Rangini camera grid.

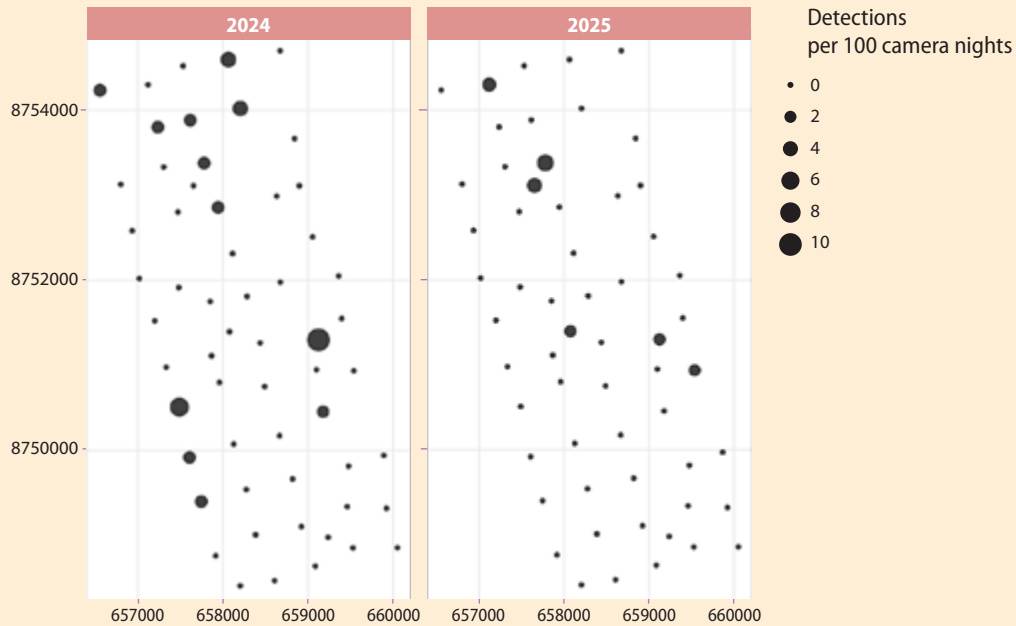


FIGURE 16. Taracumbi Three Ways camera grid.

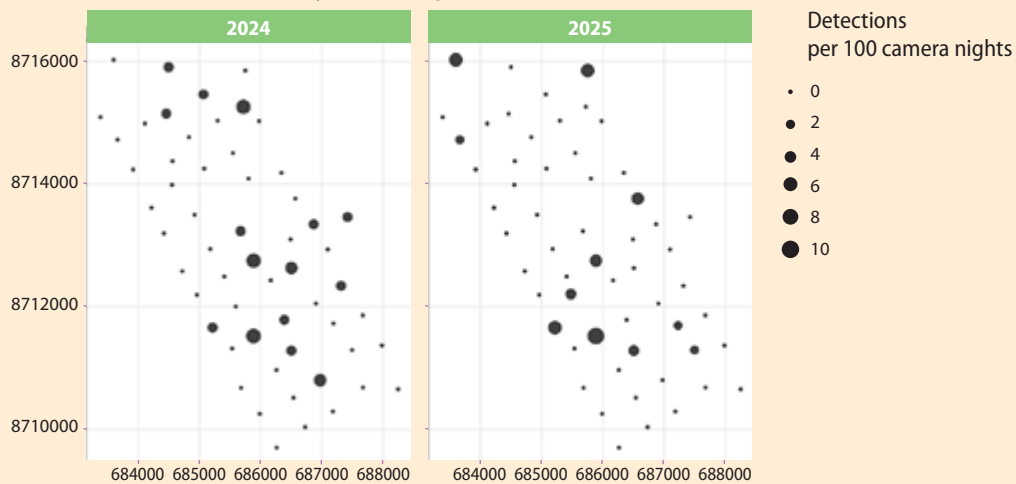
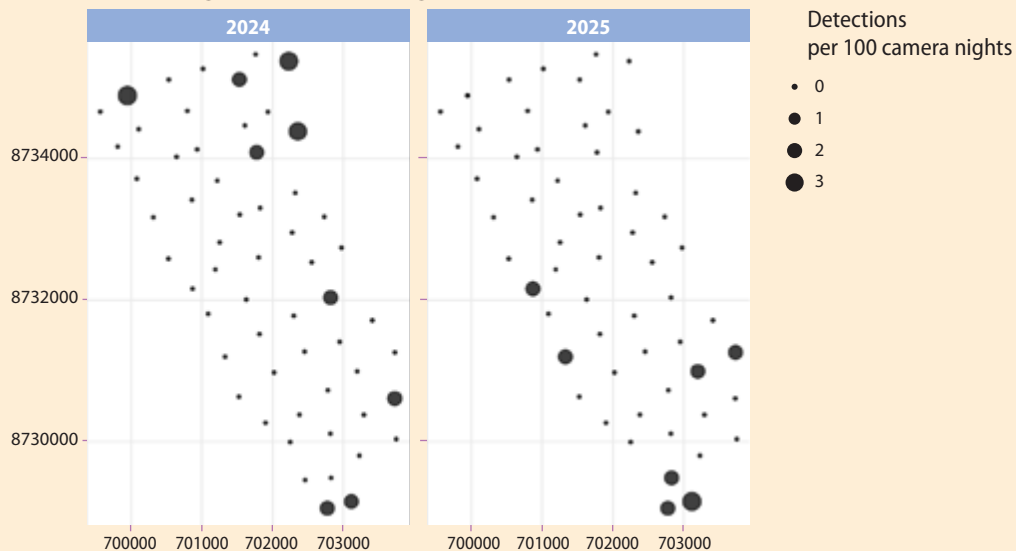


FIGURE 17. Andranangoo Goose camera grid.

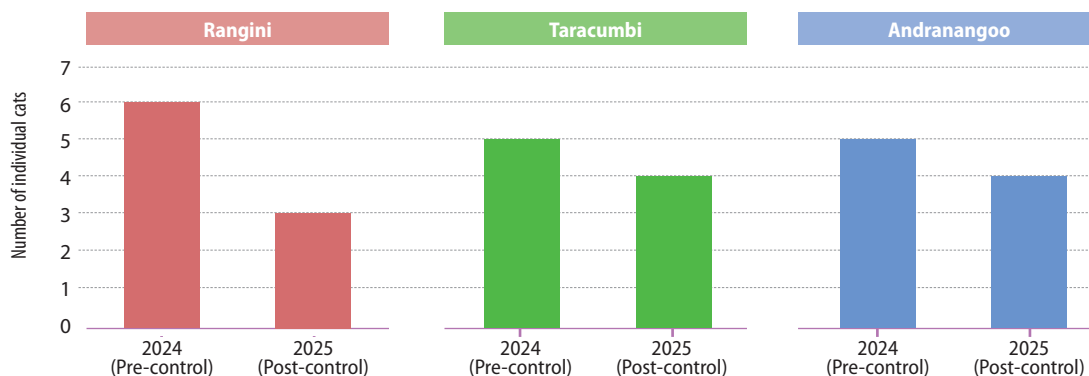


Based on baseline camera data, we estimated that at least five individual cats were present on the grid (two ginger, two black, and one tabby). The tabby individual was confirmed to have been removed by a Felixer on 30 July 2024. Substantial cat removal occurred within the first six months of the program in this area. At two Felixer locations within this priority area, a total of seven ginger, one black, and two tabby cats were targeted by Felixers between June-December 2024. In addition, two ginger and one tortoiseshell cat were removed through shooting at locations where individuals were likely to have home ranges overlapping the camera grid. One Felixer unit was deployed continuously at the same location within the camera grid for 12 consecutive months and recorded repeated cat detections, firing approximately every 6 weeks. In total, this unit fired at seven cats over this period, indicating ongoing immigration of cats into the area following removal of resident individuals.

During the post-control camera survey in Taracumbi, no individuals could be confidently matched to those detected during the baseline survey. Although identification uncertainty limits definitive conclusions, we hypothesise that most, if not all of the four cats detected on the camera grid post-control period were new individuals. The high rate of removals in the first six months, combined with continued removals thereafter, suggests both high immigration rates and that the initial camera grid likely underestimated cat density, as some individuals may not have been detected on cameras at all. Overall, multiple lines of evidence indicate that cat immigration rates in the Taracumbi priority area are likely high.

At Andranangoo, five individual cats were identified from the baseline camera grid (two black, one ginger, and two tabbies). There is some uncertainty in this estimate, as differences in body size and shape in camera images of black cats suggest there may have been up to six individuals, although this could not be confirmed. Of the individuals identified during the baseline survey, the ginger cat was confidently removed via cage trapping, and the two black cats were likely removed using Felixer Grooming Traps (based on locations of detections). During the post-control camera survey, four individual cats were detected (one black, one ginger, and two tabbies). The two tabby individuals were confidently identified as the same individuals detected during the baseline survey. The ginger cat was identified as a new individual, while the black cat could not be confidently classified as either a retained or new individual. Notably, one very large black male cat was detected during the baseline survey but was not detected again in subsequent camera surveys or recorded as removed by any control method. There was also a record of a large, uniquely patterned tabby cat that was not detected on the baseline camera grid but was recorded shortly afterward on a road-based surveillance camera. This individual was subsequently removed by a Felixer. This observation highlights that camera grids are likely to detect only a proportion of resident cats during a six-week survey period. In this priority area, shooting within the camera grid was difficult due to limited road access and dense vegetation either side of tracks. Most cats removed through shooting were located further south and were unlikely to have home ranges overlapping with the camera grid.

FIGURE 18. Number of unique individual cats on baseline camera surveys (2024) and after control period surveys (2025)



- Top:** Comparison of infrared and white flash images of a ginger cat taken using a Reconyx camera, highlighting differences in coat pattern contrast relevant to individual identification.
- Below:** Example image from a Felixer camera showing low resolution and washed-out colouring, illustrating the difficulty of identifying individual ginger cats.



- Top left and right:** Images of a tabby cat identified on the baseline camera grid at Rangini, and a subsequent image of the same individual following removal, showing matching flank patterning.
- Below left and right:** Images of a ginger cat captured on a Reconyx camera trap and subsequently following removal using a cage trap at Andranangoo.



WUNINGA (NORTHERN BRUSHTAIL POSSUM)

Activity indices indicated declines in possum detections between 2024 (pre-control) and 2025 (post-control) across all priority areas, with the largest decline observed at Andranangoo and smaller declines at Rangini. No change was detected at Taracumbi (Figure 19).

Naïve occupancy showed contrasting patterns among locations. Naïve occupancy declined at Rangini, but increased at Andranangoo and more substantially at Taracumbi (Figure 20). This indicates that, despite declines or limited changes in detection rates, possums remained widely distributed across these areas.

Modelled nightly detection probability varied strongly among locations and between survey periods. Possum detection probability was highest at Andranangoo and lowest at Rangini, with intermediate values at Taracumbi (Figure 21 and 22). Detection probability declined significantly between 2024 and 2025 at Andranangoo (13.2% vs 9.6%; odds ratio = 1.44, $p < 0.001$). A smaller but statistically significant decline was also observed at Rangini (1.2% vs 0.8%; odds ratio = 1.47, $p = 0.041$), while no significant change was detected at Taracumbi ($p = 0.55$).

Camera configuration variables had little influence on possum detection probability. Lure type and flash type showed no detectable effects, and camera placement had a weak and non-significant influence, with slightly lower detections on roads and trails compared to bush habitats.

Wuninga (Northern Brushtail Possum).



MONITORING RESULTS WUNINGA (NORTHERN BRUSHTAIL POSSUM)

FIGURE 19. Wuninga activity indices (number of nightly detections per 100 camera nights).

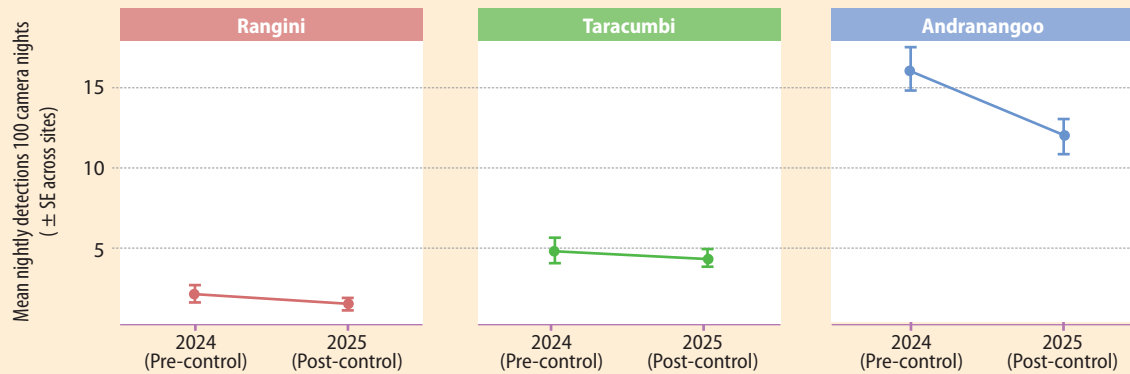


FIGURE 20. Wuninga naïve occupancy (proportion of camera stations where cats were detected on a grid).

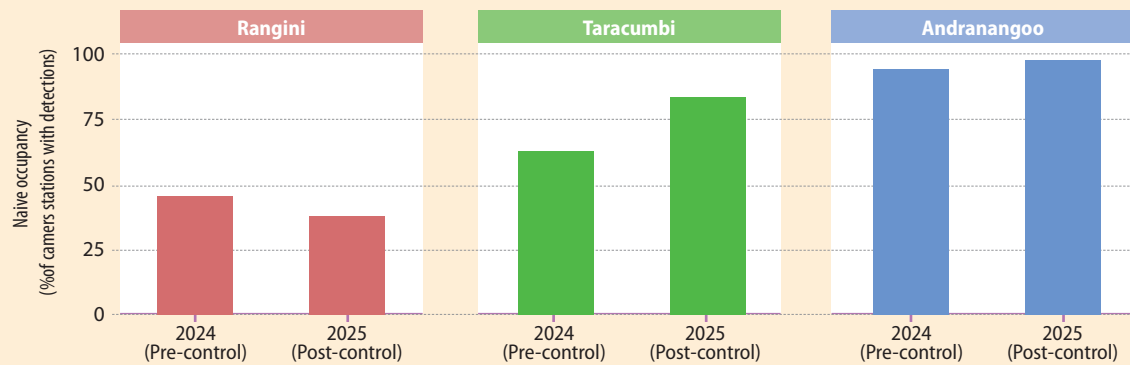


FIGURE 21. Wuninga predicted detection probability from GLMM with 95% confidence intervals.

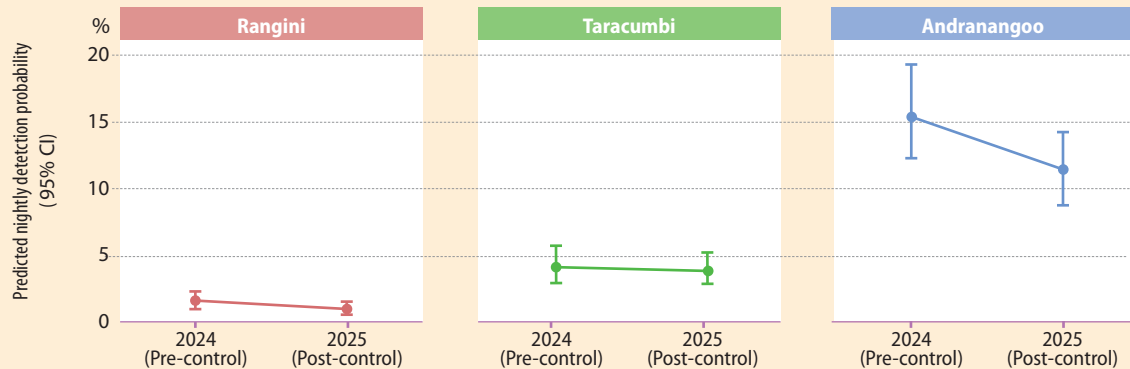
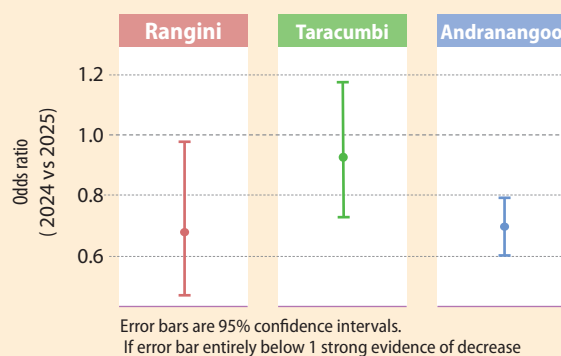


FIGURE 22. Relative change in Wuninga detection probability between after cat control surveys (2025) and baseline surveys (2024).



OTHER NATIVE SPECIES INCLUDING THREATENED SPECIES

Naïve occupancy was also examined for other notable and threatened species detected on the camera grids (Figure 23).

Northern Brown Bandicoots were more widely detected at Andranangoo and Rangini than at Taracumbi. Black-footed Tree-rats were most widely detected at Rangini, with lower occupancy at Taracumbi and very limited detections at Andranangoo. At Andranangoo, Black-footed Tree-rats were detected at five stations, and only during the 2025 post-control monitoring period. Brush-tailed Rabbit-rats were rarely detected, at two stations in Rangini, with a single station at Andranangoo, and were absent from Taracumbi. This low level of detection is consistent with previous research indicating that this species is undergoing marked declines and local extinctions on Melville Island, with feral cat predation identified as a key proximate threat. Northern Brush-tailed Phascogales, a cryptic and rarely detected species, were recorded at Taracumbi and Andranangoo, but not at Rangini. Naïve occupancy was highest at Taracumbi (mean across two surveys 12%). This species has not been detected on mainland Northern Territory monitoring programs for approximately 20 years, highlighting the significance of these records. Dingoes were commonly detected across all priority areas, with naïve occupancy averaging around 50% of camera stations.

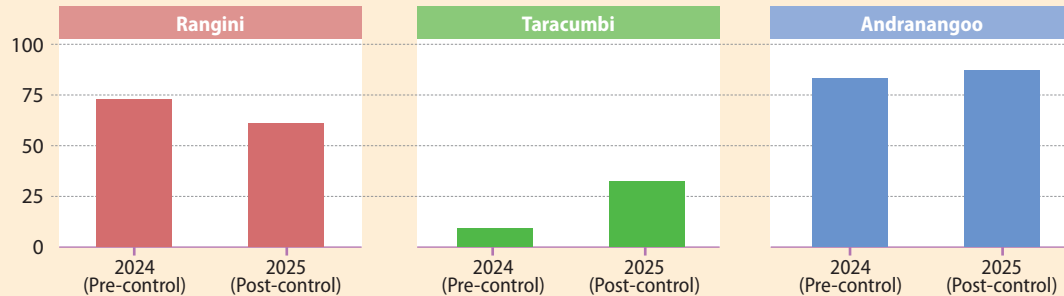
Images from camera grids of Northern Brush-tailed Phascogale, Black-footed Tree-rat, Northern Brown Bandicoot, Northern Brushtail Possum, Dingo and Brush-tailed Rabbit-rat.



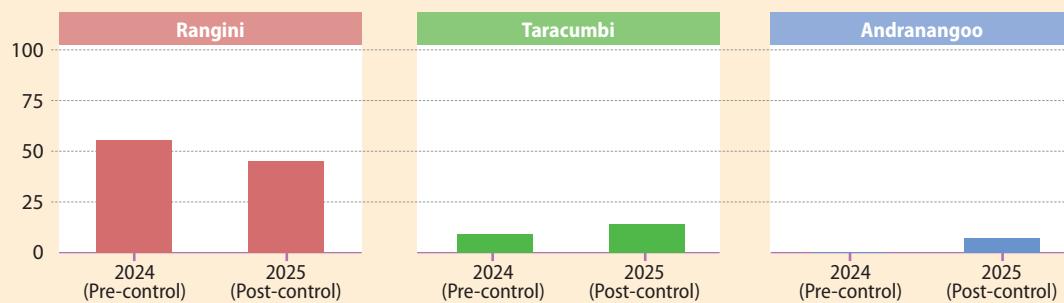
MONITORING OTHER NATIVE SPECIES INCLUDING THREATENED SPECIES

FIGURE 23. Naïve occupancy (Percent of camera stations where species was detected on a grid) in 2024 and 2025 for five native species: northern brown bandicoot, black-footed tree-rat, brush-tailed rabbit-rat, northern phascogale and dingo.

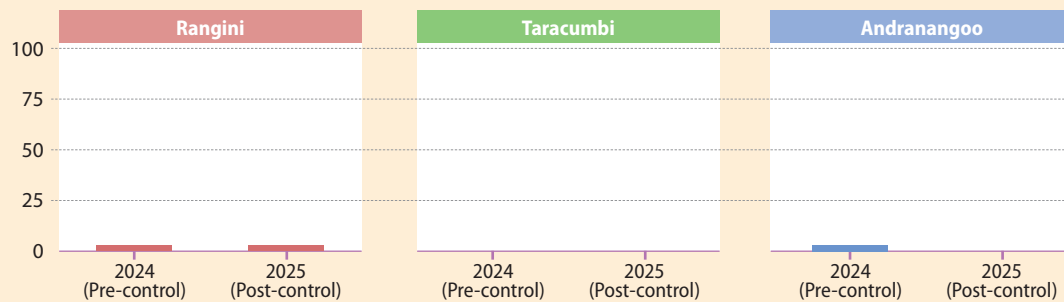
KIPOPI/MARINYI – NORTHERN BROWN BANDICOOT



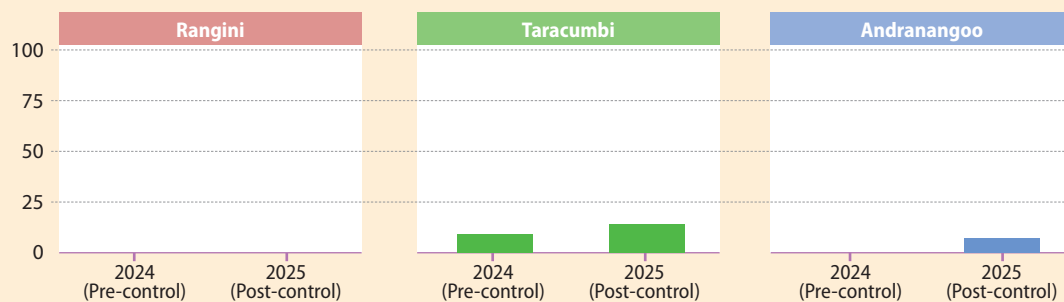
YINTAMUNGA – BLACK-FOOTED TREE-RAT



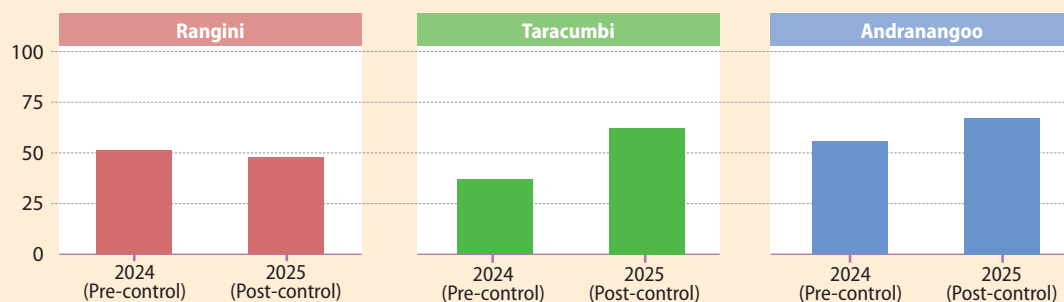
RATAKA – BRUSH-TAILED RABBIT-RAT



PWUMPUNGA – NORTHERN PHASCOGALE



TAYAMINI – DINGO



CAT DIET ANALYSIS – PRELIMINARY RESULTS

A total of 51 cats were dissected during this project for stomach content analysis. These individuals were culled through the night shooting program, cage trapping, or opportunistic shooting by community members. An additional 26 cats, collected prior to the commencement of this project, were also included in the analysis. These results are preliminary. In several cases, fur samples and other unidentified material were retained for later identification using hair cross-section analysis or expert verification. As a result, the figures presented here likely underestimate the true frequency and diversity of prey items in cat diets.

Across all samples, eight species of native mammals, seven species of reptiles, and three species of birds were identified (Table 4). Mammals were the most common prey group, occurring in 60% of stomachs, followed by reptiles (47%), insects (22%), birds (10%), and frogs (2.5%). The most frequently detected mammal was the savanna glider (known as Rijinga in Tiwi), present in 22% of stomachs. Northern brushtail possums were confidently identified in three stomachs; however, this is likely an underestimate, as additional samples containing unidentified fur are yet to be analysed. Among reptiles, skinks (including *Glaphyromorphus darwiniensis* and *Eremiascincus douglasi*) were the most commonly recorded group, occurring in 32% of samples.

TABLE 4. PRELIMINARY LIST OF SPECIES DETECTED IN FERAL CAT STOMACHS.

Group	Species	Common name	Tiwi name
mammal	<i>Isoodon macrourus</i>	Northern Brown Bandicoot	Kipopi/Marinyi
mammal	<i>Melomys burtoni</i>	Grassland Melomys	Wuruwataka
mammal	<i>Mesembriomys gouldii melvillensis</i>	Black-footed Tree-rat	Yintamunga
mammal	<i>Petaurus ariel</i>	Savanna Glider	Rijinga
mammal	<i>Pseudomys delicatulus</i>	Delicate Mouse	Wuruwataka
mammal	<i>Rattus tunneyi</i>	Pale Field-rat	Wuruwataka
mammal	<i>Sminthopsis butleri</i>	Butler's Dunnart	
mammal	<i>Trichosurus vulpecula arnhemensis</i>	Northern Brushtail Possum	Wuninga
reptile	<i>Brachyurophis roperi</i>	Northern Shovel-nosed Snake	
reptile	<i>Chlamydosaurus kingii</i>	Frilled Lizard	Kurupurrani
reptile	<i>Eremiascincus douglasi</i>	Orange-sided Bar-lipped Skink	
reptile	<i>Glaphyromorphus darwiniensis</i>	Top End Mulch-skink	
reptile	<i>Heteronotia binoei</i>	Bynoe's Gecko	Wulikarani
reptile	<i>Oedura rhombifer</i>	Zigzag Velvet Gecko	Wulikarani
reptile	<i>Varanus</i> sp.	Sand Goanna	Muwaka
reptile	<i>Varanus gouldii</i>	sand goanna	Muwani
bird	<i>Geopelia humeralis</i>	Bar-shouldered Dove	Mwapura
bird	<i>Trichoglossus rubritorquis</i>	Red-collared Lorikeet	Mirririji
bird	<i>Turnix</i> sp.	Button-quail	Puwarriir

- Top left:** Contract ecologist/shooter Pat Hodgens and Tiw Ranger Stanley Tipungwuti taking a DNA sample from a shot cat.
- Top right:** Project Officer Ritsuko Maeda and Tiwi Ranger M. Austral dissecting a cat.
- Below left:** Partially digested Savanna Glider from inside cat stomach.
- Below right:** Partially digested Northern Brown Bandicoot from inside cat stomach.



DISCUSSION OF MONITORING RESULTS

Feral cat activity declined most strongly at Rangini, where detection rates, naïve occupancy, and modelled detection probability all decreased following control, indicating that management was most effective at this site. In contrast, reductions at Taracumbi and Andranangoo were weaker and more variable, with no statistically significant changes in cat detection probability. These differences likely reflect variation in initial cat density, landscape connectivity, immigration rates, and control effectiveness among sites.

At Rangini, the strong response is likely due to relatively lower cat densities across the peninsula and hence reduced immigration potential, consistent with its more isolated, peninsula landscape context. This suggests that peninsula systems, with good access for effective cat control activities may provide greater return on investment, as removed individuals are less rapidly replaced. In contrast, continued detections and repeated Felixer firing events at Taracumbi indicate high immigration rates, limiting the effectiveness of control despite sustained effort and substantial cat removals. Achieving cat population reduction at this site would likely require greater intensity and broader-scale control, which may not be operationally feasible. At Andranangoo, despite also being located on a peninsula, overall control effectiveness was limited here as proven by number of individuals still alive from the baseline grid. Restricted track networks and dense vegetation reduced shooting effectiveness within the camera grids, results in most removals occurring outside the monitored area. Cage trapping and Felixer deployment within the grid also had relatively low success, and while increased effort may have improved outcomes, this was not feasible within project constraints.

Responses of Wuninga (Northern Brushtail Possum) were more complex. Detection probability declined at both Rangini and Andranangoo; however, naïve occupancy patterns indicate that possums remained widespread across all areas. At Andranangoo and Taracumbi, stable or increasing naïve occupancy suggests that possum populations persisted despite changes in activity indices. At Rangini, both activity indices and naïve occupancy declined, although this site also had the lowest baseline detection rates and may therefore be more sensitive to small changes in detections.

Responses of native species to predator control are unlikely to be immediate, and given the short timeframe of this study, rapid increases were not expected. Patterns observed for other threatened species highlight strong spatial variation in native fauna communities across the Tiwi Islands. For example, Black-footed Tree-rats were most common at Rangini, suggesting potential competition with possums for den sites in this area. These patterns reinforce that variation in native species abundance among sites is likely driven by a combination of habitat, competition, and historical factors, in addition to predation pressure.

Overall, cat control was most effective at Rangini, highlighting the value of targeting more isolated landscapes such as peninsulas. These results emphasise the need for a flexible, site-specific approach to feral cat control.

4. COMMUNITY ENGAGEMENT, INVOLVEMENT AND EDUCATION

A comprehensive and culturally appropriate community engagement campaign was undertaken to support the implementation and awareness of this project. Engagement focused on working through Tiwi governance structures, involving Traditional Owners in on-ground project activities through casual employment, and maintaining regular communication with the broader Tiwi community about project activities and outcomes. The campaign aimed to raise awareness across the Tiwi community about the impacts of feral cats on biodiversity and the importance of feral cat control.

Concern about the impacts of feral cats on wildlife has already been formally documented through the Tiwi Islands Indigenous Protected Area (IPA) planning process. The IPA Planning Committee, which included 24 representatives from the eight Tiwi landowner groups or clan groups, identified feral cats as a 'Top Threat' to biodiversity and is included in the Tiwi Islands IPA Plan of Management (2023–2033). This project represents an important first step towards implementing the feral cat control actions identified by Traditional Owners through this planning process.

Project update delivered at the Wulirankuwu clan group meeting in May 2025.



ENGAGEMENT WITH TIWI DECISION-MAKING GROUPS

Project planning and implementation were guided through key Tiwi decision-making forums. Prior to project commencement, the Tiwi Rangers and Project Officer attended all Melville Island Tiwi clan group meetings and Tiwi Land Council meeting to introduce the project and seek guidance on appropriate locations for management activities.

These meetings were important forums for outlining the feral cat control methods being used and the associated monitoring program methods. Discussions were held with clan groups to identify suitable areas for the work and select the three priority management areas, while ensuring culturally sensitive sites such as Pukumani (closed Country) were avoided.

Throughout the project, updates were regularly provided at clan group meetings and at one meeting of the newly established Tiwi Islands IPA Committee. Project updates were also shared with clan groups on neighbouring Bathurst Island to increase awareness of the project and ensure those Traditional Owners remained informed about project activities.

At the completion of the project, a summary of activities and results was presented at a Tiwi Land Council meeting, attended by representatives from each of the eight Tiwi clan groups. Project outcomes were also shared and discussed with the Tiwi Rangers team and the Tiwi Resources Directors.

These forums provided important opportunities to inform leadership groups about the project, seek feedback, and ensure activities aligned with community priorities and cultural protocols. In total, project staff attended 24 Clan Group meetings, one IPA Committee meeting, two Tiwi Land Council meetings, and one Tiwi Resources Directors meeting.

Project introduction and planning with the Tiwi Land Council in May 2024.



- Top:** Project update delivered at the Yimpinari clan group meeting in May 2025.
- Middle top:** Project update delivered at the Wurankuwu clan group meeting in May 2025.
- Middle below:** Project summary and results presented at the Tiwi Land Council meeting in March 2026.
- Below:** Project summary and results debrief at the Tiwi Rangers and Tiwi Resources Board meeting in April 2026.



TRADITIONAL OWNER/CULTURAL ADVISOR EMPLOYMENT AND PARTICIPATION

Traditional Owners were actively involved in project activities through casual employment with the Tiwi Rangers. Both men and women from three different clan groups participated in the project. This involvement supported local employment, skills development, and opportunities for Traditional Owners to access and spend time on Country, while participating directly in the management of feral cats on their land. In some cases, participation in this project also created pathways into ranger employment, with two casually-employed Traditional Owners later recruited as permanent part time Tiwi Rangers.

Traditional Owners worked alongside Tiwi Rangers, contract shooters, and the project officer, assisting with several project activities including:

- Deploying camera traps in monitoring grids across the three priority management areas before and after the feral cat control campaign.
- Checking, downloading data from, and maintaining Felixer Grooming Traps in the field under the supervision of trained staff.
- Participating as part of the spotlighting teams conducting feral cat control operations.

Overall, 195 person-days of employment were provided across 38 individual Traditional Owners from the three clan groups which aligned with the three project priority areas.

Pat Hodgens and Traditional Owners setting up a cage trap for cats near Taracumbi in September 2024.



- Top left:** Contract ecologist/shooter Pat Hodgens and young Traditional Owners Lenny and Harry Desantis spotlighting for cats in September 2024.
- Top right:** Tiwi Ranger, Stanley Tipungwuti, and Traditional Owner, Romanis Bush, setting up a camera trap at Andranangoo/Goose Creek in June 2024.
- Centre left:** Traditional Owners retrieving a camera trap from the Andranangoo/Goose Creek camera grid in August 2024.
- Centre right:** Traditional Owners setting up a camera trap at the Rangini camera grid in July 2024.
- Below:** Camping trip to Goose Creek Top Landing to set up a camera monitoring grid in June 2024.



SCHOOL AND YOUTH ENGAGEMENT

Engaging young people was considered an important component of the project, as they represent the next generation of Tiwi decision-makers. Education and youth engagement activities aimed to raise awareness about the impacts of feral cats on Tiwi wildlife and the importance of feral and pet cat control.

Feral cat awareness sessions were delivered by Tiwi Rangers at local schools across all three Tiwi communities. Five schools participated in these sessions: Xavier Catholic College and Murrupurtiyanuwu Catholic Primary School in Wurrumiyanga, Milikapiti School, Pularumpi School in Pirlangimpi, and Tiwi College. Delivering these sessions through Tiwi Rangers was particularly important, as it enabled students to learn directly from local Rangers working to protect wildlife on their Country.

In 2024, a Junior Ranger program was established at Tiwi College on Melville Island and in 2025 extended to include Xavier Catholic College on Bathurst Island. The project supported 10 days of work experience for the Tiwi Junior Rangers, providing students with opportunities to participate in hands-on field activities and learn about feral cat control and wildlife monitoring.

Activities included:

- Dissecting feral cat stomachs to identify prey species and understand which animals are at risk
- Learning how to ethically set cage traps for cats
- Learning about Felixer Grooming Traps and how they work
- Deploying remote cameras for feral cat and wildlife monitoring
- Reviewing camera trap images and learning about the different animals found on their Country

In total, 10 Junior Ranger work experience days were undertaken during the project, with group sizes ranging from two to 30 students.

Tiwi Rangers delivering a feral cat and pig awareness presentation at Xavier Catholic College in Wurrumiyanga in November 2025.



- Top left:** Tiwi Rangers delivering feral cat and pig awareness presentations at Pularumpi School in Pirlangimpi in November 2025.
- Top right:** Tiwi Ranger Stanley Tipungwuti teaching Junior Rangers from Tiwi College to set cage traps for feral cats in August 2024.
- Centre left:** Tiwi Ranger Stanley Tipungwuti teaching Junior Rangers from Tiwi College how to check images from remote camera and Felixer Grooming Traps in August 2024.
- Centre right:** Contract shooter Jason Turl teaching Junior Rangers from Tiwi College how to dissect feral cats in November 2024.
- Below:** Tiwi Rangers Stanley Tipungwuti and M. Austral teaching Junior Rangers from Tiwi College how to set up remote cameras to monitor feral cats and wildlife in November 2024.

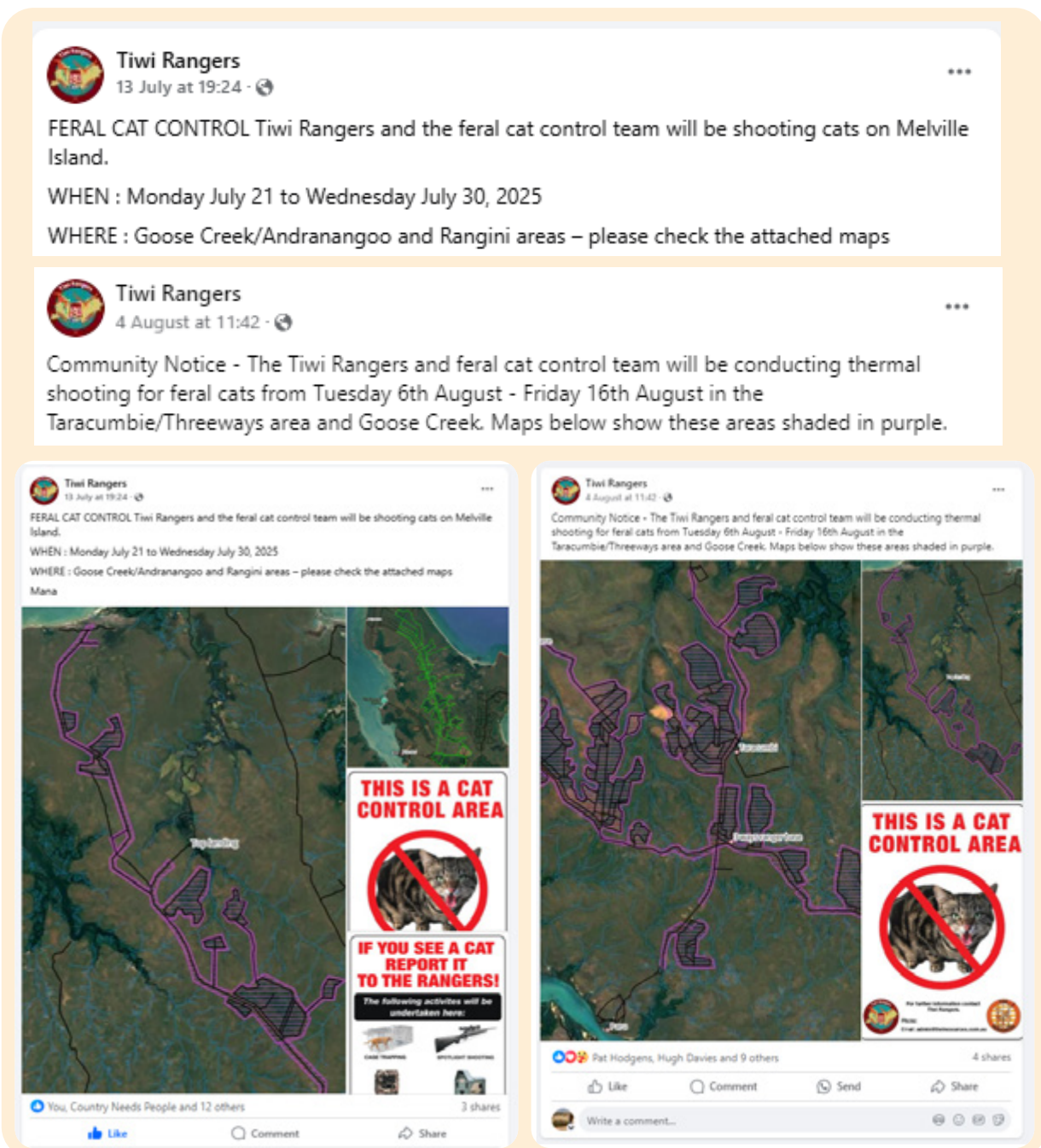


COMMUNITY COMMUNICATIONS

Information about the project and its activities was shared with the broader community through a range of communication channels. Plain English communication materials appropriate for Tiwi audiences were developed and used to ensure information about the project was accessible. Project updates were regularly published in the Tiwi newspaper *Pupuni Ngirramini* and shared on the Tiwi Rangers Facebook page. For example, these updates included:

- Notices informing the community of when and where night shooting activities were occurring
- Summaries of prey species identified in feral cat stomachs
- Updates highlighting Junior Rangers assisting with project activities

Examples of Facebook posts on the Tiwi Ranger Page.



Tiwi Rangers
14 November 2025 · 🌐

Kill those cats! Get rid of them, get rid of the pigs, put them down - we need pupuni murakupuni! That was the message from elders John Wilson, Tina Puatjimi and Alice Munkara this week at Xavier Catholic College and Murrupurtyanuwu Catholic Primary School. Rangers have been talking to students all at communities about pujiakatui and feral pigs. Feral cats are killing Tiwi animals and pigs are trashing wetland country and eating everything - including turtle eggs and hatchlings. They are also host to bad diseases.

Derek Puruntatameri explained to students at Milkapiti School and Pularumpi School that pigs and cats are a big problem for the Tiwis. 'That's why we're telling you mob. You're our future, you need to know about these problems because you'll be the ones looking after country. On the mainland, they've lost many animals, they don't even have names for them anymore, but here our animals are safer, we've got to look after them. That's our job. It's everyone's responsibility to look after country, to look after our animals.'

Stanley Tipungwuti told the students that although you can't easily see cats in the bush, but they're out there. They have a big effect on our native wildlife; they're the wild ones. They don't belong here on the Tiwi Islands, while people brought them here, they're all over now.'

Rangers want to spread the message about feral cats and have made t-shirts for kids with the slogan: 'Xarluwu pujiakatui kapi murakupuni - No cats killing Tiwi wildlife!' Their work has been supported by a Saving Native Species grant, which is part of the Australian Government's Threatened Species Action Plan [Threatened Species Commissioner](#)

Xavier Catholic College Wurrumiyanga



Tiwi Rangers
29 July at 14:30 · 🌐

Feral cats are killing Tiwi threatened species! A Butler's Dunnart (*Sminthopsis butleri*) has been found in the stomach of a 5.4kg ginger male cat. This is the first documented evidence of a feral cat preying on this small - and special - carnivorous marsupial. Butler's Dunnarts are listed as Vulnerable in the NT and Nationally and are only found on the Tiwi Islands.

Tiwi Rangers have been working with predator ecologists and professional shooters from [Terrain Ecology](#) over the past year to humanely remove feral cats from high conservation areas on Melville Island. Apart from the Butler's Dunnart, the big ginger tom had also eaten a Northern Brown Bandicoot (*Isodon macrourus*) and two Delicate Mice (*Pseudomys delicatulus*).

This project is supported by a Saving Native Species grant, which is part of the Australian Government's Threatened Species Action Plan, and will continue until the end of 2025. [Threatened Species Commissioner](#)



Hugh Davies, Eridani Mulder and 43 others · 1 comment · 13 shares

Like · Comment · Share

Tiwi Rangers
14 December 2024 · 🌐

Feral cats are killing Tiwi wildlife. Rangers are regularly finding Rjinga (Savanna Gliders) in the stomach contents of feral cats, along with other animals including lizards, snakes, birds and other small mammals.

This important project, which is protecting Wuninga (Northern Brush-tailed Possums) and other species by managing feral cats on Melville Island, is funded by the [Department of Climate Change, Energy, the Environment and Water](#) Saving Native Species Program, and will continue till end of 2025.

[Threatened Species Commissioner](#)



Terrain Ecology is with **Tiwi Rangers**.
13 December 2024 · 🌐

Our team has been working with the [Tiwi Rangers](#) researching the best methods to control feral cats in recent months. This last week we have removed 7 feral cats... [See more](#)

Tiwi Rangers
6 days ago · 🌐



Tiwi College
6 days ago · 🌐

Yesterday, we continued our Junior Ranger's program with the help of [Charles Darwin University](#) and [Tiwi Rangers](#) by diving into the impact of feral cats on Tiwi Island's biodiversity. The students had an action-packed day! They set traps using different types of bait, dissected cats to learn more about their diet, and checked SD cards to spot cats on camera.

One of the highlights was using an AI-powered camera that can detect cats from a distance - helping with monitoring and managing their population. It's amazing to see our students getting hands-on experience in conservation! 🐾📷

Examples of Facebook posts on the Tiwi Ranger Page.

More funding for feral cat control on Melville Island

WARNING POISON

DANGER TO HUMANS AND ANIMALS
READ LABEL AND INSTRUCTIONS AT ALL TIMES

KILLS MOSQUITOES AND OTHER PESTS
DO NOT USE ON HUMANS OR ANIMALS

For more information, call 1-800-4-A-GRASS
 EPA Reg. No. 100-100000



see any feral cats out bush
report the location to the Twei

Article in Tiwi Newspaper Pupuni Ngirramini April 2025.

Article in Tiwi Newspaper Pujikatuwi (cats) threaten Tiwi wildlife



...and with cats contributing to two-thirds of the total. In Australia, where there are 1.6 billion cats, dogs, rabbits, and birds, and 1.2 billion people.

Pujikatuwi are killing Tiwi animals

...and with cats contributing to two-thirds of the total. In Australia, where there are 1.6 billion cats, dogs, rabbits, and birds, and 1.2 billion people.



ON-GROUND AWARENESS MATERIALS

To ensure community members were aware of management activities occurring in the field, “This is a Cat Control Area” signs were placed along bush access tracks in areas where feral cat control was being undertaken. These signs alerted people to the potential presence of shooting activities, cage traps, camera traps, and Felixer Grooming Traps, helping to improve community awareness and safety as well as the legally required 1080 warning signs positioned at Felixer Grooming Traps.

Top: Project signs were erected to advise community members of cat control activities. Traditional Owner, Marie Puruntatameri (right), with a sign on her Country.

Below: Tiwi Ranger, Kahlisha Austral (right), with a 1080 warning sign. Signs were placed near all Felixer Grooming Traps.



AWARENESS MERCHANDISE

Additional awareness materials included Karluwu Pussycat (“Stop the Cats”) T-shirts, which were developed to promote the project and raise awareness of feral cat presence and impacts on wildlife. The T-shirts were created through a local collaboration to produce a Tiwi-designed and printed shirt highlighting the importance of feral cat control. The artwork was designed by Johnathan World Peace Bush, and the shirts were hand screen-printed by Jilamara artists at the art centre. The shirts were produced for Tiwi Rangers and Tiwi Resources staff, Rangers’ families, casual Traditional Owners involved in feral cat control and monitoring on Country, and Tiwi decision-makers and committee members.

Top: The collaboration with Jilamara Arts, which resulted in the production of the Karluwu Pussycat t-shirts, featured in the Tiwi Newspaper *Pupuni Ngirramini* in January 2026.

Below: Tiwi Rangers and artist Jonathan Bush wearing Karluwu Pussycat t-shirts.



RANGER EXCHANGE WITH NYANGUMARTA RANGERS

In June 2025, the Tiwi Rangers hosted five Nyangumarta Rangers and two Nyangumarta Ranger Coordinators as part of a week-long ranger exchange. The Nyangumarta Rangers are from the north-west Pilbara and south-west Kimberley regions of Western Australia.

Top: Tiwi Ranger and Nyangumarta Ranger teams after their week of working together on the Tiwi Islands in June 2025.

Below: Nyangumarta Rangers servicing cat monitoring cameras.



MEDIA AND OUTREACH

A short film documenting the project was produced by Weave Films. It highlights the importance of feral cat control in protecting native wildlife, the range of project activities undertaken and project collaboration. It includes interviews with Traditional Owners, Tiwi Rangers and project officers/ ecologists. Once completed, the film will be shared with the Tiwi community via forums such as clan group, Tiwi Land Council, Tiwi Islands IPA and Tiwi Resources Board meetings and social media. It will be a useful tool for communicating project outcomes to external stakeholders and potential future funders and partners.

TABLE 5. SUMMARY OF COMMUNITY ENGAGEMENT CAMPAIGN.

Activity	Number of days/sessions/meetings
Casual Traditional Owners/ Cultural Advisors employed	195 person-days across 38 individual people
Feral cat awareness talks by Rangers at Tiwi schools	9 presentations
Tiwi Junior Ranger work experience	10 days
Clan Group meetings	24 meetings
Tiwi Islands IPA Committee meeting	1 meeting
Tiwi Land Council meetings	2 meetings
Tiwi Resources Board meeting	1 meeting
Tiwi Newspaper <i>Pupuni Ngirramini</i> stories	5 stories
Community cat t-shirts for kids and adults	200 shirts hand printed
Film on Tiwi cat control to protect Wuninga	8 minute documentary



Tiwi Rangers teaching Junior Rangers from Tiwi College how to prepare a site for FeliXer Grooming Traps in May 2025.

CONCLUSION

This project demonstrated that targeted feral cat control on the Tiwi Islands can reduce cat abundance under certain conditions, with the strongest outcome achieved across an isolated peninsula (Rangini, northwest Melville Island). Though how long such reductions may last, or their associated ecological benefits remain unclear. Across the project, a substantial number of cats were removed using a combination of control methods, generating important insights into the effectiveness, limitations, and cost-efficiency of each approach.

The project delivered significant social and capacity-building benefits. It provided employment, training, and on-ground experience for Tiwi Rangers and Traditional Owners, supporting skill development in monitoring, cat control, and ecological data collection. The program also strengthened community engagement and reinforced local leadership in land management.

Results demonstrate that no single method is sufficient for sustained feral cat control. Instead effective management requires a broad, integrated approach that combines multiple complementary methods, is responsive to local conditions, and is refined and sustained over time. Variation in outcomes among priority areas highlights the importance of tailoring control strategies to landscape context, accessibility, and cat population dynamics.

Most importantly, this project has established a strong foundation for ongoing, Tiwi-led cat control. It has built the knowledge base, operational experience, and community support necessary to continue and expand strategic cat control efforts into the future.



LIST OF DATASETS GENERATED FROM THIS PROJECT

- Camera grid deployment details 2024 and 2025 (locations, survey length, camera placement, lure type etc)
- Camera grid species detections 2024 and 2025 surveys
- Shooting effort (start time, end time, number of people, weather etc)
- Shooting track logs
- Cats seen, shot and retrieved on night shooting transects
- Felixer data (locations, deployment lengths, firing events)
- Cost of cat methods comparison
- Felixer camera detections (log of all species that passed in front of Felixers taken from FMS)
- Cage trapping effort and captures
- Cat dissection database (DNA sample number, stomach contents, morphometrics)
- Community engagement evidence

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