Science for Saving Species

Research findings factsheet

Project 4.2.2

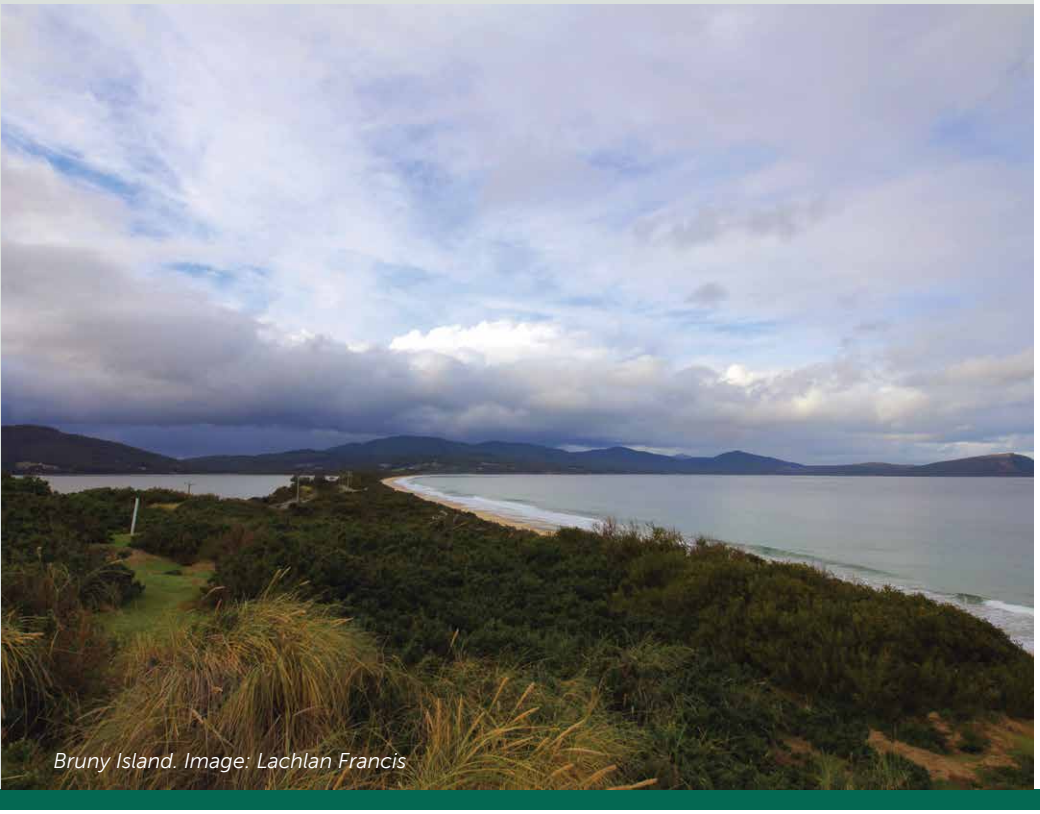
Threatened Species Recovery Hub

National Environmental Science Programme

Saving threatened species on priority islands: Cat management on Bruny Island

In brief

Although islands are biodiversity hotspots, they are particularly vulnerable to threats posed by invasive species. Feral cats have been responsible for, or implicated in, dozens of species extinctions since European arrival, on mainland Australia and its islands. On Bruny Island off the southern Tasmanian coast, a number of threatened and culturally significant species are impacted by predation by feral cats. This research set out to help conservation management agencies working on Bruny Island to address feral cat management in the most efficient and cost-effective manner with the aim of supporting recovery of key native species. Our prioritisation project has helped to establish new priority sites for cat management, and identified areas for cat exclusion through fencing. It also addressed concerns of locals about the potential increase in numbers of introduced rats and mice in the absence of cats under future successful management.



Bruny Island. Image: Lachlan Francis

Background

Australia's more than 9000 islands support hundreds of threatened and culturally significant species. Islands are home to disproportionately high levels of biodiversity and high numbers of endemic species (species found nowhere else). However, they are especially vulnerable to biological invasion, which is the major driver of biodiversity loss on islands. Feral cats pose a significant risk to Australia's unique native animals and, since their introduction with European arrival, have been implicated in dozens of extinctions of native species, including on islands. The question remains, however, whether all islands are necessarily suitable candidates for feral cat eradication programs, which are often expensive.

Bruny Island is a large (353km^2) inhabited island off the coast of southern Tasmania. At least 10 threatened animal species are present on Bruny Island, and the island is an important site for many migratory birds that are both threatened and culturally significant. However, Bruny Island is also host to a range of introduced species, including feral cats, rats, mice and rabbits.

Under the Threatened Species Strategy, the Australian Government identified Bruny Island as one of

The University Of Queensland AUSTRALIA

Tasmanian Government

Kingborough

Background (continued)

five Australian islands for potential cat eradication. In response, investigations are underway into a variety of options for the management of feral cats on the island, from complete eradication of cats to responsible cat ownership. We conducted this project in 2018 to inform decision-making about the future of cat management on the Island.

Many species on the island would benefit from the eradication of cats, including threatened eastern quolls (*Dasyurus viverrinus*), eastern barred bandicoots (*Perameles gunnii*), forty-spotted pardalotes (*Pardalotus quadragintus*) and hooded plovers (*Thinornis rubricollis*); and the non-threatened species little penguins (*Eudyptula minor*), short-tailed shearwaters (Ardenna tenuirostris) and the native swamp rat (*Rattus lutreolus*). Penguins are important to eco-tourism on the island, and shearwaters are culturally significant to the island community.

Research aims

We aimed to support the recovery of threatened and culturally significant faunal species on Bruny Island that are at risk of predation by invasive species. To do so, we investigated the conservation benefits to species that have permanent breeding populations on Bruny Island in response to various options for feral cat management.

Further, to address local community concerns about cat eradication, we aimed to investigate the potential release of rodent populations on Bruny Island if cats were removed.

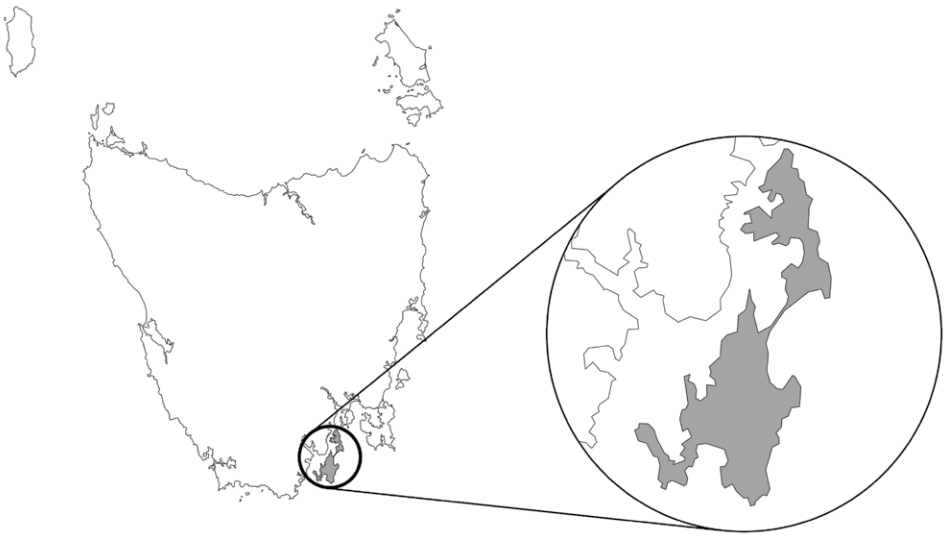


Figure 1. Bruny Island is a large (353km^2) inhabited island off the southern coast of Tasmania.

Some local residents on the island are concerned about the effect of removing feral cats on the populations of invasive rodents; in particular, locals worried that eradicating feral cats would lead to an increase in the numbers of these smaller pest animals, in a process known as "mesopredator release". Rodents are known predators of ground-nesting birds, of which Bruny Island has many, several of them among the island's threatened and/or culturally valued species.

There was no information available at the time of our study about the abundance of rodents on Bruny Island, what the potential effect of rodents on seabird colonies might be or the effect of the presence of cats on the abundance of rodents on Bruny Island. A study of cat–seabird interactions at Bruny Island locations The Neck and Whalebone Point was available, and showed that cats live and hunt within these seabird colonies; the study was informed on work by the Invasive Species Branch of the Tasmanian Government Department of Primary Industries (DPIPWE), Tasmanian Parks and Wildlife Services and other programs, such as the Hamish Saunders Memorial Island Survey Report 2013. However, the only prior studies on mesopredator release of rats following cat removal are limited to low-productivity islands (sites where prey resources other than conservation assets are scarce), which Bruny Island cannot be considered to be, meaning that it had limited application to our research.

The research team worked with the Bruny Island Cat Management Project, in partnership with the Kingborough local council, scientists from the Tasmanian Government Department of Primary Industries, Parks, Water and Environment Invasive Species Branch, Tasmanian Parks and Wildlife, land managers and species experts.

Lachlan Francis checking tracking tunnel survey results on Partridge Island, part of the South Bruny National Park. Image: Liam Daley

What we did

We examined how the key threatened and culturally significant species are impacted by feral cat predation on Bruny Island. The species assessed were the threatened eastern quoll (*Dasyurus viverrinus*), eastern barred bandicoot (*Perameles gunnii*), forty-spotted pardalote (*Pardalotus quadragintus*) and hooded plover (*Thinornis rubricollis*); and the non-threatened but culturally significant little penguin (*Eudyptula minor*) and short-tailed shearwater (*Ardenna tenuirostris*). Penguins are important to eco-tourism on the island, and shearwaters are culturally significant to the island community. We also studied introduced invasive black rats and mice (*Rattus rattus* and *Mus musculus*) and the native swamp rat (*Rattus lutreolus*).

To fill knowledge gaps about rat abundance and potential response following cat eradication we undertook surveys of the abundance of rodents at multiple sites and islets, in the presence or absence of seabirds and of cats. We did this by deploying footprint tracking tunnels for single night surveys during the winter and spring of 2018.

We analysed tracking data to determine the probability of tracking rats in the presence and absence of seabirds and cats, which we interpreted as an index for abundance in the presence and absence of cats and seabirds on the Island. This work also served to identify the potential impacts of cat management on rodent populations.

We combined existing available data and expert knowledge to generate population-level responses to feral cat management on the Island, simulating the population trajectories for each of the key species identified under no feral cat management and under complete eradication of feral cats. The differences between these two population trajectories for each species were calculated as the conservation benefit of feral cat eradication.

Population-level benefits were spatially distributed according to each of the key species' distributions across the island landscape. This we used as a basis for prioritising locations to be considered for ongoing management across all species.

Given that island conservation projects are often expensive, particularly on larger islands like Bruny, and conservation budgets are always finite, we used the project prioritisation protocol (PPP), which builds on the Noah's Ark framework (a methodology that considers the costs and benefits of conservation actions) as a way to maximise conservation outcomes for threatened species under conditions of limited budgets. The PPP is a transparent, repeatable process that allows conservation managers to decide between projects competing for a limited budget. The evaluation of likely project benefits is integral to PPP, and it also considers biodiversity benefits, likelihood of success, costs, and weightings for species.

Key findings

Through the course of this project, it became clear that an eradication program on Bruny Island would be a complex and large scale undertaking and with some knowledge gaps requiring attention.

Prioritisation

Our key finding is that, if the decision is made that whole-island eradication is not undertaken, specific land units should be targeted for ongoing feral cat management, based on the distributions of threatened and culturally important species and their vulnerabilities to cats. The research identified three key areas for initial prioritisation if an island-wide cat eradication is to be considered: The Neck, Dennes Point and the whole of North Bruny. Priority areas for ongoing cat management, either in lieu of an eradication or in conjunction with an eradication, were determined to be Whalebone Point, The Neck, Lutregala Marsh and Dennes Point. These identified areas of greatest conservation benefit could be used as priority areas for cat exclusion fencing, and would be a valuable investment in protecting threatened and culturally valuable species.

Rats

Field surveys revealed the presence of a highly competitive native swamp rat at sites around Bruny Island. We observed mutual exclusivity between the introduced

Cited material

Francis, L.R. (2018). Not all islands are equal. A conservation analysis of feral cat management on Bruny Island, and a rodent ecological interaction field study, B. Env. Sc. (Hons) Thesis, University of Queensland, Brisbane.

Further Information

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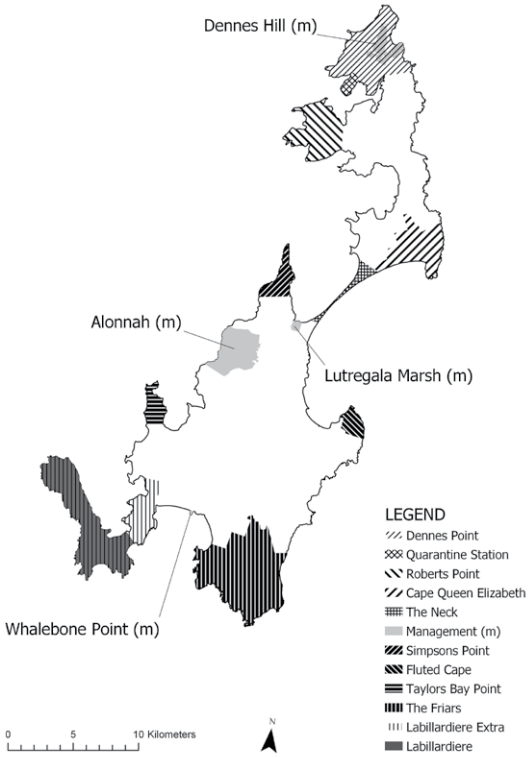
Key findings (continued)

black rat and native swamp rat. Data analysis revealed that the presence of seabirds was positively correlated to the probability of tracking rats (either native or introduced); and that the presence of cats had a smaller, negative (and statistically insignificant) correlation to the probability of tracking rats. We therefore anticipate that if feral cats become absent under a future eradication, the highly productive island landscape (presence of alternative food sources) and presence of the native rat will limit any dramatic population increase in invasive black rats in suitable habitat.

Species status

Through expert elicitation and consultation with multiple experts, we confirmed the long-held suspicions that, despite species records of eastern barred bandicoots on Bruny Island in state and national databases, they are not present on the island. The consensus is that they were probably never present. Several other marsupials common on mainland Tasmania are not present on Bruny Island (e.g., Tasmanian devils, *Sarcophilus harrisii*; and southern wombats, *Vombatus ursinus*).



RIGHT: Figure 2. Areas considered under the Bruny Island prioritisation exercise.

Implications and applications

The research has been presented to the steering committee of the Bruny Island Cat Management Project, of which project leader Dr Justine Shaw is a member. In addition, prioritisation maps such as Figure 2 have helped managers to identify areas that would be suitable starting points for eradication and ongoing feral cat management. The research is also relevant to other researchers and practitioners in Australia currently working on cat eradications on islands.

Our findings have led to changes in on-ground cat management undertaken by Tasmanian Parks and Wildlife Service and the Bruny Island Cat Management Project. This work has contributed to a successful new Regional Land Partnerships project, led by NRM South and Kingborough Council. This partnership was developed to fund new management initiatives on the island, such as the fencing of key areas to conduct research towards understanding the efficacy of the various cat management options.

The finding that invasive black rats and native swamp rats are highly competitive and mutually exclusive has also informed the Bruny Island Cat Management Project's community engagement, regarding cat management being unlikely, as feared, to drastically increase the numbers of invasive black rats on the island in response to cat eradication.

Future research supported by the Bruny Island Cat Management project through Regional Land Partnerships funding may be able to address knowledge gaps identified by the research, including the distribution of seabirds on the island, the impacts of rats predating on seabirds and cat predation rates on threatened mammals and birds on the island. This information, once determined, will be valuable to informing where future cat management should best be undertaken, and quantifying the benefits of whole island cat eradication.

Australian Government

Threatened Species Recovery Hub
National Environmental Science Programme

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