

# ABSTRACTS BOOK

## Feral Cat Symposium 2

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# 30 YEARS OF FERAL CAT MANAGEMENT IN WA

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We have designed and developed a number of techniques to control feral cats. Thirty years ago, a reintroduction program of Burrowing Bettongs (*Bettongia lesueur*) and Golden Bandicoots (*Isoodon auratus*) to the Gibson Desert, failed due to feral cat predation. We were then asked to develop a bait that could be deployed aurally over broad-scale areas. The bait needed to be attractive to feral cats; capable of carrying a toxin and relatively easily and cheaply manufactured. This work resulted in development of the *Eradicat* bait, registered in Western Australia in 2015. The bait has since been submitted for national registration. We have also developed trapping techniques to sample the target population and provide a thorough understanding of all aspects of cat biology. We have also examined methods to monitor control efficacy.

This presentation includes feral cat control on the mainland and off-shore islands, work that has made a significant contribution to conservation in Western Australia and elsewhere. Consequently, DBCA is recognised both nationally and internationally in the development of control strategies for feral cats.

## EFFECTIVE MANAGEMENT NEEDS TO BE MORE THAN JUST NUMBERS, YOU NEED A PLAN

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The understanding of the impacts of cats on our biodiversity and agriculture is well known and the national conversation around the need to manage, control and/or eradicate feral cats is gaining momentum, but what people can do about the problem is often still challenging to navigate. Legislation is not easy to follow, available and effective tools vary depending on where and who you are, up to date information on best practice management can be hard to find and what about domestic or stray cats? As the National Feral Cat and Fox Management Coordinator the most common question I get from landholders, land managers and community and biosecurity groups is I/we have cats, what can we do about them? This is where planning is important. What is the issue you are wanting to manage for? Who else around you has the issue, can you coordinate management? What are the objectives of your management? Do you know what tools are available to you in your state? How will you know if it is working? Effective feral cat management needs to be more than just the number of cats removed.

## THE IMPORTANCE OF FLEXIBILITY AND PERSISTENCE IN FERAL CAT MANAGEMENT

**Georgina Anderson <sup>1</sup>, AMANDA BOURNE <sup>1</sup>, Sophia Callander <sup>1</sup>, Phoebe Dickins <sup>1</sup>, Clint McGee <sup>1</sup>, Bryony Palmer <sup>1</sup>, Raquel Parker <sup>1</sup>, Phil Scully <sup>1</sup> & Georgia Volck <sup>1</sup>**

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Feral cats are among the most significant threats to fauna conservation in Western Australia (WA). Managing the impacts of feral cats on threatened fauna requires flexibility, pragmatism and persistence. Currently, the Australian Wildlife Conservancy manages four wildlife sanctuaries in South West WA: Faure Island in Shark Bay, Mt Gibson on the eastern edge of the wheatbelt and Karakamia and Paruna in the Perth Hills. We will discuss the range of different approaches to feral cat management employed at these sanctuaries, including exclusion fencing, isolation, trapping and Eradicat baiting. Approaches are adapted to suit each property and the species we are aiming to conserve. Briefly, at Karakamia, Faure Island and the 7,832 ha fenced safe haven at Mt Gibson, we have eradicated all feral predators, including both cats and foxes. Ongoing management focuses on maintaining feral predator-free status by preventing incursions. These sanctuaries support large, stable populations of threatened mammals vulnerable to cat predation, including Burrowing and Brush-tailed Bettongs, Banded Hare Wallabies and Shark Bay Bandicoots. At Paruna, an unfenced 1,912 ha property bordered by two national parks, daily cat trapping has been sustained for nearly a decade, supporting small but stable and diverse native mammal populations in the presence of relatively low feral cat densities. Across the larger unfenced part of the Mt Gibson property, we are trialling ground-based and aerial Eradicat baiting and reintroducing Brush-tailed Possums and Western

Quolls, which are known to persist in the presence of cats. Eradication of cats from fenced or otherwise isolated areas is extremely effective for native fauna conservation. However, achieving conservation benefits at larger scales will require identifying tolerable thresholds of cat activity and maintaining cat activity below these thresholds through the sustained application of new and existing management tools.

## INTENSIVE ADOPTION AS A MANAGEMENT STRATEGY FOR UNOWNED, URBAN CATS

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Globally, managing unowned urban cats is an ethical and community concern because these cats suffer poor welfare, are a risk to public health, cause nuisance, and endanger urban wildlife. While management options are often presented as a choice between culling (unpopular with many citizens) or trap–neuter–return (TNR) (cats are desexed and returned to site with supplementary feeding), for 25 years the Lonely Miaow (Inc.) charity in Auckland, New Zealand, has used intensive adoption or trap–assess–resolve (TAR). As of 2019, of 14,611 unowned cats trapped, 64.2% were adopted, 22.2% were euthanized if unsocialised or in grave ill-health, 5.7% were neutered and returned to the site, and 7.9% had other outcomes such as transfer to other shelters. Adoption rates increased over time, exceeding 80.0% in 2018 and 2019. The cost of processing each cat from capture to adoption rose from NZ \$58 in 1999 to NZ \$234 by 2017. The welfare of these cats when trapped was severely compromised. Approximately 22% required veterinary treatment; common ailments included respiratory infections, ringworm, dental problems, and trauma. Consistently, > 50% of cats were kittens ( < 5 years old. TAR avoids euthanasia where possible, while still removing cats. Its effectiveness would be enhanced by fewer abandonments of owned cats and kittens, fitting within integrated strategies for controlling unowned cats involving community education. Cat adoptions improve cat welfare and, with appropriate husbandry such as containment, should alleviate concerns about nuisances, public health, and attacks on wildlife or the cats themselves, benefiting the community and the cats. This case study is relevant to Australian cities where pressure to use TNR persists because there is no perceived alternative to culling.

# TESTING THE USE OF FELIXER- GROOMING TRAPS TO CONTROL CATS IN THE JARRAH FOREST OF WESTERN AUSTRALIA.

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Feral cats are one of the most significant threats to native terrestrial vertebrate species in Australia and have proven to be extremely difficult to control in the southern jarrah forests of Western Australia. We aimed to determine the most effective methods for deploying Felixer-grooming traps in the Upper Warren area where ten threatened or priority species are threatened by predation by feral cats. We deployed eight Felixer traps over three, 14,000-19,000 ha sites for 2-3 months each. The Felixer traps have been shown to be safe to use in the presence of native fauna in the area. Cat individuals and activity before, during and after the deployment of the traps was monitored by an array of at least 50 remote cameras. Preliminary results indicate that feral cat activity in these areas reduced by 49%, 31% and 78% at the three trials sites, relative to comparative control sites. The reduction of feral cat activity at the treatment sites were sustained for up to five months after the Felixer traps were removed. To further inform deployment we analysed the relationship between landscape variables and feral cat activity and found that topographic wetness index and track type were the best predictors of feral cat activity. Ongoing trials are testing the optimisation of Felixer deployment based on these landscape variables and the use of 'standard targeting mode' rather than 'conservative targeting mode' to improve efficiency. Early indications are that these traps may be able to remove more than 60% of the cat individuals present at a meso-spatial scale, and therefore be an important and complementary tool to deliver improved conservation outcomes for threatened species vulnerable to cat and fox predation in the southern jarrah forest.

## KEEPING OUR NYARLGOO (BILBIES) SAFE

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Bawoorrooga is located in the central Kimberley and is a well-known stronghold for Nyarlgoo on Gooniyandi country. The ongoing traditional burning practices for this desert landscape have allowed for protection from severe fires and have created an abundant food source for this threatened species. The Gooniyandi rangers and Traditional Owner Claude Carter, have been working with researchers to monitor the local Nyarlgoo population and understand their threats, how fire impacts Nyarlgoo resources and how we can best manage them. Camera traps, 2ha plots and numerous sightings have made it evident that feral cats are frequent in the area and pose a threat to this significant Nyarlgoo population. With support from the Kimberley Land Council and Environs Kimberley the Gooniyandi Rangers are exploring options for feral cat management to keep the Bawoorrooga Nyarlgoo safe.

## THE ECOLOGY OF FERAL CATS ON THE SOUTH COAST OF WESTERN AUSTRALIA

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Effective management of feral cats requires an understanding of their ecological attributes, which are reflective of their ability to exploit most habitats across Australia. On the south coast of Western Australia there has been limited work on both diet and spatial ecology of feral cats, and this gap in knowledge has been the subject of a recent PhD study. Building on work to protect the critically endangered Kyloring (*Pezoporus flaviventris*) and other threatened fauna, conventional stomach content analysis has provided insights into the pressure and impact of cats on native species across four conservation landscapes on the south coast. Stable isotopes have been used as a novel method to further explore the dietary niche of feral cats and investigate longer term dietary preferences in important south coast conservation reserves. Aspects of the spatial ecology of feral cats including preferences in resource selection and landscape use, have been modelled using data collected from radio collared cats across the region. These findings can be used to inform control options, and are already being used to guide feral cat management in the Fitz-Stirling landscape. Combined with an improved understanding of the relationship between prey availability and environmental productivity the work completed through this project has potential to underpin and increase efficiencies in the management of feral cats in south coast ecosystems.

# IMMUNOCONTRACEPTIVES FOR FERAL CAT CONTROL IN AUSTRALIA

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The burden of feral cats on Australian wildlife is unparalleled with an estimated 75 million native animals killed every day. The control of feral cats in Australia since the 1960s is estimated to be approximately \$19 billion-the costliest of any invasive species. Virally vectored immunocontraception (VVIC) has been proposed as a means of controlling feral cats in Australia for some time. This technique involves integration of host (cat) reproductive genes into the genome of a viral vector. Upon infecting a host, the virus produces the reproductive proteins in infected cells. The host can then direct an adaptive immune response towards the virally-produced reproductive proteins that then targets the natural activity of these reproductive proteins, resulting in reduced reproductive potential. Virally vectored immunocontraception may have several benefits over traditional management tools relating to improved efficacy, species specificity and welfare outcomes.

Over the last three years, we have constructed three candidate immunocontraceptives using feline herpesvirus 1 (FHV-1) as a vector to express feline reproductive proteins. We hypothesise these strains may suppress the activity of critical reproductive processes in the cat, rendering the cat partial or fully sterile. Development of this technique may a means of widespread feral cat control and bring relief to the many threatened species currently facing extinction as a result of feral cat activity.

Over the last three years, we have constructed three candidate immunocontraceptives using feline herpesvirus 1 (FHV-1) as a vector to express feline reproductive proteins. We hypothesise these strains may suppress the activity of critical reproductive processes in the cat, rendering the cat partial or fully sterile. Development of this technique may offer provide widespread feral cat control and bring relief to the many threatened species currently facing extinction as a result of feral cat activity.

## MEETING IN THE MIDDLE: MANAGING STRAY CAT POPULATIONS IN AUSTRALIA

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In Australia, we define cats according to where they live and how dependent they are on us, with management techniques developed for three discrete categories; cats are either beloved family pets, wild feral pests or unwanted stray animals. While feral and pet cats are legislated for, and managed separately, with funding from a variety of sources, stray cats currently fall into a grey zone in the legislation for animal welfare and/or control in Australian states and territories. Any management or control that is carried out is typically sporadic, ill funded and often covert, carried out by those individuals or organisations most motivated to 'save' stray cats - either by placing them in human homes, euthanasing them, or by feeding them and allowing them to live on the streets unmolested. Using both published and unpublished local data on cat health, demographics, diet and roaming we wish to demonstrate how neglecting control of stray cat populations could adversely affect the management of both pet and feral cats in Australia.

## ASSESSMENT OF FERAL CATS IN DRYANDRA, WESTERN AUSTRALIA

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Dryandra Woodland National Park ('Dryandra') features the largest area of native vegetation on the western edge of the Western Australian wheatbelt, and hosts a range of native fauna rarely seen in other parts of southwest Western Australia. However, the 17 isolated bush blocks making up Dryandra are separated by cleared farmlands, where predation risk due to feral cats (and red foxes) is likely to limit survival of dispersing animals. Between 2015 and 2021, a dedicated group of 13 community hunters removed 162 feral cats from farmlands surrounding Dryandra and nearby town of Narrogin. Diet analysis for these cats revealed consumption of foods associated with both natural and farming environments. Of the 92 cats whose guts contained food, 399 vertebrates were consumed, dominated by introduced house mice. Native fauna also featured, including one cat which had eaten 13 animals: a gecko, elapid snake, passerine bird and 10 stubble quail chicks. Scavenging of farm animal carrion and human refuse was also common. Demographics and overall health of the cats were also analysed. Compared with other cats sampled across southwest WA, these cats were in superb physical condition and had an average age of 2.5 years. They also showed substantial reproductive

potential with 50% of females reproductively active at time of sampling; 17% of females were pregnant (including a 16.5-year-old) with 54 kittens between them. Predation by feral cats threatens persistence of native species around Dryandra, and proposed wildlife corridors connecting bush blocks would benefit fauna by facilitating movement and therefore increasing genetic diversity. However, our data indicate that feral cats around Dryandra are thriving, and there is a need for their ongoing management if wildlife corridors across this landscape are to be a success. The study highlights the value of feral cat control carried out by a dedicated group of local professionals.

## FERAL CAT RESPONSES TO FIRE: NEW FIELD DATA AND A REVIEW

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Fire may exacerbate the impacts of feral cats by making it easier for them to hunt. There is some evidence from northern Australia that cats favour severe fire scars with high prey abundance and will travel long distances to recently burnt areas. Whether these patterns extend to arid and temperate Australia remains unclear. We reviewed all available studies of cat responses to fire and found a range of positive (e.g., increased activity in burnt areas), negative (decreased activity) and neutral responses. Positive responses were more likely if study areas had been burnt more recently (measured in months). We will also present new field data on cat responses to planned burns and wildfires in arid and temperate ecosystems. Our results suggest there may be a critical time period immediately post-fire when prey are most vulnerable to elevated impacts of predators, and within which management interventions are likely to be most impactful.

# A COMPARISON OF TOXIC BAITES FOR FERAL CAT AND FOX CONTROL IN SOUTHWEST WESTERN AUSTRALIA: AN ADAPTIVE MANAGEMENT EXPERIMENT TESTING THE EFFECTIVENESS OF CAT MANAGEMENT IN COMPLEX MANAGEMENT AREAS.

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The Western Shield program has been managing invasive foxes in Western Australia since the early 1990's and since the early 2000's for feral cats. Currently Probait® is the most common toxic bait deployed, but it only targets foxes. Eradecat®, a more recently developed bait, is designed to target cats but its effectiveness in the environments of southwest Western Australia is still being trialled. Here we evaluate the effectiveness of Probait® and Eradecat® for reducing fox and feral cat activity in south-west Western Australia using Nambung National Park/Southern Beekeepers Nature Reserve and Lesueur National Parks as experimental sites. Although Eradecat has proved effective at managing feral cats in some environments, we found that Eradecat® had limited effectiveness at reducing feral cat activity on the northern sandplains of the Swan Coastal Plain, Western Australia. Our model predicted that the maximum potential reductions in cat activity 50-days post baiting would likely not exceed about 25%, but compensatory mechanisms are likely to reduce this potential effect to nil. We also found that Probait® could reduce fox activity by about 40-80%, but that Eradecat® was substantially more effective. Baiting with Eradecat® was found to suppress fox activity by up to 99% and maintain low activity for several months. These results suggest that the addition of Eradecat® baits in the Western Shield predator control program could reduce invasive fox activity within fauna recovery sites and likely lead to improved outcomes for native species; however, feral cat management in complex management areas will require additional effort to improve conservation outcomes.

# THE CURIOUS CAT: FERAL CAT ACTIVITY AT ARTIFICIAL REFUGES

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**Context:** Studies of artificial refuges tend to report the use by target species; few studies report the use by non-target species. Artificial refuges can act as ecological traps, increasing the abundance of prey species in an area while also attracting potential predators to the area. Predators like feral cats (*Felis catus*) target hunting around areas of greater prey activity and often revisit refuges, which decreases their search time and increases hunting efficiency.

**Aims:** This study investigated feral cat activity at artificial refuges on a Bush Heritage Australia property.

**Methods:** Experimental sites are paired in cleared (crop-impacted sites) and intact sites at Eurardy reserve and replicated four times. Sites consisted of 4 plots, with three artificial refuge types (corrugated iron, pallets or fence posts) and a control plot. Feral cats are monitored using camera traps with cat interactions categorised into three behaviours: walking past, interacting (such as scratching, playing, sitting) and investigating. (sniffing and entering).

**Results:** Preliminary findings show cat activity is significantly different between refuge types, with pallets showing more interacting and investigating behaviours. There was no difference in activity between treatment sites.

**Conclusions:** Early analysis shows that cats are attracted to artificial refuges, which could therefore act as an ecological trap for prey species. Treatment (cleared or intact) had no influence on cat behaviours at artificial refuges, despite cats benefitting from open, disturbed landscapes.

# FELIXER FERAL CAT GROOMING TRAP TRIALS IN THE PRESENCE OF NORTHERN QUOLLS IN THE PILBARA REGION OF WESTERN AUSTRALIA

**Harriet Davie <sup>1</sup>, TODD EDWARDS <sup>2</sup>, Corrin Everitt <sup>3</sup>, Lesley Gibson <sup>3</sup>, Jared Nelson <sup>2</sup> & John Read <sup>4</sup>**

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Feral cats are a major threat to much of Australia's native fauna and their effective management is a high priority for DBCA. Fortescue supported trials of three Felixer feral cat grooming traps at its Ironbridge Project site in the Pilbara – a collaboration with DBCA, Roy Hill and Thylation. Felixers were tested in conservative toxic mode in the presence of the endangered northern quoll and a variety of other species to test for target specificity, from 29 January to 22 October 2021. This trial follows a testing phase in non-toxic mode conducted between April 2018 and January 2020 (Dunlop et al, 2019).

During the trial a total of 504 photo trigger events were recorded, with all fired doses correctly identified as feral cats. A total of six feral cats were fired on by the units, with a further eight feral cats photographed but not fired on. In some instances, cats passed the units multiple times and did not trigger the units, likely in part due to devices being in conservative targeting mode. It is estimated that nine individual feral cats, based on their appearance, were present in the study area during the trial, indicating the success rate for target recognition and dose application was 67%.

Northern quolls were recorded by the Felixer twice during the trial, from 504 photo trigger events, and correctly identified as non-targets. The results are consistent with the preceding photo-only trial, which recorded 226 northern quoll from 1332 trigger events, with no northern quoll identified as targets.

The results provide early evidence that the Felixer units are safe to use for targeted control of feral cats in the presence of endangered northern quolls in the Pilbara. Further trials are planned to validate these results.

# CHALLENGES IN ACHIEVING HUMANE AND EFFECTIVE FERAL CAT CONTROL

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Achieving community support for feral cat control is critical for ongoing funding and successful program outcomes. To achieve this, animal welfare concerns must be adequately addressed. It is difficult to strike the right balance between cost effectiveness and humaneness. However, applying humane and ethical principles can be beneficial. For example, it is imperative to commit to using the most humane methods, to continue to refine existing methods to improve welfare outcomes and to ensure humane assessments are undertaken for new methods. For example, cage traps should be used in preference to leg hold traps, and for any traps mental as well as physical impacts must be minimized with the latter relying on rapid response to when a cat is captured. In addition, attention must be given to the killing method used for trapped cats, as this can be a key risk especially when landholders or community groups participate in trapping programs – feral cats continue to be drowned despite this not being acceptable nor legal. The continued reliance on 1080 remains a challenge in terms of humaneness and public expectations – more work is needed to replace this toxin. The relative humaneness matrix is a valuable tool and any ‘new’ methods must be assessed and included in the matrix – this relates particularly to the use of blunt trauma and to carbon monoxide gas to kill cage trapped feral cats. With legal aspects, nationally agreed codes of practice for feral cat management should be regulated under animal welfare legislation in all jurisdictions to help ensure minimal standards of animal welfare are met. In terms of the future, non-lethal methods may offer more humane options with both gene drive technology and Feline Herpesvirus as a vector for immunocontraceptives, showing some potential, but welfare impacts must be fully evaluated.

## AI AND AUTOMATION FOR CAT MONITORING

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Predation by feral cats is one of the most significant threats to priority threatened species in Australia. Threatened species across Australia will therefore benefit from affordable smart technology that can improve introduced predator control. We have been working on developing a fully automated smart camera that is configured specifically to identify and respond to the presence of feral cats in real time. The camera also includes silent electronics to reduce the risk of scaring the cats, and novel methods for illuminating its field of view. Our prototype camera can incorporate on-board 'edge' artificial intelligence (AI) species detection. Edge AI differs from cloud-based AI algorithms in that species identification can be processed locally, on the device, and therefore the camera can make independent decisions in a matter of milliseconds without having to connect to the internet or cloud; this speed of response is essential for advancing an autonomous trigger that could be used to safely capture the target species. The smart camera will reduce potential non-target impacts and promises to be affordable and flexible in terms of where they can be deployed. On-board communications allow the camera to also send through notification of what it has seen, which can therefore act as an incursion alert or notification of trap activation.

## DEVELOPING PIPELINES FOR VERTEBRATE GENETIC BIOCONTROL

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Producing a genetic biocontrol such as gene drive for invasive vertebrate pests, including the feral cat, will depend on two achieving two key goals: (1) optimising the design of genetic elements necessary to achieve population suppression, and (2) developing pipelines for introducing these genetic elements into the germ line of non-laboratory-model species. For the first goal, our laboratory is currently using the zebrafish as a vertebrate model to optimise the design of a population suppression gene drive. For the second goal, we are developing a pipeline for non-model mammal species (currently fox and rabbit) that exploits induced pluripotent stem cells coupled with nuclear transfer to produce animals with targeted knock-in of very large genetic elements (as required for a gene drive). Our approach could also be applied to developing a genetic biocontrol to suppress feral cat populations.

# WHAT IS THE TEMPORAL AND SPATIAL SCALE OF IMPACTS OF A NOVEL FERAL CAT CONTROL METHOD ON CAT ACTIVITY?

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Declines and extinctions of native fauna due to habitat loss associated with native vegetation clearing and degradation are exacerbated by introduced herbivores and predators. Efforts to conserve native fauna populations are more likely to be effective if they use a range of approaches, including restoring native fauna habitat, 'bottom-up' approaches to reduce reproductive rates of invasive species (or increase reproduction of native species), and 'top-down' lethal control methods, as well as integrating control of multiple invasive species. Feral cats are particularly challenging to control, with a traditional toolbox of methods including shooting, trapping, and baiting, that vary in cost, scale, and their effects on targets and non-targets at both individual and population levels.

The innovative Felixer grooming trap is a promising addition to the toolbox for integrated pest control, but its potential for population-level impacts in open landscapes is unclear. We are investigating the temporal and spatial scale of Felixer grooming trap effects on feral cat activity, and testing whether sequentially targeting hotspots of feral cat activity can maximise impact. Felixer data is used to assess how effectively feral cats (and foxes) are targeted. Monitoring data from a network of remote cameras ~2 km apart on tracks is used to assess feral cat activity, both to identify current hotspots for deployment (especially reinvasion pathways or 'source' areas for breeding and dispersal), and to assess effects on cat activity in a Before-After Control-Impact (BACI) experimental design. Preliminary results will be presented.

# FERAL CAT IMPACTS ON A THREATENED ENDEMIC MARSUPIAL IN THE WAKE OF THE BLACK SUMMER BUSHFIRES – NGO RESPONSE TO PROTECT THE KANGAROO ISLAND DUNNART

Helen Crisp <sup>1</sup>, Heidi Groffen <sup>2</sup>, PAT HODGENS <sup>3</sup>, Doube James <sup>4</sup> & Josef Schofield <sup>1</sup>

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The 2019/2020 Black summer bushfires burnt through >97% of the known range of the Kangaroo Island dunnart *Sminthopsis aitkeni grisioventer*. Within days of the fires passing, members of the small NGO Kangaroo Island Land for Wildlife were assessing the potential impacts of the fires on the KI dunnart and other Endangered species and were re-establishing survey sites destroyed in the fires and searching desperately for any unburnt patches of bushland where the species may have found refugia.

Within days, our team discovered that the KI dunnart and several other Endangered species had survived, but so had feral cats and it soon became clear that these invasive predators were reinvading remnant patches of bushland faster than we could remove them.

This presentation will detail the three years of hard work and determination that our team and island community has put in every day since to protect our threatened species after the devastating days when the lives of all Kangaroo Islanders were changed forever in December 2019.

From initially setting cage traps with volunteers and landholders, we will detail the following key actions:

- deployment of Felixer grooming traps
- emergency construction of the Critical Refuge and then the larger 380 ha Western River Refuge in partnership with Australian Wildlife Conservancy to protect the only known persisting KI dunnart population the use of soft jaw legholds and thermal shooting
- the startlingly high rate of predation of KI dunnarts (8.8%) discovered through stomach content analysis
- refinement and deployment of Felixers equipped with AI technology

This presentation can be used as a guide as to how to respond to catastrophic stochastic events where NGO's are often best placed to respond immediately and work in partnership to combat the combined impacts on threatened species of fire and high predation rates from invasive predators.

## A CASE STUDY: IMPROVING THE EFFICIENCY OF FERAL CAT CONTROL IN ONE OF AUSTRALIA'S SPECIAL PLACES

**Simon Croft <sup>1</sup> & PAUL JENNINGS <sup>2</sup>**

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Nearly half of the habitat on Kangaroo Island in South Australia, was lost during devastating bushfires in 2019-20.

The island is inhabited by feral cats at densities 10 X higher than on mainland Australia. Impacts of feral cats preying on wildlife are magnified in post-fire landscapes, representing an urgent need to implement effective control programs.

We ran two trials of the Encounter Solutions Celium trap alert technology, which was fitted to the existing 180 trap network spanning 179 km<sup>2</sup> in winter 2022. In the first trial, 1,324 trap nights were recorded and the trap alert correctly reported 100% of triggered traps and 47 cats were captured. In the second trial, from 2,287 trap nights, 354 triggers were reported, with 33 feral cats captured. There was a 200% reduction in the number of staff and a 70% reduction in time taken to check traps per day. Vehicle use reduced from three to one and daily distance travelled declined by 43% (247.8 to 141.5 km per day). Following this successful trial the network was expanded to cover 776 km<sup>2</sup>, connecting 300 traps. In 15 weeks, the network captured 200 feral cats.

A cost-benefit analysis indicated a 36% decrease in the cost of delivering the program. Further, improved animal welfare outcomes were achieved whereby triggered traps were prioritised and checked sooner. These systems can be used by both professionals and communities interested in delivering landscape-scale introduced predator control programs efficiently.

# SETTING THE SCENE FOR FAILURE: VICTORIAN FERAL CAT LEGISLATION, SOCIAL LICENCE DIMENSIONS AND THE FRENCH ISLAND FERAL CAT ERADICATION PROJECT.

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A decade of population suppression of feral cats on French Island along with a program that supported the sterilisation of all owned cats on French Island set the scene for an invasive species eradication operation. Changes to state regulation were made to support use of some 'new' tools. Monitoring programs were established and informed eradication operational planning. A series of committee structures met regularly to discuss operational issues. The eradication operation was initiated in June 2021 and was successful in greatly reducing the feral cat population contributing to a rapid recovery in native wildlife species. Use of a critical capture tool was blocked by the project control board in July 2022. Field operations continued for a further two months before the team were stood down and dispersed.

Invasive species eradication operations are typically complex with those conducted on inhabited islands even more problematic. Social licence was the key reason cited for blocking use of capture tools. This paper will reflect on the regulatory path and diverse social licence(s) that contributed and consequences flowing from the failure of the project.

## DRYANDRA WOODLAND NATIONAL PARK LIFE AFTER FERAL CATS

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Dryandra Woodland National Park is a 28,000 ha fragmented remnant of the woodland that occurs between the jarrah forest to the west and the more arid vegetation to the east. It is surrounded by agricultural enterprises that carry out a range of farming practices. While other areas have seen a range of threatened and non-threatened fauna become locally extinct, Dryandra has maintained most species at low population densities; this has been tested by the pressure applied by feral predators and in recent times the feral cat has been a major cause of species decline.

The Department of Biodiversity, Conservation and Attractions in conjunction with Peel Harvey Catchment Council and neighbouring landholders have successfully reduced feral cat impacts resulting in significant recovery of native fauna. Not only have populations increased but species not seen for decades in Dryandra are returning. However, this success brings its own issues and difficulties to ensure the long-term viability of fauna populations with low numbers of feral predators remaining in the landscape. Different control measures may be required at different stages of the park's recovery; what worked well to recover fauna populations from near extinction may not be as successful at maintaining populations at high densities or preventing populations from again declining, and new methods that are suited to controlling feral predators at recovered sites will be required. At Dryandra we are investigating opportunities and believe that advances in feral animal control now and in the future will allow us to maintain the recovered fauna populations and the improvement to the ecosystem that has resulted from having the fauna component returned.

## PAST, PRESENT AND FUTURE OF DOMESTIC CAT MANAGEMENT AND YOUR LOCAL GOVERNMENT

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Domestic cats have enjoyed free rein of suburban Australia since their introduction 200+ years ago.

During this time cats have become an important companion to many Australians however their impact to urban wildlife has largely been ignored. Furthermore, the issue of domestic cats fuelling feral cat populations has not been given enough attention.

As a Councillor who has grown up with pet cats and also studied and worked in the environmental field, I began to wonder - Why have cats enjoyed these freedoms when their companion counterparts (dogs) have been subject to containment since the 1970's? Fremantle Council and other Local Governments have been on a journey since 2017 to introduce new Local Laws for cat owners aimed at protecting our urban wildlife while also keeping cats safe at home through the introduction of cat prohibited areas and educational campaigns.

Results to-date have been only mildly effective, with domestic cats still being captured in our natural bushland areas and entering their neighbours' properties uninvited. Consequently, our communities are demanding even tougher Local Laws (containment).

Following these strong calls from the community, numerous local governments have tried to introduce tougher Local Laws aimed at cat containment however the State Government has rejected each attempt suggesting new laws would have "an unintended effect on cat owners' existing rights and interests."

I'm going to share the journey we've been on in Local Government so far, highlighting what the State Government will and won't permit. I'll also run through the key steps you can follow to introduce Cat Prohibited areas across your suburb.

Importantly, I'll then discuss where to from here? What changes we need the State Government need to make in the interests of Australian wildlife and cat safety.

## NESP THREATENED SPECIES RECOVERY HUB

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The National Environmental Science Program's Threatened Species Recovery Hub wrapped up at the end of 2021. It included a broad program of research on cats, carried out with many partners over six years, that focussed on major knowledge gaps and opportunities. The program included a suite of field-based research to improve the way we manage cats, either by getting smarter about how we use existing control options, or by trialling new approaches. The program also included a major effort to improve the evidence base that underpins cat control, by providing the first robust estimates of the feral cat population size and spatial variation in

density; documenting the toll of cats on native animals; identifying the species most at risk from cats and whether these were adequately protected by existing on-ground programs; and placing cat predation pressure in the context of pressures from other threats, including fox predation. In addition, the program broadened consideration of cat impacts, and justification for their management, to include the economic and human health consequences of cat-borne diseases, and the conservation impacts of pet cats, as well as feral cats. The program was integrated closely with government policy initiatives, and the on-ground action undertaken many government and non-government organisations. The research was very widely publicised through mainstream and social media, helping to strengthen public understanding of cat impacts, and public support for cat management. Many key findings have been adopted for use by governments and on-ground and advocacy NGOs to support ongoing action and campaigns on cats. The Threatened Species Recovery Hub's cat research program illustrates some of the potential benefits of national approaches for major conservation challenges, an approach being continued by the new National Environmental Science Program's Resilient Landscapes Hub.

## MONITORING AND MANAGING FERAL CATS IN AN ARID LANDSCAPE

**Dave Algar<sup>1</sup>, Neil Hamilton<sup>1</sup>, CHERYL LOHR<sup>1</sup>, Mike Onus<sup>1</sup>, Kristen Nilsson<sup>1</sup> & Ashleigh Johnson<sup>1</sup>**

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We have employed an adaptive management framework in the control and monitoring of feral cats (*Felis catus*) on the Matuwa Indigenous Protected Area for 19 years. Prior to initiating any methods of control we recorded 25-30 cats per 100km of transect. We now record 3-4 cats per 100 km. We use hundreds of Reconyx PC900 camera-traps and a rapid survey technique called the cat track activity index (TAI) to assess the efficacy of feral cat management techniques, including leg-hold trapping and/or aerial baiting or ground baiting with Eradicat®. In recent years, we found that aerial baiting is more cost-effective than ground-baiting alone, and that landscape-scale leg-hold trapping should be employed at least once per decade to prevent the feral cat population from becoming biased towards large adult males that may be less inclined to take bait. Additionally, when the density of feral cats is low, camera-traps are an ineffective method of monitoring feral cats compared to TAI, and the type of lure used will significantly effect the number of cats detected by a camera-trap.



# CATS ON COUNTRY- THE JOURNEY OF NYANGUMARTA RANGERS MANAGING CATS ON THEIR COUNTRY.

**JACOB LOUGHRIDGE <sup>1</sup> & Lynette Wilridge <sup>1</sup>**

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The Nyangumarta Rangers manage an Indigenous Protected Area (IPA) of approximately 28,000km<sup>2</sup> stretching from 80 Mile Beach to the Great Sandy Desert in the north-west of WA. They actively manage Country, caring for culturally important and threatened species including black-footed rock wallaby, northern quoll and greater bilby. Since the ranger team was formed in 2016, feral animal management (camel, cat, cattle) has been and continues to be a key part of the work plan and new 2022-2032 IPA management plan. The Nyangumarta rangers are worried about feral cats as they are threatening important cultural and natural values on Nyangumarta Country. The rangers have noticed widespread feral cat occurrence across the IPA through sensor camera monitoring, sightings and tracks. The rangers regularly deploy available management options including cage trapping, shooting and traditional hunting with high effort and little success. We recently have received funding and support to conduct more strategic cat management utilising Felixer grooming trap. The plan is to utilise this new technology and focus cat management at rocky outcrops to protect key threatened species populations (black-footed rock wallabies, northern quoll and brush-tail possum) from predation. The Felixer deployments will be combined with fine scale fire management and cat shooting in order to increase the effectiveness of management. Nyangumarta is one of the first Aboriginal Ranger groups (if not the first) in northern WA to go through the licensing and approvals process to be able to obtain and deploy Felixers on their own Country. To get to this stage has been a journey navigating the various regulatory processes required to gain access to Felixers and utilise 1080 on country.

## FERAL/STRAY/PET: DEFINITIONS MATTER WHEN MANAGING CATS

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A speed talk outlining the difficulties with the WA Cat Act 2011 in its current form for implementing cat containment, and the definitions of "pet" vs "stray" vs "feral" cat and how that impacts management.

## CATS ARE ATTRACTED TO SUCCESSFUL CONSERVATION EFFORTS.

**Christopher Johnson <sup>1</sup>, Sarah Legge <sup>2</sup>, HUGH MCGREGOR <sup>3</sup> & Katherine Moseby <sup>4</sup>**

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Almost all species threatened by feral cats are within their preferred weight range for prey; small enough to be easy to kill and large enough to provide sustenance. Therefore, when a conservation program successfully brings wildlife threatened by feral cats back to a landscape, they are also bringing back an attractive food source for cats. In this presentation, I'll discuss two examples where GPS collaring of cats has demonstrated they have a strong attraction to conservation efforts. The Arid Recovery reserve in central South Australia is a cat-free safe-haven where populations of native rodents have boomed and are dispersing through the fence and into the surrounding landscape. Feral cats have learnt this and now target their hunting along the reserve's boundaries, creating increased predation pressure and new challenges for management. The second example comes from research in the Kimberley region, where feral cats show a strong preference for hunting in fire scars, yet only where there has been successful conservation efforts and small mammal numbers have recovered. This has unfortunate implications for conservation projects, where the greater the success and more wildlife that is recovered, the greater the risk of hyper-predation from cats. I will discuss how threats could be mitigated and incorporated into project planning.

# WESTERN SHIELD: LANDSCAPE SCALE FERAL CAT MANAGEMENT

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Western Shield is the Department of Biodiversity, Conservation and Attractions' (DBCA) flagship fauna conservation program. It aims to protect native fauna through the landscape scale management of foxes and feral cats. With respect to feral cats, initially the program focused on research to develop the most effective tools and strategies to manage feral cats at a landscape scale. With the development and registration of the cat-specific 1080 bait, Eradicat®, in 2014, Western Shield has now integrated feral cat baiting with fox baiting and other complementary measures at 12 sites covering over a million hectares of the state. We share our insights of the operational implementation of feral cat management at a landscape scale, some of the key learnings and priorities looking forward.

## IMPROVING THE OUTLOOK FOR AUSTRALIA'S NATIVE SPECIES

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Cat control is commonly implemented across Australia for the protection of threatened wildlife. The majority of research understandably focuses on cat control methods and reducing cat density. However, an understanding of feral cat behaviour can help improve control methods and inform predator thresholds required for co-existence of predators and prey.

Drawing on a number of collaborative research projects across arid sites, data will be presented on aspects of feral cat behaviour and ecology including neophobia, hunting behaviour, movement, diet and feeding behaviour. Control methods could be adapted to target these natural behaviours. Population Protecting Implants (PPIs) are one example where an understanding of cat behaviour may be used to improve the target specificity of control. Data on recent PPI trials will be presented.

Predator thresholds are explored using a number of sites where native species were reintroduced into areas with variable cat activity as measured by camera traps. Data from a 7 year experiment where bilbies and burrowing bettongs were reintroduced into paddocks containing cats suggests that predator thresholds for co-existence are dynamic and influenced by both predator and prey behaviour as well as cat demographics, alternative prey and habitat.

## DO FERAL MEGAHERBIVORES FACILITATE FERAL CAT ACTIVITY IN HIGH-RAINFALL SAVANNAS?

**Hugh Davies <sup>1</sup>, Brett Murphy <sup>1</sup>, GEORGINA NEAVE <sup>1</sup> & Tiwi Land Rangers <sup>2</sup>**

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A recent conceptual model has emerged to explain the widespread and severe decline of native mammal populations in northern Australia. It posits that high-severity disturbance regimes (frequent high-severity fires and heavy grazing by feral megaherbivores) allows feral cats to invade landscapes with a relatively dense understorey. There are likely multiple mechanisms underpinning this disturbance-mediated relationship, and they are not well understood. For example, there is often a correlation between the density of feral megaherbivores and feral cats. High densities of feral megaherbivores typically creates a dense network of 'game trails', penetrating areas of dense understorey vegetation. It is well established that mammalian predators in Australia and elsewhere make use of natural features such as dry creek beds and fire scars, and anthropogenic features like roads, however no studies have investigated the use of game trails by feral cats. Understanding how cats may benefit from features created by feral megaherbivores, is critical to mitigating the impacts of cats. This is particularly important in monsoonal northern Australia, where lethal control of feral cats is extremely difficult, yet management of feral megaherbivores is far more feasible. Our study was conducted in the high-rainfall savannas of the Tiwi Islands. We addressed the question of whether feral cats preferentially use game trails created by buffaloes and horses. We deployed 104 motion-activated camera-traps at 52 paired sites, consisting of one camera facing across a game trail and one camera in undisturbed vegetation.

# PROGRESSING CAT MANAGEMENT IN WA, THE LAST FOUR YEARS

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Since the first WA Feral Cat Symposium in 2018, there has been considerable progress in Western Australia to improve outcomes from managing feral cats. The formation of the WA Feral Cat Working Group, with endorsement from the National Feral Cat Taskforce and the WA Biosecurity Council, has provided a platform to deliver improved conservation outcomes through the collaborative, effective, resource efficient and humane management of feral cats across all land tenures. Against three pillars – accessible information, prioritised research and coordinated management – the group has quickly become a ‘one stop shop’ for cat matters in the State, and a national leader in driving evidence-based change. Here we first provide an overview of how the working group was formed and its current structure. Second, we then outline the approach taken to making information more accessible to land managers and researchers alike, including the Working Group website, and how we are assisting stakeholders to broaden their collaborations and management scopes. Third, we provide an overview of how we have been facilitating the end-user led identification, prioritisation and addressing of knowledge gaps to improve management. We finish with an overview of the focal issues for the group through 2023 and beyond. The Working Group has clearly demonstrated how a shared vision for better cat management has led to fabulous collaborations and improved on-ground outcomes.

## HERE KITTY-KITTY: LURE CHOICE FOR PREDATOR ATTRACTION IN A TEMPERATE RAINFOREST.

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Combinations of lures, set in conjunction with camera-traps, are often employed to monitor feral cats, though there is debate about their effectiveness. Most lures need to be serviced monthly, increasing field time and costs. In areas where lures are likely to attract competitive scavengers, one might expect a decrease in cat captures due to the fear of antagonistic interactions. To test the effectiveness of lures to attract feral cats and other predators, I deployed four grids of 16 camera-traps. These cameras were left in rainforests for four months, with each camera being treated with an olfactory, food, visual, or null lure each month. The relationship between lure type and other environmental factors (predictors) on site detection, visitation, and daily detection (dependent variables) were examined using a linear mixed-effects model, with grid and camera-trap as a nested random effect. Relative to the control, the odds of a cat visiting a camera-trap site during the study period increased by a factor of 5.36 (CI=1.58-18.22) for the visual lure, and 4.22 (CI=1.1-16.12) when using the food lure, but not the olfactory lure (odds ratio=2.06, CI=0.59-7.19). Visual and food lures also increased the total number of visits to a camera-trap site (visual odds ratio=2.89, CI=1.39-5.99) (food odds ratio=2.23, CI=1.01-4.91), while olfactory lures did not (odds ratio=1.55, CI=1.39-5.99). The presence of Tasmanian devils apparently had no influence on cat visitation, contrary to previous findings. I recommend that future lured camera-trap studies use prey-resembling visual lures in preference to food or smells if: (i) they wish to deploy cameras long term with minimal servicing requirements, and (ii) the goal is to target feral cats, as these visual lures did not attract the other predators. However, for studies wishing to examine multiple predators, with the resources to service their cameras monthly, food lures are a good option.

## MANAGING FERAL CATS IN A MULTI-TENURE LANDSCAPE

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The Fitz-Stirling area is a fragmented landscape comprising of private and government managed conservation reserves and agricultural land. Plant richness, species endemism and local provenance are critical conservation values alongside a raft of threatening processes. Among these threats Bush Heritage Australia identified impacts by introduced predators as a significant impediment to the health of its reserves and restoration projects. In 2020 support from Lotterywest enabled the launch of the Fitz-Stirling Fauna Recovery Project. The aims of the project have been to deliver landscape-scale, integrated feral animal management across tenure in a collaborative framework. The challenges have been many but after only two years of

operations and community engagement a platform for success has been built and many positive outcomes achieved.

## NEW TECHNOLOGY IN THE TOOLBOX OF FERAL CAT MANAGEMENT

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Variability in cat prey selection and behaviours are demonstrated through a 27 year study of 2293 feral cat diets compared with prey availability at an arid zone site. Variability of feral cat responses to cat baits, traps and Felixers are demonstrated through camera trap studies, with optimum combinations of control tools recommended. Ability to recognise individual feral cats through Artificial Intelligence (AI) and specifically designed Bluetooth tags enables the ADIMA (Automated Detection Identification and Management of Animals) system to distinguish and target feral cats (but not wildlife) and stray cats (but not pets). Further advances in AI and automated management tools will continue to improve management of individual feral cats and also reduce numbers of unowned cats that could become feral.

## EFFICACY OF TARGETED CAT CONTROL AT YAMPI SOUND TRAINING AREA

**Melissa Bruton** <sup>1</sup>, **Skye Cameron** <sup>1</sup>, **Pippa Kern** <sup>1</sup> & **BRADEN RILES** <sup>1</sup>

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Yampi Sound Training Area, located on Dambimangari country in the South-West Kimberley, is an area of exceptional biodiversity, and with populations of many threatened species susceptible to feral cat predation. Increasing cat densities in the lowlands of Yampi is concerning for the persistence of susceptible species across the landscape. In order to evaluate the efficacy of targeted feral cat control we estimated feral cat densities before and after cat management activities. A fortnight prior to feral cat control we established discrete 3 camera arrays of 60 cameras each. Cameras were placed 500m apart and were located along cat travel pathways

such as tracks and creek beds. Each camera array was separated by >10km. Targeted cat control was conducted through shooting intensively for 11 nights across 2 of the 3 camera arrays. The 3rd camera array was used as a temporal control of cat densities. Shooting resulted in 25 cats being removed from the survey area. Camera arrays remained active in the field for a fortnight after completion of control activities. Changes in cat density estimates were assessed in response to control actions. This study builds on a long-term feral cat monitoring program on Yampi Sound and results will be discussed in the context of long-term trends of feral cats and the implications for threatened species populations.

## POTENTIAL FOR IMPROVING FERAL CAT BAITING EFFICIENCY BY INTEGRATING HABITAT SELECTION DATA

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Feral cats are one of the most destructive invasive species on the planet, and as such their management is a conservation priority. In big, open landscapes management of feral cats is largely restricted to aerial poison baiting. However, as cats are infrequent scavengers, baits are usually distributed at high density (e.g. up to 50 baits/km<sup>2</sup> for Eradicat®), and so aerial baiting can become prohibitively expensive at scale. As cats often preferentially select for particular habitats and so are usually not distributed homogeneously across the landscape, to increase encounter rates, it would make sense to drop baits in habitats that are most heavily used and avoid areas that are infrequently visited by cats. By baiting only high-use areas, the effective extent of baited areas could potentially be enlarged at little to no extra cost.

To test this hypothesis, we obtained GPS data from feral cats using home-made satellite transmission capable GPS collars built from commercial GPS asset trackers (SPOT traces) in the South Australian arid rangelands. SPOT traces proved to be an effective and economical method of collecting GPS data. We used step selection functions to assess preferred habitats, and used dynamic Brownian bridge movement models to estimate home ranges. Species distribution models were seeded with points intersecting home ranges, to determine the probability of cat presence relative to landscape features. Alternate baiting strategies were then simulated based on cat habitat use data, and compared to a standard block baiting strategy.



This work was conducted on the lands of the Antakirinja Matu-Yunkunytjatjara, and Adnyamathanha peoples. We recognise and respect the enduring relationship they have with their lands and waters, and we pay our respects to Elders past, present, and emerging.

## FERAL CATS - COMMUNITY ENGAGEMENT ACROSS A LANDSCAPE

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Two years ago, Landcare Tasmania started undertaking a number of Landscape Restoration Projects which involve on ground activities and community capacity building and outreach. We develop project themes around the needs of our Landcare groups and community participants that arise from their project proposals.

Feral Cat management is a common issue that community groups want to tackle. To assist with this, we undertake three different levels of engagement through our Community Outreach program to engage people across a catchment in managing feral cats.

- 1) General Information Session - invite all of the community to understand more about the impacts of cats on agriculture, community and biodiversity and why we need to manage them.
- 2) Introduction to effective, coordinated, Active Management - involves more detailed information around legislation, coordination and active onground management of feral cats.
- 3) Targeted Feral Cat Action Plan - Supporting groups that have the capacity to develop and action a plan.

We involve active Landcare groups to show their wares at workshops and provide onground experience of effective cat management techniques and associated trials and tribulations. These workshops fill a vital gap in enabling community groups to take responsibility for feral cat management, providing them with certainty around available control tools, humane management, legislative requirements, coordination and external support so they know they are following best practice management.

# TRIALLING THE USE OF FELIXERS ON THE BIRRILIBURU INDIGENOUS PROTECTED AREA

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The Birriliburu Rangers work on the Birriliburu Indigenous Protected Area (IPA) in the Little Sandy and Gibson Deserts of Western Australia. It is a vast and remote landscape where the rangers conduct land management activities including managing fire, monitoring threatened species and feral predators, managing weeds and controlling large feral herbivores. Katjarra, also known as the Carnarvon Ranges, is in the south-west corner of Birriliburu determined area, is home to an array of endemic, rare and important flora and fauna species. Feral cats are recognised as a threat to a number of these threatened species in this area such as the Greater Bilby, Northern marsupial mole, Malleefowl and Great Desert skink. These species stand to benefit from the development of an operationally viable and effective cat control program. Due to the remote location of the Birriliburu Indigenous Protected area and the healthy population of dingoes other forms of cat control have not been implemented. That is why Birriliburu Rangers see using Felixers as an important tool to trial feral cat control in key areas of the IPA. The Birriliburu Rangers have been conducting feral cat and fox monitoring at Katjarra since 2015 and using this data and tracking skills have placed three Felixers out for 5 months. Birriliburu Rangers will present the results of this 5 month non-poison trial at Katjarra and discuss the challenges and benefits for Ranger teams using this new technology in remote areas.

# TOWARDS A FERAL CAT-FREE KANGAROO ISLAND

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Feral cats on Kangaroo Island (KI) are a significant threat to wildlife, agriculture and human health through predation, competition and disease transmission. Feral cat densities are also 10 x higher than on mainland Australia. Funding has been provided by State and Federal governments and philanthropy to investigate whether eradication of feral cats from the 384 sq km Dudley Peninsula on Kangaroo Island is feasible. Since 2020, we have trialed and refined traditional detection and control methods such that 65% of the Dudley Peninsula is now under active eradication efforts with 99.2% landholder support. Deployment of advanced technologies such as 4G-connected, solar powered cameras linked to artificial intelligence based image recognition software, have enabled us to achieve significant cost efficiencies. Once completed, the Dudley Peninsula will provide a safe haven for a multitude of threatened species and provide the opportunity for reintroductions. Completing the Dudley Peninsula eradication combined with successes from the other feral cat control programs, will allow us to estimate the costs of scaling up to a whole of island eradication, which would make KI the world's largest inhabited cat-free island.

## MANAGING FERAL CATS TO PROTECT THE CENTRAL ROCK-RAT

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The Central Rock-rat (*Zyomys pedunculatus*) is a Critically Endangered rodent confined to two locations in the MacDonnell ranges of central Australia. It was predicted to be the mammal most likely to go extinct in the next 20 years. Predation from feral cats is a key threat to the species and the likely cause of its historical distribution contraction and population decline. We undertook a multi-year experimental baiting program in Tjoritja National Park to determine if aerial baiting is effective at reducing feral cat abundance and whether this management has an impact on the Central Rock-rat population. We baited feral cats at two sites totalling 8000 ha in area but not at two control sites located nearby.

Aerial baiting successfully removed feral cats from the baited areas, with no recaptures of known individuals on camera traps after baiting. Overall reductions in cat density of 80-90% were achieved. There were higher levels of colonisation and higher persistence of Central Rock-rats at baited sites, but this was variable among years. In addition, the baiting benefitted the Black-footed Rock-wallaby (*Petrogale lateralis centralis* – EPBC Vulnerable), with steadily increasing occupancy at baited sites.

In 2022 we expanded the feral cat control area on Tjoritja National Park to include suitable habitat surrounding the Central Rock-rat core population and a buffer area. The baited area now covers 1100 km<sup>2</sup>. This has coincided with a multi-year La Nina event that has led to a Rock-rat population increase and expansion (“boom”). Future management will aim to maintain rock-rat persistence across this wider area of occupancy and to fine tune the feral cat control programme. This work is guiding the development of an Integrated Feral Cat Management Plan with the Anangu-Luritjuku Rangers to manage the only other known Central Rock-rat population on Haasts Bluff Aboriginal Land Trust.

## GENE TECHNOLOGY AND ITS POTENTIAL FOR PEST CONTROL

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Alien vertebrates are some of the costliest invasive alien species worldwide, directly causing species extinctions and driving profound environmental change. In Australia, mammals are the costliest invasive taxa; with feral cats, rodents (house mice and rats), pigs, rabbits, and red foxes accounting for 95% of the total costs imposed by invasive mammals over the last 50 years. Despite some notable successes in eradicating vertebrate invasive alien species on islands, continental eradications remain elusive, and are greatly hampered by a lack of socio-political resourcing and will. New tools are urgently needed.

CRISPR-based gene-drive approaches have considerable potential for the eradication or suppression of invasive alien species. By avoiding unwanted consequences to non-target organisms, genetic biocontrols offer many advantages over classical control methods such as poison baiting, trapping or hunting. There have been promising developments in laboratories using gene-drive technology in mosquitoes, fruit flies, mice, and proof of principle for CRISPR gene editing has been demonstrated in cats. Despite great interest in developing the technology for a range of vertebrate pests, the feasibility of achieving large-scale eradications of these species using gene drives remains unclear.

This presentation will provide an overview of gene drive technology with particular focus on recent advances in mammals. Prospects for gene drive application in cats, informed by spatially explicit individual-base modelling, will also be discussed.

# FERAL CATS, KYLORING AND CONSERVATION ON THE SOUTH COAST OF WA

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Since the mid-2000s DBCA has led the integration of feral cat control into the operational landscape-scale management of introduced predators on the south coast of Western Australia. The critically endangered Western Ground Parrot - Kyloring (*Pezoporus flaviventris*) is impacted by predation by feral cats, and this project addressed the impact of feral cats in over 500,000 ha of conservation reserves between Albany and Israelite Bay, east of Esperance, in an adaptive management framework. With 18 EPBC listed threatened fauna at risk of predation from feral cats in the target reserves, integrated management of both foxes and feral cats has been a key action for the recovery and increased resilience of both threatened and non-threatened fauna. Baiting, delivered through DBCA's Western Shield program, trapping and other methods have been employed in an integrated approach to introduced predator control, with feral cat and fox activity declining in core Kyloring habitat. Partnerships between government, tertiary institutions, community and non-government organisations have been fundamental to implementing this work. In the 12 years since baiting commenced the declining trend in Kyloring has been halted in the last wild population, and the native species in this landscape have shown a positive response to predator management. In this paper we will highlight some of the outcomes and learnings from the south coast work.

## FERAL CAT MANAGEMENT AND ENVIRONMENTAL APPROVALS

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It is likely that feral cats are doing more long-term damage to native fauna across mining tenements than the mining operations themselves. Yet the environmental regulators appear to

be reluctant to strongly support and incorporate feral cat (and other declared pests) management in environmental approvals.

Mining operations typically only disturb small proportions of their mining tenements, yet as a land manager under section 30(2) of the BAM Act these companies have a responsibility to take measures to control declared pests. Only a small number of mining companies undertake feral cat management programs, yet there is evidence to indicate that mining operations support and, in some circumstances, seem to foster feral cat proliferation.

This talk will discuss the issue of feral cats in mining operations in the context of regulator approvals, fauna management plans and will make recommendations on how the various State Government departments and mining companies can do more to reduce feral cat abundance.

## A NEIGHBOURHOOD APPROACH TO FERAL CAT MANAGEMENT TO PROTECT NUMBATS IN DRYANDRA WOODLAND

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The farmers surrounding Dryandra Woodland National Park play a significant role in the conservation of threatened fauna. PHCC's National Landcare Program Numbat Neighbourhood project has built upon the successful "Farmers 4 Fauna" project working with landowners to increase the trajectory of the endangered numbat and other threatened species through feral animal control, protection of their habitat, weed control and providing knowledge extension opportunities. These activities complement and build upon the recovery actions undertaken by the Department of Biodiversity, Conservation and Attractions (DBCA).

The farmers are conscious of the precious natural assets on their doorstep and want to play a role in protecting them. PHCC is supporting their efforts through funding professional invasive species control, Community Environment Grants, ongoing technical support, extension, acknowledgement and loaning cage traps.

The recently awarded Dryandra Woonta Grant through an Australian Government's 100 Priority Species Grant has allowed us to extend, complement the Numbat Neighbourhood Project as well as trial innovative feral cat control technology and research the origin of feral cats in Dryandra through their DNA.

Project successes include 300 feral cats culled (to November 2022) and reported to PHCC and recorded into Feralscan. DBCA's monitoring data shows an increase in the mean daily camera sightings of numbats over the course of the project. The strength of the project and successes centre on the collaborative approach with neighbouring farmers, Traditional Owners, local, state and federal government, NGO's and industry – People Working Together for a Healthy Environment.

## HOW SHOULD WE TALK ABOUT CATS? INSIGHTS FROM RECENT PUBLIC POLLING AND FOCUS GROUP RESEARCH

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Cats have played an important role in human history as companions. They have also been a major driver of wildlife declines and extinctions in places where they have been introduced, such as Australia.

Australia has approximately 4.9 million pet cats and that number is growing. There are an estimated average of 2.8 million feral cats across the continent, but this figure can boom to 5.6 million in wet years. Research has estimated that collectively cats (both feral and domestic) kill almost 2 billion native animals every year.

Our collective conservation challenges largely centre on motivating the right people to take action. Ultimately to get stronger action on feral cat management and encourage more responsible pet ownership we need to work out the most effective ways to engage communities across Australia on these different, but related, issues.

The Invasive Species Council has worked with Essential Media Company to better understand people's attitudes towards feral and domestic cat management across the country. The project utilised quantitative polling analysis and in-depth focus groups to explore perceptions of both feral and domestic cat management and outline the key approaches to effective communications with different audiences.

This social research project builds on the previous studies to unpack public acceptance of different policy responses and outline ways to effectively engage with, and motivate action in, different audiences on domestic and feral cat management.

# LOOKING AFTER THREATENED SPECIES AND CONTROLLING CATS: THE ANANGU WAY

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The Rangers of the Kiwirrkurra Indigenous Protected Area are renown for their unique method of cat control and successes in protecting the threatened species of Bilby (Ninu) and Great Desert Skink (Tjalapa). These threatened species are important to the dreamtime stories (Tjukurrpa) of the Kiwirrkurra Traditional Owners. By continuing traditional cat tracking and hunting practices around Kiwirrkurra community, the Kiwirrkurra Traditional Owners have managed to effectively control feral cat populations in these areas and sustain sizeable populations of threatened species in these areas. This is combined with intensive use of traditional fire management as part of the ranger program, creating a fine-scale patch mosaic protecting old growth spinifex and promoting bush foods which are essential to these threatened species survival. This has resulted in the year-on-year increase in Tjalapa populations as well as the steady maintenance of Bilby populations around Kiwirrkurra community in favoured hunting areas. The use of these practices, not only is effective in looking after these species but is also an important way for the Kiwirrkurra Traditional Owners to maintain their strong connection to country as well as passing on these traditional practices to the next generation. We would like support in bringing at least two Kiwirrkurra Rangers to present about all this work that has been happening for many years at the Feral Cat Symposium in February, as well as to discuss and learn about future pest control options in more remote areas of Kiwirrkurra IPA where this traditional hunting has been lost.

# THE USE OF ARTIFICIAL REFUGES BY SMALL VERTEBRATES AFTER PRESCRIBED FIRE

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Whilst fire is an important disturbance in Australia, there is some evidence to suggest that the reduction of vegetation structure and habitat complexity can improve the hunting success of feral cats and red foxes—potentially increasing the likelihood of threatened species decline. Presently, there are few options for reducing the impacts of invasive predators after fires in open environments. In this project, we trialled the emerging approach of constructing artificial refuges for small vertebrates in recently burnt forest in an effort to improve population persistence. The specific objectives of this project were to identify which species use the artificial refuges compared to a control site, and whether the frequency of use changes with increasing time since fire. We found that birds and reptiles were detected more frequently inside compared to outside the refuges. Additionally, the frequency of detections increased with increased time since fire for birds, mammals, and reptiles. These results suggest that small vertebrates recognise the artificial refuges as preferred habitat (compared to nearby burnt forest) for moving or foraging, perhaps due to a perceived lower predation risk.