



CENTRE FOR
INVASIVE SPECIES SOLUTIONS

GLOVEBOX GUIDE FOR MANAGING FERAL CATS



Part of the

pestSMART 

publication series

Website: www.pestsmart.org.au

This publication is licensed under a Creative Commons Attribution 4.0 International license, except for photographic and graphical images contained within it. Photographs and other graphical material must not be acquired, stored, copied, displayed and printed or otherwise reproduced — including by electronic means — for any purpose unless prior written permission has been obtained from the copyright owner. Copyright of photographs and other graphical material is variously owned by Invasive Animals Ltd, individuals and corporate entities. For further details, please contact the Communications Manager, Invasive Animals Ltd. The Creative Commons Attribution 4.0 International license allows you to copy, distribute, transmit and adapt material in this publication, subject to the exception for photographic and other graphic material set out above, and provided you attribute the work as shown below. The license does not transfer ownership of the copyright. A summary of the license terms is at: <https://creativecommons.org/licenses/by/4.0/>

© Invasive Animals Ltd

Citation: Johnston, M. and Algar, D (2020). Glovebox Guide for Managing Feral Cats. PestSmart Toolkit publication. The Centre for Invasive Species Solutions, Canberra, ACT

At the time of writing this publication Mr Michael Johnston was a consultant for Scientec Research Pty Ltd and Dr Dave Algar was employed by the WA Department of Biodiversity, Conservation and Attractions

Print ISBN: 978-1-925727-25-8

Web ISBN: 978-1-925727-24-1

Published by: The Centre for Invasive Species Solutions

The Centre for Invasive Species Solutions gratefully acknowledges the funding support for the publication of this document through the Australian Government Department of Agriculture, Water and the Environment. This project is also supported by the Northern and Yorke Landscape Board, through funding from the Australian Government's National Landcare Program.

Disclaimer: The information contained in this publication has been prepared with care and is based on knowledge and understanding at the time of writing (2020). Some of the information in this document is provided by third parties, and all information is provided "as is", without warranty of any kind, to the extent permitted by law. After publication, circumstances may change and before relying on this information the user needs to take care to update as necessary.

NO PRODUCT PREFERENCES: The product trade names in this publication are supplied on the understanding that no preference between equivalent products is intended and that the inclusion of a product name does not imply endorsement over any equivalent product from another manufacturer.

ALWAYS READ THE LABEL: Users of agricultural or veterinary chemical products must always read the label and any permit, before using a product, and must strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this publication.



Australian Government

Department of Agriculture,
Water and the Environment



National
Landcare
Program



Contents

About this guide.....	4
LEARN.....	6
PLAN.....	12
MONITOR.....	14
MANAGE.....	19
IMPROVE.....	25
Extra information.....	25
Further reading.....	44



Feral cat on Christmas Island. Image by Michael Johnston.

About this guide

This Glovebox Guide for Managing Feral Cats is a general guide to provide background information to support the control of feral cat populations in Australia. This guide adopts the definition of 'feral cat' as those that live and reproduce in the wild (e.g. forests, woodlands, grasslands, deserts) and survive by hunting or scavenging; none of their needs are satisfied intentionally by humans. It is recognised that this categorisation of life cycles is artificial and that individual cats may transition between classes, such as stray and domestic, throughout their lifecycle. However, these other classes are not considered in this guide unless specifically mentioned.

Feral cats present a significant environmental impact and there is growing evidence of economic impacts to agricultural enterprises.

The rapid colonisation of the Australian mainland and Tasmania by feral cats originated from multiple locations but was considered to be 90% complete by 1890. Straying domestic cats from dwellings or vessels as well as deliberate introductions or abandonments were recorded in journals of the time.

Since the late 1970's, there has been a growing understanding of feral cat impacts on populations of native wildlife and agricultural livestock through predation and disease. Estimates of the annual predation impact by feral cats on Australian native wildlife suggest 272 million birds, 470 million reptiles, 815 million mammals are killed with additional losses of invertebrates and amphibians. However, native wildlife populations are also impacted by other factors including habitat disturbance, changed fire regime and climate change. Ongoing research questions remain to understand the resilience of native wildlife populations in response to the combination of these factors relative to that of native and invasive predatory species.

National, State and Territory government agencies have prepared policy, plans and procedural documents to mitigate threats and impacts from feral cats. The regulatory environment is evolving and as such it is expected that there will be new laws, control tools and strategies that affect the management of feral cat populations being implemented into the future.



Feral cat and Lewin's Rail – French Island. Image by Michael Johnston.

This guide seeks to enable best practice feral cat management by providing current, albeit broadly applicable, information on:

- feral cat ecology;
- identifying feral cats;
- identifying impacts of feral cats;
- feral cat control in the presence of other predators;
- management tools and strategies;
- safety to domestic animals; and
- policy and legislation.

This glovebox guide does not cover all the details of feral cat management, so consideration should be given to enrolment in recognised pest management courses.

For more information on feral cat management visit www.pestsmart.org.au

All the reference material used to create this glovebox guide is provided in the back of this guide.

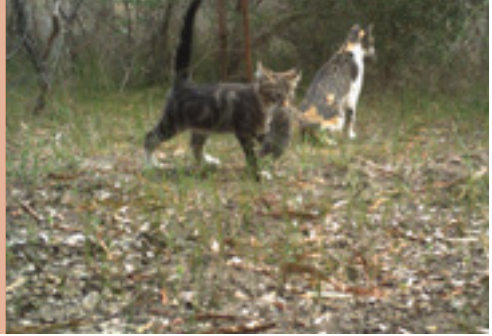
LEARN

Taxonomic names:

Felis catus (Linnaeus, 1758)

Common names:

Feral cat, Wild cat



A kitten presented with prey by its mother, French Island. Image by Michael Johnston.

Ecology

Description

Feral cats are the same species as domestic cats, but may appear taller and heavier given the greater muscle definition resulting from their active life history. Feral cats can have a variety of coat colours. Tabby, black or ginger are the most common with other types occurring with hybrid patterns of black and white, tortoiseshell and 'fancy breeds' indicating a more recent link to a source population of domestic cats. Typical adult body weights are between 2.0 – 4.5 kg, but heavier individuals of up to ~6 kg are commonly reported.

Pathways of Spread

Cats accompanied Europeans as they colonised Australia from multiple locations between 1824–86, with cats being recorded over most of the mainland by 1890. The founders of feral cat populations are likely to have come from straying or abandoned domestic cats with populations on islands established either to fulfil the role as companions and rodent controllers, or following shipwrecks.

Cats were also intentionally traded and released in attempts to manage rabbit populations. The introduction of cats by Makassan traders prior to arrival of Europeans is also plausible although more recent genetic studies suggest that European breeds became established prior to Asian breeds.

Distribution and abundance

Established populations of feral cats are present over 99.8% of Australian terrestrial environments, including many offshore islands. Populations have been eradicated on islands, which has supported recovery of extant wildlife species or translocation of species from other locations. On the mainland, there is an increasing number of fenced 'havens' where invasive predators have been removed to provide refuges for specific wildlife species. These areas are necessarily limited in size and scale relative to the former distribution of the species that they protect.

National estimates of feral cat populations range between 1.4 – 5.6 million individuals with population densities varying with environmental factors reflecting the impact that rainfall or drought has on prey resources.

Habitat Description

Feral cats are highly adaptable and maintain viable populations across the range of habitats within Australia. This includes alpine landscapes along the Great Dividing Range, tall temperate forest, savannah grasslands, oceanic islands in the tropics through to the arid zone.



Feral cat in snow. Image by Parks Victoria.



Feral cat in tall, wet forest. Image by Matt Rees.



Feral cat in arid zone. Image by Emma Spencer.

Nutrition

Feral cats are generalist carnivores with over 400 vertebrate prey species recorded from Australian sites. Recent estimates by the Threatened Species Recovery Hub suggest that this translates to 1,645 million individual animals across reptile, frog, bird and mammal species being preyed upon each year. Invertebrate species are also commonly consumed. Dietary studies have demonstrated that feral cats will exploit the food resources that are available and can switch rapidly in response to changing prey availability. Reductions in preferred prey can be exploited to optimise the efficacy of baiting programs. European rabbits form a dietary staple in many areas, but this does not 'control' rabbit populations. Cats predominantly use visual and audible cues to trigger hunting behaviours but will also consume carrion, i.e. scavenged carcasses from roadkill or other sources and meat baits.

Reproduction

Female cats can come into season multiple times annually and may mate with multiple males.

They can breed from seven months of age although females may enter their first oestrus at up to 12 months of age in feral populations with births more frequently reported between September and March in south-east Australia. The non-breeding period is shorter in warm semi-arid sites compared to cooler temperate areas.

Pregnant feral cats in the semi-arid zone were found to typically carry four embryos. Litter size post-weaning is expected to vary according to availability of prey resource with two–three kittens being commonly observed.

Lifecycle Stages

Kittens are fully dependent on their mother's milk for the first three weeks of life with live prey being offered by the mother from four weeks coinciding with eruption of teeth. Weaning is generally at or about seven weeks. Adult teeth are fully present by seven months. Mortality of kittens can be high due to predation, disease, misadventure or limitations in availability of food resources. Kittens will be left in cover while the mother hunts with prey offered to the kitten(s) for training purposes (see <https://youtu.be/KqKlnhW0DHc>).

The dispersal of young cats is not clearly understood; however, dispersal cannot occur before the permanent canine teeth have erupted, which commences three and a half months after birth. Females rarely venture as far afield as males, often establishing a home range close to that of their mother. Yearling/subordinate males tend to remain within their natal range until they are old and strong enough to establish a home range themselves. As they grow, they come under increasing attack from older males and in their second year they usually disperse.

Males have larger home ranges than females and seek as many mating opportunities as possible.

Home range sizes were 2.46 km² for female and 5.10 km² for males averaged from data collected at 47 Australian and international sites.

Biological and behavioural weaknesses

Australia does not have any native members of the cat family, Felidae. A number of transmissible diseases are present within the domestic cat population, including toxoplasmosis, feline enteritis, feline leukaemia virus and cat flu.

The relationship with other large predators in Australia, such as foxes and wild dog/dingoes is unclear other than that there is evidence that feral cats are preyed upon opportunistically. Similarly, native predators including eagles, goannas and pythons are known to take cats, particularly younger animals. The introduction of other predators will not necessarily lead to improved control of feral cat populations.

Impacts

Economic

It is difficult to place a dollar value on the economic impact of feral cats as these are heavily biased towards mitigating environmental impacts as compared to financial losses to the agricultural sector. Recent studies have estimated annual losses of \$12 million to the grazing industry due to cat-mediated parasites along with an annual \$6 billion impact in human health associated with diseases such as cat scratch fever, toxoplasma and sarcosporidiosis

Feral cats create an opportunity cost whereby the value of the investment directed into pest control is not available for other end uses. The majority of feral cat impact is on wildlife species that are difficult to place a direct dollar value on. However, there are many examples of the Australian community's support for undertaking work to mitigate the impact that feral cats create with philanthropic donations to private wildlife conservation organisations or eradication programs, e.g. Tasman Island (TAS). Government agencies have responded to these community calls for greater wildlife protections by improving the policy framework and directing investment into ecological restoration programs, termed as 'safe havens' on islands and within fenced exclosures.

Environmental

Feral cats are recognised internationally as having direct predation impacts on wildlife populations. Broadscale decline of Australian wildlife populations, particularly within the small and medium-sized mammals, have been well documented and with cats considered to have contributed to the extinction of 25 of the 30 native Australian mammal species. Devastating impacts on reptiles, amphibians, invertebrates and birds have been summarised in a recent series of studies.

There is also a growing understanding of impacts associated with disease transmission, particularly toxoplasmosis as well as competition for food resources. Cats shed toxoplasma oocysts in their faeces, which are inadvertently consumed by terrestrial and marine wildlife species that may subsequently develop toxoplasmosis leading to physiological and behavioural changes.

Social

Discussion of feral cat control can create heated debate amongst the community. The strong affinity for cats as pets can lead some people to find it difficult to understand the scale of impacts caused by feral cats. The discussion can also be clouded by the spectrum of understandings of the term 'feral cat' that ranges from roaming domestic cats to those cats that fit within the definition used in this guide. Animal welfare issues and animal rights also feature in the broader discussion about management of pest animals although this is more commonly in relation to perceptions about

impact on cats to a greater extent than the species impacted. Nonetheless, the techniques used to manage feral cat populations should be as humane as possible.



Feral cat eating a wallaby carcass. Image by Joe Scanlan.

Check the laws and guidance for your state or territory, including those that address the humane treatment of all animals.

We recommend following the six step pest animal adaptive management framework

PLAN

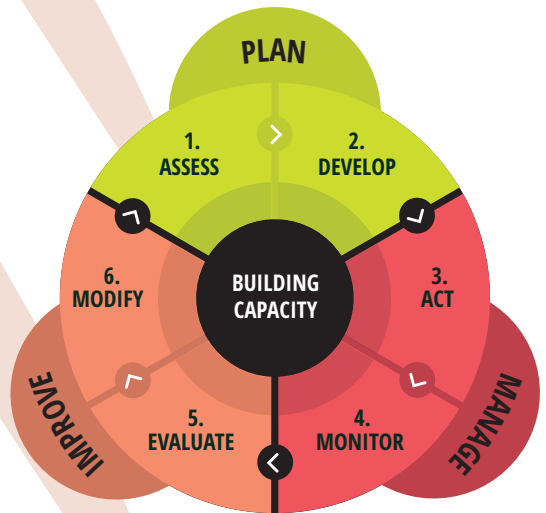
1. Assess and understand the problem
2. Develop a plan and set clear objectives

MANAGE

3. Choose control techniques and strategies and implement
4. Monitor the outcomes of your plan

IMPROVE

5. Evaluate the plan – did you meet your objectives?
6. Modify as required and repeat as necessary



Use [FeralCatScan](#) to record and map feral cat sightings, damage and control activities. Only public data recorded is available to the community, to help decide where to undertake control, and coordinate with neighbours.

FERALSCAN
ORG.AU

PLAN

Identifying feral cats and their impacts

Detecting the presence of feral cats and their impacts

It is common for feral cats to be present, but not seen, and for their presence to go unnoticed in bushland areas due to their cryptic behaviours, minimal vocalisations and avoidance of interactions with humans. Traditional methods for detecting feral cats relied on detecting footprints in sand surfaces, spotlight searches or opportunistic observations of cats or their prey remains.

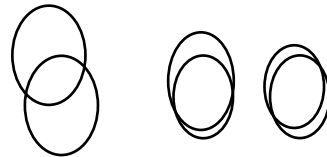
Distinguishing between feral cat, fox, dog and quoll tracks

Differentiation between the footprints of feral cats and other species, such as wild dogs and foxes, can be confounded by weathering or unsuitable soils. The key distinguishing feature to separate cats from that of canids and quolls is the absence of claw marks, reflecting the typical 'retracted claw' state that cats use when walking. Cat prints also appear to be almost circular compared to other species.



WILD DOG FOX QUOLL CAT

Figure 1 – The relative size and shape of wild dog, fox, quoll and cat tracks (top row shows front foot and bottom row shows back foot).



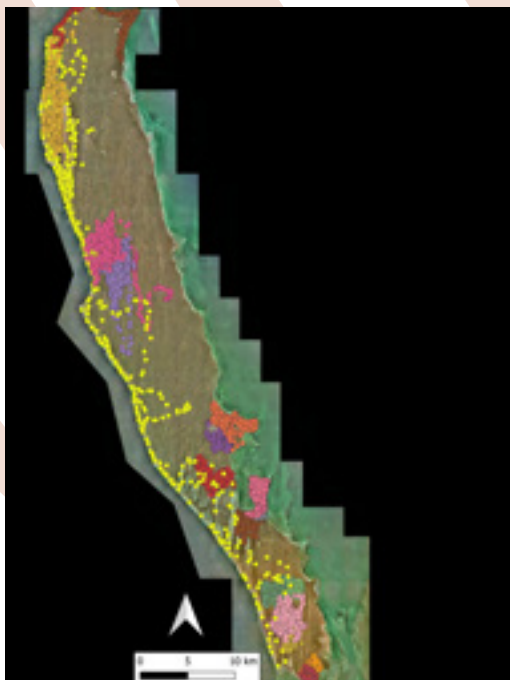
WILD DOG FOX CAT

Figure 2 – Usual foot print placement for wild dogs, foxes and cats.

Broadscale use of trail cameras provide insights into the presence, behaviour and prey of feral cats that can support i) better population estimates, ii) identification of individuals, iii) behaviour and iv) monitoring the outcomes of control operations.

Researchers have also benefited from technological advances that has supported use of GPS tracking technologies that provide detailed information on individual cats over time. These devices permit the study of feral cat activity and movement with locations being recorded at intensive intervals, i.e. 5 minute or more broadly across months.

Most Australian GPS collaring studies conducted to date have required cats to be recaptured to remove the collar and access the data, which can be difficult due to trap shyness. Collars with satellite uplinks have demonstrated long-range movements in excess of 100 km over a period of weeks by individual feral cats - <https://youtu.be/v8DB7tr8NcA?t=1197>. Owners of domestic cats have been directly involved in documenting the roaming by their pets using low-cost GPS devices.



GPS collar data from feral cats on Dirk Hartog Island. Image by Dave Algar.

MONITORING

Monitoring is undertaken to determine the presence of feral cats at a site or to measure the effectiveness of control operations by monitoring the population prior to and following the work. The results achieved can vary according to the technique chosen. None of the monitoring techniques described here provide a 100% accurate understanding of the feral cat population in an area and the use of multiple techniques is encouraged.

Sand pads

Construction and servicing of sand pad arrays can provide data on the presence of feral cats within a site. Sand pads can be formed from local raked soils or by clean sand brought into the site. Sand pads should be spaced at intervals of a minimum of 500 m to reduce repeat counts. Counts of cats crossing the sand pads can be compared prior to and following control operations. While sand pads do not influence the cat's behaviour, it can be difficult to discern the presence of multiple cats that cross the surface, or support the collection of information about whether individuals are resident or recently arrived in the area.

Track counts

Daily cat activity counts can be conducted in sites with an extensive network of sandy tracks. A clean surface is created by towing a heavy drag behind a vehicle. Tracks are inspected for cat footprints each morning. To reduce the possibility of double counting, footprints are assigned to an individual cat if no other footprints are present on at least the previous 1 km of track. Each time new cat footprints are encountered along the track, data is recorded on the direction of movement (i.e. whether the animal walked along the track or crossed it), distance of the footprints from the start of the track, approximate size of imprints and whether more than one animal was present.

Cameras

Trail cameras can be used to measure cat presence along trails or at randomised locations across the landscape. Scent lures, such as cat urine or anal gland can be used but are not necessary on track alignments. Visual lures have also been used to promote investigation of site by feral cats. Consideration should be given prior to use of food lures as these may increase the predation hazard to wildlife species.

Population density estimates can be derived using camera detections of cats and then using statistical analysis techniques.

The accuracy of population density estimates can be reduced by several factors including motion blur compromising the confident identification of tabby cats. The prevalence of black cats at the site and overexposure of night-time photos of ginger coloured cats also reduces accuracy.

The noise and flash illumination associated with camera operation are readily detected by feral cats and may alternately provoke a startle response or approach for closer investigation. In rare circumstances, feral cats have been observed to avoid cameras evidenced by footprints in sand approaching and deviating around the camera site. Deciding on an accurate and efficient data curation procedure generated from trail camera surveys is important at the start of the survey.

The cameras should be mounted horizontally, as opposed to angled 45°, as this allows for a greater field of view and a trigger zone of predictable shape. Check to see whether the camera manual provides information on trigger zones to ensure the camera can

be installed in the arrangement to best trigger on cats. Alternatively, a downwards-facing camera can provide a uniform view of cats as they pass under the lens. However, this format typically provides a more limited field of view and requires the cat to be directed under the camera. Further information is available at <https://pestsmart.org.au/pest-animals/monitor-techniques/>.

Theft and vandalism of trail cameras is a common and expensive problem that affects the accuracy of the monitoring programs particularly when targeting small-medium sized animals such as feral cats.

Detection Dogs

The principle of trained 'sniffer' dogs for use in border and quarantine services is well established. Similarly, trained dogs can also be used to confirm the presence of feral cats by identification of scats as well as detecting and following fresh scent trails. Dogs may also be used to support capture and shooting attempts in suitable habitats. The expense associated with the training and husbandry of conservation dogs and their handlers tends to limit the use of this tool to high value research projects, island restoration and eradication programs. Further information is available from the Australasian Conservation Dog Network <https://conservationdognetwork.com.au/>.

Spotlight search

Counts of feral cats, along with other species, may be conducted from slow-moving vehicle along pre-defined survey transects driven at night. The observer uses a high brilliance spotlight and/or appropriate thermal sensor to detect animals along the transect. Optimal counts are achieved when observers can operate from an elevated position in the vehicle. The driver needs to be familiar with the route to minimise overhead and on-track hazards. Spotlight surveys should be replicated at the same time over three or more evenings to generate an average number of detections per kilometre of transect length. The procedures used are the same as those used for monitoring



Detector dog sitting in the 'focussed response' position where a cat scat was located. Image by Michael Johnston.

of other species such as red foxes, see <https://pestsmart.org.au/wp-content/uploads/sites/3/2020/06/Monitoring-techniques-for-vertebrate-pests-foxes.pdf>. Spotlighting may not be suitable for all areas due to tall grass or other vegetation that limits detection of animals on the ground. Note that feral cats may also be detected in trees during spotlight surveys. The results are also influenced by behavioural traits where individuals may have become 'spotlight-shy' or are subject to other social or seasonal factors.

DNA-based identification of individuals

The use of a non-invasive hair snare may also be used to estimate the population size as it allows for identification of individuals regardless of their colour. A 'Sticky Wicket' technique uses three timber stakes situated at the end of a



Sticky Wicket installation. Image by Neil Hamilton.

'channel' that runs parallel to the direction of the track. The stakes are pressed into the ground so that they are ~60 cm high and positioned in the ground at an angle so that they spread out as they rise, being 7 cm apart at the base and expanding to 12 – 15 cm apart at the top. The stakes are covered with double-sided adhesive tape (Stylus, 40 mm '740') to capture hair as the cat walks through the channel. Collected hair is removed with sterilised forceps and sealed inside a paper envelope. This is then placed within a ziplock plastic bag and stored in a freezer to reduce DNA degradation. Sites should be serviced daily, including freshening the collection surface to reduce potential for 'capture' of multiple cats which complicates the analysis. Arrangements with a suitably qualified genetics laboratory should be made prior to embarking on such an approach.

Hair snares can also be constructed from coarse wooden stakes or wire brushes and treated with a suitable scent lure.



Wire Brush hair. Image by Michael Johnston.

Site-specific indices

Development of monitoring techniques specific to certain sites enables collection of data on the success of control operations. As an example, counts of wing pairs within defined plots was used to index predation of seabirds on Tasman Island. Feral cats killed seabirds each night as they roosted on the island. Repeated clearing and counts of the prey provided a useful index for presence and activity of feral cats at this site.

Incidental Observations

Landholders and community members are able to record sightings of feral cats and other species using the [FeralScan app](#). The package provides a community mapping resource that can centralise pest animal data management across multiple species as well as generating activity reports for specific areas.



FeralScan website and app. Image supplied by Peter West.

MANAGE

Tools to Control Feral Cats

Poison baiting

Broadscale control of feral cats can be achieved using poisoned meat baits applied at appropriate times when prey resources are less available, nominally early winter in southern Australia and the end of the dry season in northern Australia. Aerial baiting provides greater opportunity for feral cats to encounter baits than trail baiting operations. There is no known advantage in provision of non-toxic free-feed baits prior to use of toxic baits, however, this can be undertaken to assess the potential for exposure of non-target species.

Two bait products are currently registered by the Australian Government for feral cat control, being Eradicat® and Curiosity® with application rates of 50 baits per km². The Eradicat® bait is a kangaroo meat and chicken fat sausage that is directly injected with 4.5 mg 1080. It is only for use within Western Australia to control feral cats on conservation estate and at other sites under permission from the Western Australian Government but national registration is being pursued. The Curiosity® bait uses a similar meat sausage and delivers 78 mg PAPP toxin in a robust

encapsulated pellet. Encapsulation reduces exposure of wildlife species to the toxin, while the use of the PAPP toxin provides a degree of species selectivity. Curiosity® is registered nationally, but there are limits on use stipulated to further minimise exposure of wildlife species. Additional bait products are currently under development or are subject to limited use under permit.

Proposals to undertake poison baiting programs are reviewed by government agencies prior to purchase of baits being granted. Procedures of how to purchase baits are provided as part of this review process.

Cage trapping

These devices have broad community support for trapping of feral cats and are commonly used with a food lure of fried chicken, tinned fish or rabbit pieces.

Cage traps can be effective at capturing a proportion of feral cats, commonly the inexperienced or poor hunters however, there will be a proportion of cats that will not enter the devices.

A plan to deal with the captured cats and non-target species must be in place prior to installing cage traps, including how to treat non-target species that sustain an injury. Ensure that local regulations are followed with respect to the

locations where traps may be placed. Traps should be fitted with a cover to protect captured animals from the weather. Prepare the trap site such that the traps do not wobble and confirm that moving parts of the trap operate smoothly. Detailed procedures on the use of cage traps can be found at: <https://pestsmart.org.au/toolkit-resource/trapping-of-feral-cats-using-cage-traps/>.

Padded leghold trapping

Legislative support for the use of rubber-padded leghold traps to capture feral cats exists in some jurisdictions. The traps are also used by researchers to capture feral cats for use in scientific study or eradication programs on islands. These traps are capable of capturing a greater proportion of feral cats given that neophobic cats are more likely to enter the 'set' given that the trap is concealed. Olfactory or visual lures are commonly used in preference to food lures. Traps will benefit from preparation prior to first use (see video - <https://youtu.be/sszOh49Z0jY>) and maintenance, including replacement of rubbers,

to ensure reliable operation and minimisation of injury to trapped animals. Detailed procedures on the use of leghold traps for capture of feral cats are provided at <https://pestsmart.org.au/toolkit-resource/trapping-of-feral-cats-using-padded-jaw-traps/>

Grooming trap (permit required)

The 'Felixer' device exploits cats' innate grooming behaviour by rapidly propelling a gel containing a toxicant onto the cat as it walks in front of the sensor array. They are typically installed on the edge of tracks or barrier fences to remove feral cats following these alignments. A series of audio lures, such as bird calls, can be played from the device to call animals into the site. Lasers are used to interpret the height, shape and pace of animals. A series of conditions are then employed to lock out the device in the presence of non-target species, including domestic animals that had been fitted with a specific tag.



Felixer device, annotated photo showing sensors with a bettong and lasers detecting a feral cat. Image by Thylation.com.

Fencing

Exclusion fencing to protect wildlife species from invasive predators have been established at twenty-eight sites across Australia covering 594 km². Large containment areas such as the Arid Recovery Project, Roxby Downs foster the conduct of research into the ecological functions of wildlife as well as the interaction between native and invasive species. costs for barrier fences vary according to the complexity of the topography, vegetation, freight and labour costs with recent examples estimated at ~\$40,000/km on Dudley Peninsula, Kangaroo Island and ~\$60,000/km in the Pilliga, NSW. Designs commonly incorporate a 1.8 m mesh barrier with a floppy top overhang. Electrical hotwires may also be added to the barrier. Routine and regular maintenance of fences is critical to capitalise on the investment in the fence construction.

Shooting

Shooting is highly target-specific and can be used to remove feral cats from discrete areas but is less suited for reducing impacts across broadscale areas. Skilled shooters can be engaged to remove feral cats in sites where the vegetation supports this. Shooting is most frequently undertaken at night using spotlights and/or thermal sensors. Feral cats may be attracted into the range of shooters by using a rabbit whistle in the same manner as used for foxes.

Expert Tracking

Hunting feral cats on foot is practised by Indigenous tracking experts in some arid zone communities to protect threatened wildlife populations. Cat prints are identified and followed through the landscape until the cat is located and killed by blunt trauma euthanasia.

Strategies to control feral cats

Working with Nature

Land managers considering implementing a feral cat control program need to give particular consideration to the timing of activities. This necessarily includes how seasonal factors will affect the operational efficacy with respect to the ranging and breeding behaviour of cats as well as activity of non-target species. In particular, an abundance of alternate prey will reduce bait consumption by feral cats and may also lead to greater potential for bait competition and consumption by wildlife species. Capture of seasonally active non-target species such as reptiles is common if using food lures in traps in warmer months.

Land stewardship practices with respect to retention of complex habitat, livestock grazing and burning regimes can also influence feral cat impacts on native wildlife.

Working with people

The intentional release of cats into bushland areas in the expectation that this will manage rabbit populations has been consigned to history. Feral cat populations are self-sustaining but may occasionally be bolstered by stray or abandoned domestic cats. The community can contribute towards reducing this by adopting the principles of Responsible Pet Ownership by sterilising their domestic cats and containing pets on their property. A key benefit to cat owners is that their pets are likely to have longer and healthier lives and reduced impact on wildlife populations.

Adaptive management

An adaptive approach to monitoring and managing feral cat populations is required to achieve operational objectives. Changes in approach

and tool choice may be warranted to account for new information, changed regulation or environmental factors that impact delivery of the operation.

Choosing the right control tool

The most effective approach is an 'integrated approach' that usually involves the progressive use of a range of tools, i.e. not relying on just one tool. The table below outlines some of the basic pros and cons of common control tools. The advantages and disadvantages described might be different for each situation. Local knowledge and consultation will help determine the best tools for use in a given situation. Note that some control tools might not be permitted in certain areas (see page 24).



Sterilising pet cat in a remote community. Image by Kiwirrkurra IPA / AMRRIC.

Table 1: Pros and Cons of currently available feral cat control tools

CONTROL TOOL	ADVANTAGES	DISADVANTAGES	COMMON USES
1080 Baiting (Eradicat)	<ul style="list-style-type: none"> • Can be applied on a broadscale by vehicle or aircraft. • Low cost with respect to area treated. • Requires relatively little time. • Can be applied on a broadscale basis by vehicle or aircraft. 	<ul style="list-style-type: none"> • Restricted use in peri-urban areas. • Hazardous to domestic animals and some wildlife. No antidote. • Perceptions of welfare impact on poisoned animals. • Reduced efficacy when alternative prey resources are abundant. 	<ul style="list-style-type: none"> • Used predominantly within Western Australia for conservation programs.
PAPP baiting (Curiosity)	<ul style="list-style-type: none"> • Can be applied on a broadscale by vehicle or aircraft. • Low cost with respect to area treated. • Requires relatively little time. • Encapsulated toxin reduces exposure of wildlife species. • Improved animal welfare outcome on poisoned animal. • Can be applied on a broadscale basis by vehicle or aircraft. 	<ul style="list-style-type: none"> • Restricted use in peri-urban areas. • Hazardous to domestic animals and some wildlife. A veterinarian may be able to treat accidentally poisoned animal. • Reduced efficacy when alternative prey resources are abundant. 	<ul style="list-style-type: none"> • Used within conservation programs in SE Australia where state/territory governments permit.
Cage trapping	<ul style="list-style-type: none"> • Can be used in peri-urban areas where baiting is not appropriate • Domestic animals and non-target species can be released. • Can confirm removal of specific animals. • Enables a relatively quick and humane death when trap checked. 	<ul style="list-style-type: none"> • A proportion of feral cats will not enter cage traps. 	<ul style="list-style-type: none"> • Commonly used in areas with proximity to people.
Indigenous expert tracking	<ul style="list-style-type: none"> • Selective and target-specific • Social, health and cultural benefits 	<ul style="list-style-type: none"> • Requires suitable sand / soil surface • Only useful for localised control • Requires expert interpretation of footprints 	

CONTROL TOOL	ADVANTAGES	DISADVANTAGES	COMMON USES
Soft-jawed leghold trapping	<ul style="list-style-type: none"> • As for cage trapping. • Concealed traps are better able to capture a greater proportion of cats. 	<ul style="list-style-type: none"> • Greater skill required to prepare trap sets. • Injury to non-target captures is possible. 	<ul style="list-style-type: none"> • Used in eradication and research programs.
Exclusion fencing	<ul style="list-style-type: none"> • Is capable of excluding feral cats from an area. 	<ul style="list-style-type: none"> • Relatively expensive to construct and maintain. • Still requires removal of feral cats from within fenced area. • Limits movement of other wildlife. 	<ul style="list-style-type: none"> • Protecting high value populations of wildlife in ecological restoration programs.
Shooting	<ul style="list-style-type: none"> • Selective and target-specific. • May be suitable for areas where other tools are not appropriate. • Can confirm the identity of individual animals. 	<ul style="list-style-type: none"> • Limited population reduction in large sites. • Vegetation can reduce efficacy. • High level technical ability and local knowledge. • High labour investment. • Restricted use where domestic cats are present 	<ul style="list-style-type: none"> • Commonly used in conjunction with trapping programs. • Is used to target specific individual cats.
Felixer (permit required)	<ul style="list-style-type: none"> • Selective and target specific. • Sentinel control tool capable of removing multiple feral cats. • Domestic animals can wear a tag that locks out the gel propulsion mechanism. • Does not require skilled labour. 	<ul style="list-style-type: none"> • Secure sites may be required to ensure the poison is inaccessible. • Relatively expensive - cost associated with lease of unit. • Limited population reduction in large sites. 	<ul style="list-style-type: none"> • Undergoing development and optimisation. • Currently used under research permits.

IMPROVE

When evaluating your plan at the end of the year/season, consider the following questions:

- how well did the plan work?
- what features worked and why?
- what features did not work and why not?
- did the operation cost more or less than expected?
- could money be spent more effectively next time?
- what could be changed to make the plan work better next time?

Modify the management, monitoring or community engagement plan if required. Repeat the process until the planning process is the best it can be. This will likely need to adapt the plan each year as the situation changes in respect to environmental factors or change in technologies or policy.

To get further support evaluating your plan and for further information on feral cat management resources, information and references visit pestsmart.org.au/toolkits/feral-cats

EXTRA INFORMATION

Hazard Mitigation

Risks to Domestic Animals

Feral cat control programs using poison baits and traps can impact on domestic animals within and adjoining the management zone. Notification of landowners within and adjoining the site must occur ahead of the start of the program. Individual State and Territory governments have specified notification periods and signage requirements.

Conservation and detection dog handlers must maintain an awareness of the hazards to their dogs at each site including snakes, heat stress, cliff edges, etc. as well as presence of control tools such as traps and baits.

Policy and Legislation

Legal Status and Management

At the Meeting of Environment Ministers on 15 July 2015, Ministers endorsed the National declaration of feral cats as pests. As part of this declaration, Ministers agreed to review arrangements within their respective jurisdictions and, where necessary, to remove unnecessary barriers to effective and humane control of feral cats. Ministers also agreed to consider feral cat management as a priority in threatened species recovery

programs, and to pursue the development of a national best practice approach to the keeping of domestic cats.

Each State and Territory has regulations governing the requirement for land managers to undertake feral cat control. Similarly, the control tools available to land managers differ between land tenures in some jurisdictions. Land managers and their agents must familiarise themselves with the specific requirements applicable to their intended operation prior to beginning work. The relevant regulations may include animal welfare, chemical handling, use of firearms, aircraft operation, agriculture and protected areas management, threatened species, domestic animals and biosecurity.

The Threat Abatement Plan for Predation by Feral Cats (2015) was published by the Australian Government to map out strategies to reduce the feral cat impacts on native wildlife. The plan includes an extensive list of species that are known, or suspected, to be affected by feral cat populations. Members from the Commonwealth, State and Territory Governments, NGOs and key feral cat researchers contribute to a National Feral Cat Taskforce that provides a national advisory, coordination and informal oversight group to implement the actions and targets in the Threatened Species Strategy.

Table 2: Summary of legislative support for feral cat management tools by jurisdiction - Source: National Feral Cat Taskforce.

	ACT	VIC	NSW	WA
SHOOTING	Under regulations	Only by authorised persons	Under permit	Under regulations
BAITING	Only by authorised persons	Curiosity under permit 1080 prohibited	Curiosity order being drafted	Only by authorised persons
CAGE TRAPS	Under permit	Under regulations	Under permit	Under permit
LEGHOLD TRAPS	Under permit	Only under Ministerial approval	Under permit	Only under special exemption
DETECTION DOGS	Prohibited for hunting	Under regulations	Under regulations	Under regulations
FELIXER	Under research permit	Under research permit 1080 prohibited	Under research permit	Under research permit



Permitted for use under regulations



Under permit/only by authorised persons

TAS	QLD	SA	NT
Under regulations	Under regulations	Under permit	Under regulations
Under permit	Under permit	Only by authorised persons	Under permit
Under regulations	Under regulations	Under regulations	Under regulations
Only under Ministerial approval	Under regulations	Under regulations	Under regulations
Under regulations	Under regulations	Under regulations	Under regulations
Under research permit	Under research permit	Under research permit	Under research permit


 Only under exemption/prohibited

Table 3: Declared as pest within state legislation

STATE	RELEVANT LEGISLATION RELATING TO CAT MANAGEMENT
ACT	<ul style="list-style-type: none"> • Not declared a listed pest under the Pest Plants and Animals Act 2005 • Identifies cats as a damage-causing species under the ACT Pest Animal Management Strategy 2012-2022
VIC	<ul style="list-style-type: none"> • Feral cats declared as a pest on specified Crown land under the Catchment and Land Protections Act 1994 • Listed as a Potentially Threatening Process under the Fauna and Flora Guarantee Act 1988
NSW	<ul style="list-style-type: none"> • A Pest Control Order for feral cats being drafted under Local Land Services Act 2013 • Not listed as a pest under the Biosecurity Act 2015 • Biodiversity Conservation Act 2016 (Schedule 3) lists feral cats as a key threatening process • The Natural Resources Commission's (2016) pest management report recommends listing feral cats as a pest under the Biosecurity Act 2015 • Listed as a priority pest species in all 11 Regional Strategic Pest Animal Management Plans https://www.lls.nsw.gov.au/help-and-advice/pests,-weeds-and-diseases/pest-control/regional-strategic-pest-animal-management
WA	<ul style="list-style-type: none"> • Declared as a pest under the Biosecurity and Agriculture Management Act 2019
TAS	<ul style="list-style-type: none"> • Not declared an invasive species under the Cat Management Act 2009 • Not declared as a pest under the Animal Welfare Act 1993 • The Tasmanian Cat Management Plan 2017-2022 recommends amendments to the Cat Management Act 2009 to allow for improved feral cat control
QLD	<ul style="list-style-type: none"> • Declared as restricted matter under the Biosecurity Act 2014
SA	<ul style="list-style-type: none"> • Declared Animal Pest under the Landscape South Australia Act 2019
NT	<ul style="list-style-type: none"> • Declared Feral Animal under the Territory Parks and Wildlife Conservation Act 2006

Table 4: Relevant legislation by jurisdiction

STATE	RELEVANT LEGISLATION RELATING TO CAT MANAGEMENT
ACT	<ul style="list-style-type: none"> • Domestic Animals Act 2000 • Bush Capital Legacy– Iconic City, Iconic Natural Assets (ACT NRM Council 2009) • Pest Plants and Animals Act 2005 • ACT Pest Animal Management Strategy 2012-2022 • Animal Welfare Act 1992 • Domestic Animals Act 2000
VIC	<ul style="list-style-type: none"> • Catchment and Land Protections Act 1994 • Fauna and Flora Guarantee Act 1988 • Prevention of Cruelty to Animals Act 1986 • Prevention of Cruelty to Animals Regulations 2008 • Agricultural and Veterinary Chemical (Control of Use) Act 1992 • Domestic Animals Act 1994 • Wildlife Act 1975
NSW	<ul style="list-style-type: none"> • Local Land Services Act 2013 • Game & Feral Animal Control Act (NSW) 2002 • Non-Indigenous Animals Act 1987 (NSW) • The NSW Invasive Species Plan 2008-2015 and updated 2015-2022 Plan • Natural Resource Commission (2016) Pest Management Report • Biosecurity Act 2015 • Prevention of Cruelty to Animals Act 1979 • Prevention of Cruelty to Animals Regulations 2012 • Pesticides Act 1999 • Pesticide Control (1080 Bait Products) Order 2019
WA	<ul style="list-style-type: none"> • Biosecurity and Agriculture Management Act 2007 • Biodiversity Conservation Act 2016 • Animal Welfare Act 2002 • Animal Welfare (General) Regulations 2003 • Dog Act 1976

STATE**RELEVANT LEGISLATION RELATING TO CAT MANAGEMENT****TAS**

- Cat Management Act 2009
- Animal Welfare Act 1993
- Biosecurity Act 2019
- Tasmanian Cat Management Plan 2017-2022
- Dog Control Act 2000

QLD

- Biosecurity Act 2014
- Animal Care and Protection Act 2001
- Animal Management (Cats and Dogs) Act 2008

SA

- Landscape South Australia Act 2019
- Agricultural and Veterinary Products (Control of Use) Act 2002
- Animal Welfare Act 1985
- Animal Welfare Regulations 2012
- Dog and Cat Management Act 1995

NT

- Territory Parks and Wildlife Conservation Act (NT) 2006
- Animal Welfare Act 1999
- Animal Welfare Regulations 2000

Table 5: Cat management tools available within jurisdiction

STATE	TOOL AVAILABLE
ACT	<p>Shooting:</p> <ul style="list-style-type: none"> • shooting limited to feral animals on private property with permission; • feral cats listed as a feral animal that can be removed; • must comply under the Firearms Act 1996. <p>Baiting:</p> <ul style="list-style-type: none"> • permitted for use by authorised persons. Currently there are no specific feral cat control programs in the ACT; • no additional Territory legislation required for the use of cat baits if approved by APVMA. <p>Cage trapping:</p> <ul style="list-style-type: none"> • a person may apply for a commercial or private trapping permit under the process outlined in Division 6.2 under the Animal Welfare Act 1992. <p>Leghold traps:</p> <ul style="list-style-type: none"> • padded-jaw are permitted under the Animal Welfare Act 1992; • a person may apply for a commercial or private trapping permit under the process outlined in Division 6.2 under the Animal Welfare Act 1992. <p>Dogs:</p> <ul style="list-style-type: none"> • use of hunting dogs prohibited under the Animal Welfare Act 1992 and Domestic Animals Act 2000. <p>Felixer grooming trap:</p> <ul style="list-style-type: none"> • no specific legislation preventing the use of Felixers at this stage; • until broadscale registration is received, Felixers can only be operated with a research permit for the area approved by the APVMA.
VIC	<p>Shooting:</p> <ul style="list-style-type: none"> • shooting permitted but limited to departmental and agency staff (and their agents) on specified crown land. <p>Baiting:</p> <ul style="list-style-type: none"> • the use of PAPP for control of feral cats is supported but not 1080; • Curiosity is restricted to persons operating under a specific permit issued from Agriculture Victoria and DELWP. Use is restricted to specified Crown land. Controls have been established under the Agricultural and Veterinary Chemicals (Control of Use) Act 1992. <p>Cage trapping:</p> <ul style="list-style-type: none"> • permitted ensuring trap complies with regulation 34 and individual sets trap in accordance with regulation 35 and 36 under the Prevention of Cruelty to Animals Regulations 2008; • traps can only be set with approval from land holder.

STATE	TOOL AVAILABLE
VIC	<p>Leghold traps:</p> <ul style="list-style-type: none"> • leghold traps are permitted by Ministerial approval for declared feral cats in limited circumstances and only where the feral cat declaration applies, in sites where eradication is achievable. <p>Dogs:</p> <ul style="list-style-type: none"> • dogs can be utilised to point or flush feral cats under the Prevention of Cruelty to Animals Regulations 2008 and Domestic Animals Act 1994. <p>Felixer grooming trap:</p> <ul style="list-style-type: none"> • No specific legislation preventing the use of Felixers; • 1080 is not an approved poison for control of feral cats in Victoria.
NSW	<p>Shooting:</p> <ul style="list-style-type: none"> • feral cat listed as a non-indigenous game animal under the Game & Feral Animal Control Act (NSW) 2002; • a game hunting licence is not required to hunt non-indigenous animals on private land however, is required to hunt on public land. <p>Baiting:</p> <ul style="list-style-type: none"> • 1080 is registered for use by authorised officers. An authorised person may only use or possess 1080 bait products for the control of wild dogs, foxes, feral pigs or rabbits under the Pesticide Control (1080 Bait Products) Order 2019; • a Pest Control Order is being drafted for the use of Curiosity baits. <p>Cage trapping:</p> <ul style="list-style-type: none"> • permit required to trap and control on public land under the Game & Feral Animal Control Act (NSW) 2002; • traps must comply with the Prevention of Cruelty to Animals Act 1979. <p>Leghold traps:</p> <ul style="list-style-type: none"> • permit required to trap and control on public land under the Game & Feral Animal Control Act (NSW) 2002; • soft-jawed traps permitted under the Prevention of Cruelty to Animals Act 1979. <p>Dogs:</p> <ul style="list-style-type: none"> • dogs may be used to locate, point, flush or retrieve ensuring compliance under Prevention of Cruelty to Animals Act 1979 and Companion Animals Act 1998. <p>Felixer grooming trap:</p> <ul style="list-style-type: none"> • no specific legislation preventing the use of Felixers; • until broadscale registration is received, Felixers can only be operated with toxins if approved by the APVMA and State authorities.

STATE	TOOL AVAILABLE
WA	<p>Shooting:</p> <ul style="list-style-type: none"> • must be licenced and comply under the Firearms Act 1973, Animal Welfare Act 2002 and Biodiversity Conservation Act 2016; • authorised persons may humanely destroy feral cats providing land owner permission is obtained. <p>Baiting:</p> <ul style="list-style-type: none"> • Eradicat bait (1080) registered for use in Western Australia; • Eradicat can only be used by Authorised Officers, Licensed Pesticide Management Technicians that comply under the Medicines and Poisons Act 2014. <p>Cage trapping:</p> <ul style="list-style-type: none"> • cage trapping permitted for cat control (under permit) under the Animal Welfare Act 2002. <p>Leghold traps:</p> <ul style="list-style-type: none"> • leghold traps are not permitted for cat control (unless under special exemption), considered inhumane devices under the Animal Welfare Act 2002. <p>Dogs:</p> <ul style="list-style-type: none"> • the use of dogs is permitted ensuring compliance under the Animal Welfare Act 2002 and Dog Act 1976. <p>Felixer grooming trap:</p> <ul style="list-style-type: none"> • no specific legislation preventing the use of Felixers; • until broadscale registration is received, Felixers can only be operated with toxins if approved by the APVMA and State authorities.
TAS	<p>Shooting:</p> <ul style="list-style-type: none"> • Authorised Officers may humanely destroy cats found in prohibited areas (National Parks, Conservation Areas, Public Reserves, State Forest and private property with a conservation covenant) under the Cat Management Act 2009; • a person may humanely destroy a cat on their land in accordance with the Cat Management Act 2009 and Animal Welfare Act 1993, providing land is over 1 km from the nearest residence; • Shooting is not permitted within 250 m of a dwelling. <p>Baiting:</p> <ul style="list-style-type: none"> • only available to Authorised Officers under appropriate permits. <p>Cage trapping:</p> <ul style="list-style-type: none"> • Authorised Officers may trap and humanely destroy cats found in prohibited areas by under the Cat Management Act 2009; • a person may trap in or on premises lawfully entered, providing land is over 1 km from the nearest residence, under the Cat Management Act 2009.

STATE	TOOL AVAILABLE
TAS	<p>Leghold traps:</p> <ul style="list-style-type: none"> • a person must not use a leghold trap under the Animal Welfare Act 1993. The Minister may grant an exemption to use a leghold trap under certain conditions. <p>Dogs:</p> <ul style="list-style-type: none"> • dogs may be used only during daylight hours to locate, point and flush cats; • owners must ensure compliance with Animal Welfare Act 1993 and Dog Control Act 2000. <p>Felixer grooming trap:</p> <ul style="list-style-type: none"> • no specific legislation preventing the use of Felixers; • until broadscale registration is received, Felixers can only be operated with a research permit for the area approved by the APVMA.
QLD	<p>Shooting:</p> <ul style="list-style-type: none"> • permitted providing shooters have a firearms licence and comply with the Weapons Act 1990 and with the Animal Care and Protection Act 2001; • must obtain landowner permission. <p>Baiting:</p> <ul style="list-style-type: none"> • 1080 is registered for the control of feral cats and authorised officers can supply and distribute 1080 baits; • landholders may apply to Queensland Health for individual approvals for several 1080 and PAPP bait products. <p>Cage trapping:</p> <ul style="list-style-type: none"> • must obtain landowner permission before trapping; • cage traps can be used providing they comply with the Animal Care and Protection Act 2001. <p>Leghold traps:</p> <ul style="list-style-type: none"> • must obtain landowner permission before trapping; • leghold traps are permitted ensuring they comply with the Animal Care and Protection Act 2001. <p>Dogs:</p> <ul style="list-style-type: none"> • dogs may be used only to locate, point and flush cats ensuring compliance under the Animal Care and Protection Act 2001 and Animal Management (Cats and Dogs) Act 2008. <p>Felixer grooming trap:</p> <ul style="list-style-type: none"> • no specific legislation preventing the use of Felixers; • until broadscale registration is received, Felixers can only be operated with toxins if approved by the APVMA and State authorities.

STATE	TOOL AVAILABLE
SA	<p>Shooting:</p> <ul style="list-style-type: none"> • feral cats may be humanely destroyed at any time providing a Hunting Permit is obtained; • authorised persons may humanely destroy feral cats providing landowner permission is obtained. Approval is required on National Parks and Reserves; • authorised persons must comply under the Firearms Act 2015, Animal Welfare Act 1985 and Animal Welfare Regulations 2012. <p>Baiting:</p> <ul style="list-style-type: none"> • 1080 and PAPP are registered for use in feral cat control and may only be distributed by authorised persons under the Agricultural and Veterinary Products (Control of Use) Act 2002. Baiting on public and private land is by authorised persons only. <p>Cage trapping:</p> <ul style="list-style-type: none"> • permitted for use by authorised persons ensuring compliance under the Animal Welfare Act 1985. <p>Leghold traps:</p> <ul style="list-style-type: none"> • permitted for use by authorised persons ensuring compliance under the Animal Welfare Act 1985. <p>Dogs:</p> <ul style="list-style-type: none"> • dogs are permitted to locate, hold at bay and retrieve feral animals but must not be set on animals. Owner must ensure dog is compliant under the Dog and Cat Management Act 1995. <p>Felixer grooming trap:</p> <ul style="list-style-type: none"> • no specific legislation preventing the use of Felixers; • until broadscale registration is received, Felixers can only be operated with toxins if approved by the APVMA and State authorities.
NT	<p>Shooting:</p> <ul style="list-style-type: none"> • feral cats are a declared pest and can be taken at any time. Land owner permission must be obtained; • shooters must comply under the Firearms Act 1997. <p>Baiting:</p> <ul style="list-style-type: none"> • unless authorised a person must not lay baits under the Animal Welfare Act 1999; • if you are a property owner or manager, you need to apply for a 1080 Pest Animal Management Authorisation; • authorised persons are permitted under certain conditions. <p>Humane cage trapping:</p> <ul style="list-style-type: none"> • permitted ensuring they comply under the Animal Welfare Act 1999.

NT

Dogs:

- dogs may be used to locate, point and flush feral cats ensuring compliance under council by-laws, the Animal Welfare Act 1999 and Animal Welfare Regulations 2000.

Felixer grooming trap:

- no specific legislation preventing the use of Felixers;
- until broadscale registration is received, Felixers can only be operated with toxins if approved by the APVMA and Territory authorities.



Feral Cat and Brush-tailed Phascogale. Image by Marika Maxwell.

Further reading

Ecology

Department of Environment (2015). Threat Abatement Plan for Predation by Feral Cats. Commonwealth of Australia.

Denny EA and Dickman CR (2010). Review of cat ecology and management strategies in Australia. Invasive Animals Cooperative Research Centre, Canberra.

Jones E and Coman BJ (1981). Ecology of the feral cat, *Felis catus* (L.), in south-eastern Australia I. Diet. *Wildlife Research* 8(3), 537-547.

Jones E and Coman BJ (1982). Ecology of the feral cat, *Felis catus* (L.), in south-eastern Australia II.* Reproduction. *Wildlife Research* 9, 111-119.

Read J and Bowen Z (2001). Population dynamics, diet and aspects of the biology of feral cats and foxes in arid South Australia. *Wildlife Research* 28, 195-203.

Legge, S, Murphy, BP, McGregor, H, Woinarski JCZ, et al (2017). Enumerating a continental-scale threat: How many feral cats are in Australia? *Biological Conservation* 206, 293-303.

Mitchell B and Balogh S (2007). Monitoring techniques for vertebrate pests - feral pigs. Orange, NSW: Department of Primary Industries.

Control

Algar D and Burrows ND (2004). Feral cat control research: Western Shield review--February 2003. *Conservation Science Western Australia*, 5(2), 131-163.

Algar D, Johnston M, Tiller C, Onus M, Fletcher J, Desmond G Hamilton N and Speldewinde P (2020). Feral cat eradication on Dirk Hartog Island, Western Australia. *Biological Invasions* 22(3), 1037-1054.

Fancourt BA, Cremasco P, Wilson C and Gentle, MN (2019). Do introduced apex predators suppress introduced mesopredators? A multiscale spatiotemporal study of dingoes and feral cats in Australia suggests not. *Journal of Applied Ecology*, 56(12), 2584-2595.

Johnston M, Algar D, O'Donoghue M, Morris J, Buckmaster T and Quinn J (2020). Efficacy and welfare assessment of an encapsulated para-aminopropiophenone (PAPP) formulation as a bait-delivered toxicant for feral cats (*Felis catus*). *Wildlife Research* 47, 686-697.

Legge S, Ringma J, Bode M, Radford J, Woinarski J, Mitchell N and Wintle B. (2018). Protecting Australian mammals from introduced cats and foxes: The current status and future growth of predator-free havens. Online resource accessed August 2020.

McGregor HW, Hampton JO, Lisle D and Legge S. (2016). Live-capture of feral cats using tracking dogs and darting, with comparisons to leg-hold trapping. *Wildlife Research* 43, 313-322.

Read JL, Bowden T, Hodgens P, Hess M, McGregor H and Moseby K (2019). Target specificity of the Felixer grooming "trap". *Wildlife Society Bulletin* 43(1), 112-120.

Monitoring

Bengsen A, Butler J and Masters P (2012). Estimating and indexing feral cat population abundances using camera traps. *Wildlife Research* 38(8), 732-739.

Fancourt BA (2016). Avoiding the subject: the implications of avoidance behaviour for detecting predators. *Behavioral Ecology and Sociobiology* 70, 1535-1546.

Hanke PU and Dickman CR (2013). Sniffing out the stakes: hair-snares for wild cats in arid environments. *Wildlife Research* 40(1), 45-51.

Heurich M, Müller J and Burg M (2012). Comparison of the effectivity of different snare types for collecting and retaining hair from Eurasian Lynx (*Lynx lynx*). *European Journal of Wildlife Research*, 58(3), 579-587.

Meek PD, Fleming P, Ballard G, Banks P, Claridge AW, Sanderson J and Swann D (Eds.). (2014). *Camera trapping: wildlife management and research* (Vol. 2). Melbourne, Australia: CSIRO Publishing.

Triggs, B. (2004). *Tracks, Scats and Other traces: A Field Guide to Australian Mammals*. Oxford University Press, USA

Impacts

Doherty TS, Davis RA, van Etten EJ, Algar D, Collier N, Dickman CR, Edwards G, Masters P, Palmer R and Robinson S (2015). A continental-scale analysis of feral cat diet in Australia. *Journal of Biogeography* 42(5), 964-75.

Fancourt BA and Jackson RB (2014). Regional seroprevalence of *Toxoplasma gondii* antibodies in feral and stray cats (*Felis catus*) from Tasmania. *Australian Journal of Zoology* 62, 272-283.

Fancourt BA, Nicol SC, Hawkins CE, Jones ME and Johnson CN (2014). Beyond the disease: is *Toxoplasma gondii* infection causing population declines in the eastern quoll (*Dasyurus viverrinus*)? *International Journal for Parasitology: Parasites and Wildlife* 3, 102-112.

Fancourt BA (2016). Avoiding the subject: the implications of avoidance behaviour for detecting predators. *Behavioral Ecology and Sociobiology* 70, 1535-1546.

Legge S, Taggart P, Dickman CR, Read J and Woinarski JCZ (2020). Cat-dependent diseases cost Australia AU\$6 billion per year through impacts on human health and livestock production. *Wildlife Research* 47, 731-746.

McLeod R (2004). *Counting the Cost: Impact of Invasive Animals in Australia*. Cooperative Research Centre for Pest Animal Control, Canberra.

Woinarski JC, Murphy BP, Legge SM, Garnett ST, Lawes MJ, Comer S, Dickman CR, Doherty TS, Edwards G, Nankivell A and Paton D (2017). How many birds are killed by cats in Australia? *Biological Conservation* 214, 76-87.

Woinarski JCZ, Murphy BP, Palmer R, Legge SM, Dickman CR, Doherty TS, Edwards G, Nankivell A, Read JL and Stokeld D (2018). How many reptiles are killed by cats in Australia? *Wildlife Research* 45, 247-266.

Woinarski JC, Legge SM, Woolley LA, Palmer R, Dickman CR, Augusteyn J, Doherty TS, Edwards G, Geyle H, McGregor H and Riley J (2020). Predation by introduced cats *Felis catus* on Australian frogs: compilation of species records and estimation of numbers killed. *Wildlife Research*, 47(8) 580-588.

Woinarski JCZ, Legge SM and Dickman CR (2019) *Cats in Australia. Companion and Killer*. Clayton South Victoria. CSIRO Publishing.

7. Notes



The page contains 20 horizontal ruling lines. Three large, diagonal, light-brown brushstroke-like shapes are overlaid on the page, starting from the top right and extending towards the bottom left. These shapes are semi-transparent and have a soft, feathered edge, resembling a light-colored paint or ink stroke.



