

# HUMANE CAT POPULATION MANAGEMENT GUIDANCE

International Companion Animal Management Coalition



HUMANE SOCIETY  
INTERNATIONAL



## Executive summary

**The International Companion Animal Management Coalition has produced this document to provide government bodies and non-governmental organisations with a detailed resource to support them in their development and implementation of effective and humane programmes to manage cat populations.**

Over thousands of years, the relationship between cats and humans has evolved, with an estimated 500 million cats living throughout the world today. The size and make-up of individual cat populations can vary significantly, as can the circumstances and environments in which they are found.

There is no single intervention that will work for all situations where cat populations require some degree of management. An initial assessment and consideration of all potential relevant factors must be made before deciding on the most appropriate programme. What is essential is that the programme is comprehensive and focussed on root causes of the roaming cat population, and not solely on treating the symptoms.

This document examines the five stages of a comprehensive cat population management programme and the elements contained within them.

- A** The initial data collection and assessment: understanding the problem you are facing by asking the right questions, finding out the relevant information and involving everyone who needs to be involved.
- B** Analysing and interpreting assessment data with consideration of the influential factors in cat population management: what influences the size and make-up of the cat population and people's desire to control that population?
- C** The components of a comprehensive cat population programme: based on your specific circumstances and selecting the solutions most appropriate to your situation.
- D** Designing the intervention: the process that is necessary to create a specific programme suited to your needs.
- E** Implementation, monitoring and evaluation: applying and keeping the programme on track, and making sure it is effective and achieving its goals.

Throughout this document we will be referencing additional resources that will further aid and support the development of an effective cat population management programme.





## Introduction

### The International Companion Animal Management Coalition

The International Companion Animal Management Coalition (ICAM Coalition) is made up of representatives from the World Society for the Protection of Animals (WSPA), the Humane Society International (HSI), the International Fund for Animal Welfare (IFAW), the international arm of the Royal Society for the Prevention of Cruelty to Animals (RSPCA International), the World Small Animal Veterinary Association (WSAVA) and the Alliance for Rabies Control (ARC).

This group was set up to fulfil several objectives, including the sharing of information and ideas on companion animal population dynamics with a view to coordinating and improving member organisations' recommendations and guidance. Each organisation has agreed that it is important to strive to improve our mutual understanding through collaboration. We have a responsibility as funding and advisory bodies to ensure we are offering the most accurate guidance, based on the latest available data and concepts, to those involved with cat population management in the field.

We also believe it is important that we endeavour to be transparent and to document our opinions and philosophy whenever possible. It is to this end that this document has been produced – it represents our recommendations at the time of writing, based on the knowledge we have accrued to date, and will be subject to updates when appropriate. We are aware of the incompleteness of data in this field and will strive both to support the collection of new data and to incorporate it into our future discussions, assessments and guidelines.



### Who this guidance is for?

This document is intended for use by government bodies and non-governmental organisations (NGOs) that are involved in cat population management. A similar document, presenting guidelines on the humane management of dog populations, was produced by the ICAM Coalition in November 2007 ([www.icam-coalition.org](http://www.icam-coalition.org)).

Ideally, responsibility for cat population management properly resides with local or central government. Animal welfare NGOs should not be required to take on the domestic animal management functions that properly reside with the local authority other than through a contractual agreement, with appropriate funding and resources. However, animal welfare NGOs play a key role in guiding and supporting government strategy, so it is important for such organisations to have an understanding of all the components of a comprehensive strategy. This will enable NGOs to target their support where it can be most effective and to make the best use of limited resources.

Nevertheless, historically, the management of roaming cat populations has come under the remit of NGOs rather than government. Often the management of these populations is regarded as a low priority issue compared with dogs. This is because, for example:

- dog ownership sometimes requires a licence and is therefore more likely to be regulated by a central authority
- dogs present a more obvious public health risk to humans than cats, e.g. the predominance of the dog as a source of rabies in humans, hence the focus of rabies control programmes on the dog
- public nuisance problems are more overt with roaming dogs (barking, fighting, urine and faecal contamination)
- the dog has been associated with humans for much longer than cats, and in many societies a higher value is attributed to it as a companion animal
- dogs are more likely to be pedigree i.e. pure-bred and therefore have some monetary value (either the owner has paid a certain sum to have the dog, or is able to sell the dog for a certain sum) – breeding pedigree dogs may, in some countries, require licensing, while most cats are non-pedigree i.e. of no particular breed, do not have any monetary value and are usually obtained and given away for free
- dogs are often expected to work for humans (e.g. herding or guarding) and may be trained to fulfil this role, whereas

cats are not usually regarded as being trainable, and it is their natural behaviour (e.g. hunting of rodents) that benefits humans

- the majority of owned cats are allowed to roam freely – where they go and what they do is not regarded as being within human control
- cats are less domesticated and closer to 'wild-type' than dogs and can therefore, in certain favourable climates, survive in the environment with little or no human intervention or support – this perceived lack of dependence also leads some people to consider them less amenable, suitable for, or deserving of management
- the welfare concerns of dog populations are usually more visible, prompting more motivation to manage them.

### The aim of the document

As an animal welfare advocate, the ICAM Coalition believes that when population management is deemed necessary, it is essential that it is achieved in a humane manner and ultimately leads to an improvement in the welfare of the cat population as a whole. As NGOs, we also believe it is important that population management is achieved as efficiently and cost effectively as possible due to limitations on resources and our responsibility to our donors.

The aim of this document is to provide guidance on how to assess cat population management needs and how to decide upon the most effective and resource-efficient approach to managing the population humanely.



We are aware that the status, composition and size of cat populations can vary significantly between and within countries, so there is no single intervention that will work for all situations. Therefore, we strongly advocate the need for initial assessment and consideration of all potential relevant factors before deciding on a programme design. The only concept we consider universal is the need for a comprehensive programme that is focussed on causes and not solely on treating the symptom, namely the roaming cat population.

## Why do we need to control cat populations?

The need to manage roaming cat populations arises in many situations, including:

- where the welfare of the cats is compromised (see following section)
- where cats present a public health risk to humans, either through the transmission of zoonotic disease (e.g. rabies, toxoplasmosis) or contamination of the environment (through urine, faeces)
- where cats cause a public nuisance e.g. fighting, scavenging for food (at garbage dumps, restaurants, hotels)
- where cats present a risk to other cats through the transmission of disease (e.g. viruses)
- where cats pose a significant threat to wildlife through predation, in particular where this involves endangered species or where a wildlife population is approaching a critical threshold beyond which it cannot recover.

The welfare of roaming cats may be compromised due to a wide range of causes, including:

- high levels of disease
- inadequate food supply, or inappropriate food supply (cats are obligate carnivores, have specific nutrient requirements and cannot survive on a vegetarian or protein-deficient diet)
- lack of shelter and/or extremes of environmental temperature
- high mortality, especially in kittens who are most vulnerable
- road accidents, a common cause of injury and death
- attacks by dogs and other predators
- malicious attacks by humans, including poisoning.

If none of the above situations apply, the welfare of the cats is good and there is no conflict with humans, there may be no indication to intervene and manage a cat population. However, in most cases problems eventually arise in unmanaged roaming cats, resulting in public health issues, nuisance complaints, and animal welfare concerns because of, for example, high cat and kitten mortality.

Where there is a need for management, the ICAM Coalition's aim is to ensure that effective and humane methods are used and to prevent the use of inhumane methods such as:

- cruel methods of catching
- cruel methods of killing (such as poisoning, electrocution, drowning)
- incarceration in poorly equipped or managed holding facilities.

It is relevant when discussing the ICAM Coalition's aim of cat population management to return to an earlier point about the domestication of cats. The process of domestication involves humans imposing a selection pressure for or against certain desired traits. The outcome of this process can be the evolution of a species that fits the human ideal more closely, but a potential side effect is that the species may become less well adapted to an environment without human care. The extent to which this has happened with cats is currently difficult to establish. There is some evidence that cats struggle to maintain good welfare when left without human care from the observation that some cats trapped by trap, neuter, return (TNR) programmes are in a poor state of welfare. However, there is also evidence, not least from some remote islands, where a small founding population has led to the establishment of a large population of cats, that cats can and do flourish without human care. Whether cats are domestic animals that require human care to achieve a good state of welfare or whether they are close enough to their original wild ancestors to be able to survive and maintain a good state of welfare without human care is an important question. This is because the answer would dictate what animal welfare organisations such as the members of the ICAM Coalition would perceive as the desired goal of cat population management.

Should we be aiming for all cats to have adequate human guardianship or is just the absence of persecution enough? In the face of limited data on this subject the ICAM Coalition has taken the decision to err on the side of caution and state as its goal for cat population management to be 'a time when all cats benefit from adequate guardianship'. However, the coalition is interested in exploring this question in more detail and is ready to amend this position in light of more evidence.

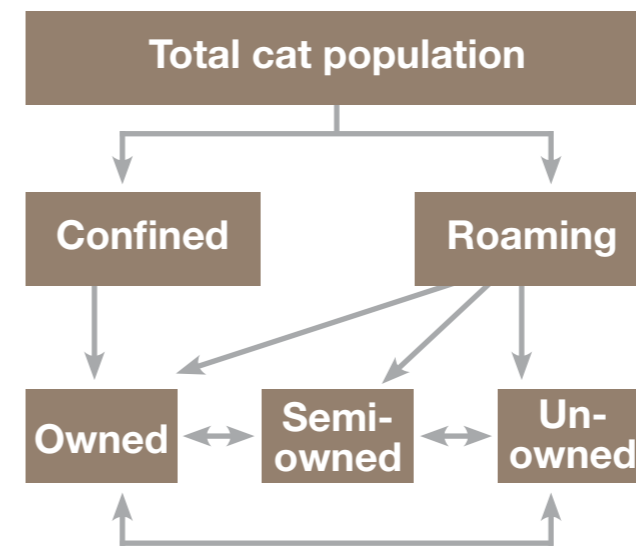


## Terminology

How to define cats within cat populations can be difficult – the best definitions are those that are workable from a practical aspect. The cat population can be divided into those cats that are confined indoors at all times and those that are free to roam (Bradshaw et al 1999). Cats confined indoors can either be owned or held temporarily in holding facilities such as shelters or foster homes, whereas roaming cats can be owned, semi-owned or un-owned (Figure 1).

### Figure 1: Sub-populations of the total cat population

The diagram shows the sub-populations into which the total cat population can be partitioned. These categories are fluid and cats may move between categories, as indicated by the arrows.



### Confined cats

Owned cats confined indoors are very likely to be socialised to humans, and have their reproduction controlled by humans. Pedigree cats are more likely to be kept indoors and to have a certain monetary value. Indoor-only cats are unlikely to be a source of unwanted kittens and are unlikely to contribute to the roaming population unless they escape. Except in North America and Australasia, indoor-only cats usually make up a small proportion (less than 20 per cent) of the owned cat population (Rochlitz 2005).

Other confined cats are those kept in facilities such as animal shelters, sanctuaries and foster homes.

### Roaming cats

For the purposes of cat population management, it is the roaming cats that are the focus. Within this population, it is most practical to think of roaming cats as belonging to one of three main groups: **owned**, **semi-owned** and **un-owned**, which are defined below. These definitions are proposed as the most workable for cat population management.

However, because management plans must be adapted to account for the huge variability of conditions where they are necessary, one should be prepared to re-examine the definitions so that they are the most suitable for a particular plan.

### 1 Owned cats: those for whom an owner can be identified i.e. the person says: "That's my cat".

Owned cats are likely to be owned by an individual, a household, or even a business. An owned cat is a cat that belongs to a specific owner, who cares for the cat by providing food and shelter and who undertakes to be responsible for the cat's welfare. An owned cat is likely to be in reasonable body condition, show some evidence of being socialised to humans and allow itself to be handled (though some owned cats may not). Reliable data are lacking, but a survey in the UK found that the average age of owned cats at death was 12½ years, and the main causes of death were old age/senility, kidney failure, cancer and road traffic accidents (Rochlitz et al 2001). Most cats killed in road accidents were male and less than four years old. These data are likely to be different in other countries.

Most owned cats are allowed outdoors (except in some countries such as the United States of America where approximately 50 per cent are confined indoors or confined in outdoor enclosures), but where they go and what they do when outside is not usually within the control of the owner. When outside, the cat is part of the roaming cat population. Identification of an owned cat can be by microchip, tattoo, or collar, but the majority of owned cats do not have any form of identification. Without identification, it can be difficult to distinguish between owned cats and other categories within the roaming cat population, although owned cats are usually in better physical condition and more socialised to humans.

### 2 Semi-owned cats: those for whom some kind of caregiver can be identified even if the caregiver does not regard themselves as owners in the conventional sense i.e. the person says "I sometimes feed that cat, or I sometimes offer it shelter, but it does not belong to me".

Semi-owned cats are those living usually in small colonies but sometimes singly, within human communities, on farms, and other locations such as hotels, hospitals and restaurants. They may or may not be socialised to humans. They congregate in these locations because of the availability of food and shelter, which may be provided by a caregiver. A caregiver may be an individual, a household or a business (e.g. hotel staff). Caregivers often enjoy looking after the cats, whose presence is usually appreciated in the community and by local tourists.

It is common for caregivers to feed and provide minimum care for colonies of cats living outdoors because they are concerned about the cats' welfare, but they do not regard themselves as owners of the cats and may be reluctant to take responsibility for them. Caregivers may be prepared to provide these cats with some food and shelter, and possibly emergency veterinary care, but this care does not often extend to providing other aspects of conventional pet ownership such as identification, sterilisation, vaccination or parasite control.

Owners of farms, hotels, restaurants, hospitals, abattoirs and other similar locations may want to maintain small groups of roaming cats for rodent control. The cats are often highly valued for their hunting ability and may have been purposefully acquired for the location. They are likely to live exclusively or primarily on the owner's property, which decreases the likelihood of problems with neighbours.

### 3 Un-owned cats: those for whom an owner or caregiver cannot be identified.

Un-owned cats may have been previously owned or semi-owned, but for one reason or another may have lost their connection with their owner or caregiver, or they may never have had an owner or caregiver. They may or may not be socialised to humans. These cats find their own food through scavenging and hunting, and make use of whatever shelter is available in the environment. They do not benefit from any veterinary care or other human attention but nevertheless are often partly dependent on resources (food and to a lesser extent shelter) from humans, even if these are not deliberately provided for them (for example garbage dumps and fishing ports). These cats are the most vulnerable group within the roaming cat population, as they do not benefit from any kind of guardianship.

### Colony

A colony is defined as a group of three or more sexually mature (aged five to six months or more) cats living and feeding in close proximity (Slater 2005). The term is usually used to describe un-owned or semi-owned cats. A managed colony is a group of roaming cats that is controlled by a TNR programme or similar approach (see page 26).

### Stray and feral cats

The term 'stray' is sometimes used to describe previously owned cats that have become separated from their owners and are therefore lost, or gone 'astray'. In this case, stray implies that the cats are socialised to humans. Sometimes, however, stray is used to describe all roaming cats, whether socialised or not socialised to humans, and regardless of the cats' sources of food or shelter or ownership status.

While the term 'feral' is often used to describe the un-owned cat that cannot be handled and is un-socialised and therefore not suitable for placement in a home (Slater 2005), the term is also used in a broad sense to include all roaming cats that do not have an identifiable owner, regardless of socialisation status, or the sources of the cats' food or shelter. This includes cats within managed colonies where a caretaker can be identified, other semi-owned cats such as community or barn cats, and un-owned cats that live on the fringes of human communities, such as cats subsisting on rubbish/food dumps. In Australia and New Zealand, the definition of the term 'feral' is closer to the definition of 'feral' used by biologists: cats that live and reproduce in the wild, survive by hunting or scavenging, do not live near centres of human habitation and do not have any of their needs provided by humans.

In this document, in order to avoid confusion the terms 'stray' and 'feral' are not used. Cats are qualified by whether they are owned, semi-owned or un-owned, and if relevant, by whether they are socialised or not socialised to humans. However, when findings from the literature are quoted, the terms used in the source articles are preserved and clarification is provided to be consistent with the above definitions.



### Roaming cat populations

The terms free-ranging, free-roaming and roaming are all used in the literature to describe cats that are free to roam in the environment. In this document the term 'roaming' will be used, in accordance with the use of this term in the ICAM Coalition's *Humane dog population management guidance*.

#### Observations of roaming cat populations

- The distinctions between owned cats allowed outdoors, semi-owned and un-owned cats are often blurred; these cats are all part of the roaming population.
- The population of roaming owned cats is constantly changing. Some owners expect that their cat will go away for a few days and then return. When a cat does not come back, efforts to find it may be limited and often the cat does not have any form of identification. Lost cats are rarely re-united with their owner.
- When owners no longer want their cat, they can easily abandon it somewhere away from their household ('dumping') rather than finding another owner (privately or through a shelter where available). These cats may become less socialised to humans if they do not have contact with them for some time, especially if they were not socialised to humans as kittens during the sensitive period of development (between two and eight weeks of age).
- Some semi-owned or un-owned cats may eventually be adopted and become owned cats, providing they are still socialised to humans.
- The kittens of roaming cats, if they are not socialised to humans by the time they are eight weeks of age, will not usually be suitable as owned cats, but may adapt successfully as semi-owned cats whose needs are met by a caregiver.
- Adult cats that are not socialised to humans are not able to adapt to the existence of a confined owned cat, but may be managed effectively as a semi-owned cat.

### Responsible cat ownership

Responsible ownership means that an owner fulfils a duty of care to ensure that their animal's physical and psychological needs are fully met. These include:

- the need for a suitable environment
- the need for a suitable diet
- the need to be able to exhibit normal behaviour patterns
- the need to be housed with, or apart from, other animals
- the need to be protected from pain, suffering, injury and disease.

Instead of focussing on meeting an animal's needs, ownership can also be defined by emphasising the obligations of an owner, i.e. what they should provide. Both cat owners and caregivers should be able to fulfil these obligations.

The minimum obligations of responsible ownership include:

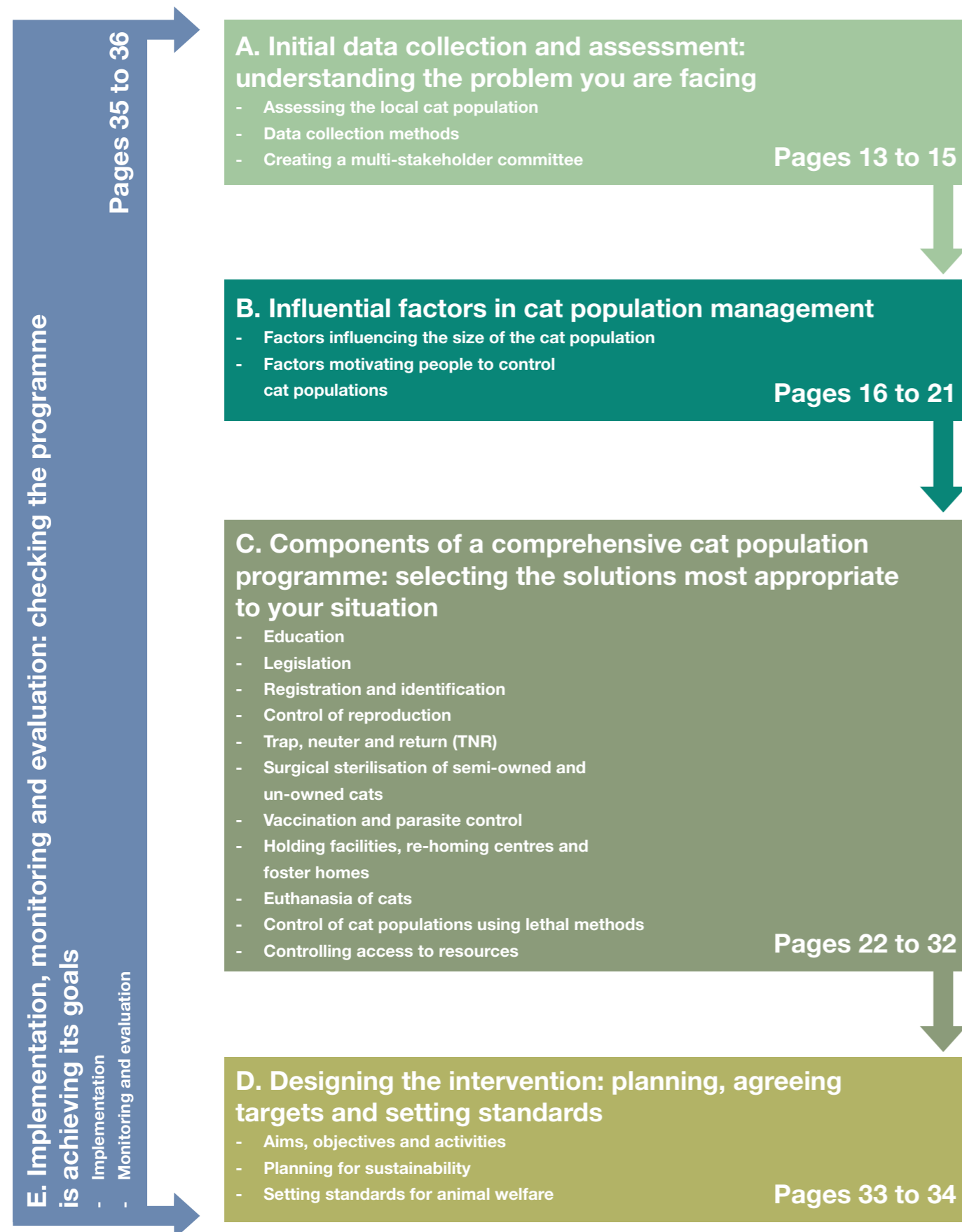
- provision of food, shelter and any other resources (such as social interaction) necessary to maintain an acceptable level of both physical and psychological welfare
- prevention of reproduction (by sterilisation, contraception or other methods unless breeding is planned and homes are available for the offspring)
- identification of cats that have been sterilised by a visual mark e.g. ear tip, tattoo on ear (males and females) or at surgical site (females)
- provision of basic veterinary care (vaccination, parasite control)
- minimising the risks cats may pose to the public or to other animals (in some countries, such as Australia, this is a legal requirement where cat curfews and other restrictions on cat ownership may apply)
- the individual identification of cats – in some countries there may be a legal requirement for owned cats to be identified so that the owner can be traced; however, even if there is no legal requirement, the ICAM Coalition regards this as an essential component of responsible ownership.

In some countries, codes of care are developed to provide minimum and ideal standards of care to ensure owners have guidance on what behaviour is obligated and recommended of them as cat owners. See [www.defra.gov.uk/wildlife-pets/pets/cruelty/documents/cop-cats.pdf](http://www.defra.gov.uk/wildlife-pets/pets/cruelty/documents/cop-cats.pdf) for the UK code of practice for the welfare of cats and [www.biosecurity.govt.nz/animal-welfare/codes/companion-cats](http://www.biosecurity.govt.nz/animal-welfare/codes/companion-cats) for the New Zealand Animal welfare (companion cats) code of welfare. For 'the five freedoms' see [www.fawc.org.uk/freedoms.htm](http://www.fawc.org.uk/freedoms.htm) for the basic animal welfare framework that underlies many codes of care.



## Humane cat population management – a process overview

This flow chart refers to the following sections within this document. It provides a general overview of the stages and processes that need to be considered when embarking on a population management programme.



## A. Initial data collection and assessment: understanding the problem you are facing

Before embarking on a cat population management programme it is essential that the dynamics of the cat population are understood and measured objectively. This approach ensures that the final management programme is tailored to the characteristics of the local cat population, instead of being a single blanket intervention for all cats or all situations.

attitudes towards owned cats, the roaming cat population, sterilisation and other issues.

See the following website for examples of household surveys: [www.fanciers.com/npa/studies.html](http://www.fanciers.com/npa/studies.html)

### Participatory appraisals, focus groups and informal interviews

The aim of focus groups and informal interviews is to explore the subject area from a range of different perspectives, so it is important to ensure that a good representation of the public is included. Interviews are defined as 'informal' when a group of people is asked open-ended questions and the questioning is allowed to develop as a conversation as opposed to following a strict script of pre-defined questions. Participatory appraisals aim to go a step further, by maximising the engagement of local people using flexible and visual tools that don't require people to be literate. This allows local people to guide the direction of the appraisal themselves in order to identify their own priorities for the future programme, rather than just gathering information that someone else uses later to make decisions. The composition of the groups should be carefully considered to ensure everyone feels relaxed and able to respond and discuss the subject matter openly and honestly with the interviewer. Individuals, both cat-owning and non-cat-owning, caregivers and representatives of involved authorities and organisations should be invited to participate in meetings where they discuss all issues to do with the cat population (owned, semi-owned and un-owned), and their attitudes towards them. Representatives of existing shelters, and local groups already involved in cat population control, may have collected data and can be an additional useful source of information.

### Indicator counts and mark-resight methods

A population indicator count is simply a count that, under certain assumptions, will indicate whether the number of cats in an area increases or decreases over a period of time. It will not tell you how many cats there are in the area, but a later repeat count can be compared to the original count to indicate if the number of cats has changed.

The method for conducting an indicator count is to select one or more routes across the city or municipality and count cats along those routes. The selected route would need to be recorded accurately so that the count can be repeated consistently. The number of cats seen on a route

### Assessing the local cat population

Initial assessment should include these questions:

- What is the current size of the cat population and what are the categories within it?
- Where are the owned, semi-owned and un-owned cats coming from?
- What are the main welfare issues faced by these cats?
- What is currently being done, both informally and officially, to control the cat population and why?

The fluid nature of the cat population, with many cats disappearing from some households and at least some being added to other households, complicates attempts to measure accurately the dynamics of this population. Ideally, a population estimate should be performed prior to a programme's implementation, but reliably estimating the size of the roaming cat population in a particular location can be difficult. At the very least, a population survey can be used as an indicator of population change over time. In other words, although an estimate of absolute population size may not be that accurate, using the same survey protocol over time would reflect the magnitude of population increase or decrease.

Formal and informal methods of collecting information on the cat populations and on residents' opinions are also crucial to developing the right combination of approaches and obtaining support for population management.

### Data collection methods

#### Household surveys, either door to door or by telephone

Surveys are used to gather data on all aspects of cat ownership, such as: the number of households owning cats; the source of the cat; the cat's sterilisation status; how many litters the cat has had including before sterilisation was done if it was done; whether the household feeds other cats and any welfare problems associated with them and

will certainly be affected by the time of year (especially if there is a clear breeding season), time of day and perhaps by the weather, as well as by the person counting the cats. It is important to try to reduce the effect of these factors by keeping everything the same, as far as possible (i.e. count at the same time of day, avoid times of unusual weather and have the same people involved). It is also necessary to decide on a consistent counting protocol, for example, whether to count cats seen on balconies and roofs or to check for cats under parked cars.

Ideally the indicator counts should be repeated on at least three consecutive days (avoiding any days that may show abnormal cat numbers, for example, due to unusual weather) to find an estimate of how much the counts vary day-to-day. When the indicator counts are compared across years, taking account of changes due to breeding season, any changes in the number of cats can then be compared to the day-to-day variation. If the observed year-to-year change is greater than the day-to-day variation, then it is possible to reject normal day-to-day variation as the reason for the observed change in cat numbers.

The mark-resight method is where cats can be marked (or otherwise identified) and detected later by sighting in order to estimate population size and survival rates. A critical assumption of the mark-resight method to estimate population size is that resighting is independent of marking probability; if cats that are easier to see are also easier to mark this leads to an underestimate; if cats that have been marked become harder to see, this leads to an overestimate.



Once a control programme has started and providing that managed sterilised cats can be marked, for example by having the tip of their ear removed (ear-tipping, see page 27), a mark-resight estimation can be made. This requires good record keeping on the dates of release of marked animals and an estimate of survival. It must be noted that this method of assessment assumes both that marking probability is independent of sighting probability, as explained previously, and that you are working with a closed population. This is a population where there is absolutely no chance of immigration or emigration of animals, especially if the programme that is marking the cats is focused on only a small area within a much larger population of cats. However, as discussed earlier, even if the estimate of population size is not accurate, using the same methodology over time will reflect population size changes over time.

In a survey of a control programme where sterilised cats are marked by ear-tipping, the following equation (Lincoln-Petersen method of analysis) can be used to estimate the total number of adult cats:

$$\text{Total number of adult cats} = \frac{\left( \text{Total number of ear tipped cats released} \times \text{Survival} \right) \times \text{Total adult cats seen on survey}}{\text{Total number of ear - tipped cats seen on survey}}$$



Surveys are best conducted at peak cat activity times, but allowing for sufficient daylight, as this is when the most cats will be seen, such as at dawn and dusk. The areas to be surveyed must be clearly defined to avoid straying into areas where cats have not been marked.

Ideally, owners can be asked to identify their cats by collar when a survey is being taken in their locality, so that the population of roaming owned cats can be estimated separately.

## Creating a multi-stakeholder committee

Within the perspective of this document, a stakeholder is any person, group of people or organisation that can affect or be affected by cat population management. Creating a committee including representatives from several stakeholders can help improve assessment, analysis and interpretation, design and implementation of a project and finally monitoring and evaluation by benefiting from a range of relevant perspectives. Ideally, it will be the duty of the responsible government authority to bring together stakeholders for consultation. However, NGOs can take the lead in creating a working group that includes the relevant authorities.

The following is a list of possible stakeholders to be consulted. Those marked with \* are recommended as minimum requirements of the committee.

- Government \* – usually local, but central will also be relevant for policy and statutes and will be the key stakeholder if the programme is national. Several departments are likely to be relevant, including wildlife and conservation, agriculture/veterinary, health, environment (especially with regard to refuse collection), tourism, education and sanitation. (The government must be represented on the committee).
- Veterinary community \* – national governing body,

- veterinary professional association, private practitioner clusters, government vets, and university veterinary department.
- NGO community \* – local, national and international organisations working in animal welfare, animal rights, wildlife and conservation, and human health.
- Animal sheltering, fostering and re-homing community \* – both government/municipality-run and private/NGO-run organisations.
- Academic communities with relevant experience e.g. in animal behaviour, veterinary science, sociology, wildlife, conservation, ecology and epidemiology.
- Legislators \* – departments responsible for both writing and enforcing legislation.
- Educators – in schools and universities.
- Local media – for education, publicity and local support.
- International bodies with relevant responsibilities – such as the World Health Organization (WHO), World Organisation for Animal Health (OIE) and worldwide veterinary associations.
- Local community leaders/representatives \*
- Local community – both cat owners and non-owners.





## B. Influential factors in cat population management

The data collected during the initial assessment can be analysed and interpreted by taking into consideration two main categories of factors: those that influence the size of the cat population and those that motivate people to control cat populations. Factors that will affect the cat population management plan need to be considered and explored in detail, to ensure that the intervention is suitable for the particular location and circumstances.

### Factors influencing the size of the cat population

#### Reproductive capacity

The sub-population of cats that is contributing most to the population problem needs to be identified, so that management efforts can initially be focused on this sub-population. This could be unplanned litters born from owned cats, as few are sterilised, those born before the owned female cats are eventually sterilised, or litters from semi-owned or un-owned cats, as both these populations are unlikely to be sterilised.

Breeding in cats is not controlled by people to the extent that it is in dogs. Potentially, this is because the majority of cats are not pedigree and of little monetary value or because owners may simply be 'surprised' before they think to control breeding when they encounter the earlier onset and more frequent oestrus cycling in cats as compared to dogs. Compared with dogs, cats appear to be more successful at reproducing and raising a litter to maturity without human intervention or support, as suggested by the existence of islands with cat populations that remain stable or growing without constant recruitment. However, there are no examples of the same situation for dogs.



Pedigree cat breeding is likely to be controlled, with cats and kittens confined indoors, and is probably carried out on a very small scale in developing countries. There is no indication that there is a need for intervention for population control reasons in this small section of the cat population although there may be welfare concerns.

#### Background information

Cats have a high reproductive capacity. Female cats are seasonally polyoestrous with an anoestrus period associated with day length. Pregnancies can occur throughout the year, but seasonal births are more common and dependent on optimal environmental conditions (i.e. during spring and summer).

Females can have one to two litters a year and one to 10 kittens per litter (Deag et al 2000), with the first litter at five to six months of age. In a survey of US households by New et al (2004), the average litter size (kittens born) was 5.3. There can be high neonatal and juvenile mortality (causes include infectious disease, trauma from road accidents, dog attacks and predator attacks).

In Australia (Toribio et al 2009), the US (Chu et al 2009) and the UK (Murray et al 2009), there are high levels of sterilisation of owned cats (over 80 per cent), but 13-20 per cent of females have mainly unplanned litters before sterilisation.

In a survey of cat ownership and management patterns in central Italy, 43 per cent (39/91) of cats were sterilised, about one in three cats had had a litter, and all litters were considered accidental rather than planned (Slater et al 2008).

#### 1 Roaming owned cats

Owned female cats are likely to receive better health care than semi-owned and un-owned cats, and hence can be an important source of kittens (having more than one litter per year, more kittens per litter and greater kitten survival).

Even if most owned female cats are eventually sterilised, it is often the planned or (mostly) unplanned litters produced by them beforehand that are the most important source

of kittens and cats entering the roaming cat population. Owners may want their cat to have kittens before being sterilised, or may be unaware of the age at which cats can get pregnant, or that they can become pregnant again soon after weaning their litter.

#### 2 Roaming semi-owned and un-owned cats

The extent to which these cats contribute to the cat population will vary greatly depending on many factors, including their health status, availability of resources (especially food and suitable nesting sites), number of litters born per year, number of kittens per litter and kitten mortality. The majority of cats are not likely to have been sterilised. Semi-owned cats have a higher reproductive success than un-owned cats as they benefit from at least a minimum level of care (food and shelter provided by a caregiver), but overall their reproductive success is smaller than that of owned cats.

#### Background information

In an American survey of un-owned (feral) cats, females produced a mean of 1.4 litters per year, with three kittens per litter. Most females were able to produce their first litter at less than 1 year of age. The majority of kittens (75 per cent) died or disappeared by six months of age, and trauma was the most common cause of death (Nutter et al 2004b).

#### Availability and access to resources

Un-owned and semi-owned roaming cats rely on food and shelter provided intentionally or unintentionally by humans. Food sources include open refuse dumps, household garbage, public bins, as well as households and individuals deliberately feeding cats, in the case of semi-owned cats. Shelter includes structures such as barns, sheds, and garages. The cats' survival and their reproductive success, which includes survival of kittens, often depends on access to these sources of food and shelter, though in some cases un-owned cats can survive and reproduce without human related resources.

#### Movement of cats between groups within the population

##### 1 Owned cats

Owned cats may become separated from their home, through becoming lost or by deliberately leaving the household, for example, when a male looks for females in oestrus. Conditions in the household may not be suitable for cats so they leave of their own accord. Cats may be

returned to their owners if the owners are actively looking for them and/or if they have some kind of identification, but this is uncommon.

They may be deliberately left somewhere away from their home by their owner because they are no longer wanted (abandonment). Abandoned cats reflect a failure of the human-animal bond and are evidence that cats are regarded as disposable and of little value. A cat may not meet the sometimes unrealistic expectations of the owner; owners may also have a poor knowledge of normal cat behaviour.

The option of leaving an unwanted cat at a shelter may not exist, or owners may feel that the welfare of their cat will be better as an un-owned roaming cat than in a shelter.

#### Background information

Findings from US, UK and Australian data:

- Many cats leave households and many are added to households; 20 to 25 per cent of cats are acquired as previously owned cats that are lost (strays) and are socialised to humans, or are acquired as free gifts from others (Miller et al 1996).
- Over half of cats entering shelters are not relinquished by an owner, but are socialised to humans (Marston and Bennett 2009).
- Reunification of cats with owners is uncommon; few cats (less than five per cent) in shelters are traced back to their owners, as few have any form of identification (Zawistowski et al 1998, Rochlitz 2000).
- Abandonment of cats at sites where population control programmes are in place appears to be a common phenomenon (Levy and Crawford 2004).
- In a study of search and identification methods that owners used to find a lost cat in Ohio, US, the percentage of lost cats recovered by their owners was low, possibly in part because of the lack of use of traditional identification methods (such as a collar) and the general acceptance that cats may roam. Only 19 per cent of cats had some type of identification at the time they were lost. Most cats that were recovered returned home of their own accord or were found in the neighbourhood (Lord et al 2007).
- A survey of 53 animal shelters found that stray cats (those cats that were not relinquished by their owners) entering shelters were much more likely to be re-united with their owners if they were microchipped, although some problems related to microchip registration were encountered (Lord et al 2009).

## 2 Semi-owned and un-owned cats

Semi-owned cats depend on a caregiver; if this care ceases they become un-owned cats. Un-owned cats do not directly receive care from humans, but some may become semi-owned if they join a managed colony or similar group. If semi-owned or un-owned cats are socialised to humans, they may be adopted (either directly 'from the street' or via shelters or foster homes) and become owned. The movement of cats from owned to semi-owned and un-owned can be substantial, but movement in the other direction is usually less frequent, and depends on how well socialised to humans the cats are and on attitudes of humans towards these cats. Some owners may be reluctant to adopt cats whose previous history is unknown.

## Factors that motivate people to control cat populations

### Attitudes towards cats

Attitudes need to be explored within households and communities before effective strategies of population control can be devised. If negative attitudes towards cats exist, they will reduce the likelihood of management programmes succeeding, especially if population stability as opposed to reduction is the aim.

Religion and culture play an important role in people's attitudes and beliefs. There may be a belief that sterilisation will cause undesirable behavioural changes, that sterilisation is a form of mutilation or that to deprive an animal of the ability to reproduce is an unacceptable infringement of its rights. Religious and cultural attitudes must be explored and addressed with sensitivity and understanding if they need to be challenged for the benefit of animal welfare.



Surveys from the US show that cats are more likely than dogs to die, be killed, be given away, be relinquished to shelters or be taken away by animal control officers (New et al 2004). More cats than dogs disappear from households, and more are acquired 'off the street'. These findings reflect less attention or concern by cat owners, in general, compared to dog owners, but may not hold true for other countries, for example, see the following background information box.

### Background information

A comparison of Bahamian cat and dog caregivers on New Providence JAAWS 12, 30-43 2009 Fielding W.J. Women were more likely to own cats and men more likely to own dogs. Cats were more likely to be adopted and kept as companions than dogs, and more likely to be allowed to live indoors with the family. Cat caregivers appeared to be more attached to their pets than dog caregivers, with dogs being kept as working animals to provide protection. This finding may have been confounded by the fact that more cat caregivers were women, who are reported in the literature as interacting more with cats than men. While many pet owners thought their cats should be sterilised, only a minority of them got their pets sterilised, and cats received limited health care. Despite this, caregivers thought that they were good pet owners.

In this instance, an education programme targeted at women should be developed, which promotes responsible pet ownership and animal welfare, and explores why, despite support for sterilisation, few cats are sterilised. Reasons for not sterilising cats may include cost, the belief that animals have a right to reproduce, concern that the animal's nature will be altered, as well as religious and cultural beliefs. There may also be failure to appreciate the welfare cost to the individual cat, and to the population as a whole, of unregulated reproduction.

### Zoonoses

The presence of large numbers of cats, which interact with the human population, raises concern about the transmission of disease from cats to humans. Despite people's fears, the transmission of infections from cats to humans is relatively uncommon. Unfortunately, knowledge within the medical community and public health authorities regarding zoonotic diseases can vary, and veterinary sources may be more reliable.

The following websites present information on zoonotic diseases:

- [www.catvets.com/professionals/guidelines/publications/?Id=181](http://www.catvets.com/professionals/guidelines/publications/?Id=181) – A detailed 32-page document on the main zoonotic diseases, how to prevent and treat them.
- [www.capcvet.org/index.html](http://www.capcvet.org/index.html) – A number of articles on the diagnosis, treatment, prevention and control of parasites of clinical importance to dogs, cats and humans
- [www.fabcats.org/cat\\_group/policy\\_statements/index.html](http://www.fabcats.org/cat_group/policy_statements/index.html) – A detailed documents on toxoplasma and cat scratch disease, and three-page summary document on zoonotic diseases and how to avoid infections (rabies not included)
- [www.hpa.org.uk/HPA/Topics/InfectiousDiseases/InfectionsAZ/1191942145653/](http://www.hpa.org.uk/HPA/Topics/InfectiousDiseases/InfectionsAZ/1191942145653/) – A detailed information on a range of zoonotic diseases affecting cats and humans, from the Health Protection Agency (UK).

## 1 Rabies

There are a number of countries that are rabies free, but in locations where rabies is present, the following information applies.

Cats acquire their rabies infection from wildlife or dogs, for example, by fighting with a wild animal (mostly raccoons, foxes, or skunks in the US). Hence roaming unvaccinated cats are at the highest risk for rabies infection. The canine rabies variant can also be maintained in unvaccinated dog populations, which in turn may serve as an ongoing source of rabies for both humans and non-humans in a community. However, there is currently no known cat-adapted rabies strain and cats have not been shown to serve as a reservoir of the disease.

Cats will not show signs immediately following exposure to a rabid animal as incubation may be several days, weeks or even months. Symptoms vary, but classic signs of rabies in cats are changes in behaviour, including aggression, restlessness and lethargy, increased vocalisation, loss of appetite, weakness, disorientation, paralysis, seizures and even sudden death.

Rabies vaccines induce a long-lasting immunity, and widespread immunisation campaigns can be very effective. However, legislation to control rabies in cats by vaccination may not exist or may not be enforced in countries where the control of canine rabies is a priority. Nevertheless, all those involved with cat management programmes and roaming cats must be vaccinated against rabies, take all the precautions necessary to avoid being bitten by a cat, and receive prompt wound care and post-exposure treatment if bitten. Sterilised cats may be less likely to encounter infected wildlife because of behavioural changes that result from sterilisation, such as reduced roaming, which may be seen in male cats, especially if they are neutered before puberty (Bradshaw 1992).

Oral vaccination programmes in wildlife can cut the risk of rabies in cat populations by reducing the virus prevalence among wildlife species that might spread the disease to cats. For example see [www.alleycat.org/NetCommunity/Page.aspx?pid=691](http://www.alleycat.org/NetCommunity/Page.aspx?pid=691).

## 2 Toxoplasmosis

Toxoplasmosis is caused by infection with *Toxoplasma gondii* (*T. gondii*), a coccidian parasite. In people with a normally functioning immune system, toxoplasmosis may be mild and pass undetected or may cause symptoms such as fever and lymph node enlargement.

Toxoplasmosis can cause severe illness in certain 'high risk' groups of individuals whose immunity is impaired. This group comprises:

- developing fetuses
- babies and young children
- very elderly people
- pregnant women (because of the risk to their baby)
- immune-suppressed people.

A cat infected for the first time (typically a young cat) will start to shed millions of oocysts in its faeces after a few days. These oocysts are shed for a short period of time, usually less than 14 days, before the body's immune response stops further shedding. Oocysts shed into the environment do not become infectious until they sporulate, typically after one to five days, so fresh cat faeces do not present a risk.

In most cases, people become infected via one of two routes:

- ingestion of oocysts from the environment e.g. through contact with soil containing sporulated oocysts – this can also occur indirectly through eating soil-contaminated fruit or vegetables
- ingestion of meat containing tissue cysts – fresh meat is most risky since freezing meat for several days or cooking will kill most tissue cysts.

The risks of acquiring toxoplasmosis from a cat are extremely small and most people are infected through other routes (such as eating undercooked meat). Simple everyday hygiene measures can be taken to reduce the risks of infection (from cats and other sources). These include:

- wearing gloves when handling potentially contaminated material (for example, when gardening, cleaning a cat's litter tray or handling raw meat), and making sure to wash one's hands afterwards.
- avoiding eating undercooked meat, and thoroughly washing fruit and vegetables before eating them.

### 3 Other zoonoses and cat diseases

Other potentially zoonotic infections include plague (*Yersinia pestis*), cat scratch disease (Bartonellosis), Lyme disease (Borreliosis), *Salmonella*, *Pasteurella*, roundworms (Toxocariasis) and hookworms, fungal infections (Microsporium, Sporotrichosis), Cryptosporidiosis, and Giardiasis. Fleas and ticks may serve as vectors for cat scratch disease (*Bartonella spp*) and other zoonotic diseases.

Reports of zoonotic diseases in semi-owned and un-owned cats indicate that, for most diseases that have been investigated, these cats do not have a greater rate of infection than roaming owned cats.

In situations where un-owned or semi-owned cat populations are managed through vaccination and parasite control, cats should be in improved health and hence should not pose an increased risk of zoonotic disease or source of infection for other cats as compared with owned cats.

#### Background information

Nutter et al (2004a) found that feral cats and pet domestic cats had a similar baseline health status and faecal prevalences of infections with *Cryptosporidium spp.*, *Giardia spp.* and *Toxocara cati*. Feral cats had higher seroprevalences of *Bartonella henselae* and *Toxoplasma gondii*, probably due to greater exposure of feral cats to the vectors or hosts of these organisms.

Semi-owned or un-owned cats are less likely to have antibodies against coronavirus, the agent of feline infectious peritonitis (FIP), than are owned cats. Because coronavirus is transmitted primarily via the faecal-oral route, roaming cats' behaviour of burying their faeces may reduce the risk of transmission, compared with indoor cats sharing a litter box in a multi-cat household. Also semi-owned or un-owned cats usually live at a lower density compared with owned cats.

Most studies report a similar prevalence of infection with FeLV and FIV in semi-owned, un-owned and owned cats (see Luria et al 2004, and TNR programmes section E).

#### Nuisance complaints

Complaints about cats are often about their behaviours such as spraying urine, yowling and fighting (often at night), and fouling areas with urine and faeces leading to contamination of the environment. In addition, people do not like finding

sick, injured, or dead cats, or remains of any prey items. Some of these objectionable behaviours are reduced or absent once the cat is sterilised.

#### Predation of wildlife

Wildlife predation is relevant because cats hunt small mammals and birds and the welfare of the wildlife involved is also a concern for the organisations that form the ICAM Coalition. Predation of wildlife is one of the most controversial issues regarding roaming cats (see Tantillo 2006, Slater 2005, Longcore, Rich and Sullivan 2009); the discussion here only introduces some of the main points of this controversy. Relationships between cat advocates and wildlife advocates can unfortunately be hostile with little dialogue between the two groups. Such polarisation is unfortunate as there may be some common objectives between the wildlife and cat groups, such as advocating sterilisation of cats, stabilising or reducing roaming cat populations, and finding ways of improving the environment for birds and mammals.



© iStockphoto.com/Vassily Vishnyskiy

#### Wild birds are common prey for cats

Data on predation by cats are limited, with studies involving relatively small sample sizes and focused on small areas. Nevertheless, some observations on cat predation can be made.

- On continents mammals are the main prey eaten by cats, with birds forming about 20 per cent of the diet (Fitzgerald and Turner 2000).
- Relatively few species of mammal commonly form most of the diet. While birds are a less frequent component of the diet, usually many more species are eaten (Slater 2005).
- In some conditions, such as on farms or in food storage areas, cats are valued as hunters of species such as rats, mice and rabbits.
- Cats living near refuse dumps or those that are fed by caregivers, households and others will have food scraps as a high proportion of their diet.

- Cats are opportunistic feeders, so providing them with a readily available food source as a part of a population management programme may reduce predation on their usual prey species; however motivations to hunt exist independent of end-goal consumption, so feeding is unlikely to stop predation completely.
- Wildlife that has evolved on islands with no mammalian predators is particularly susceptible to the impact of cat predation.
- The actions of humans have a much greater effect on vulnerable and threatened species than cat predation of wildlife.

There are also additional challenges with the current available research.

- Predation is often studied by examining the diet of cats in different locations. This is done by examining gastrointestinal samples from cats that are killed, faeces analysis, recording prey brought home by owned cats and examination of dead or partially eaten prey found in the environment. However, diet studies do not provide evidence of the impact on a species unless prey species abundance, potential repopulation rates, other sources of predation and mortality are also monitored, as well as the predation of cats on other predators of wildlife and the



ecosystem in which the cats and their prey live.

- Sometimes findings from a study of a small unrepresentative number of cats at a particular time of year are extrapolated to the entire cat population of a country throughout the year, which gives an inaccurate representation of the magnitude of cat predation.
- Predation by cats of rabbits, rats, mice and other species considered abundant or problematic may be regarded as beneficial by some – the impact of desired predation on perceived 'pests' and valued wildlife is not always separated in studies.

Research on the hunting behaviour of cats before and after sterilisation would help to address some of the concerns about the impact of roaming cat predation on wildlife. Molecular genetic techniques that identify prey DNA in predator faeces are being developed; they offer an improved method for studying roaming cat food habits over time. The vulnerability of endangered species in isolated island settings where cats, as an introduced species are the main, and sometimes only predator, is of most concern. In this situation, co-operation and interaction between wildlife, conservation and cat groups is essential so that the optimal solutions for both populations can be found. These solutions may include a trap, neuter and return or relocate (TNR/R) programme aimed at reducing cat numbers (see page 26), a programme where all cats are caught and killed, or a combination of programmes. Eradication of a cat population, even on an island, can be very difficult to achieve and can be a costly, lengthy and unpopular intervention.

#### Background information

See [www.mammal.org.uk](http://www.mammal.org.uk) for information on carrying out surveys of small mammal populations. See [www.invasiveanimals.com](http://www.invasiveanimals.com) on the control of roaming cats in Australia. See Slater (2005) for a more detailed discussion on the effects of feral cat predation on wildlife.



## C. Components of a comprehensive cat population management programme: selecting the solutions most appropriate to your situation

An effective cat population management programme needs a comprehensive approach. Each programme should be tailored for a particular site according to the local cat population itself, local circumstances relating to cat ownership and wildlife sensitivity, and community wishes for the future cat population and their expected level of involvement in any programme. The data from the assessment phase described in section A should be analysed and interpreted with consideration of the influential factors described in section B to establish the local situation. The following section C outlines a range of components that might form part of a tailored and comprehensive cat population control programme.

Programmes must be planned for the long term. Companion animal population management is a permanent challenge because dogs and cats are valued by humans and hence a core population will be renewed and protected by people, providing a permanent source of potentially unwanted animals unless carefully managed.

Ideally, the overall programme should be coordinated by the local authority responsible for cat population management. NGOs should work with the authority to identify the areas in which they can support the programme and make most difference. It is possible, however, that there is little involvement of a local authority in implementation and the NGO will be working relatively independently on a day-to-day basis, but with authority approval.

### Education

The first step in addressing the control of roaming cat populations is the education of the public (both cat-owning and non-cat-owning) on responsible ownership. The following factors should be considered:

- Public education to increase awareness of roaming cat issues and an impact on cat welfare will be necessary for engaging community involvement.
- Management strategies should focus on supporting responsible cat ownership and on reducing the un-owned and semi-owned population, with the aim of minimising the transition of cats from owned to semi-owned or un-owned and maximising the transition of cats from un-owned to semi-owned or owned.
- Education initiatives should be developed in coordination

- with the local education authorities and carried out by trained professionals. Development of key messages is an important first step and may be best achieved through multi-stakeholder consultations. These messages should be tested for their effectiveness and reviewed on a regular basis.
- Educational messages can be communicated in many ways, including through:
  - formal seminars and structured lessons in schools
  - leaflets and brochures provided to targeted audiences
  - awareness-raising in the general public through the press, billboards, radio and TV
  - directly engaging people in discussions and exercises as part of community-based programmes.
- All potential sources of education on cats should be engaged to ensure that messages are kept consistent. Ideally this should include animal welfare groups, the veterinary profession, schools, enforcement bodies and the media (including animal-focused media groups). It may be necessary for one particular body to take on a coordinating role.
- Veterinarians and veterinary students may also benefit from educational efforts, such as through learning about:
  - the rationale behind and justification for population management
  - their role in related public health issues
  - methods of reproductive control
  - key messages on responsible ownership for clients
  - euthanasia methods
  - how they can become involved with and benefit from proactive population management programmes that encourage the responsible care of cats, including regular veterinary care.
- It can take time for the impact of education on cat population management to become evident, so methods of monitoring and evaluation need to incorporate both short-term and long-term indicators.

### Confining owned cats indoors

The decision to keep a cat indoors should be based on an assessment of the welfare of the cat whether it is kept indoors or allowed out, and the risks to animals that may be hunted by cats. A cat with access to the outdoors is at risk of traffic accidents, disease, trauma, theft or getting lost, whilst an indoor cat is at risk of not being able to perform some natural behaviours, and of social stress if kept with other cats in a restricted environment. Each location will have characteristics that impact on either side of this equation, and ultimately it is up to local authorities and the individual cat owner to decide the outcome. If owners decide to confine their cats indoors, it is essential



that they understand the requirements of their cats and ensure that their needs are adequately met; for example, the need to express certain natural behaviours and how this can practically be met indoors. This may include the provision of hiding and perching spaces and the opportunity to perform exploratory and predatory-type behaviours by hiding food and playing with toys. Hence the provision of reliable information on how to ensure good welfare of cats in an indoor environment is important (e.g. indoor cat initiative [www.vet.ohio-state.edu/indoorcat.htm](http://www.vet.ohio-state.edu/indoorcat.htm), [www.catalystcouncil.org](http://www.catalystcouncil.org) and [www.fabcats.org](http://www.fabcats.org)). Owners who decide to allow their cats access to the outdoors are equally responsible for protecting their welfare through measures such as regular vaccination and parasite control, as well as considering partial confinement such as at night when the risks of traffic accidents are higher. Partial confinement may also be used to reduce the risks of predation by keeping cats indoors when prey is most active, such as at dawn or dusk, or at certain times of year when young animals are most vulnerable. Cat-proof fencing may also be used to restrict cats to gardens and prevent predation in the wider environment.

It is likely that confining cats indoors will not be a sustainable form of ownership in many countries where housing infrastructure is unlikely to be sufficient to confine a cat.

### Legislation

It is essential that the cat population management programme fits within legislative guidelines – and is preferably well-supported by them. Legislation is important for the sustainability of the programme and can be used to ensure that cat population management is carried out humanely and consistently. Relevant legislation can be found at both central and local government level and is sometimes scattered within several different statutes, laws or acts. Separate policy

documents may also be relevant and can impact on the emphasis or method of legislative enforcement.

Several issues need to be considered when using this component.

- There is a balance to be struck between clear legislation and legislation that is so restrictive and unrealistic that it does not allow for evolution in management practices over time.
- Time should be taken to draft new legislation carefully, drawing from the experiences of other countries and relevant professionals. An inclusive process with all relevant stakeholders participating should be used, including appraisal exercises where input is actively sought and incorporated from several sources.
- Changes to legislation are difficult to achieve so it is important that submitted drafts are accurate and realistic. The end product should deliver laws that: are holistic, sustainable and considered suitable and reasonable by the community; engage the authorities with their responsibilities; and succeed in achieving the desired impact for animal welfare.
- Sufficient time should be allowed for any changes to legislation to be introduced. Guidance notes should be provided in advance to help with interpretation.
- Legislation will be a ‘paper exercise’ unless it is enacted uniformly and enforced effectively. Effective enactment will usually require the majority of effort to be spent on education and incentives and the minority to be spent on carrying out punitive enforcement measures. Education about legislation has to be targeted at all levels, from law enforcement bodies (such as lawyers, police and animal welfare inspectors) to relevant professionals (such as veterinarians and shelter managers) and cat owners. Successful enforcement has been achieved in some countries through the use of animal welfare inspectors (also referred to as wardens or animal control officers). These officials are trained and resourced to provide education, handle animals when required and enforce legislation through advice, warnings, cautions and eventual prosecutions.

The term ‘ownership’ is harder to define from a legal standpoint. In welfare terms we can define both cat owners and caregivers by their obligation to provide for the cat’s needs. Under animal welfare legislation there is rarely any differentiation between owner and caregiver. When it comes to ‘duty of care’ both may be accountable.

A good example of well-measured differentiation is contained in the New Zealand Animal welfare (companion cats) code of welfare 2007 ([www.biosecurity.govt.nz/files/regs/animal-welfare/req/codes/companion-cats/companion-cats.pdf](http://www.biosecurity.govt.nz/files/regs/animal-welfare/req/codes/companion-cats/companion-cats.pdf)). It makes a distinction between owner and caregiver and states that: “While a person who

merely feeds cats in a colony is not the 'person in charge' in terms of the Act, and therefore is not legally responsible for the cats in the colony, it should be noted that, where people trap cats in the colony in order to provide for their vaccination, de-sexing or care, they will have legal obligations as the 'person in charge'."

This is further clarified in the accompanying report ([www.biosecurity.govt.nz/files/regs/animal-welfare/req/codes/companion-cats/companion-cats-report.pdf](http://www.biosecurity.govt.nz/files/regs/animal-welfare/req/codes/companion-cats/companion-cats-report.pdf)), which states: "The public draft of the Code sought to make people who provided care to cats in a colony legally responsible for the welfare of those cats. In terms of the Act, these individuals do not have the obligations of the 'owner or person in charge'. However, should they elect to trap the cats for the purposes of vaccination, de-sexing, etc., they acquire those obligations while the cats are in their care."

## Registration and identification

Registration of cats is not normally required by law (some exceptions may apply, for example, in some parts of Australia and New Zealand). The most effective way of clearly connecting an owner with his or her animal is to use registration and identification together. This should encourage a sense of responsibility in the owner as the animal becomes identifiable as his/her own. Registration with identification is an important tool for reuniting lost animals with owners and can be a strong foundation for enforcement of legislation (including abandonment legislation and mandatory regular rabies vaccinations). Identification of owned cats should be promoted, but this is problematic compared to dogs, which are commonly identified by a collar and sometimes by microchip (see *Identification methods for dogs and cats*:

*Guidance for WSPA staff and member societies* on [www.icam-coalition.org](http://www.icam-coalition.org)).

It has been shown that collars are well-tolerated by cats and are a very effective method for visual identification (Lord et al 2010). Three types of collar were evaluated (plastic buckle, breakaway plastic buckle safety, and elastic stretch safety) and found to be equally effective. The collar should be carefully fitted, regularly checked, and the owner should be prepared to replace it if it comes off or is lost.

Sometimes cats are identified by a tattoo on the inner aspect of the ear (which is quite a small area). The cat has to be anaesthetised for tattooing to be performed, and the tattoo may not be easily read without closely handling the cat. Tattoos of the ear whose purpose is to identify the cat are different from tattoos whose purpose is to indicate that the cat has been sterilised (see page 25).

Identification by microchip ('identichip') is the preferred method for permanent identification, but it is relatively expensive, requires a certain degree of skill for insertion, is not visible and cannot be read from a distance as scanners are required to read the chip. Also, as with tattooing, there is a need for a registration centre with personnel to manage the scheme. Some owners may not notify the registry of a change in address so not all animals identified by a microchip or tattoo can be traced back to their owners. Microchipping has the advantage of being a global system, so animals moving from one area (or country) to another can continue to be identified. Before instituting a microchip system, it is advisable to check that the chips and scanners used conform to ISO standards. For example: [www.petlog.org.uk](http://www.petlog.org.uk)

Mandatory registration and identification can help the practical problems faced by shelters. When a cat brought to a shelter is identified, it can be returned to its owner without delay. If not identified, it is by definition 'un-owned' so the shelter can implement its policies without the delay of waiting for an owner to come forward. Both scenarios will free up valuable shelter space, which will potentially increase capacity.

Identifying individual cats can be difficult because the majority of cats are non-pedigree and, at least compared with dogs, there is much less variation in size, coat colour and pattern and other physical aspects. It is often difficult to distinguish one cat from another i.e. a small black short-haired cat may look very much like another, so may not be recognised by its owner.

## Control of reproduction

Control of reproduction is central to any population management plan. The following effects and considerations may need to be taken into account:

- Sterilisation reduces or eliminates behaviours associated with reproduction and also leads to better welfare of the individual cat (including being friendlier to humans, having a smaller home range in males, reducing roaming and fighting, reducing morbidity and mortality).
- It is beneficial to promote sterilisation of female and male cats before they reach puberty and are capable of reproducing; this also reduces the chance of mammary cancers in female cats in later life.
- Male (tom) cats should be sterilised as well as female cats because their sexual behaviour often leads to complaints from the public. Nuisance behaviours include urine spraying, howling at night, and fighting with other cats.
- Older males (more than 18 months to two years) have larger home ranges, and may be more successful at mating than younger males. All male cats should be

included in a sterilisation programme.

- Voluntary, incentive-based measures may encourage owners to have their cats sterilised and identified (e.g. reducing the cost of sterilisation if the cat is microchipped at same time).
- It is necessary to ensure the availability of veterinary expertise to provide safe and effective sterilisation services.

## Surgical sterilisation

Permanent sterilisation is currently achieved by surgery, where the reproductive organs of the cat are removed under anaesthesia (for guidelines see [www.sheltervet.org/index.cfm](http://www.sheltervet.org/index.cfm) and Looney et al 2008). Surgical sterilisation is relatively expensive and requires trained veterinarians and ancillary staff, an infrastructure (cages, building), drugs and equipment. If a local veterinary infrastructure already exists, it should be encouraged to offer a sterilisation service; financial investment as well as training may be necessary to ensure the service is taken up.

## Non-surgical sterilisation

While currently it is most commonly achieved by surgical sterilisation, the development of effective methods for the non-surgical control of reproduction holds great promise for developing countries. While contraceptives are available for female cats, they are not licensed for long-term use and should only be administered under veterinary supervision. Long-term fertility control using chemical sterilants or contraceptives is an active area of research, but to date no such products are commercially available for cats. It is hopeful that they will be available in the future (see [www.foundanimals.org/index.php/About-Michelson/the-michelson-prize.html](http://www.foundanimals.org/index.php/About-Michelson/the-michelson-prize.html) for a discussion on funding available for such research and [www.acc-d.org](http://www.acc-d.org) for an overview of available products and the research into chemical sterilants and contraceptives so far). Budke and Slater (2009) examine the use of matrix population models to assess a three-year single treatment non-surgical contraception programme versus surgical sterilisation in feral cat populations.

## Vasectomy of male cats

As an alternative to castration in semi-owned and un-owned cats, it has been suggested that hormonally intact vasectomised males might provide better colony stabilisation. In observations by Stoskopf and Nutter (2004), however, vasectomised male cats showed no advantage over castrated males in stabilising colony populations. The time they stayed with a colony was similar to that of intact male cats, which was significantly shorter than castrated males. Vasectomised male cats had significantly larger home ranges than intact or castrated males and moved greater distances from the feeding sites. These findings are likely related to their search for breeding females, since the females in their home colonies were spayed. Vasectomised males also continue to perform behaviours that may be considered a nuisance, such as fighting and spraying.

## Surgical sterilisation of owned cats

Because cats can be sexually mature from five to six months of age, and because unplanned litters in young cats are common, neutering just before puberty is commonly advocated.

While the usual age for neutering male and female cats is six to eight months, a policy of early age neutering (EAN) as of eight weeks of age (or when the kitten weighs at least 400 grams) should be considered, providing the necessary veterinary expertise is available and the kittens are in good health. Neutering at this age will prevent the accidental litters born to cats at the onset of puberty. In addition, owners are already in contact with the veterinary clinic for vaccination and parasite control and may be more receptive to having their kitten sterilised at that time rather than several months later.

In addition to identification, an owned cat should be marked to show that it has been sterilised. This is usually in the form of a tattoo on the ear in males and females (the preferred site) or at the surgical site in females. This mark indicates that the cat is, or was in the past, an owned cat, and is the equivalent of ear-tipping for un-owned and semi-owned cats managed by TNR (see section below). It also protects the cat from undergoing unnecessary anaesthesia and surgery again, for example, if it is caught as part of a TNR intervention or brought into a shelter by someone other than the owner.

## Background information

See *IFAW Companion animal field manual Part 4: Anaesthesia, Part 5: Technique for surgical sterilisation and Part 6: Surgical environment and post-surgical recovery*. In the appendix there are protocols for EAN (part 6) and for assessing the need for post-operative analgesia (part 9). [www.ifaw.org/Publications/Program\\_Publications/Companion\\_Animals/asset\\_upload\\_file726\\_61605.pdf](http://www.ifaw.org/Publications/Program_Publications/Companion_Animals/asset_upload_file726_61605.pdf)

Detailed protocols can also be found in the Association of Shelter Veterinarians veterinary medical care guidelines for spay-neuter programs (Looney et al 2008).

## Surgical sterilisation of semi-owned and un-owned cats

Sterilisation of these populations is usually delivered within a TNR intervention. Such interventions offer a non-lethal method of controlling semi-owned and un-owned cat populations, centred on sterilisation. Non-lethal methods are usually preferred by the public, and can be effective if interventions are well planned and implemented, and if the goal is stabilisation and eventual reduction in the size of the managed population rather than eradication.

A TNR or similar intervention should not be developed in isolation, but form an integral part of a comprehensive management programme that addresses all the issues identified as impacting on the cat population. For example, if the owned cat population is identified as a significant source of unwanted kittens, a TNR intervention alone will not efficiently impact on this source, a sterilisation intervention focused on owned cats, preferably including financial contributions from the owners themselves, should be included.

During implementation, there must be some flexibility so that the intervention can be adapted to deal with any problems or changes that arise in the cat population. For example, if a large proportion of trapped cats are found or suspected to be owned, an intervention directed at cat owners to sterilise their cats should be prioritised.

Because semi-owned cats have a higher reproductive success than un-owned cats, it is advisable to target this population before un-owned cats.



## Trap, neuter, return (TNR)

TNR (sometimes referred to as CNR (capture, neuter, release) is a method of humanely trapping unneutered cats, neutering them, and returning them back to the same environment where they were collected.

## Basic principles

TNR interventions will have a greater visible impact if focused on well-defined, preferably geographically restricted, cat populations, rather than diluting effort across multiple populations.

Managed colonies should not be maintained where cats are known to pose a threat to vulnerable species, near municipal water supplies, and other areas where they are very likely to come into conflict with humans or in regions where terrestrial wildlife rabies is epizootic unless widespread vaccination of cats against rabies is included.



The TNR location should give caretakers easy access and be safe for the colony (away from major roads) without attracting excessive attention from passers-by. TNR interventions can encourage the abandonment of owned cats at TNR locations, so a mechanism for identifying these cats and removing them from the colony for adoption should be in place as well as local education campaigns to discourage abandonment.

A TNR intervention should not be started if a significant proportion of the community is opposed, which could pose a threat to returned cats, or if there are no reliable caregivers to look after the cats. These factors should be addressed first, before including a TNR intervention within the overall management plan.

## The concept of guardianship in TNR

Ideally, a TNR intervention should have a guardianship component where returned sterilised cats are regularly monitored and managed by a caregiver. Caregivers (also known as guardians or semi-owners) should provide a minimum level of care, which includes food and shelter, sterilisation, basic veterinary care (vaccination, parasite control), and veterinary attention in the case of injury or disease.

- TNR interventions can be aimed at both semi-owned and un-owned cats. By promoting guardianship, a well-run intervention should result in an increase in semi-owned

and a decrease in un-owned cats. This may not be possible with all cats, as some will be too un-socialised or solitary-living rather than part of a colony.

- Cats should be monitored at least every other day, and preferably every day, by a dedicated caregiver who knows the cats and is committed to their welfare.
- The caregiver should trap and sterilise all new cats, remove tame cats (providing they can be re-homed) and trap and remove kittens young enough to be socialised (those less than eight to 10 weeks old) for adoption (providing they can be re-homed). In situations where re-homing is not an option, euthanasia of kittens should be considered if a high mortality, and hence suffering, is likely. If sufficient resources are available to limit mortality, these kittens could be left in place and trapped later for sterilisation, preferably early-age sterilisation if possible to avoid missing the first breeding cycle.
- A caregiver should have the permission of the landowner, or whoever is responsible for the location the cats are in, to manage the colony at that location. This can provide legitimacy and protect the cats and the caretaker.

The local community and authorities as well as NGOs and animal welfare groups can support the caregiver by providing:

- direct financial support
- free or subsidised cat food
- free or subsidised veterinary care, including sterilisation, vaccination and parasite control
- education on the best ways to manage the cats
- help with resolving any problems.

## Excluding owned cats from TNR and similar interventions

In any cat management programme involving TNR, efforts must be made to exclude owned roaming cats from being caught in traps intended for semi-owned and un-owned cats. Owned cats must either be confined indoors during the trapping period, or be easily identifiable by means of a collar and tag, tattoo or microchip; they should also be subject to an additional intervention that aims to control their unwanted breeding. This can be achieved by alerting cat owners in the targeted area of the need to confine cats at certain times, provide collars for their cats, and/or acceptance that if their cat is trapped it may be sterilised. Methods to do this include leafleting, telephone contact, direct contact and local community meetings prior to the start of the intervention.

Nevertheless, some owned cats may inadvertently be trapped. If trapped cats are in good condition and friendly towards humans, this should alert personnel to the fact that they may be owned. Some cats benefit from a 12 to 24 hour 'cooling-down period'; they may initially appear to be hostile and not socialised to humans, but will quickly settle down and become friendlier, and be recognised as owned.

The presence of a tattoo (in ear or at surgical site) indicates that the cat has been sterilised and is owned, or has been owned in the past.

A policy should be in place to determine what action to take with these cats. If they are not sterilised the decision may be to sterilise them, even without the consent of the owner (who should have been aware of the intervention and the need to confine or identify their cat). If they are already sterilised, options include releasing the cat where it was trapped (the assumption being it is owned and will find its way home) or taking it to a holding facility, where if it is not claimed it may be offered for adoption.

## Types of TNR interventions

The most basic form of TNR involves free, low-cost or subsidised sterilisation (with ear-tipping) for roaming un-owned or semi-owned cats, as well as rabies vaccination (recommended for all locations where rabies is endemic or where there is a high risk of importation of rabies into a currently rabies-free area) and sometimes treatment against parasites.

Ear-tipping permanently identifies the cat as sterilised and protects the cat from the stress of being re-trapped and anaesthetised. In some interventions the left ear in female and the right ear in male cats are tipped; in other interventions the same ear in females and males is tipped or a notch is made in the lateral aspect of the ear. In general, careful tipping of 1cm from the tip of the ear is the preferred and best method of identifying a semi-owned or un-owned cat as having been sterilised.

TNR interventions can also include more focus on disease control and post-sterilisation care. For example, TTVARM: trap, test (for feline leukaemia virus (FeLV) and feline immunodeficiency virus (FIV)), vaccinate, alter (sterilise), return, and monitor (or manage). See section e for a more detailed discussion of testing for diseases and section b for a discussion of guardianship that forms the basis for monitoring.

In some cases, a cat colony has to be removed from a particular site, usually because it poses an unacceptable threat to a particular wildlife species or because the site is to be redeveloped. In this case, the R in TNR would stand for 'relocation' as opposed to 'return' and is an alternative to trapping and killing as a control method. However, it is not always a practical solution, especially for large populations due to limitations of space and cost, so it is only advised for small colonies in isolated situations.

It is important to ensure that whatever method is selected is consistently used and understood by the authorities, NGOs and the public, particularly if more than one body is involved in carrying out these activities.

## Additional information on trap, neuter and relocate

- A new safe site, where the cats can be managed as a colony, must be found.
- Before relocating cats to a new site, it must be established that their presence there will be supported, is not contravening any regulations and does not pose a risk to other animals or to humans.
- All the cats must be sterilised, vaccinated against rabies (if appropriate, and other diseases as required) and treated for parasites after trapping and before being offered for adoption or relocation.
- All kittens or adult cats that are socialised to humans should be offered for adoption, with only un-adoptable animals transferred to the new site.
- The cats should initially be relocated to an enclosure or large cage and allowed to adapt to the new location and to the caregiver before being released.
- The colony is subsequently managed as a TNR colony.
- There must be a caregiver who is responsible for supervising the adaptation of the cats to the new site, and undertakes to provide adequate guardianship.

The orientation to the new location is crucial to get the cats to remain there. Cats should be confined in a large cage or similar enclosure for at least two to three weeks, until they consider that location to be their permanent feeding station.

Advice on relocation of cats should be sought from expert organisations (see [www.hsus.org/pets/pets\\_related\\_news\\_and\\_events/san\\_nicolas\\_island\\_cats\\_042709.html](http://www.hsus.org/pets/pets_related_news_and_events/san_nicolas_island_cats_042709.html) and [www.mfrs.org/subpg/programmes/ferals.php](http://www.mfrs.org/subpg/programmes/ferals.php) and [www.snip-international.org/](http://www.snip-international.org/) and [www.alleycat.org](http://www.alleycat.org)).

## Testing for FeLV and FIV

There is some debate about the need for FeLV and FIV testing, particularly if funds are scarce and such testing will mean that fewer cats will be sterilised as a result. In addition, the accuracy of positive tests for FeLV and FIV decreases when prevalence is low, so up to 50 per cent of positive test results might be expected to be false positives. Confirmatory testing is often impractical. The recent advent of FIV vaccination is an additional complication; the vaccine induces antibodies against FIV that cause false-positive results in the currently licensed FIV tests. While previously owned cats may have been vaccinated against FIV, it may not be possible to differentiate them from infected cats.

Most interventions choose to focus on mass sterilisation as the primary goal and do not routinely test for FeLV and FIV, because resources for managing cat populations are limited. Focusing resources on sterilisation will reduce the transmission of FIV (by reducing fighting) and FeLV (by reducing reproduction). One option is to test cats in an area for a period of time to establish the prevalence of FeLV and FIV, although this information may already be available from the local veterinary community; if prevalence is low, testing will not be worth the investment as the number of positives will be low as compared to the cost of testing and a high percentage of these positives will be false positives.

If cats are deemed suitable for adoption, testing for FeLV and FIV should be at the discretion of the veterinarian in charge. There may be situations where testing should be carried out, for example, in:

- socialised cats that are suitable for adoption but are showing signs of disease and a decision needs to be made as to whether to treat or not – if there is no option of treatment, cats should not be tested but euthanised
- socialised healthy cats that are suitable for adoption – if FIV positive they can still be re-homed but may require special care (e.g. being kept indoors); the lifespan of an FIV-infected cat can be as long as that of an uninfected cat.

## Background information

Large epidemiological studies from the US and the UK indicate that FeLV and FIV are present in approximately four per cent of semi-owned and un-owned cats, which is not substantially different from the infection rate reported for owned cats (Levy and Crawford 2004). Male cats, especially semi-owned or un-owned, are more likely to be positive for FIV because it is transferred by fighting which often occurs during territorial disputes. FeLV requires close contact for transmission and is most commonly spread from mothers to their kittens. FIV infection has a different natural history than FeLV in that infected cats can often live for a normal lifespan.

## Benefits of TNR

There are many benefits of TNR and similar interventions. They include:

### Cat-centred

- Clumped food resources provided to managed cat colonies reduce or eliminate the territory defence associated with poorer, dispersed resources.
- Increased survival times of neutered cats relative to intact cats (Nutter 2005).
- Sterilised cats are more tolerant of other cats than intact cats so there is less fighting, in particular between males, leading to fewer injuries, reduced risk of disease

transmission and hence improved health.

- Cats attempting immigration may be less likely to be excluded. This is a desirable rather than an undesirable effect, as the exclusion of cats may just lead to the establishment of colonies elsewhere which are not managed. When sterilised cats allow immigrant cats to join colonies, the new cats should also be subject to management.
- Sterilised cats, especially males, are likely to have smaller home ranges so are less exposed to risks such as road accidents.
- Improved health of females, who do not experience the risks of repeated cycles of pregnancy and lactation (Nutter 2005).
- Where kitten adoption is included in the intervention, this leads to increased longevity and survival of socialised and adopted kittens.
- Sterilised cats may become friendlier towards humans, which increases their adoptability.

### Public health and nuisance-centred

- Fewer nuisance complaints due to reduction in urine spraying, mating, fighting and noise.
- Reduced complaints about sick or diseased cats and kittens in the community.
- Reduced risk of transmission of disease to humans or to owned cats (due to vaccination against rabies and other diseases, and parasite control).
- Cleaner environment (control of garbage and other potential food sources).
- Stabilisation and in some cases reduction in the size of the colony i.e. fewer cats, leading to less contamination of the environment with urine, faeces and food/prey remnants.

### Wildlife-centred

- Stabilisation and in some cases reduction in the size of the colony i.e. fewer cats, leading to less predation.
- Smaller colony home ranges mean that although the high cat densities may result in the increased local impact of predation, the region affected is reduced compared to more widely-ranging intact cats.
- Intact female cats with nursing offspring are more prolific hunters due to the increased energy demands of nursing (Fitzgerald and Turner 2000, Nutter 2005). Spaying females eliminates reproduction and the associated increases in food requirements and hunting.
- Since breeding females and younger cats are more active and efficient hunters, the presence of sterilised aging cats may actually reduce predation (Nutter 2004a, 2005).

See the following resources and websites for extensive information on TNR interventions and related methods:

[www.hsus.org](http://www.hsus.org)  
[www.feralcat.com](http://www.feralcat.com)

[www.alleycat.org](http://www.alleycat.org)  
[www.operationcatnip.org](http://www.operationcatnip.org)  
[www.forgottenfelines.com](http://www.forgottenfelines.com)  
[www.fabcats.org](http://www.fabcats.org)  
[www.snip-international.org](http://www.snip-international.org)

## Vaccination and parasite control

Preventative veterinary treatments should be provided to protect the health and welfare of cats and to reduce the incidence of zoonotic diseases. These treatments should be offered in conjunction with education about the other aspects of responsible ownership. Local veterinary communities should be consulted regarding the prevalence and distribution of infectious diseases and parasite infestations, so that a preventative treatment protocol can be tailored to a particular area and local circumstances.

Regular vaccination and parasite control is likely to improve the health of cats, and can lead to increased reproductive success. Therefore, a sterilisation intervention should be offered in conjunction with a preventative treatment service. As with sterilisation and contraception, preventative treatments can be used to encourage owners to accept the value of general veterinary treatment and population management tools. Wherever possible, the local veterinary infrastructure should be involved in providing preventative treatments, to ensure ease of access and continuity of treatment in the long term.

## Vaccination

Vaccination guidelines are provided by the manufacturers of the product and are also available at several websites (see the American Association of Feline Practitioners (AAFP) guidelines, Richards et al 2006, [www.catvets.com/professionals/guidelines/publications/?Id=176](http://www.catvets.com/professionals/guidelines/publications/?Id=176) and [www.wsava.org/VGG1.htm](http://www.wsava.org/VGG1.htm)). Guidelines may differ slightly from one another, and there is currently debate on which vaccines should be used, and the frequency with which boosters should be given.

## Owned cats

In any location where expert opinion advises rabies control is necessary or desirable, healthy cats should be vaccinated at least once subcutaneously with a high quality inactivated rabies vaccine, as of eight to 12 weeks of age depending on the product label (ideally, vaccinating younger kittens is also advised if they are presented for vaccination and a repeat visit at eight to 12 weeks is unlikely to occur, as in the case of mass vaccination campaigns). A booster at one year, followed by boosters every three years or as required by local ordinance and the vaccine manufacturer, is indicated.

Wherever indicated by local disease prevalence, and based on a cost-benefit analysis, healthy cats can be

vaccinated with a live attenuated vaccine against feline herpes virus, feline calici virus and feline parvoviral enteritis (panleucopaenia). Cats over 16 weeks of age are vaccinated twice subcutaneously three to four weeks apart, and cats less than 16 weeks of age are vaccinated as of six weeks, every three to four weeks until 16 weeks of age. Booster vaccinations should be given one year later, and then at three-year intervals. Pregnant cats and cats infected with FeLV or FIV should only receive killed virus vaccines.

### Semi-owned and un-owned cats

Wherever possible, and certainly in any jurisdiction where rabies is enzootic or where vaccination for rabies is required by law, cats should be vaccinated against rabies following the principles for vaccination of owned cats. Cats managed by TNR or similar interventions do not usually receive more than one rabies vaccination, due to the logistical problems of re-trapping at a later date, but this may be sufficient to provide immunity for their lifespan, especially if a vaccine providing several years of immunity is used. Vaccination of colonies can result in a herd immunity effect, which is the point at which the proportion of immune individuals in the group is so high that the disease agent cannot spread through the population.

Whether cats are vaccinated for diseases other than rabies will depend on the intervention and local conditions.

The American Association of Feline Practitioners (AAFP, Richards et al 2006) advises the following for cats in TNR programmes:

- Rabies virus vaccines labelled for a three-year duration of immunity should be administered to all feral cats undergoing sterilisation in areas endemic for rabies.
- Vaccination of all feral cats against feline herpes virus, feline calici virus and feline parvoviral enteritis with live attenuated vaccines at the time of sterilisation is also highly recommended.
- An attempt should be made to re-trap cats for administration of booster rabies virus vaccines at one year and every three years thereafter. Booster vaccines for feline herpes virus, feline calici virus and feline parvoviral enteritis may also be administered at that time, but the need to boost these antigens in adult free-roaming cats is less clear.

### Parasite control

Parasitism is the most common transmissible problem of owned, semi-owned and un-owned cats. Common parasites include fleas, ear mites, ticks, intestinal ascarids (roundworm such as *Toxocara cati*), cestodes (tapeworms such as *Dipylidium caninum* and *Taenia taeniaeformis*) and hookworms (*Ancylostoma* and *Uncinaria* spp).

The choice of anti-parasite product will depend on the parasites to be treated, the route of administration that is possible, the availability and cost of the product and the characteristics of the local population. Wherever possible cats should be weighed accurately before dosage. Some products will not be suitable for pregnant and lactating animals. A specific protocol should be established for the treatment of kittens.

Agents that are given topically or by injection are most suitable for cats that cannot be handled easily, or those under anaesthesia or sedation.

See *IFAW Companion animal field manual* Part 7 Endemic disease and prophylaxis and Appendix part 7 Vaccination schedule and part 8 Anti-parasitics dose rates.



### Holding facilities, re-homing centres, and foster homes

Holding facilities and re-homing centres should be managed to a high animal welfare standard, and be designed to meet the cats' needs while minimising the risks of disease (see Haughie 1998, *ASV guidelines*). Such centres can be very expensive and time-consuming to manage, so adequate funds and personnel must be available to ensure their success. Awareness of the full costs required for re-homing centres is extremely important as centres are hard to close at short notice. Both capital expenditure and running costs should be considered and it is recommended that both the capital outlay and running costs for at least one year should be raised before commitment to a centre is made.

Centres should play an education role on responsible cat ownership within a community, in order to counteract any possible encouragement of abandonment they may represent. Owners of unwanted or problematic cats should be encouraged to consult shelters for advice and help, and

to bring their cats to them rather than abandoning them outdoors or adding them to colonies.

Policies should be written to cover important topics such as sterilisation, re-homing, capacity and criteria for euthanasia. These should take into account the welfare of individual animals, the cost implications, the aims and objectives of the facility/centre and the impact of the facility/centre on the long-term management of the cat population. Protocols should be designed for each stage of shelter activities, from quarantine on arrival, to daily routines such as cleaning, feeding and exercise, to record keeping and re-homing practices.

The design of the centre should take into account the welfare needs of the animals and also consider public access, physical characteristics, services (such as drainage and water sources), potential noise disturbance, planning permission and potential for future expansion.

A network of foster homes may be an alternative to shelters, especially for kittens or for old cats who are particularly vulnerable to infectious diseases and/or require more individual attention.

See: Guidelines for the design and management of animal shelters, RSPCA International, 2006 and the Asilomar accords: [www.asilomaraccords.org/definitions.html](http://www.asilomaraccords.org/definitions.html)

### Adoption of cats

Adoption is the ideal outcome for socialised kittens and cats and should be promoted whenever feasible. The success of an adoption intervention depends on the availability of holding facilities such as shelters or foster homes, and on the community's attitude towards adopting cats; if there is no tradition of owners obtaining cats from these places, the number of cats held will increase, leading to over-crowding and poor welfare. If negative attitudes exist towards adopting cats, an education intervention on the advantages of adopting cats from holding centres, shelters



and foster homes should be in place before starting any population management programme.

While placing tame cats and kittens into good homes is the ideal, in some situations this can be difficult, as can finding suitable foster homes in which to socialise the kittens (those less than eight weeks of age). If homes are not available, or if there is no shelter or the shelter is full, there is the option of managing these cats as semi-owned, if a suitable environment and caregiver can be found. Long-term sheltering of cats should not be considered a viable option as their welfare is likely to be compromised when shelters struggle to meet their physiological and behavioural needs.

### Euthanasia of cats

As part of all interventions, including TNR and holding facilities/re-homing centres, euthanasia will be required for cats that are suffering from an incurable illness, injury or behavioural problem that prevent them being re-homed or returned, or for cats that are not coping with their environment and are suffering poor welfare as a result. In preparation for responding to these situations, every intervention should have an agreed and written euthanasia policy. Ultimately, a successful population management programme should create a situation where these are the only occasions when euthanasia is required and all healthy animals can be found a good home or environment to live as a roaming cat. In reality, however, most countries will not be able to achieve this situation immediately but will need to work towards it while acknowledging that some healthy animals will be euthanised because not enough homes exist that meet the requirements of responsible ownership. Euthanasia deals with the symptoms and not the causes of population problems and must not be relied upon as a sole response.

Euthanasia of roaming un-owned and semi-owned cats will be the most humane option if they are living somewhere where they cannot stay and they cannot be transferred to another location or re-homed.

Adult cats that are not socialised to humans should not be kept in shelters except in cases of emergency, and a policy of euthanasia of cats in shelters should be used if they cannot be returned to an environment as a managed colony.

Only humane methods of euthanasia should be used. Intravenous injection of sodium pentobarbitone is the advised method, or intra-peritoneal injection of sodium pentobarbitone is an acceptable method of euthanasia for a cat that cannot be handled for intravenous access. The cat must be restrained in a squeeze-cage, trap or similar device and preferably should be sedated first (with an injectable preparation that leads to deep sedation and analgesia) before being injected intra-peritoneally with sodium pentobarbitone.



Kittens, unless newborns, should also be sedated prior to intra-peritoneal injection of sodium pentobarbitone.

See *IFAW Companion animal field manual* Part 3 Euthanasia and Appendix part 4 Euthanasia criteria (for medical reasons, behavioural reasons and due to inadequate guardianship). See also AVMA guidelines on euthanasia (formerly report of the AVMA Panel on Euthanasia), Schaumburg, Ill: AVMA, 2007. Available at: [www.avma.org/issues/animal\\_welfare/euthanasia.pdf](http://www.avma.org/issues/animal_welfare/euthanasia.pdf)

## Control of cat populations using lethal methods

Lethal methods of population control aim to eradicate or significantly decrease cat populations through culling a target number or proportion of cats. These are ethically questionable and are not popular with the public because of concerns for cat welfare and killing of sentient animals for perceived limited human benefit, hence alternatives should be pursued in preference.

Methods of lethal control considered unacceptable because of the animal suffering they cause include trapping followed by shooting or poisoning, shooting or poisoning in situ, hunting with dogs and deliberate introduction of diseases. All lethal control techniques can affect non-target cats (such as roaming owned cats) and other non-target species. See the [www.icam-coalition.org](http://www.icam-coalition.org) website for the WSPA publication *Methods for the euthanasia of dogs and cats: comparison and recommendations for a more detailed discussion of acceptable and unacceptable methods of lethal control*.

Lethal control methods, usually aimed at eradication, can be successful if repopulation of the target area by immigration cannot occur, as with isolated islands. However, even in island situations, great effort over a protracted time is required to accomplish eradication. The majority of successful cat eradications have been achieved on islands less than 5km<sup>2</sup> in size, with populations estimated at an average of 40 cats per site and using a combination of lethal methods.

Although lethal methods can cause rapid depopulation, they are rarely effective in the long term in mainland areas. As long as food is available cats will potentially establish themselves in the empty niche. Removing cats, even at very high levels every one or two years, may not lead to a long-term reduction in their numbers because of repopulation through breeding and immigration. The presence of human populations ensures that a proportion of cats from the owned cat population will be available to reoccupy colony sites. Also, with almost any control method or combination of methods, a few breeding cats are left and they repopulate the area.

Protection of valuable resources like threatened and endangered wildlife in mainland habitats can be accomplished by cat exclusion measures such as predator fences.

Exclusion fencing is considered to be the most humane non-lethal cat control method for wildlife areas, but the cost of establishing and maintaining fences can be prohibitive. Their use tends to be limited to the management of highly valued threatened species that live in relatively small areas.

See *Threat abatement plan for predation by cats*, Department of the Environment, Water, Heritage and the Arts, 2008, Government of Australia [www.environment.gov.au/biodiversity/threatened/publications/tap/cats08.html](http://www.environment.gov.au/biodiversity/threatened/publications/tap/cats08.html) and Slater (2005) for a discussion of lethal methods of control of feral cats.

## Controlling access to resources

Cats will be attracted to areas where there are resources such as food. To control this, especially in areas where cats are not tolerated, restriction of access to the resources should be considered. However, this should only be done with specific localised resources and carried out very carefully in conjunction with measures to reduce the roaming cat population or provide alternative food sources in more suitable areas, in order to prevent cats from starving. Cat cafés are one popular way of providing alternative feeding sites for cats to limit conflict with people in a humane way, see [www.wspa.org.uk/Images/catcafe\\_leaflet\\_tcm9-2733.pdf](http://www.wspa.org.uk/Images/catcafe_leaflet_tcm9-2733.pdf) for more details.



Cat Café

## D. Designing the intervention: planning, agreeing targets and setting standards

Once the components for the programme have been selected to suit the local conditions the full programme plan can be designed and documented.

### Aims, objectives and activities

The programme plan should include clear and agreed aims and objectives including targets for activities such as the percentage of the cat population that is targeted for sterilisation or the number of cat owners in a particular location that will need to be reached by an education programme. It is also important at this stage to describe indicators that could be used to assess progress at each stage of the programme. The indicators will be used to monitor and evaluate the success of the programme and it is important to consider them at the outset as baselines will be required.

If a number of organisations are involved in cat population management, it may be relevant to draw up agreements so each party is aware of the overarching aim and their role within the programme. These plans should also be communicated to the end users, such as cat owners and stakeholders that will be affected by the programme even if they are not responsible for the activities themselves (this may include certain authorities).

### Planning for sustainability

Cat population management programmes require human resources, infrastructure and finances. A plan of how the programme will be sustained in the long run should be drawn up at the outset; humane cat population management has a beginning but no end, as it requires ongoing activity to maintain the cat population in the desired state. Including and building upon local capacity will support sustainability, as will the development of responsible ownership as individual cat owners begin to support population management activities. It is important to consider the following factors:

**1 Responsibility:** Ideally resource requirements will be built into the budget of the responsible authority. Government bodies are most likely to be able to achieve sustainability through government funding, but may not regard cat population management as a priority. NGOs considering taking on responsibility for aspects of cat population management should ensure that they will be fully

supported and resourced, whether by the authorities or other sources, before undertaking such responsibilities. They should also consider carefully that their investment will need to be long term and this commitment may challenge their capacity to take on other work.

**2 Owner involvement:** An intervention designed to have an impact on owner responsibility could lead to the sustainability of elements of the project, as well as permanent positive behaviour change. For example, sterilisation interventions could become sustainable if owners are encouraged to pay for this service, while at the same time the veterinary profession is supported so that it can provide this at an accessible price.

**3 Fundraising:** The ability to fundraise locally will depend on several factors, including the culture of charitable giving and the status of cats in the local community. Local people, businesses, trusts and cat-related industries (pharmaceutical, pet food and pet insurance) may all be interested in supporting cat management programmes, either financially or through providing resources (such as food or medicines). International grant-making bodies may also provide funding for specific project costs, but are unlikely to support long-term running costs. Again, the sustainability of each of these sources of funds and/or resources must be considered.

**4 Human resources:** There may be people willing to provide support through unpaid human resources, sometimes termed in kind or pro bono donations. Several professions carry out pro bono work for the benefit of NGOs, such as marketing, accounting and management firms.

**5 Veterinary professionals:** The veterinary profession is an important human resource, not just for surgical and medical skills but also for vets' ability to influence owner behaviour. Qualified vets may be willing to provide some regular services for free or at a low cost. Student vets may also be willing to help out as part of their training and this can become a formal part of their course, although supervision will need to be provided. Volunteer vets and vet nurses from overseas may also be a valuable source of support, although there is the potential for them to be considered a threat by local vets if they are seen to be replacing their services and there may be local legislation that prevents employment of foreign vets. The sustainability of this resource is also difficult as travel costs may be high.

It may be preferable to utilise these volunteer vets to support the growth and skills of the local veterinary profession.

**6 Registration:** A registration system with a small fee for cat ownership could provide funding for other components of the wider programme. However, the requirement for such a payment is an uncommon practice and unlikely to be easily implemented. The licensing of semi-owned cats living in colonies could be problematic.

## Setting standards for animal welfare

The aim of maintaining the best practicable level of animal welfare should be clearly stated by the programme's standards. To ensure agreement and understanding, the standards are best developed by a team of stakeholders. Decisions regarding the fate of individual animals should be made on the basis of both their individual long-term welfare and that of the local cat population. There should also be a procedure for regular monitoring to ensure these standards are being upheld, as well as regular reviews of the standards themselves.

The following are common areas of cat management programmes that may require the application of minimum standards:

- surgery, including aseptic techniques, anaesthetics and drug regimes (e.g. analgesia)
- handling and transporting of cats
- housing and husbandry of cats
- re-homing procedures
- euthanasia – when euthanasia should be used and how it should be carried out
- record keeping and regular analysis of data – although not directly affecting animal welfare, good recording keeping can help identify parts of the programme that may be compromising welfare, for example, an unusually high incidence of post-operative complications at certain times may indicate the need for refresher training for certain veterinary staff or a change in post-operative care.

Minimum standards covering some of the above topics can be found in the *IFAW Companion animal field manual*, and in Looney et al (2008).



## E. Implementation, monitoring and evaluation: checking the programme is achieving its goals

### Implementation

This should be straightforward if priorities have been chosen sensibly and the design stage carried out in detail. This stage may require a phased approach, using pilot areas, which are monitored carefully to ensure any problems are tackled before the full programme is launched. The initial stages should not be rushed into. There might be 'teething' problems, and frequent updates will be required between key stakeholders to monitor closely and improve progress in the early phases.

### Monitoring and evaluation

Once the programme is underway it will be necessary to monitor progress and evaluate effectiveness regularly. This is necessary:

- to help improve performance, by highlighting both problems and the successful elements of interventions
- for accountability, to demonstrate to donors, supporters and people at the receiving end of the intervention that the programme is achieving its aims.

Monitoring is a continuous process that aims to check the programme is going to plan and allows for regular adjustments. Evaluation is a periodic assessment, usually carried out at particular milestones to check the programme is having the desired and stated impact. Evaluation should also be used as the basis for decisions regarding future investment and programme continuation. Both procedures involve the measurement of indicators selected at the design stage because they reflect important components of the programme at different stages.

Monitoring and evaluation should be an important part of a programme, but it should not be overly time-consuming or expensive. Choosing the right list of indicators, with regard to their ability to reflect the changes that need to be measured – and to be measured with a degree of accuracy without too much additional effort – will be key to the success of this stage. In order to choose these indicators it is essential to have a clear plan of what the programme is setting out to achieve and why, and how the intervention will accomplish this.

Ideally monitoring and evaluation will be approached in a participatory manner where all relevant stakeholders

are consulted and involved in making recommendations. It is also important to remain open-minded and positive during this process, as things may change contrary to expectations. The exposure of problems or failures should be seen as opportunities to improve the programme, rather than mistakes requiring justification.

The concept of monitoring and evaluation is not complex, but there are many decisions to be made regarding what to measure, how this is to be done and how the results should be analysed and used. These issues and others are discussed in much more detail in other texts, for example: [www.intrac.org](http://www.intrac.org).

Monitoring and evaluation of all programmes should be achieved by regular observation, good record keeping, population-monitoring techniques using standardised protocols and periodic analysis of data. Methods include:

- surveys of the size of the roaming cat population (e.g. household surveys, participatory appraisals, mark-resight)
- surveys of the local community regarding the outcome of the cat management programme
- recording the incidence of nuisance complaints and public health issues such as cases of rabies in cats
- assessment of intervention activities and the observations of caregivers
- assessing the welfare problems of roaming cats (including the health and stability of managed colonies, kitten and adult mortality, disease incidence).

### Evaluation of activities in shelters

If population management programmes are effective, they should have an impact on shelter activities. Measures that should be monitored include:

- the number of cats entering shelters
- where these cats are coming from in order to target the programme effort to problematic locations
- the proportion of cats that have some form of identification
- the number of cats reclaimed, adopted or killed
- the health of cats including disease incidence
- the number of kittens admitted
- the success of socialisation and adoption interventions for kittens and other cats.

## Monitoring of TNR interventions

To ensure that a TNR intervention is being conducted appropriately the following measures can be used to monitor the success of trapping protocols used in TNR:

- the overall trapping effort – the number of trap-nights (number of traps times number of nights) until at least 90 per cent of the cats in the colony were captured or until no more than one cat remains un-trapped
- the trapping efficiency – the percentage of cats captured per colony.

Since cats that are part of a TNR intervention are marked by ear-tipping, the size of the managed population can be evaluated by a mark-resight study, provided that accurate records have been kept so the total number of cats treated, marked, released and predicted still to be alive can be estimated at the time of the resight survey.

## Background information

Nutter et al (2004c) was able to achieve, for 107 feral cats in nine colonies, a mean overall trapping effort of 8.9 +/- 3.9 trap-nights per cat captured and a mean overall trapping efficiency of 98% +/- 4%. She attributed the success of the trapping intervention in part to the regular feeding schedules and locations maintained by the colony caretakers.



## References

- Bessant, C., (editor) (2006) *Feral cat manual*, Feline Advisory Bureau, Taeselbury, High Street, Tisbury, Wiltshire SP3 6LD, ISBN 0 9533942 4 7
- Bradshaw, J.W.S., (1992) *The Behaviour of the Domestic Cat*, CABI International, Wallingford, Oxon
- Bradshaw, J.W.S. Horsfield, J.A. Allen, J.A. and Robinson, I.H., (1999) Feral cats: their role in the population dynamics of *Felis catus*, *Appl Anim Behav Sci* 65: 273-283
- Budke, C.M. and Slater, M.R., (2009) Utilization of matrix population models to assess a three-year single treatment non-surgical contraception program versus surgical sterilization in feral cat populations, *J Appl Anim Welf Sci* 12(4):277-92.
- Centonze, L.A. and Levy, J.K., (2002) Characteristics of free-roaming cats and their caretakers, *J Am Vet Med Assoc* 220(11):1627-33.
- Chu, K. Anderson, W.M. and Rieser, M.Y., (2009) Population characteristics and neuter status of cats living in households in the United States, *J Am Vet Med Assoc* 234 (8) 1023-1030.
- Deag, J.M. Manning, A. and Lawrence, C.E., (2000) Factors influencing the mother-kitten relationship, *The domestic cat: the biology of its behaviour*, edited by D.C. Turner and P. Bateson, 2nd edition, Cambridge University Press, Cambridge, 23-45.
- Fitzgerald, B.M. and Turner, D.C., (2000) Hunting behaviour of domestic cats and their impact on prey populations, *The domestic cat: the biology of its behaviour*, edited by D.C. Turner and P. Bateson, 2nd edition, Cambridge University Press, Cambridge, 151-175.
- Foley, P. Foley, J.E. Levy, J.K. and Paik, T.J., (2005) Analysis of the impact of trap-neuter-return programs on populations of feral cats, *J Am Vet Med Assoc* 227(11):1775-81.
- Haughie, A., (1998) *Cat rescue manual*, Feline Advisory Bureau, Tisbury, Wiltshire.
- Hughes, K.L. Slater, M.R. and Haller, L., (2002) The effects of implementing a feral cat spay/neuter program in a Florida county animal control service, *J Appl Anim Welf Sci* 5(4):285-98.
- Hughes, K.L. and Slater, M. R., (2002) Implementation of a feral cat management program on a university campus, *J Appl Anim Welf Sci* 5(1):15-28.
- Levy, J.K. and Crawford, P.C., (2004) Humane strategies for controlling feral cat populations, *J Am Vet Med Assoc* 225(9):1354-60.
- Longcore, T. Rich, C. and Sullivan, L.M., (2009) Critical assessment of claims regarding management of feral cats by trap-neuter-return, *Conservation Biology* 23:887-894
- Lord, L.K. Griffin, B. Slater, M.R. and Levy, J.R., (2010) Evaluation of collars and microchips for visual and permanent identification of pet cats, *J Am Vet Med Assoc* 237(4):387-394
- Lord, L.K. Wittum, T.E. Ferketich, A.K. Funk, J.A. and Rajala-Schultz, P.J., (2007) Search and identification methods that owners use to find a lost cat, *J Am Vet Assoc* 230 (2): 217-220
- Lord, L.K. Ingwersen, W. Gray, J.L. and Wintz, D.J., (2009) Characterization of animals with microchips entering animal shelters, *J Am Vet Assoc* 235 (2): 160-167
- Looney, A.L. Bohling, M.W. Bushby, P.A. Howe, L.M. Griffin, B. Levy, J.K. Eddlestone, S.M. Weedon, J.R. Appel, L.D. Rigdon-Brestle, Y.K. Ferguson, N.J. Sweeney, D.J. Tyson, K.A. Voors, A.H. White, S.C. Wilford, C.L. Farrell, K.A. Jefferson, E.P. Moyer, M.R. Newbury, S.P. Saxton, M.A. and Scarlett, J.M., (2008) The Association of Shelter Veterinarians veterinary medical care guidelines for spay-neuter programs, Association of Shelter Veterinarians' Spay and Neuter Task Force, *J Am Vet Med Assoc* 233(1):74-86.
- Luria, B.J. Levy, J.K. Lappin, M.R. Breitschwerdt, E.B. Legendre, A.M. Hernandez, J.A. Gorman, S.P. and Lee, I.T., (2004) Prevalence of infectious diseases in feral cats in Northern Florida, *J Feline Med Surg* 6: 287-296
- Marston, L.C. and Bennett, P.C., (2009) Admissions of cats to animal welfare shelters in Melbourne, Australia, *J Appl Anim Welf Sci* 12(3):189-213.
- Miller, D.D. Staats, S.R. Partlo, C. and Rada K., (1996) Factors associated with the decision to surrender a pet to an animal shelter, *J Am Vet Med Assoc* 209: 738-742.
- Murray, J.K. Roberts, M.A. Whitmarsh, A. and Gruffydd-Jones, T.J., (2009) Survey of the characteristics of cats owned by households in the UK and factors affecting their neutered status, *Vet Rec* 164(5):137-41.

New, J.C. Jr. Kelch, W.J. Hutchison, J.M. Salman, M.D. King, M. Scarlett, J.M. and Kass, P.H., (2004) Birth and death rate estimates of cats and dogs in US households and related factors, *J Appl Anim Welf Sci* 7(4):229-241.

Nutter, F.B., (2005) Evaluation of a trap-neuter-return management program for feral cat colonies: Population dynamics, home ranges, and potentially zoonotic diseases. DPhil dissertation (unpublished), North Carolina State University

Nutter, F.B. Dubey, J.P. Levine, J.F. Breitschwerdt, E.B. Ford, R.B. and Stoskopf, M.K., (2004) Seroprevalences of antibodies against *Bartonella henselae* and *Toxoplasma gondii* and fecal shedding of *Cryptosporidium* spp, *Giardia* spp, and *Toxocara cati* in feral and pet domestic cats, *J Am Vet Med Assoc* 225(9):1394-8.

Nutter, F.B. Levine J.F. and Stoskopf M.K., (2004) Reproductive capacity of free-roaming domestic cats and kitten survival rate, *J Am Vet Med Assoc* 225(9):1399-402.

Nutter, F.B. Stoskopf, M.K. and Levine, J.F., (2004) Time and financial costs of programs for live trapping feral cats, *J Am Vet Med Assoc* 225(9):1403-5.

Richards, J.R. Elston, T.H. Ford, R.B. Gaskell, R.M. Hartmann, K. Hurley, K.E. Lappin, M.R. Levy, J.K. Rodan, I. Scherk, M. Schultz, R.D. and Sparkes, A.H., (2006) AAFP Feline Vaccine Advisory Panel Report, *J Am Vet Med Assoc* 229(9):1405-1441.

Rochlitz, I., (2005) Housing and welfare, *The welfare of cats*, edited by I. Rochlitz, Springer, The Netherlands, 177-203.

Rochlitz, I., (2000) Feline welfare issues, *The domestic cat: the biology of its behaviour*, edited by DC Turner and P Bateson, 2nd edition, Cambridge University Press, Cambridge, 207-226.

Rochlitz, I. de Wit, T. Broom, D.M., (2001) A pilot study on the longevity and causes of death of cats in Britain, *BSAVA congress clinical research abstracts*, Cheltenham: 528.

Scott, K.C. Levy, J.K. Gorman, S.P. and Newell, S.M., (2002) Body condition of feral cats and the effect of neutering, *J Appl Anim Welf Sci* 5(3):203-13.

Slater, M., (2005) The welfare of feral cats, *The welfare of cats*, edited by I. Rochlitz, Springer, The Netherlands, 141-175.

Slater, M.S. Di Nardo, A. Pediconi, O. Dalla Villa, P. Candeloro, L. Alessandrini, B. and Del Papa, S., (2008) Cat and dog ownership and management patterns in central Italy, *Prev Vet Med* 83 (3-4): 267-294

Stoskopf, M.K. and Nutter, F.B., (2004) Analyzing approaches to feral cat management – one size does not fit all, *J Am Vet Med Assoc* 225(9):1361-4.

Tantillo, J., (2006) Killing cats and killing birds: philosophical issues pertaining to feral cats, *Consultations in feline internal medicine*, edited by J August, St Louis: Elsevier, 5:701-708

Toribio, J.A. Norris, J.M. White, J.D. Dhand, N.K. Hamilton, S.A. and Malik, R., (2009) Demographics and husbandry of pet cats living in Sydney, Australia: Results of cross-sectional survey of pet ownership, *J Feline Med Surg* 11(6):449-61

Zawistowski, S. Morris, J. Salman, M.D. and Ruch-Gallie, R., (1998) Population dynamics, overpopulation, and the welfare of companion animals: new insights on old and new data, *J Appl Anim Welf Sci* 1(3):193-206

The International Fund for Animal Welfare's community-led animal welfare manual is available at [www.ifaw.org/ifaw\\_international/publications/program\\_publications/help\\_dogs\\_and\\_cats.php](http://www.ifaw.org/ifaw_international/publications/program_publications/help_dogs_and_cats.php)



World Society for the Protection of Animals  
222 Gray's Inn Road  
London WC1X 8HB  
United Kingdom  
T: +44 (0)20 7239 0500  
E: [wspa@wspa-international.org](mailto:wspa@wspa-international.org)  
W: [www.wspa-international.org](http://www.wspa-international.org)



Humane Society International  
2100 L Street NW  
Washington D.C. 20037  
United States of America  
T: +1 (202) 452 1100  
W: [www.humanesociety.org](http://www.humanesociety.org)



International Fund for Animal Welfare  
411 Main Street  
PO Box 193  
Yarmouth Port  
MA 02675  
United States of America  
T: +1 (508) 744 2000  
W: [www.ifaw.org](http://www.ifaw.org)



Royal Society for the Prevention of Cruelty to Animals  
Wilberforce Way  
Southwater  
Horsham  
West Sussex RH13 9RS  
United Kingdom  
T: +44 300 1234 555  
W: [www.rspca.org.uk](http://www.rspca.org.uk)



Alliance for Rabies Control  
54–66 Frederick Street  
Edinburgh EH2 1LS  
United Kingdom  
E: [info@rabiescontrol.net](mailto:info@rabiescontrol.net)  
W: [www.rabiescontrol.net](http://www.rabiescontrol.net)



World Small Animal Veterinary Association  
W: [www.wsava.org](http://www.wsava.org)

