

Olympic Dam Felixer trial

February-March 2018



A particularly large feral cat that was sprayed at Olympic Dam in February 2018

NB the white dot on its flank is an infrared Felixer activation beam 23cm above ground level

Executive Summary

A total of 39 feral cats and one fox were sprayed with lethal doses of toxic gel during a five week trial of Felixer grooming traps at Olympic Dam in February and March 2018. The Felixers had a 98% efficiency at delivering doses to target cats and foxes, with the single nontarget kangaroo unlikely to be effected at all by being sprayed with 1/8 of its lethal dose. Evidence from this pilot trial suggest that Felixers can provide an ethical, targeted and effective tool for controlling feral cats at Olympic Dam. Future developments informed by longer trials are likely to further improve the efficacy and cost-effectiveness of Felixers

Limitations Statement

In preparing this document Ecological Horizons Pty Ltd makes no warranty or guarantee, whether expressed or implied, with respect to the information reported or to the findings, observations or conclusions expressed in this document. Further, such information, findings, observations and conclusions are based solely on observations made and information available to Ecological Horizons Pty Ltd at the time of this study.

Introduction

Predation and/or disease transmission by feral cats represents a significant threat to wildlife and even human health, necessitating their control. Conventional cat traps require regular baiting and checking and also necessitate feral cats to be restrained, transported and subsequently euthanased, which poses logistical, safety and animal welfare challenges. Felixers have been designed by Ecological Horizons to provide automated, targeted and humane control of feral cats without affecting threatened wildlife.

Felixers operate by using an array of range-finding LIDAR sensors to detect and distinguish cats from non-target wildlife species. Target animals must intercept two activation beams and not intercept either blocking sensors (see Fig 1). Once 'confirmed' as a target animal by a complex algorithm, the Felixer instantaneously and silently squirts a measured dose of toxic gel that adheres to the coat of the feral cat. Once fired upon, the cat typically runs off, grooms the toxic gel and then dies remote from the Felixer, which automatically resets with another dose. The Felixer photographs all 'target' activations (Fig. 2) and other objects that intercept the sensors in a pattern not consistent with feral cats. Felixers are also equipped with a programmable audiolure to attract cats into range.

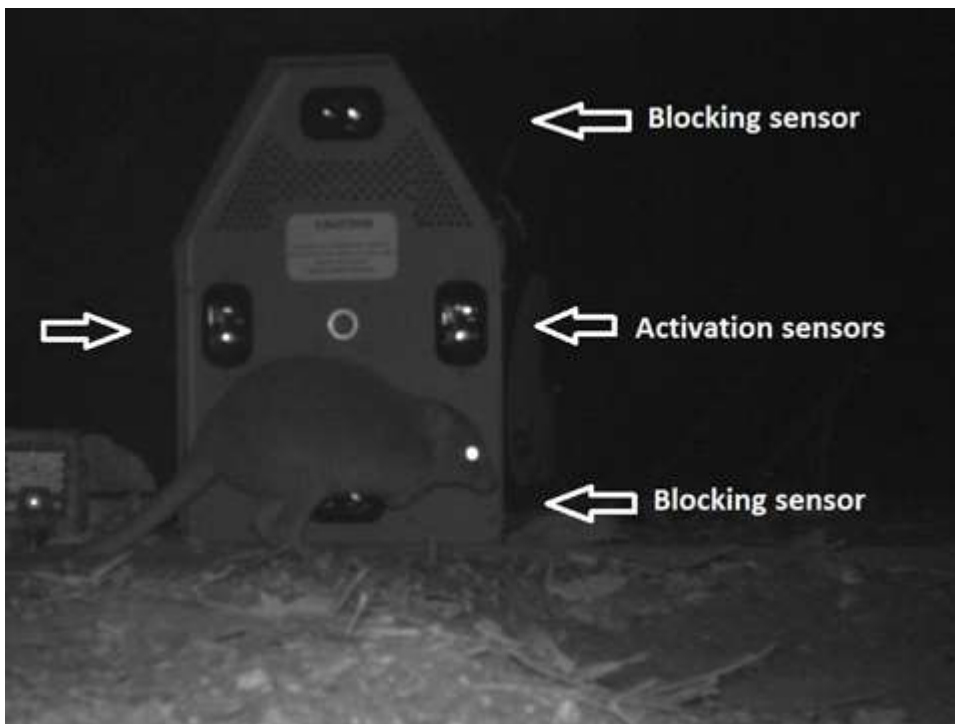


Figure 1. This bettong passes underneath the activation sensors and hence will not activate the Felixer.



Figure 2. A feral cat from the Olympic Dam trial showing the activation sensors (revealed through infra red camera) intercepting the head and rump of the cat and the bottom blocking sensor passing between the cat's legs at the point of firing.

BHP expressed an interest in trialling Felixers on the Olympic Dam mine lease with a view to potentially purchasing and trialling this novel method for sustained feral cat control. Ecological Horizons loaned seven brand new Version 3 Felixers for this trial, which aimed to optimise target discrimination software prior to shipping to the Felixer purchasers.

Methods

Seven V3 Felixers were deployed on the Olympic Dam mine lease/Arid Recovery Reserve fence for 5 weeks from February 7 to March 14, 2018. Cat activity was expected to be high in this region because cats are attracted to the area by native rodents and reintroduced threatened mammal species filtering out through the fence and also because the cat proof fence intercepts and channels cat movements in the region. Waste disposal areas and infrastructure on the Olympic Dam mine lease may also act as a refuge or source area for feral cats in the region, highlighting the value of feral cat control there.

Felixers were set at approximately 1km intervals along the fenceline, targeting areas used for cat trapping and dunes where cat activity is typically highest (Figure 3). Felixers are accurate over 2.5m (effective range will soon increase to 4m) and hence they were set across vehicle tracks where cats are more likely to walk than through vegetation (Fig. 4). Where necessary the ground was levelled with the use of a spade to guarantee accurate discrimination throughout the target range.

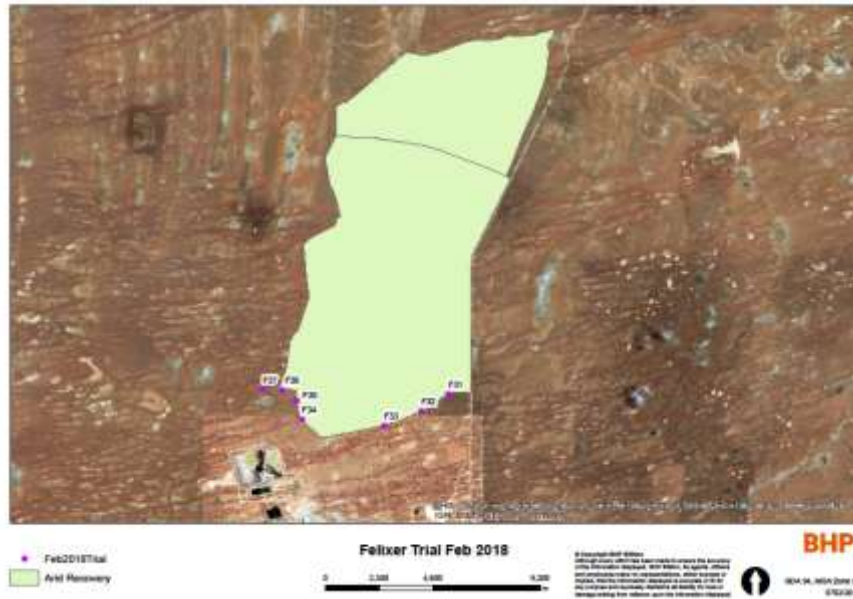


Figure 3 Location of 7 Felixers for Olympic Dam trial



Figure 4. Felixers were set up across vehicle tracks adjacent to the fence where cat activity is highest. This site F33 is the same area that leg-hold traps have historically been used for cat control, either in the corral or elevated platform visible behind the Felixer.

Felixers were assigned to 4 different random assortments of audiolures, whereby one of seven lures played for 8 seconds every 15 minutes for one night, was quiet the next night, then sequenced through other lures on every second night. Data from the Felixers was downloaded after 1 week to ensure all units were operating effectively and then at the conclusion of the trial. Images were used to determine the number of target cats (and foxes) and non-target wildlife detected and distinguished by the Felixers. Data logs were interrogated to determine which lures, if any were playing prior to cat detections.

The Felixer target discrimination algorithm includes multiple safeguards to minimise likelihood of non-target firings. These include shutting the Felixer down for 60 seconds whenever the top blocking sensor beam is broken, in case tall non-targets like kangaroos or people subsequently bend down. The Multi-target blocker prevents firing if the Felixer considers it is detecting 2 objects on different planes (ie 1 crow standing 1m away and a second crow breaking the other activation sensor at 2m distance), or if a cat is approaching the Felixer at too great an angle to ensure a side-on spray. To differentiate cats from wallabies, which typically move past far faster (when hopping) or slower (when standing) than cats, the algorithm also prevents firing if the object moves past outside the typical pace of a cat. Finally, before a target is confirmed, the Felixer checks whether each sensor has received valid information within 40ms. Rarely the microprocessor is so busy evaluating the multiple sensor data that it cannot confirm polling data within the last 40ms and hence despite meeting all other criteria for firing the Felixer blocks firing.

The deployment of Felixers was conducted according to APVMA permit 80962 and Adelaide University AEC permit S-2015-223, both issued to John Read of Ecological Horizons.

Results

A total of 39 cats were squirted by the 7 Felixers over 5 weeks, at a rate of just over one cat per week per Felixer. Two of the Felixers (F32 and F35) each squirted 9 cats whilst F37 only squirted a single cat during the trial. A further 38 cats that were not squirted (for a number of reasons explained below) were also detected. Cat detections did not decline throughout the trial, with 18 cats detected on the fifth and final week (Fig. 5).

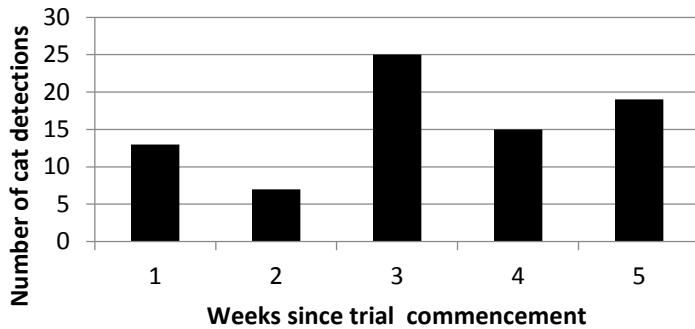


Figure 5 Cat detection rate during the Olympic Dam trial.

A total of 488 images were taken during the trial, including the 77 cats. All 186 vehicle passes, along with all detections of birds, rabbit, rodents, lizards, people, bettongs and quoll were correctly assigned as non-targets and not fired upon (Fig. 6). One of three foxes was correctly identified as a target. The only non-target squirted was 1 of 10 red kangaroos. Hence the overall efficacy of the 41 toxic doses used was 98% hitting targets.

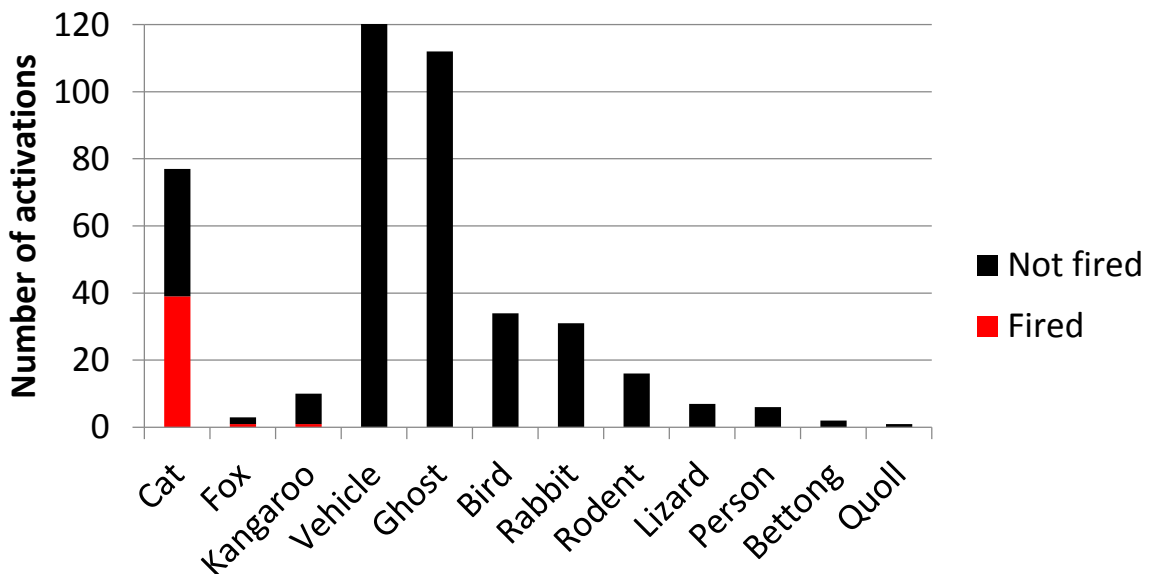


Figure 6. Target discriminations of cats, other wildlife, people and vehicles during the Olympic Dam trial. Many 'Ghost' photos, where no object or animal was visible, were probably attributed to vehicles passing too fast to be captured by the image.

Only 19 of the 77 cats were detected by the Felixers within 10 minutes of a lure playing, with a further 10 being recorded within an hour of a lure playing (Fig. 7). Given that lures were programmed to play every second night, approximately half of the cat detections would be expected to have occurred within 1hr of a lure if the lures had no effect. This lure efficacy data will be combined with a much larger dataset from national trials in 2018 to determine which lures (if any) significantly increase the likelihood of spraying cats.

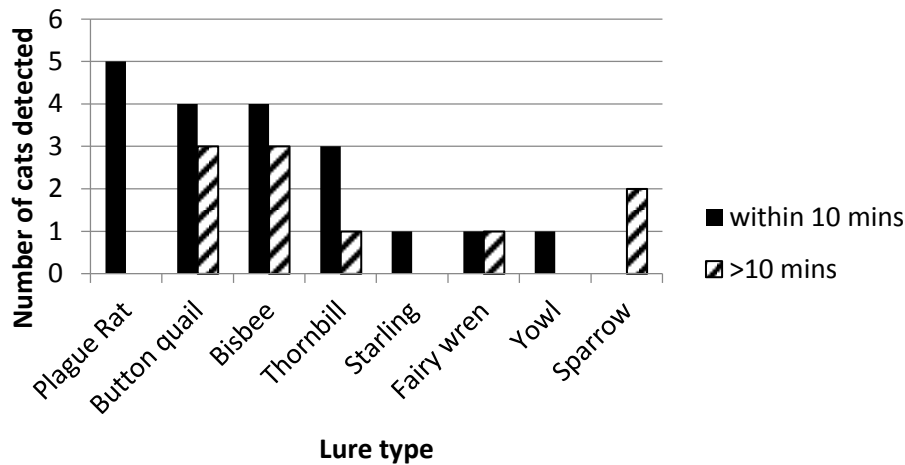


Figure 7. Lures playing when cats were detected

Failure for the Felixer to fire on nearly half of the cat detections (Fig. 6) was frustrating, but analyses of the datalogs suggests that this fault was not as serious as it appears and many of the false negative discriminations can be addressed through software modifications. A third of these false negatives were attributed to the cat moving too fast or too slow past the Felixer (Fig. 8). In environments like Olympic Dam where wallabies are not present, a less conservative algorithm would have fired on each of these cats. Importantly, in at least 3 cases, a cat that was not fired on was subsequently fired on within 10 minutes (Fig. 9) and in other cases the cat was likely targeted later (Fig. 8)

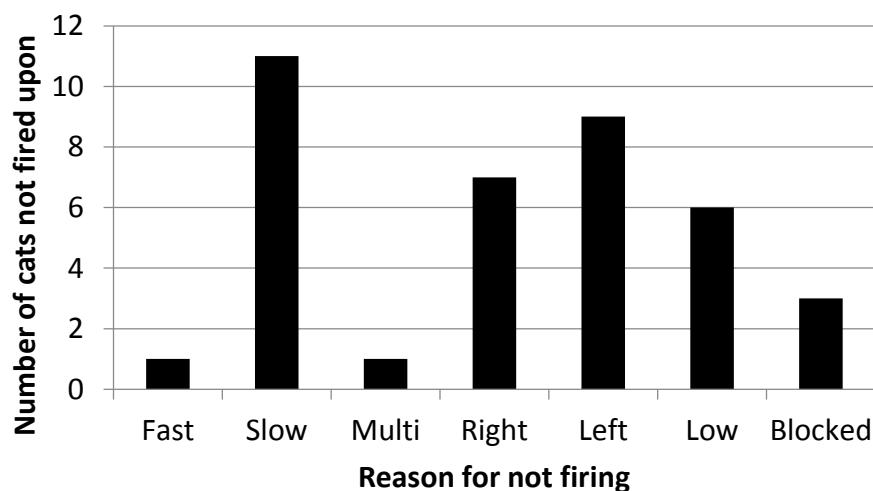


Figure 8. Reasons for false negative blocking of cat targets



2018-03-14_01-40-33_SLOW



2018-03-14_01-42-54_TARGET FIRED



2018-02-25_02-49-04_RIGHT



2018-02-25_02-55-37_TARGET FIRED



2018-02-27_05-36-56_TARGET_BLOCKED



2018-02-27_05-45-22_TARGET FIRED

Figure 9 3 instances of cats that were not fired on subsequently activating the same Felixer within 10 minutes



2018-02-24_02-45-54_SLOW



2018-02-25_00-08-23_TARGET FIRED

Figure 10. A cat that moved too slowly to activate a Felixer was subsequently sprayed (the spray approaching the cat was captured on the image) the following morning.

A wide range of nontarget animals were photographed by the Felixer, typically when they intercepted the bottom sensor (visible in some photos) without intercepting both activation sensors (Fig. 11)



Figure 11. Nontargets detected in the Olympic Dam trial. Note the image of nontarget western quoll (bottom left) and the kangaroo which intercepted the top blocking sensor on its nose (bottom right)

Discussion

The trial area along the Olympic Dam mine lease boundary with Arid Recovery Reserve clearly supports a high cat density, with 39 feral cats sprayed and no indication of a decline in cat detections within the 5 week trial. Confirmation of kills is not possible in an unbounded trial of non-collared cats, but evidence from other pen and field trials suggests that most cats that are squirted subsequently succumb to 1080 poisoning. For example, in a concurrent trial within the Red Lake paddock of Arid Recovery that has yet to be fully analysed, 2 collared cats were both found dead within 48 hours of being sprayed.

Delivery of 98% of the toxic doses to target cats or foxes is a very pleasing outcome, compared to typical efficacies of toxic baiting programs where a majority of baits are removed by non-targets (especially crows and goannas). The single non-target red kangaroo that was fired on was unlikely to have been effected by the dose since the kangaroo was unlikely to fastidiously groom the entire dose and in any case adult kangaroos would need to consume the full volumes of 8 Felixer cartridges for a lethal dose. Importantly, no small wildlife (including bettongs and a quoll), people or vehicles were incorrectly identified as a target, which conforms with previous studies that Felixers are a safe and target specific tool for feral cat control, even around workplaces.

This trial identified overly conservative sensor verification as a source of false negative blocking of Felixers that has already been verified by increasing the valid polling frequency from 40ms to 60ms. In addition, in environments like Olympic Dam without wallabies, modification to the discrimination algorithm would decrease the number of cats that were not fired upon because they move too fast or too slow. This trial also suggested that the current audiolures may not have improved cat control efficacy. These preliminary trial data will be analysed together with several trials across Australia to provide more robust interpretation of optimal settings, lures and deployment conditions. These software upgrades can be readily uploaded into Felixers using the USB that also stores all data.

Acknowledgements

Ecological Horizons would like to thank BHP employees Alice Taysom, for arranging the trial, and Kim Solly Amy Graves, James Owen, James Gardner and Zac Richardson for assisting with the trial implementation. Alex Schumacher from Applidyne assisted with interpretation of log files and Max Bardwell from Applidyne prepared and arranged the Felixers for the pilot study.