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The Kangaroo Island dunnart: distribution, status and effective monitoring methods

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Protecting and detecting the Kangaroo Island dunnart

Key messages

The Endangered Kangaroo Island dunnart persists on western Kangaroo Island in low numbers.

The species is hard to detect. This project trialled four monitoring methods. It found that camera traps facing drift fences were the cheapest and most effective detection method.

Dunnarts were found at five of 42 sites surveyed. Low detection rates meant the study was unable to conclude, with reasonable confidence, if there has been a reduction in site occupancy in the past two decades.

Feral cats pose a threat to the dunnart. Arrays of remote cameras found that cat densities in some areas on western Kangaroo Island were higher than average densities on mainland Australia.

An island-wide cat eradication project has begun, for economic and environmental reasons.

Inaccessibility makes aerial feral cat baiting the most practical option for western Kangaroo Island. The next stage of this project will undertake non-toxic bait trials to determine how baiting will impact upon the dunnart and other small mammal species.

Context

The Kangaroo Island dunnart (*Sminthopsis aitkeni*) is a small carnivorous native marsupial that is listed nationally as Endangered and is restricted to Kangaroo Island.

When the project began in April 2017 the species had only been seen at eight sites in the last 20 years and little was known about its habitat preferences, current distribution and abundance.

Feral cats are considered a key threat to the dunnart. To protect the dunnart and other species a feral cat eradication program has commenced on Kangaroo Island.

Some key aims of this project are:

- to understand how the Kangaroo Island dunnart will respond to broad scale feral cat control
- to determine how best to monitor the species in future
- to fill knowledge gaps about the ecology, habitat preferences, distribution and abundance of the species.

A key activity of the project has been an extensive survey across western Kangaroo Island, which trialled and compared a variety of monitoring methods in order to determine which techniques are most effective at detecting the dunnart.

The survey covered a number of vegetation types and fire histories in order to help us gain a better understanding of what habitats the species prefers, and what resources it requires to persist in the landscape.

The density of feral cats in the region was also assessed, to understand the extent to which cats may threaten the remaining dunnart population and to provide information for the planned cat eradication.

In August 2018, the final part of the project commenced, examining the potential impacts of broad scale feral cat baiting on the Kangaroo Island dunnart and other native small mammal species.



Camera trap image of a Kangaroo Island dunnart. Photo: Rosemary Hohnen

The three pit sizes trialled.
Photo: Rosemary Hohnen.



Camera traps facing drift fences were the most effective method for detecting the Kangaroo Island dunnart. Photo: Rosemary Hohnen

Kangaroo Island dunnart surveys

Surveys for Kangaroo Island dunnarts took place across western Kangaroo Island over a five month period in August–September 2017 and March–May 2018. A total of 42 sites were trapped using four methods: Elliott traps, pitfall traps, camera traps facing fence lines, and baited camera traps. Also, three different sizes of pitfall trap were trialled, including two pit sizes that are used commonly in other biodiversity surveys across Australia, and also a deep wide pit, which is a size that has been shown to be effective for

trapping the similar Butler’s dunnart on the Tiwi islands.

To examine the impact of fire on dunnart occurrence we divided the sites between three main categories, recently burnt (0–10 years post fire), regenerating (10–20 years post fire) and long unburnt (>20 years post fire). Within these categories, most sites had an overstorey of Kangaroo Island mallee-ash (*Eucalyptus remota*), brown stringybark (*Eucalyptus baxteri*) or coastal white mallee (*Eucalyptus diversifolia*).

Findings

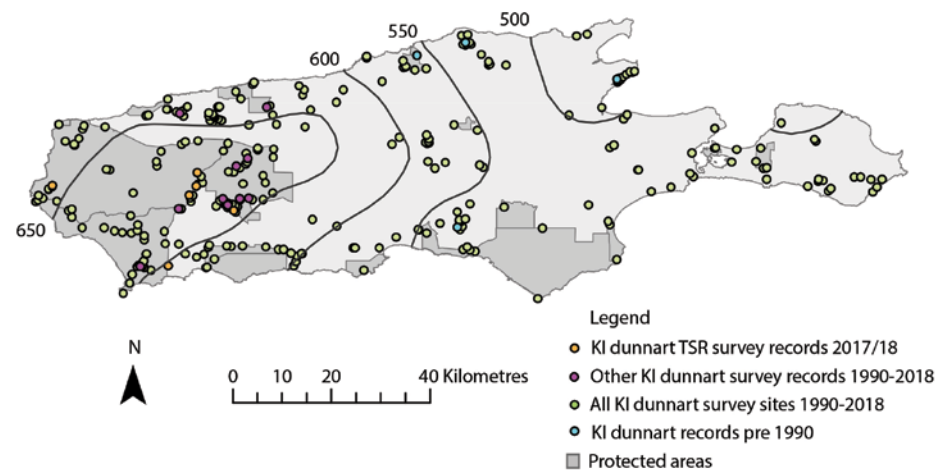
Dunnarts were detected on camera on seven occasions at five sites. Four of those sites were new, previously unsurveyed, sites and one site had a historic record.

Levels of occupancy were similar between this survey and a historic survey conducted in 1999–2001. The taxon was predicted to occupy 27% (95% confidence interval: 7 – 65%) of sites in eucalypt woodlands on western Kangaroo Island, and approximately 8% of the island as a whole. Camera traps placed to face drift fence lines were both the cheapest and the most effective dunnart detection method. Drift fence lines consist of 30 m lengths of heavy-duty plastic that are dug into the ground, forming a large barrier that funnels animals towards the cameras. Power analysis suggests that future surveys using this method must sample at least 55 sites in spring and autumn to be capable of detecting a 60% decline, and 26 sites to detect an 80% decline.

Although the sampling effort was very large, no dunnarts were caught in traps. However, wide deep pits (diameter 30 cm, depth 70 cm) were the most effective at catching small mammals, such as native bush rats and western pygmy possums, compared to other sizes such as PVC pipes, or standard 20 L buckets that are used commonly in biodiversity surveys throughout Australia.

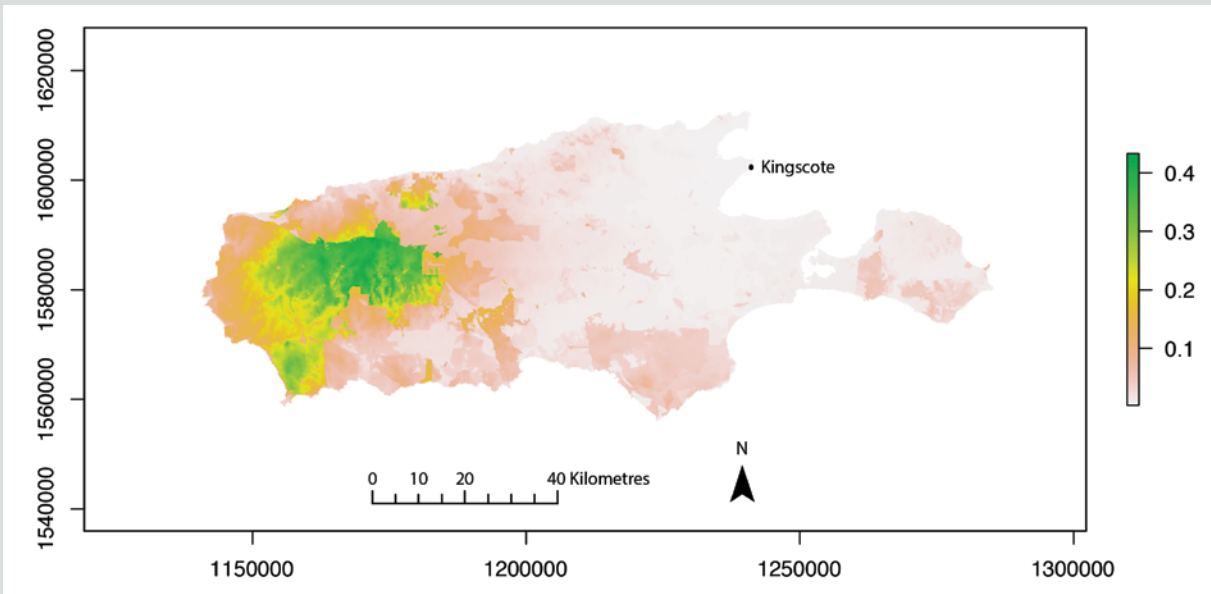
This indicates that if dunnarts need to be caught, for example, to collect genetic samples, wide deep pits are likely to be the most effective method.

The habitat preferences and likely distribution of the species was further examined with the use of species distribution models.



Kangaroo Island dunnart survey sites and records. Lines indicate rainfall isohyets.
Map: Rosemary Hohnen

An open mallee site.
Photo: R. Hohnen



Predicted dunnart occurrence. Map: Rosemary Hohnen

Species distribution modelling

Determining the factors that drive the distribution of the Kangaroo Island dunnart could help inform future surveys and effective conservation management strategies. A sufficient number of dunnart surveys have been done that enough records of the taxon now exist to examine its habitat preferences using species distribution models. These models can be used to distinguish common habitat features shared by these historic records, identify other areas where the species might persist and define habitat features that management strategies can support.

We ran generalised linear models on incidental records and presence-absence data from surveys between 1969 and 2018.

We included the variables rainfall, percentage of native vegetation in the surrounding 2km², elevation and post-fire vegetation age. Model-averaged results suggest that rainfall and post-fire vegetation age were good predictors of dunnart occurrence, which was greatest in high rainfall areas (>600 mm) and vegetation age classes less than 20 years post-fire. Dunnart occurrence was predicted to be highest on the central-western side of Kangaroo Island.

These results suggest that careful fire management could benefit the species, and that decreased rainfall (as projected by Australian climate models in the coming decades), could be an increasing threat to it in the long term.

Feral cat density estimates

Using arrays of 50 remote infrared cameras, we assessed feral cat density within Flinders Chase National Park, and at the border of the national park and farm land. After a two-month period the cameras were collected and the images downloaded and individual cats were then identified using their fur patterns.

In all three areas (national park, park border and farmland) cat densities were varied between 0.2 and 0.5 cats per km². Cat densities are therefore likely impacted by other variables that were not measured in this study such as prey availability. As the density of cats in some areas on western Kangaroo Island is over double the mainland average (0.23 cats per km²), it is possible cats are having strong negative impacts on native wildlife.

A young southern brown bandicoot. Many other species of small mammals, amphibians and birds were caught during the survey. Wide pits (diameter 30 cm, depth 70 cm) were the most effective for catching small mammals in general. Photo: Rosemary Hohnen.



Conclusions

The results of our study suggest the Kangaroo Island dunnart occupies less than one-third of sites in remnant eucalypt woodlands on western Kangaroo Island, and less than 8% of Kangaroo Island's total landmass. The species appears to prefer high rainfall areas (>700mm) and younger post-fire vegetation ages (0–20 years). A monitoring program is required to more accurately assess the species population trajectory and camera traps may be the most accurate and cost-effective method that could be used.

Arrays of remote cameras suggest that feral cat densities in some areas of western Kangaroo Island

are higher than on mainland Australia. These results are concerning and suggest that either cat control or the construction of a fenced "feral-free" enclosure could be very beneficial for the Kangaroo Island dunnart and other wildlife in the region.

To guide the planning of feral cat control strategies on Kangaroo Island, a second part of this project undertook a non-toxic bait trial to determine the likely uptake of baits by threatened and other native species. The results are summarised in a factsheet titled "Investigating feral cat control methods for western Kangaroo Island".

More Information

If you want to talk to someone about the research project please contact:

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The Kangaroo Island dunnart. Photo Jody Gates

