Science for Saving Species

Research findings factsheet

Project 1.1.11

Threatened Species Recovery Hub

National Environmental Science Programme

Can carcasses be used to reduce the threat of feral predators on ground-nesting birds by attracting dingos?

In brief

The Endangered night parrot, which was once thought extinct, was recently rediscovered in arid and semi-arid areas of inland Australia. Feral cats have been identified as a key threat to the continued survival of this ground-nesting parrot. One potential management solution to reduce the cat threat, is to elevate dingo activity at key night parrot strongholds. Dingoes have been recorded hunting and killing cats, and cats may avoid sites where dingoes are common.

We tested this theory by artificially distributing kangaroo carcasses to increase dingo activity. The study was undertaken at Bush Heritage Australia's Ethabuka Reserve in western Queensland. The kangaroo carcasses we added attracted only a few dingoes and instead became a source of food for feral cats and red foxes. We also recorded increased predation of artificial night parrot and quail nests in areas surrounding the carcasses. Crows and ravens were the dominant predators of our artificial quail nests, while foxes were the dominant predators of the artificial night parrot nests. Feral cats did not feed from the few carcasses that dingoes visited, and they were not recorded depredating eggs from either nest type.

Our findings suggest foxes pose a greater threat to night parrots than previously realised. Further, they also indicate that in certain circumstances the addition of carcasses deliberately or via culling may have indirect negative effects on ground-nesting birds. Carcasses are typically overlooked in land management and we propose that their direct and indirect impacts on native and invasive animals requires greater consideration.

Night parrot. Image: Steve Murphy

The University of Sydney

The University Of Queensland Australia

Bush Heritage Australia

Australian Academy of Science

Background

The Endangered night parrot (*Pezoporus occidentalis*) is a ground-nesting nocturnal bird that inhabits arid and semi-arid grasslands and shrublands. Night parrot populations declined severely following European settlement and this parrot was thought to be extinct. Remarkably, they were rediscovered in 2013 and since then have been occasionally sighted across parts of western Queensland and Western Australia.

Predation by feral cats (*Felis catus*) has been highlighted as a key potential threat to the night parrot and other ground-nesting birds. However, in the vast and remote settings where night parrot populations have been rediscovered, land managers have not yet developed effective strategies to control cats. Using dingoes (*Canis dingo*) to suppress cat populations is one possible solution.

Analyses of dingo scats at sites where night parrots occur, show that dingoes directly prey upon cats. Other studies have shown that the presence of dingoes can lead to avoidance behaviours in cats. This means that by increasing dingo activity, cats could experience elevated predation rates by dingoes, or cats might avoid areas where dingoes are more common. Both scenarios may in turn benefit prey that are susceptible to cat predation.

Here, we test the theory that dingoes can be used to reduce cat predation of night parrots by using animal carcasses to artificially increase dingo activity. Although dingoes often hunt for live prey, the use of carcasses by dingoes in Australia has been well documented and carcass meat may prove particularly attractive to dingoes in the food-poor arid environments where night parrots occur.

Carcasses typically have a variety of ecosystems effects and may attract other potential threats to the night parrot, such as foxes. To determine whether animal carcasses could be used as a potential management strategy, it is therefore also important to evaluate the potential negative effects that carcass distribution may have.

What we did

We monitored red kangaroo carcasses (*Osphranter rufus*) and artificial bird nests that we placed throughout 80 sites at Ethabuka Reserve. This reserve is a conservation property managed by Bush Heritage Australia on the edge of the Simpson Desert in central western Queensland. We sourced the kangaroo carcasses from pre-planned culls on agricultural properties, so no animals were harmed for the purpose of this study.

Night parrots have not been sighted in our study region but have been recorded in nearby areas with comparable habitats. This allowed us to test this management strategy without potential unintended impacts to night parrots.

Artificial bird nests were made to model those of the Endangered night parrot and the ground-nesting little buttonquail (*Turnix velox*). Each nest included a fake egg made from plasticine and a real quail egg. Little buttonquails are commonly sighted in our study area and build their nests on the ground in grassland. Night parrots build their nests in the centre of dense shrubs or large partially dead spinifex hummocks.

We put the carcasses and nests out in the field in June and October 2018, on open dune crests and in closed canopy dune valleys. We positioned equal numbers of artificial nests in areas with and without a carcass present. The species visiting and scavenging the carcasses were identified with wildlife cameras, while nest predators were monitored using a mix of cameras, animal prints and indents (bite and beak marks) on the plasticine eggs. We monitored nests and carcasses for 14 days, as ground-nesting birds in the region generally hatch in an equivalent time.

We used a range of statistical analyses to determine how total nest predation and species-specific nest predation differed for artificial night parrot and little button quail nests located in carcass-present and carcass-absent sites, across the two seasons and habitats. The work was a collaboration between staff from Bush Heritage, volunteers, students and staff from The University of Sydney and The University of Queensland, and local land managers from the Boulia Shire.

Main aim of the research

This study aimed to determine whether adding animal carcasses increases dingo activity and thereby reduces the negative impacts of feral cats on ground-nesting birds. It also aimed to investigate whether adding animal carcasses has any negative indirect effects, such as increasing red fox activity.

RIGHT AND BELOW: Artificial nest design for night parrots. Images: Emma Spencer, USYD.

Key findings

We observed 14 vertebrate species scavenging at the kangaroo carcasses that we added. The little crow (*Corvus bennetti*), visited the most carcasses, followed by the red fox (*Vulpes vulpes*), wedge-tailed eagle (*Aquila audax*), Australian raven (*Corvus coronoides*), willie wagtail (*Rhipidura leucophrys*) and dingo. Feral cats were also recorded feeding on several carcasses. It was promising that the carcasses attracted a few dingoes; less so that they were also a food resource for feral cats and red foxes. Dingoes visited less than half of the carcasses in June 2018, and they visited no carcasses during October 2018. This was probably due to the low density of dingoes at the time of our study, likely explained by extended dry weather.

When a carcass was present, the predation of artificial parrot and quail nests in the surrounding area increased. We identified five species that removed the eggs from the artificial nests. These were the little crow, Australian raven, red fox, sand goanna (*Varanus gouldii*) and centralian blue-tongued skink (*Tiliqua multifasciata*).

Red foxes are highly successful generalists and were the dominant mammalian scavenger, and the only identified mammalian nest predator. Prior research in our study area had shown that foxes can move efficiently across the vast arid landscape, which may allow them to locate the sparsely distributed carcasses, which often disappear quickly. Rates of nest predation by foxes were high and strongly affected by the presence of carcasses. Foxes may have been attracted to the carcasses due to the strong odour, and once in the area they were able to detect the nests.

The little crow and Australian raven were also important nest predators, but their predation rates were not influenced by carcass presence. This is possibly because they could detect the nests from high above using their excellent eyesight, rather than their sense of smell.

Crows and ravens were the top scavengers and predators, but they had a far lower impact on the artificial night parrot nests than on the quail nests. This contrasted with the fox, which discovered both nest types evenly. The night parrot nests were more hidden and could have been harder for birds relying predominantly on sight to detect; whereas the foxes were able to locate both nest types successfully by scent.

The foxes were better nest predators in open dune crest habitats. Some mammals preferentially travel along dune crests in this region, and this could be the case for the fox. Crows and ravens were less active nest predators in October than in June, probably due to the higher air temperatures experienced in October. As diurnal animals, crows and ravens may need to limit their activity in hot weather to prevent water loss. On the other hand, foxes are nocturnal, and their activity was probably less affected by the higher October temperatures.

We found potential evidence of dingoes influencing cat behaviour, with cats not feeding from the few carcasses that dingoes visited. At carcasses where dingoes were absent, cats sometimes spent hours scavenging the remains. This suggests that despite the general preference cats have for live prey, they will take advantage of animal remains in some environments and conditions, such as in the arid zone during dry weather. No cats were observed taking eggs from the artificial nests. This may have been because cats prefer predating birds at other life stages, such as fledglings and adults.

Implications

Our study showed that carcasses attract red foxes and feral cats and increase the probability of ground nests being predated. The ability of red foxes to access our artificial night parrot nests was concerning. Night parrot populations predominantly occur where foxes are scarce or absent, with our data suggesting that the lack of nest predation by red foxes could be important to the night parrot's survival.

Carcasses are typically overlooked in management as they can be a patchy resource that provides only short bursts of nutrients into ecosystems. However, carcasses may impose substantial negative effects on local ecosystems when they are present in excessive or unnatural quantities, such as following culling, or when fed on by invasive scavengers. These potential unintended effects should be considered when carcasses are used to fulfil management objectives, such as for supplementary feeding to bolster native predator populations.

One solution to reduce the negative impacts of carcasses on ground-nesting birds is to remove carcasses from the landscape. This may be necessary if carcasses are in abundance following sustained culling activities. However, this also requires consideration of the positive effects carcasses provide to native scavengers, such as wedge-tailed eagles and sand goannas. A possible strategy is to only remove carcasses from areas that provide important nesting habitat when ground-nesting birds are breeding and producing young. Invasive species that use carrion could be controlled when animal culls are conducted, and when carcasses are abundant. Carcass removal could also focus on times when native animal populations are low and particularly vulnerable to predation. In arid environments, this includes the early stages of drought, when prey numbers are declining but predator numbers are still high.

Our findings do not rule out the possibility of using artificially distributed carcasses to provide supplementary food for native predators such as dingoes; however, more research in this area is required. For example, to determine any negative impacts of carcass addition, we need to determine how frequently invasive predators are using carcasses in a particular region. Further research is also needed to establish whether dingoes use carcasses more frequently when they are more abundant in an environment.

Red fox removing a plasticine egg from an artificial nest. Image: Emma Spencer, USYD.

Cited material

Emma E. Spencer, Chris R. Dickman, Aaron Greenville, Mathew S. Crowther, Alex Kutt, and Thomas M. Newsome. (2021). Carcasses attract invasive species and increase artificial nest predation in a desert environment. *Global Ecology and Conservation*. https://doi.org/10.1016/j.gecco.2021.e01588

Emma E. Spencer and Thomas M. Newsome (2021). Dingoes dining with death. *Australian Zoologist*. https://doi.org/10.7882/AZ.2021.008

Further Information

Emma Spencer
e.spencer@sydney.edu.au

Thomas Newsome
thomas.newsome@sydney.edu.au

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