Biodiversity and Conservation Science

Demonstrating the Effectiveness of Detector Dogs for Feral Cat Control in Wheatbelt Reserves of Western Australia.

Department of Biodiversity, Conservation and Attractions

May 2020

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Biodiversity, Conservation and Attractions**

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May 2020

The recommended reference for this publication is:
Department Biodiversity, Conservation and Attractions, 2020, *Demonstrating the Effectiveness of Detector Dogs for Feral Cat Control in Wheatbelt Reserves of Western Australia*, Department of Biodiversity, Conservation and Attractions, Perth.

Contents

Acknowledgments

Latitude 42 Environmental Consultants Barry Baker and Katrina Jensz, Mark Holdsworth and Sue Robinson (Forest Hill Conservation Dogs) and Steven Candy completed the fieldwork and compiled information on each of the trials. The project was overseen by the Detector Dog Steering Group (Manda Page, Dave Algar, Tony Friend, Mark Cowan, Peter Lacey, Rob McLean, John Lawson). Phil Wyatt developed the field data management Fulcrum application and provided GIS support. Guus Knopers (K-9 Trainer, New Zealand) sourced and provided initial training of detection dogs. Rob McLean, John Lawson and Brian Macmahon operated and serviced the camera trap array in Tutanning Nature Reserve (NR), scanned the images and databased the results. Mark Cowan designed the camera trap array and analysed the camera trapping data. Tony Friend, Corey Mosen, Brian Macmahon, Dave Algar and Neil Hamilton trapped for cats to collar at Tutanning. Tony Friend provided support for the Latitude teams in the field, supplying 400 cattery scats for Trial 1 and downloading data from GPS collars on cats at Tutanning. Dave Algar provided 20 feral cat scats for the scat persistence trial. Two of the local landowners in the Tutanning NR area and their employees allowed access to their properties to facilitate the work. Funding and support were provided by the Foundation for Australia's Most Endangered Species Ltd (FAME), the Australian Government's National Landcare Programme, the Numbat Task Force and the Department of Biodiversity, Conservation and Attractions. Mark Blythman assisted in compiling the report.

Summary

In partnership with the Foundation for Australia's Most Endangered Species Ltd (FAME), the Australian Government's National Landcare Programme, and the Numbat Task Force, the Department of Biodiversity, Conservation and Attractions (DBCA) trialled the effectiveness of using detector dogs (scent detector dogs) for feral cat (*Felis catus*) control on conservation reserves in the Wheatbelt of Western Australia.

The objectives of the project were to demonstrate and quantify the reliability and efficiency of detector dogs to detect feral cat scats, and to locate and track live feral cats with an endpoint of euthanasia.

The efficacy of locating cats with scent tracking dogs in and adjacent to conservation areas would appear to be high but achieving successful and humane euthanasia of detected cats is difficult.

The trials demonstrated that detector dogs are highly efficient at detecting cat scats within a Wheatbelt woodland environment and that scats can provide a detectable indication of the presence of feral cats for a period of one month in this environment.

Detector dogs were able to reliably and efficiently locate and track feral cats in targeted search areas, however achieving an end point of euthanasia was challenging in well-vegetated woodland reserves due to feral cat behaviour and limited methods for trapping and humane killing.

The study indicates that farms are good refuges for feral cats and probably provide shelter and food for individuals that venture into adjacent reserves at times. Controlling feral cats occupying farmland could therefore be an effective strategy in reducing the overall population of cats within the Western Australian wheatbelt and reducing predation pressure in adjacent conservation reserves. This would be best achieved through a suite of techniques, of which dogs should only be considered as one of a number of useful strategies. Their particular value would be in locating cats that had not succumbed to broader-scale programs such as poisoning and trapping.

1 Introduction

In 2018, the Department of Biodiversity, Conservation and Attractions (DBCA) in conjunction with project partners, the Foundation for Australia's Most Endangered Species Ltd (FAME), the Australian Government's National Landcare Programme and the Numbat Task Force, initiated research to test the effectiveness of using detector dogs to complement existing feral cat (*Felis catus*) control on conservation reserves in the Wheatbelt of Western Australia. Latitude 42 Environmental Consultants were engaged to provide detector dogs and handlers and to undertake trials to evaluate and quantify the level of effectiveness of this technique in feral cat control projects.

The project consisted of two trials on Tutanning Nature Reserve (Tutanning NR) in the Wheatbelt of Western Australia. The specific objectives of the project were to:

1. demonstrate and quantify the ability of detector dogs to detect feral cat scats when present at the study site; and
2. demonstrate the capability of detector dogs to reliably and efficiently locate and track live feral cats, with an endpoint of euthanasia.

This report summarises the key outcomes and recommendations from the project.

2 Study area

The main study was carried out in Tutanning NR (32.558642°S 117.333960°E) and adjacent agricultural land, located 20 km east of Pingelly in the Wheatbelt of Western Australia. Tutanning NR is approximately 2,400 ha in size, and is characterised by jarrah/wandoo open woodlands and patches of kwongan (heath and shrublands) (Safstrom 1997). The climate of the area is regarded as Mediterranean and characterised by hot dry summers and cool, moist winters (Safstrom 1997). The average annual rainfall is 328 mm mostly falling between May and September (http://www.bom.gov.au/climate/averages/tables/cw_010626.shtml).

The reserve is surrounded by agricultural land used mainly for grain crops and sheep grazing, with shelter belts remaining on the hilltops, comprising large woodland trees with most of the understory removed. Tutanning NR has been a significant refuge for native flora and fauna, however recent declines in a number of mammal species have been observed. Threatened and priority fauna species recorded in the reserve include numbat (*Myrmecobius fasciatus*), chuditch (*Dasyurus geoffroii*), woylie (*Bettongia penicillata ogilbyi*) and red-tailed phascogale (*Phascogale calura*), while other more common mammal species include tammar wallaby (*Notomacropus eugenii*), western grey kangaroo (*Macropus fuliginosus)* and western pygmy-possum (*Cercartetus concinnus*). Tutanning NR is regularly baited for red foxes (*Vulpes vulpes*) under DBCA's Western Shield native animal conservation program (https://www.dpaw.wa.gov.au/management/pests-diseases/westernshield), but at the time of the study no feral cat control was being undertaken within the reserve.

3 Detector dogs

Three trained detector dogs were used during the project trials. All dogs had been trained to detect cats and provide a focussed response to the target odour. At the time of commencement of the project all dogs had cat detection experience spanning numerous projects in Australia. The dogs were also trained to avoid a range of non-target wildlife odours and wore muzzles throughout the trials.

During the first trial, detector dog teams consisted of a dog, a handler and an orienteer. Two teams were used during this trial. During the first part of trial 2, the detector dog team consisted of a dog, a handler and a shooter. One dog was used during this trial. During the extension to trial 2 the two detector dog teams consisted of a dog and a handler, sometimes accompanied by a shooter. Three dogs were used between the teams during this trial to allow resting of one dog.

4 Trial 1: Detection of scats (May 2018)

Objective: Demonstrate and quantify the ability of detector dogs to detect feral cat scats when present at the study site

Summary of methods

Search area and 'planted' scats

The study area comprised a 720 ha section of Tutanning NR located in the south of the reserve (Figure 1). The survey area was nominally divided into 466, 1.5 hectare quadrats. Each quadrat was divided into 24 smaller plots (25m x 25m) and one of these plots was randomly selected to lay a cat scat (cat scats were marked to identify it as a 'planted' scat). All planted scats were obtained from commercial cat-boarding facilities.

Search transects were placed over the survey area so that they bisected a series of quadrats. The transect line was designed to ensure the dog team worked from a central line within the quadrat. The locations of all scats detected by dogs were recorded using GIS-based mobile phone application, and the distance from the scat to the transect subsequently calculated.

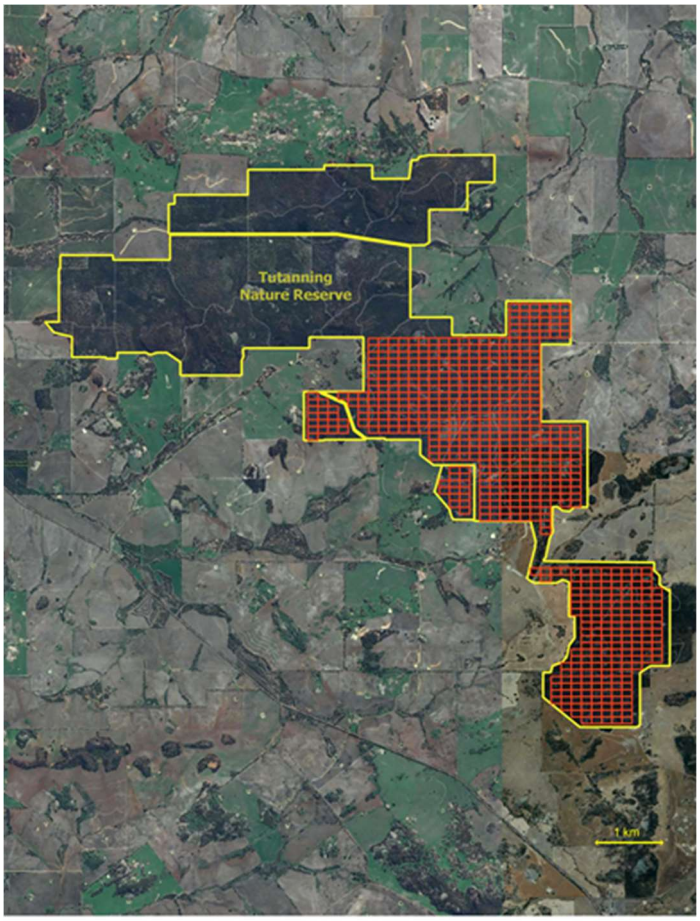

Figure 1. Tutanning Nature Reserve showing the 1.5 hectare quadrat overlay for cat scat detection study.

While the dog team knew there was at least one scat somewhere in the area of each of the 1.5 hectare quadrats, they did not know the location of the scat. The dog team were instructed:

1. To search along the transect once, i.e. not to re-trace steps to try and find the missed scat; and
2. If the scat was found, not to truncate the search or speed it up because they knew the only scat was found.

Weather conditions were recorded at the start of the day's search effort and any significant changes through the day were also recorded.

Scat persistence in the environment

To assess how long fresh scats remained detectable in the trial site environment, 20 pairs of scats (total 40 scats) were planted at random locations within the reserve and checked at regular intervals over a period of 29 days. Each pair of scats comprised one scat from a feral cat and one scat collected from a commercial cat-boarding facility cat ('planted' scat). The condition of scats was categorised when checked as no change, part missing, mostly missing, and completely missing. At the completion of the trial, detector dogs were used to ascertain if scats were still detectable.

Reliability and efficiency of detector dogs to detect feral cat scats

Scat persistence

Most of the scats laid within the reserve in the scat persistence trial were still present 29 days later when the experiment was terminated and could still be detected by a dog at close quarters at that stage. Scats therefore provide a detectable indication of the presence of feral cats for a period of up to a month in a woodland environment in the Western Australian wheatbelt.

Scat detection

Dogs proved to be highly efficient at detecting scats within the woodland environment of the WA wheatbelt, detecting scats in 58 percent of the quadrats that were searched.

Detection probabilities for scats declined with distance from the transect line and with increasing exposure time (age) of the scat. For scats exposed for up to 10 days, detection probabilities remained higher than 0.5 for a distance of up to 45m from the transect line, but the distance was reduced to 25m after 20 days, and after 30 day this was only achievable on the transect line.

Search time of the dog team was shorter at lower temperatures and substantially increased when temperatures exceeded 10ºC. Scats were harder to find when exposure time exceeded 20 days. This was possibly confounded with rainfall as significant rainfall events occurred during the latter part of the search component of the trial.

Simulations to inform management activities

Simulations based on the detection probabilities derived from this study provide guidance on survey effort necessary to detect the presence of cats in woodlands in the WA wheatbelt.

A simulation study was undertaken by replicating the search method used in this study (line transect overlaid on a grid) in a simulation of a range of cat densities (i.e. 1 cat/1515 ha to 15 cats/1515 ha) for a notional reserve area of 1515 hectares.

Under scenarios of low cat density (a single cat) in an area of 1515 hectares, a mean total search effort of 106 hours, or 47 transects of 1.5 km length would be necessary to detect if a scat was present with a high (0.99) probability of detection. For lower cat densities the simulations from this study indicate that placing search transects 200 m apart is more time-efficient than the 100 percent area coverage obtained by placing transects every 100 m.

5 Trial 2: Detection of live cats (August 2018)

Objective: Demonstrate the ability of detector dogs to reliably and efficiently locate and track live feral cats, with an endpoint of euthanasia.

Summary of methods

Identifying known locations of feral cats

Baseline and actual knowledge of where feral cats were located and and/or where activity was greatest was informed by the use GPS collars fitted to feral cats, camera traps and spotlighting surveys.

GPS collared cats

Prior to commencing the study, DBCA staff undertook trapping to capture feral cats and fit them with GPS-VHF (remote download) collars. Intensive trapping efforts within Tutanning NR met with low success, so later trapping targeted adjacent farmland. Five feral cats were caught and collared.

Data from four of the five collared cats was downloaded immediately prior to the commencement of field work. One of the cats had not been detected since it was collared. Data from the collars indicated that the four cats were denning on farmland adjacent to Tutanning NR — three to the south of the reserve, and one to the north. There were few data points showing denning within the nature reserve.

Camera Traps

Thirty Reconyx Hyperfire HC600 cameras were deployed within the reserve and set to operate 24hours a day. Cameras were unbaited.

Site selection for cameras was randomised but with a minimum distance of 750m between each camera, along with a buffer of at least 50m from any vehicle track or boundary with agricultural land. The boundary and road buffers provided security for the cameras as well as consistency in the primary objective of examining the broader landscape, rather than activity that may be influenced by “corridors” such as roads or reserve edges.

Cat detections on camera traps within Tutanning NR were few and concentrated in the south west corner of the reserve adjacent to farmland. Detections never exceeded a mean rate of 0.2 cats / day / 30 camera trap days (equivalent to 1 cat / 500 camera trap days) across the six months that the cameras were operational.

Spotlighting surveys

Spotlighting surveys were conducted from a vehicle each night from 17-21 August between 2200 and 2400 h to determine the location of collared cats and the presence of other cats in the study area. The vehicle travelled at a speed of 10 km/h, and the maximum distance travelled never exceeded 10 km on any one night.

Only three individual sightings of cats were recorded by spotlighting surveys over six nights (12 hours / 60 km), none of which were on the reserve. One of these cats was collared.

Search methods for collared feral cats

Because camera trapping data and earlier work with scat detection dogs indicated that few cats were present within Tutanning NR, and all collared cats were largely residing

on farmland, much of the work was restricted to the two private properties with collared cats, located to the south and north of Tutanning NR, respectively.

The tracking was conducted in areas the dog team considered likely to contain feral cats. This was most often determined by using telemetry to roughly determine (within 500 m) the location of a radio-collared cat, but some areas that were considered to provide suitable refuge were searched without prior knowledge of cat occupancy of the area. Fourteen searches of varying duration were conducted on private property located to the south and north of Tutanning NR.

The dog was allowed to determine the direction of the search, with only occasional direction by the handler e.g. to avoid hazards such as barbed wire or broken glass. The handler subjectively interpreted the strength of the dog's response to scent as none, low, medium, or high, based upon the trained behaviour and handler familiarity with the dog's baseline behaviour and body language.

During searches, the shooter positioned himself in a situation where a detected cat was potentially likely to run, thereby offering the opportunity for a shot to be fired. If a cat was not shot when breaking cover but was found in a den, it was euthanased with a single shot to the head, where possible, and the find classified as a 'kill'. Where the cat could not be euthanased in a den site within 15 minutes, the find was classified as a '*potential kill'*. Potential kills were subsequently assessed to evaluate the likelihood of converting these to an actual kill in a practical field-working situation, and were subjectively assigned to a category of high, medium and low probability. Where the dog indicated the presence of a cat, or a search where a cat was known to be present from the presence of a VHF signal, it was referred to as an '*encounter'*.

Reliability and efficiency of detector dogs to locate and track live feral cats (collared), with an endpoint of euthanasia

The dog was highly effective in detecting the presence of a cat, identifying the initial location of a cat on 13 of 14 potential encounters. Of the 14 encounters with cats, a total of seven or possibly eight individual cats were identified, five which had been collared and three others that were detected during searches for collared individuals. Of the 14 encounters, the dog team successfully tracked and located 10 cats and achieved two kills and eight potential kills. Four of the encounters failed to lead to locating a cat: on one of these occasions, the dog could not locate the cat despite a medium level of interest and a high level of confidence that a collared cat was in the vicinity. In this case the cat appeared to be denning around farm sheds and machinery and possibly was sitting well above ground level. With the other encounters, cats moved rapidly ahead of the dog team and the trail was subsequently lost or the search terminated because the dog required a rest, or another cat was encountered.

When the dog team were tracking a scent trail, cats typically moved to other refuges including rubbish tips, rock outcrops, farm buildings, rabbit holes and a tree. In remnant vegetation, rock outcrops were preferred: around farm homesteads, outbuildings and rubbish tips were preferred.

Attempts were made to euthanase cats whenever they were found but this proved difficult on most occasions due to the limitations on methods of capture and euthanasia. Of the eight encounters resulting in potential kills, two were assessed as having a high probability of achieving an actual kill if more time and additional tools were available, a medium probability with one, and a low probably with the remaining four. Additional tools may include techniques such as leg-hold trapping that have been used in cat and fox eradication projects in Australia, but which were not available to the contractors during this trial and would require further approvals under Western Australian legislation.

6 Trial 2: Detection of live cats - extension (June 2019)

Objective: Demonstrate the ability of detector dogs to reliably and efficiently locate and track live (non-collared) feral cats, with an endpoint of euthanasia.

Following on from the 2018 field work, additional activities were undertaken within the study area in June 2019 to further explore the ability of trained detector dogs to locate and track live feral cats (uncollared) to an endpoint of euthanasia.

Summary of methods

Camera Traps

The existing camera grid set up prior to the 2018 trial (30 unbaited cameras set in a constrained randomised design) was utilised to determine cat density within Tutanning NR prior to and during the period of the June 2019 field work. Eight cats had been identified on cameras over a six-month period prior to the trial 2 extension.

Nineteen additional cameras were deployed within areas where the eight cats had been observed. Additional cameras were baited with sardines or cat scat. The additional cameras were placed along tracks or the boundary of the reserve (interface between the reserve and agricultural land). In many cases the cameras were moved every few days after an area had been thoroughly searched by a dog team.

Only one cat was detected by the unbaited camera traps within the reserve immediately prior to commencement of field work (mid-April to early June), and no cats were detected on the same cameras over the time of the field work (521 trap nights).

In contrast, 14 images of cats (4–6 individuals) were detected on the baited cameras placed along roads and on the boundary of the reserve (268 trap nights) adjoining farmland. Most of the detections (12 of 14 images) were on the boundary cameras.

Spotlighting surveys

Spotlighting surveys were conducted from a vehicle between 19:00-24:00 on 9, 11, 13, 15, 16, 19, 20 and 23 June to determine the presence of cats in the study area and on adjacent farmland. Spotlighting within the reserve utilised the extensive road

network within Tutanning NR. All spotlighting off the reserve was undertaken on private property to the south or north of Tutanning NR and along the southern and northern boundaries of the reserve. The total time spent spotlighting was 17.5 hours and the total distance covered was 150 km.

Four cats were sighted during these spotlight surveys, one on the north-eastern boundary and three on private property south of Tutanning NR.

Search methods for uncollared cats

Tracking was largely confined to within Tutanning NR, with some work undertaken on adjacent farmland in areas where feral cats had previously been known to occur. Within the reserve, searching occurred in areas where cameras had detected a cat or areas such as breakaways, rock outcrops or creek lines which were considered likely to contain feral cats or their dens.

During a search the dog was allowed to determine the direction of the search, with only occasional direction by the handler to avoid hazards. The handler subjectively interpreted the strength of the dog's response to scent as none, low, medium, or high, based upon the trained behaviour and handler familiarity with the dog's baseline behaviour and body language.

Reliability and efficiency of detector dogs to locate and track live feral cats (non-collared), with an endpoint of euthanasia

Dogs spent a minimum 64.7 hours searching for cats and covered a minimum 312.8 km during June 2019. Of this effort, 39.5 hours were directed to areas within the reserve, with the dogs covering 190.3 km during the process. No cats or den sites were detected in the reserve areas selected for intensive and systematic searching.

The remaining search effort (25.2 hours; 122.5 km) was directed outside the reserve on private land. Only two cats were detected during these searches with one occupied den located. Both of these cats escaped as active pursuit was abandoned when cats moved into lambing paddocks.

All sightings of cats on cameras were followed up with dog searches. In most cases, the scent had dissipated, and cats could not be detected. Dogs only indicated interest when a search had commenced within a couple of hours of a camera detection event, and then usually only with a low or medium response. On three occasions cats were tracked by a detector dog along a road, usually near the reserve boundary, with the track eventually heading out of the reserve onto private land.

7 Key Findings

Detector dogs proved to be efficient at detecting scats within the woodland environment of the WA wheatbelt, detecting scats in 58% of the quadrats that were searched.

Detection probabilities for scats declined with distance from the transect line and with increasing exposure time (age) of the scat.

Feral cats are in extremely low numbers within Tutanning NR. This was supported by the low camera trap detection rate, and scat detection dogs locating only four feral cat scats during a month of intensive searching of 750 ha of the reserve in May 2018. In addition, five collared cats initially trapped on farmland ranged widely but were rarely recorded within the reserve, and cats were never seen within Tutanning NR during spotlight searches. Further, most of the detections from the monitoring cameras are within 100 m of the reserve boundary thus supporting the observation that cats are predominantly residing in adjacent farmland.

Information on feral cat activity and occupancy from the study indicates that cats are likely to den on adjacent farmland and forage within Tutanning NR from time to time.

This study shows that trying to detect and remove cats using detector dogs within reserves with very low feral cat densities would be difficult.

The use of detector dogs to reliably and efficiently locate and track live feral cats, with an endpoint of euthanasia, is unlikely to be an efficient method to control cats in well-vegetated woodland reserves. This relates principally to the behaviour of cats that were observed, rather than the capability of dogs to detect cats. Cats appear to be sensitive to human presence and often move away from dens when approached (Tony Friend, unpublished data). Conducting searches in open farmland where a dog can move quickly and the cat is more easily sighted by a detection team is therefore likely to be far more efficient than searching well-vegetated nature reserves and national parks.

The efficacy of locating cats with detector dogs is high but achieving successful and humane euthanasia of detected cats is challenging due to limitations on methods for trapping (cage trap only) and euthanasia (firearm only).

Efficiencies could be achieved by narrowing down search areas through habitat stratification, use of ‘sign searches’ such as sand-pads or camera traps, and GPS/telemetry studies to improve knowledge on den use adjacent to reserves.

8 Recommendations

- Detector dogs should be considered as one of a number of tools available to achieve population reduction of cats in and around WA Wheatbelt reserves to achieve conservation outcomes. Use of detector dogs could be of particular value in locating cats that had not succumbed to broader-scale programs such as 1080 baiting and trapping, and in providing opportunities where such cats could be shot or euthanased by other methods.
- The data from this study suggests that farms are good refuges for feral cats and probably provide shelter and food for individuals that venture into adjacent reserves at times. Implementing appropriate control methods for feral cats on farmland

adjacent to reserves may enhance the effectiveness of strategic control within reserves utilising broadscale poisoning and/or trapping on boundaries.

- Additional trials of detector dogs for cat eradication may be better focussed in areas of the WA wheatbelt where cat densities are higher. To evaluate the effectiveness of further trials it will be essential to have robust data on the relative abundance of feral cats before and after dogs and handler teams are deployed. Use of collared cats would be ideal for this purpose but the difficulty and expense of trapping and collaring cats is acknowledged.
- In considering the use of cat detector dogs in various bushland environments it should be recognised that dog teams will be more effective operating in open areas where visibility is greater, and a moving cat can be more easily seen by shooters. Use of dog and handler teams in well-vegetated sites, where an escaping cat is less visible, is unlikely to be effective in achieving euthanasia of a target animals.

9 Reference

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