Science for Saving Species

Research findings factsheet

Project 1.1.11

Threatened Species Recovery Hub

National Environmental Science Programme

Understanding feral cat movements to aid recovery of the Endangered night parrot

In brief

Night parrots (*Pezoporus occidentalis*) are one of Australia's imperilled birds, and feral cats are one of the key causes of their decline. Night parrots currently have a restricted distribution, and little is known about the feral cats around the remaining night parrot populations, which limits the development of effective management strategies.

This study aimed to understand feral cat movements and feral cat habitat selection around Bush Heritage Australia's Pullen-Pullen Special Wildlife Reserve in south-western Queensland. It also aimed to estimate the effectiveness of possible management actions to mitigate the threat posed by feral cats at this site.

This research was conducted close to a confirmed night parrot population, within the same landscape supporting the same types of habitats. No cats were released close to known night parrot areas. Over 2019 and 2020, we obtained GPS data from nine feral cats, and assessed their preferred habitats. Management options were then simulated based on cat movement data, including altering trap numbers and layout, and changing routes for night spotlight shooting using existing roads, random walking or creating new roads in preferred habitats.

The feral cats preferred alluvial and riparian habitats and avoided rocky woodlands and roads. The cats also moved around the night parrot population, travelling near it and sharing many of its habitats. Simulated control efforts were more successful if traps were placed at "pinch points" where drainage lines converged. In some simulations not focussing on pinch points meant that it took more than two weeks for cats to encounter a trap. In other words, strategic trap placement at pinch points is expected to increase the cost effectiveness of trapping by increasing the encounter rate.

Our findings show how the conservation of threatened birds, like the night parrot, can be enhanced through better understanding threats such as feral cats, in order to develop locally tailored control operations.

Background

Feral predators such as the cat (*Felis catus*) are a significant threat to biodiversity, with ground-nesting species at particular risk of predation. Night parrots (*Pezoporus occidentalis*) have several traits that may make them especially vulnerable. They nest and forage on the ground and, at certain times, drink at places frequented by feral cats. Night parrots also lack some of the adaptations typically associated with nocturnal birds, such as visual acuteness. There is direct evidence of night parrot predation on night parrots, such as historical reports of domestic cats bringing home numerous night parrot body parts in the 1800s, and more recent observations of cats frequenting night parrot nesting areas when nestlings become vocal just before fledging. The population size of the Queensland night parrot is likely to be around just 20 individuals, so they are especially vulnerable to predation by feral cats, even if the cats occur at a low density. This suggests that the management of feral cats where night parrots occur is a critical conservation action.

Feral cats are notoriously difficult to control, especially when at low densities. The future of cat control relies largely on refining existing control techniques and habitat management.

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Background (continued)

This means developing integrated strategies that use multiple control methods, sensitive land management that improves the quality of the resources available for the potentially affected species and, most significantly, gaining a better understanding of cat movements and behaviour to deliver more cost-effective, targeted control programs.

Aims

We had two main objectives. First, we aimed to understand the movement patterns and habitat selection of feral cats in a landscape in which night parrots occur. Second, we aimed to use this spatial information to simulate and predict the potential effectiveness of various cat control techniques (i.e., shooting, trapping and baiting, or some combination) to simulate the effectiveness of different control scenarios.

What we did

This study was undertaken on Pullen-Pullen Special Wildlife Reserve and neighbouring Mt Windsor and Brighton Downs cattle stations in south-western Queensland.

Feral cats were captured using a combination of soft-jawed foothold traps or cages (30 cm x 30 cm x 60 cm) baited with cat urine and/or faeces. Visual lures, consisting of feathers and/or foil, were installed near traps to attract the attention of cats. GPS trackers were fitted while the cats were restrained, and gender, weight, and coat colour were recorded before release at the capture site. Handling typically took less than 10 minutes.

We used two types of GPS devices, and both allowed data retrieval via satellite. We used SPOT Trace GPS units which were fitted to a leather or synthetic harness and Iridium Litetrack-130s attached to a single neck collar. We used the tracking data at one-hour intervals.

Habitat selection

We used the GPS data in habitat selection models in the program R to determine whether the cats had a habitat preference. Models included habitat variables based on Queensland's state-wide regional ecosystem mapping. We used local knowledge to aggregate the regional ecosystem descriptions from 26 types down to nine types of habitat.

Trapping simulations

We examined the effect of trap number, deployment duration and site on the probability of a cat encountering a trap set given the GPS movements of cats. We treated cage traps, foot-hold traps and Felixer grooming traps together. Cats move mostly along drainage lines, and these are also the locations where traps are mostly set during cat control operations. Given this, our simulations placed sets only along drainage lines. We were primary interested in the time it took a cat to first encounter a trap under each scenario, which incorporated randomly placed traps, and a set number of manually placed traps in the model.

To examine the effectiveness of spotlighting and shooting, and how this could be improved as a management tool, we examined the number of cat detections over a series of simulated spotlighting "patrols", based on the feral cat GPS tracking data from four cats, which overlapped in time and space. We used the location, time and frequency of patrols as the simulation variables, as these are the factors that land managers have most control over and are the costliest.

Spinifex grassland habitat for the night parrot. Image: Steve Murphy

A night parrot fledgling in grassland. Image: James Watson.

Key findings

We caught 11 feral cats in 2019 and 2020, and we obtained usable GPS data from nine of these. We found the feral cats to be wide-ranging in their habitat use but generally to prefer riparian and other productive habitats (e.g., floodplain). We frequently recorded feral cats moving though habitats associated with night parrots, such as dense spinifex and gibber plains. These are locations where they might encounter night parrot nests or be attracted to the sound of calling nestlings or increased parent activity around the nest while feeding young birds.

Rocky woodlands and roads were avoided by feral cats. This is a potentially significant result, as tracks and roads are often the locations where cat monitoring and control has been focused. However, tracks are typically placed along elevated areas away from drainage lines. So it is unclear if the tracks themselves were a deterrent or whether cats were simply staying closer to drainage lines.

The results from trapping simulations demonstrated that the probably of a cat encountering a trap was highly variable, even when large numbers of traps were used in the model. For some of the modelling scenarios, such as random placements along drainage lines, it took a long time before the first encounter by a feral cat with a trap was predicted. For example, one simulation using 50 traps took more than two weeks to yield the first encounter of a cat with a trap. In the simulations, cats encountered traps faster when traps were deliberately placed on drainage lines at pinch points where the naturally braided channels converged into more narrow pathways, rather than randomly placed.

For the shooting simulations, the use of existing tracks with vehicle patrols was not the optimal way for targeting feral cat control. By contrast, a hypothetical new vehicle track positioned to run parallel to main drainage lines in the study area resulted in a threefold increase in the feral cat detection rate.

Implications and recommendations

This study has demonstrated that feral cats have a preference for riparian zones but are found throughout the region occupied by night parrots.

We recommend that managers use high-resolution satellite imagery to help guide trap placement (i.e., cameras, cages or leg-hold traps) before field operations. Our findings suggests that in this arid environment, trapping and monitoring for feral cats is best targeted in alluvial areas where there is tree cover only.

For one realistic simulation using 50 traps, it took more than two weeks to yield the first trap encounter with any feral cat, however traps are often deployed for less than 12 days in the field. Our findings highlight how trapping could be more effective if traps were deployed for longer.

One option for future feral cat management is to either undertake patrols off-track and in parallel to drainage lines or to grade new tracks in locations that maximise encounters with feral cats.

From a management perspective, the relative benefits or potential costs of the creation of new tracks, the management of these and potential unforeseen outcomes like increased dingo activity affecting cat behaviour need to be considered. One alternative is to undertake more random car or walking patrols on hypothetical tracks targeting riparian locations. However, in both cases the mean number of detections in our model was considerably fewer than with new tracks along known movement routes of feral cats.

These findings will be useful for inferring the cat predation risk to other threatened species that occur on the Pullen-Pullen Special Wildlife Reserve. The knowledge of habitat use by feral cats and the distribution of other species could be used to predict the likelihood of cats encountering those species.

A feral cat with a tracking collar being released. Image Nicolas Rakotopare

Citation

Stephen Murphy, Hugh McGregor, Alex Kutt, Nicholas Leseberg, James Watson (in review). A rare but critical threat: using GPS tracking and simulation models to improve feral cat control for night parrot recovery. *Wildlife Research*

Further Information

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National Environmental Science Programme

Cite this publication as NESP Threatened Species Recovery Hub. 2021. Understanding feral cat movements to aid recovery of the Endangered night parrot, Project 1.1.11 Research findings factsheet.

This project is supported through funding from the Australian Government's National Environmental Science Program.