



# AUSTRALIA FELIX

Cats have preyed on Australian birds since they jumped off the First Fleet, but there have been no nation-wide studies about the extent of the damage they cause—until now. **John Woinarski, Brett Murphy** and **Sarah Legge** share the results of their new research, which shows the magnitude of cat predation on native birds.



Cats take a huge toll on Australian birdlife. But when it comes to understanding declining bird populations, it's tough to compare or separate the effects of cat predation from the effects of other threats such as habitat loss and climate change. Getting rid of feral cats in Queensland will make little difference to birds if bulldozers keep clearing the bush at current rates. Equally, leaving the bush where it is won't mean much if cats continue feasting on millions of birds. Feral cats pose a distinct and pressing problem—and one that requires understanding and solutions. To best protect our birds, we need to know the relative impacts of these different threats and how to redress the most severe of them, including how to lessen the influence of these crafty killers.

### A fiend in feline shape

Introduced to these shores in 1788, house cats spread rapidly, and by 1900 their range encompassed all of mainland Australia and many of its islands. *The Emu* in the early 1900s contained some remarkable accounts of the rapid decline of many birds, including Night, Paradise and Turquoise Parrots, and speculation on the likely causes.

Some—most notably, AJ Campbell—considered that a major cause was the proliferation of feral cats and he was unstinting in his advocacy to redress the problem. He wrote in a 1906 edition of *Emu*, “Undoubtedly, if many of our highly interesting and beautiful birds, especially ground-loving species, are to be preserved from total extinction, we must as a bird-lovers’ union, at no distant date face squarely a wild-cat destruction scheme.”

Historical evidence supported some of his claims. The Horn Expedition to Central Australia in 1894 reported local observers noting that the arrival of feral cats at Innamincka immediately preceded the rapid disappearance of the Night Parrot, and that “in one of the operator’s rooms [at Alice Springs Telegraph Station] several picture frames were covered with wings and tails of the Porcupine Parrot which had been caught by a cat last summer.” Edwin

Ashby likewise reported that, in South Australia, Ground Parrots disappeared from sites soon after the arrival of feral cats.

But there have been those who have held contrary opinions. In a 1924 assessment of the factors that were contributing to the loss of Australian birds, Ashby considered that the role of cats was generally relatively trivial, writing, “the destruction [of birds] by the predaceous animals introduced by man, such as cats, foxes, rats, etc... except in confined areas, such as islands, do not, in my opinion, seriously count.”

These contrasting perspectives have not been resolved since, at least in part because there have been few definitive studies, and no comprehensive review of the evidence.

From the mid-twentieth century the issue of the extent to which killing by cats contributed to population declines in Australian birds was reconsidered courtesy of a series of studies on cat diet. In the 1960s and 1970s, studies on Macquarie Island demonstrated that the approximately 375

“On average, more than one million birds are killed per day by cats in Australia.”

individual feral cats there then collectively killed more than 50,000 seabirds and their chicks per year, with such rates responsible for the ongoing decline and extirpation of some seabird species. Subsequent studies on many islands world-wide have concluded similarly— island bird populations are particularly at risk from cats.

However, comparable studies of the diet of cats on mainland Australia were more equivocal. One of the first such studies, in 1972 in Victoria, found the remnants of birds in only 7.5 per cent of 128 feral cat stomachs, and concluded that, “although birds were common in all sampling areas, they were a relatively minor item in the diet [of feral cats]. Presumably, other factors such as difficulty of capture are responsible for the low intake of birds.”

A different perspective came from studies in the 1990s, particularly by David Paton, of the take of birds by pet cats. These

studies estimated that in suburban areas domestic cats kill 10-20 birds per hectare per year. Paton wrote, “This is equivalent to domestic cats taking all of the young being hatched ... or at least 50 per cent of the standing crop of birds ... based on reported rates of capture, millions of birds succumb to domestic cats in large cities, like Melbourne, Sydney and Adelaide, each year.” And in 2001, an intensive study of the abundance and diet of feral cats in arid South Australia likewise concluded that cats may be exerting a severe impact, estimating that feral cats in that area killed 150 birds each per square kilometre every year.

### A national census

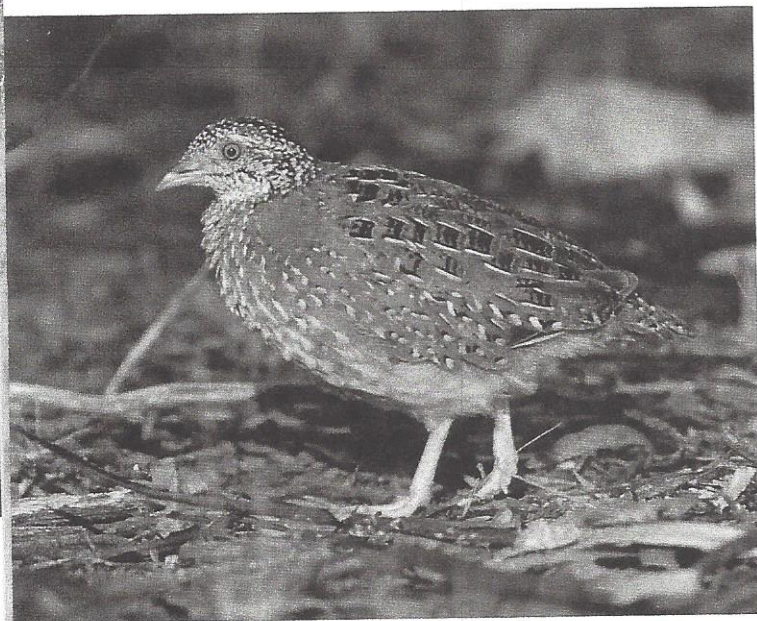
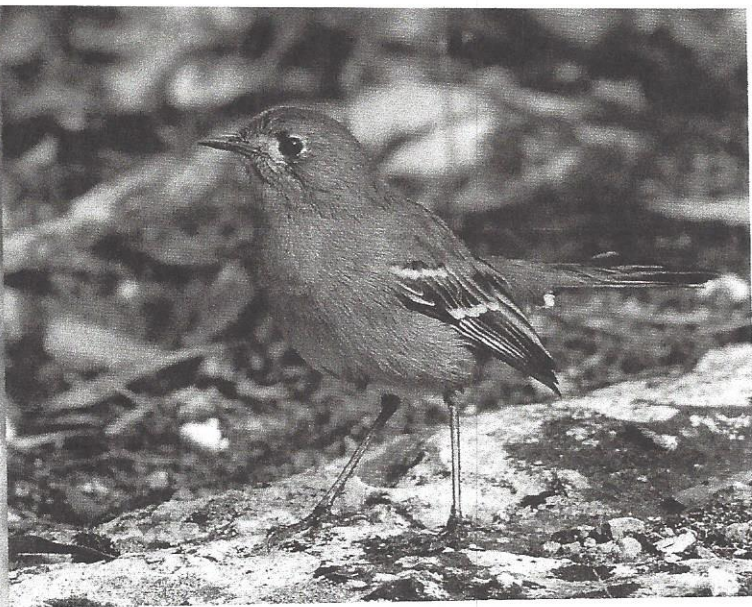
In our research we have attempted to provide an Australia-wide overview of the extent of bird mortality due to cats. First, we used a large series of local studies to model the variation across Australia in cat density. From this, we estimated that the total number of feral cats in natural environments in Australia varies from about 1.4 million (after low rainfall years) to 5.6 million (following good rainfall in Central Australia), with a further 0.7 million feral (‘stray’) cats in modified

environments. The number of pet cats in Australia is estimated (from surveys of pet ownership) at about 3.9 million.

Second, we collated data from another series of almost 100 studies (with a total of nearly 10,000 samples) across Australia of the diet of feral cats. On average, and representing what they’ve eaten in the preceding 24 hours, a feral cat in Australia will have 0.42 birds in its stomach. In natural environments, more than 99 per cent of these cat-consumed birds are native. We found that this incidence of birds in feral cat diet is significantly higher than for foxes and wild dogs. The highest incidence of birds in cat dietary samples is on islands (especially smaller islands) and in arid and semi-arid Australia.

We calculated that feral cats in natural environments in Australia kill an average of 272 million birds per year (ranging from 161 million per year following ‘dry’ years to 757 million per year following ‘wet’ years).





#### From top:

The Southern Scrub-robin lays a single egg in a nest of twigs on the ground, making it one of the many species vulnerable to predation by feral cats. Photo by David Newell

Another ground-nesting species, the Red-tailed Tropicbird breeds on islands, usually bringing up its chick under a low cover of scrub—but with little protection from cats and other pests. Photo by Lachlan Hall

Like many ground-dwelling birds, the Painted Button-quail is disproportionately vulnerable to being preyed upon by cats. Photo by Chris Tzaros

With less evidence, we estimated that feral cats in highly modified environments kill 44 million birds per year, and pet cats kill 61 million birds per year.

Our estimate of more than one million birds killed per day by cats is a large toll, but the extent to which it may represent a significant conservation impact depends in part on how large a proportion this represents of the total number of birds in Australia.

Curiously, we're not aware of any previous estimate of Australia's total bird population. We made an informed, but admittedly crude, estimate based on averages of a series of surveyed local bird densities. Our estimate is that there are about 11 billion land birds in Australia, suggesting that cats consume about 3-4 per cent of the total population every year.

For some bird species, this may represent a bearable take; for others, a chronic loss that may result in ongoing population decline and greater population-level susceptibility to other factors; for yet others, an unsustainable take that will drive severe and sharp population decline. The impact will vary among species depending upon the extent to which cats target them, their abundance and life history characteristics, and their distributions relative to variation in cat density and diet. The impact of cat predation is often magnified by other threats—cat densities and hunting efficiency tend to be higher in fragmented habitats and in areas with frequent, intense fire regimes and high rates of grazing pressure.

We found records of cat predation on 338 Australian native bird species, including records from 71 of the 117 bird species listed as threatened in Australia. We modelled the incidence of cat predation records against a series of bird traits, and found (unsurprisingly) that bird species that nest and feed on the ground, are of intermediate body size, occur on islands, and inhabit woodlands, grasslands, shrublands, heathlands and marine habitats (in this case, mostly nesting seabirds) are more likely to have been reported as cat-killed.

Of course, there is more likelihood of a bird being reported to have been killed by cats if it is of a common, widespread and well-studied species. When we controlled for these factors, we derived an estimate of the *per capita* likelihood of a bird species being killed by cats. Species with the highest estimates for this value included quail-thrushes, button-quails, ground-dwelling pigeons and doves, scrub-birds, Southern Scrub-robins, bristlebirds, quails, Ground and Night Parrots, Plains-wanderers, Western Whipbirds, Crested Bellbirds and wedgebills.

Along with some breeding seabirds that occur on islands with cats, it is species such as these that we suspect are most likely to be facing ongoing population reduction due to cat predation. Many of these species occur in remote areas and



are not subject to ongoing population monitoring or targeted conservation management. While most occur in some national parks, our analysis of variation in cat density suggests that feral cats occur as abundantly in reserved and unreserved areas, so occurrence of these birds in reserves may offer little conservation security.

### What needs to be done?

We return to AJ Campbell's plea from more than a century ago—to implement some effective control of feral cats. The Australian government's recent Threatened Species Strategy called for the eradication of cats from a small set of islands, the establishment of a network of predator-exlosures, and culling of two million feral cats by 2020. These may provide some benefit to Australian birds, but perhaps far too little for some of our most cat-susceptible species, because most cat-susceptible birds will simply fly out of exclosures; and a cull may be a temporary and ineffective approach to a long-term reduction in cat numbers and impacts.

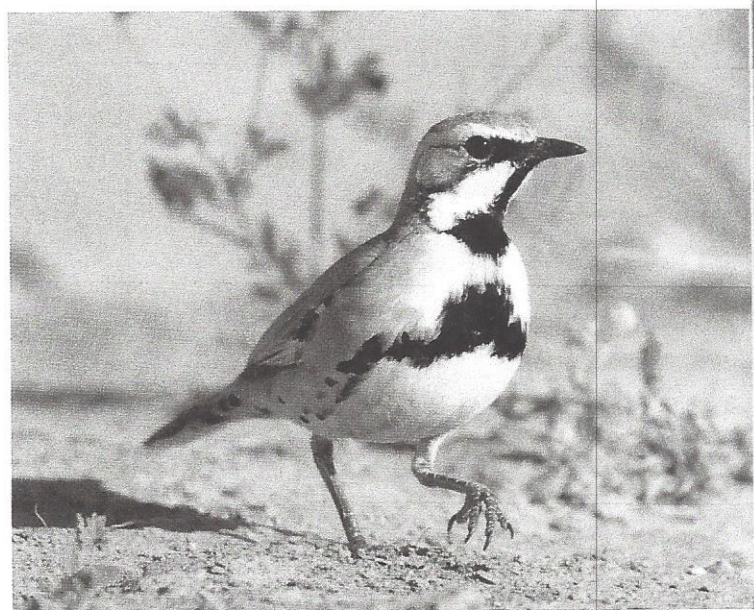
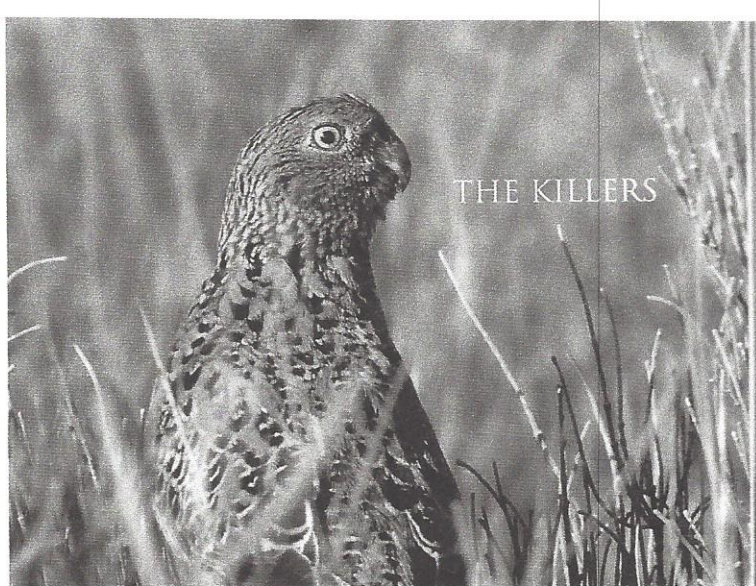
Ultimately, effective ways of controlling feral cats across vast landscapes may require new technology, such as genetic manipulation. But in addition to seeking to control feral cats, we also need to do better at monitoring at-risk bird species, and do more research on their population viability.

Feral cats are but part of this problem. Pet cats also take many birds, and options to reduce their impact are more tractable than for feral cats. One approach is to contain pet cats in a house rather than allow them to roam freely. This obviously reduces their take of birds, but also has some benefits to the cats themselves in reducing their incidence of disease, absconding or road trauma.

Feral cats have fed on many billions of Australian native birds over more than 200 years. The problem has concerned ornithologists and conservationists for more than 100 years. Little has been done to address this long-standing problem and, as a result, the status of many Australian bird species has undoubtedly deteriorated. We now have much more evidence and insight into the problem. We should no longer ignore it.

*John Woinarski and Brett Murphy are based at Charles Darwin University, and Sarah Legge at Australian National University and University of Queensland. They are all part of the National Environmental Science programme's Threatened Species Recovery Hub, and co-lead a research project that aims to better understand the impacts of feral cats, and how those impacts can be managed.*

**With thanks to Stephen Garnett, Leigh-Ann Woolley, Tim Doherty, Russell Palmer, Chris Dickman and David Paton.**



From top:

The Endangered Eastern Ground Parrot is particularly susceptible to cat predation, given its propensity to feed and nest in low heathland scrub. Photo by Lachlan Hall

Cinnamon Quail-thrushes make their home across Australia's vast outback—one of the areas researchers found had the highest incidence of birds in cat dietary samples. Photo by David Newell

Fairy Prions are just one of the ground-nesting seabirds to have benefited from the eradication of cats on Australia's Subantarctic Macquarie Island. Photo by Don Hadden