

### Managing Wildlife Damage: Feral Cats (*Felis catus*)

Jennifer Kanine<sup>1</sup> and Michael T. Mengak<sup>2</sup>

#### Introduction

Cats have lived with humans for thousands of years. The first cats were domesticated 8,000-10,000 years ago, in agricultural settlements. Wildcats near the villages found plenty of prey in grain storage areas and were useful as rodent control. Bolder individuals enjoyed more human subsidies likely giving them a fitness advantage - more offspring. Tameness and tolerance of humans increased. Although domesticated by man, cats have always retained their innate predatory nature. Inevitably cats have ran away, been lost, and have been abandoned by their owners through time. Once back in the environment, cats revert to a feral state, especially after a few generations of breeding.



Figure 1. Feral cat eating a Federally Endangered Hawaiian Petrel. Photo by Fern Duvall, Hawaii Division of Forestry and Wildlife.

Cats were introduced to North America with early colonists. Feral cats are widely viewed as one of the world's worst invasive species in modern time. They have been implicated in at least 33 bird extinctions worldwide. Currently there are 60 to 100 million feral cats in the United States preying upon birds, small mammals, reptiles, and amphibians. In the United States alone, it is estimated that a minimum of one billion birds are killed each year by feral cats. Feral cats can be a nuisance to homeowners as well. Feral cats will mark their territory, in the form of spraying, urinating, or fecal deposition. Many times this is done in flowerbeds, gardens, around trees, or along fencerows which kills flowers, can stain fences, and leaves a foul odor behind. Feral cats can also cause damage to cars when climbing on them, and will take up residence under houses, debris piles, or any form of shelter. In addition, feral cats are also reservoirs, hosts, and vectors of numerous diseases that can affect the health of humans, wildlife, and domestic house pets.

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<sup>1</sup>Graduate Research Assistant and <sup>2</sup>Professor - Wildlife Specialist, Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA 20602 USA

## STATUS

Feral cats are a non-native predator within the state of Georgia. Feral cats are found worldwide, wherever humans have introduced them.

## TAXONOMY

Cats originated from the wildcat, *Felis silvestris*, and are currently considered a separate species, *Felis catus*.

**Order:** Carnivora

**Family:** Felidae

**Subfamily:** Caninae

**Genus:** *Felis*

**Species:** *catus*

## NATURAL HISTORY

**Identification.** The feral cat typically weighs 7.25-10.0 pounds and averages 18-22 inches in length, depending on sex. Feral cats can greatly range in color from one solid color, to striped, spotted or tortoise shell. Additionally, feral cats can have short or long hair. Feral cats may be distinguishable from free-roaming house cats by a lack of tags and collars and overall body conditioning.

**Habitat.** Feral cats are able to inhabit a wide range of habitats. They are found worldwide wherever humans have introduced them. Feral cats can successfully colonize urban and rural habitats. Cats will seek out thick vegetation, rock piles, or animal burrows in open environments. Urban habitats provide abundant opportunities for adequate food, shelter, and water.

**Reproduction.** Feral cats become sexually reproductive at 5-10 months of age. During estrus female cats will loudly vocalize and exhibit crouching and rolling behaviors. Female feral cats display estrous multiple times throughout the year and are able to reproduce two to three times per year, depending on circumstances. Gestation lasts approximately 65 days and litter size can vary from 1 to 8 kittens. If the litter is lost, sometimes due to male feral cats killing the kittens, the female will go into estrus shortly thereafter. Females have been observed mating with up to seven different males during a single estrus event in feral cat colonies. Additionally, humans intentionally feed feral cats causing them to have higher fecundity rates and higher densities. Litter size has been shown to be positively correlated with the proximity to humans and supplemental feeding.

**Feeding.** Feral cats are opportunistic predators that are adept at preying upon small mammals, birds, reptiles, and amphibians. Feral cats will make roving searches of the environment encountering and capturing many prey items. After capture, cats typically perform one of three actions: they eat the prey immediately, carry the prey dead or alive to their home, or play with the prey item until such time that they kill it. Both live and dead prey are brought back to litters

of kittens. Kittens can eat solid foods at 4 weeks of age. In the United States, a minimum of one billion birds are taken each year by feral cats. Cats may hunt up to 11 hours per day. Native wildlife is ill-equipped to deal with novel predators that they did not evolve with, such as the feral cat. Recent research suggests that cats spend many hours harassing wildlife. This inflicts an indirect toll on the potential prey as they must stop feeding or caring for their own young and stay alert in the presence of the cat. Research also suggests that only a quarter of prey items are returned to the den or home so the actual impact of feral cats on wildlife may be underestimated. Free-ranging domestic cats add additional stress to native wildlife populations. Free-ranging cats add additional stress to native wildlife populations. This stress has been shown to negatively influence the health and productivity of many wildlife species.

Feral cats can also be found in areas where human refuse is collected or placed. These refuse containers or piles can be the main source of sustenance for an entire colony of feral cats. Feral cats reduce the prey base for native predators. Studies have shown that cats lack a connection between hunger and hunting; therefore they will continue to hunt even if fed regularly. As they hunt in a subsidized physical condition, they may be more efficient predators. Cats do not hunt solely for subsistence, as they do not consume everything they kill. Cats are one of the most carnivorous of our predators - rarely consuming non-meat items.

**Behavior.** Cats are instinctive predators and hunt for food or simply for the stimulus of moving prey. Sometimes this is interpreted as “hunting for fun”. Feral cats are generally solitary; however, feral cats will convert to group living in the presence of concentrated and dependable food sources. Each feral cat colony can consist of a dozen or more individuals.

Home ranges tend to vary in size depending upon food sources and habitat characteristics. Home ranges of many cats can overlap and feral cat colonies willingly accept new cats into the colony if there are enough resources. Feral cats may be active at any time throughout a 24-hour period. This may be related to a behavioral adaptation to life with diurnal humans over time. They are usually more active in the spring and summer than in the fall and winter. Furthermore, they will use existing structures for their shelters and dens.

Communication is accomplished mainly via scent-marking and vocalizations. Scent marking defines territories of cats and alerts other cats to their presence. Vocalizations include meowing, yowls, screeches, hissing, and growling. Purring is another auditory sound produced by cats that tends to indicate contentment.

**Predators.** Feral cats can be preyed upon by coyotes, free-roaming dogs and, depending on the area, also mountain lions and wolves. Many feral cats are also killed each year from vehicle collisions.

## **DISEASE**

Diseases and parasites of concern, with regards to feral cats, include the following: feline immunodeficiency virus (FIV), feline distemper, rabies, feline leukemia, leptospirosis, tularemia, plague, ringworms, hookworms, roundworms, and possibly avian flu. Of domestic species, cats have the highest percentage of rabies cases in the United States, and comprised 56.4% of all

domestic cases in the US in 2012. Within the state of Georgia in 2012, 63% of reported domestic rabies cases were cats.

Feral cats have been suspected of transmitting feline leukemia to the American mountain lion (*Puma concolor*) and transmitting feline panleukopenia to the federally endangered Florida panther (*Puma concolorcoryi*). Feral cat feces may contain *Toxoplasma gondii*, an internal parasite which negatively affects wildlife such as birds and marine mammals. *Toxoplasma gondii* can also be spread to humans through incidental ingestion. If pregnant women acquire *Toxoplasma gondii*, it can cause stillbirths, miscarriages, and abnormalities in newborn children. Additional symptoms in adults are eye problems, flu-like symptoms, fever, confusion, and seizures.

It has also been shown that cats exposed to avian flu shed the virus into the environment, raising concerns about cats being vectors for this disease. Feral cat populations often achieve high densities that facilitate the spread of disease. They may also carry endoparasites (internal – like roundworms) and exoparasites (external – like fleas and lice). If feral cat densities are high, then cats can also maintain high populations of fleas and ticks as well as roundworms and hookworms. Fleas and ticks are vectors of the diseases that cats host, transmitting bacteria to humans that cause such diseases as typhus, Lyme disease, Rocky Mountain spotted fever, cat scratch disease, and Q fever. Feral cats will readily defecate in sand boxes and garden beds – increasing the chance of spreading parasites to adults and children. Furthermore, when feral cats are fed using feeding stations, the ability to spread disease increases because multiple cats are using the same station and other wildlife may come into contact with the stations as well. Interactions between cats and humans only increases the probability of disease transmission.

## **ECONOMIC VALUE**

Feral cats and free-roaming indoor-outdoor cats kill an estimated 1 billion birds annually causing approximately \$300 billion dollars in associated damage per year. This estimate only takes into consideration bird kills; it does not take into consideration the cost of each small mammal, amphibian, reptile, or invertebrate that is taken by cats. Furthermore the estimate does not include the cost of damage done to the environment regarding cats' feces, or the damage to homeowner's cars, houses, gardens, flowerbeds, or other personal property. Additional costs for rabies or other disease treatments are assumed to be staggering but poorly documented in the literature.

## **DAMAGE ISSUES**

Feral cats can cause damage in a number of ways, including damages that may be physical, emotional, or livelihood related. Feral cats can scent-mark on anything within a homeowner's yard to mark their territory and let other cats know that they are in the area. Cats will use a flowerbed or garden as a litter box, digging up flowers and destroying crops in the process, leaving behind potentially diseased feces and urine. They will use the yard and driveway as a litter box as well. Feral cats tend to like lying on, climbing on, and sharpening claws on cars, resulting in scratches in the paint, and scratches and holes in the roofs of soft-top cars, garden furniture, door frames, and boat covers. They can get underneath houses, where they cause

damage to insulation and create an odor that permeates into the house. They may also seek shelter in or under a shed, barn, woodpile, old car, or other debris pile. Damage may also occur if garbage is left outside and is accessible; cats will chew through or tear open garbage bags. Aside from personal property damage feral cats can inflict damage to other animals in the yard.

If the homeowner wants to feed birds, feral cats are likely to use the area as hunting grounds. Feral cats also prey on any other small animals that are in a homeowner's yard. When feral cats depredate small mammals they are also depleting the prey base for other native predators within the ecosystem. This can result in increased hunting times and decreased survival for native raptors and predators.

## **LEGAL ASPECTS**

Cats are the most abundant pet in the United States, with there being an estimated 93.6 million living in 38.2 million American households. Along with this there are an estimated additional 60-100 million feral cats in the United States. Pets are often protected as companion animals in many states and municipalities. Free-ranging or feral animals are difficult to legally classify. The legal liability issues that arise when a free-ranging or feral cat injures someone or transmits rabies or other disease is a difficult and contentious matter that most municipalities are only beginning to address. Often these liability and negligence issues are ignored. Ordinances are often weak and poorly enforced.

Currently there is a trend towards the introduction and subsequent passage of regulations and ordinances that permit feral cats to be maintained in the environment as long as they have been enrolled into a trap-neuter-return (TNR) or similar program. In TNR programs cats are trapped and sterilized and then returned to the environment to be fed and cared for by a caregiver. TNR programs state that they are reducing the feral cat population by sterilizing feral cats and therefore the colonies eventually are reduced through attrition. However, studies have found that TNR programs did not provide for a consistent reduction in per capita growth or reduction of pregnant females within the colonies. Management actions suggest that greater than 50% population elimination of feral cats or greater than 75% reduction in fertility would need to be maintained in order to cause a population decrease. Because most programs do not capture and sterilize at the required 75% population threshold, TNR programs are not likely to convert increasing cat populations to stable or decreasing populations. These programs then return the cats to where they were trapped, enabling the cats to continue to prey on native species. Nearly all citizen science, nature and professional organizations that deal with feral cats and TNR believe the tactic is not a viable option. Most credible science does not support the practice. Regardless of the lack of scientific support and opposition from population managers, TNR is the most common management practice adopted by municipalities.

There has been increasing concern over who is responsible for these cats. There are state regulations prohibiting abandonment of cats, however, these are hard to enforce. Many states rely on the county and city ordinances to back up state statute; however, ordinances within a state may vary widely with regard to feral cats. Many state and county ordinances do not specifically address cats, focusing rather on dogs. A number of states are currently dealing with revising their county control ordinances and the possibilities of TNR. More recent ordinances

include more control over cats, by leashing them, licensing them, requiring outdoor enclosures, and making sure they are identified as owned animals. If ownership can be determined, then liability may be as well. With regards to feral cats, some ordinances specifically define what is meant by ownership, however, many feral caretakers may still be exempted from these ordinances; this is usually defined within the ordinance.

Defining ownership remains among the largest hurdle to affect population management. Many times the ownership depends upon county and city ordinances and interpretations of those ordinances by officials. Based on those court cases that have been decided, courts and juries may be unwilling to afford protection of feral cats or assign responsibilities to their caretakers when not outlined in statute in detail. The most logical way to determine ownership may be through examining the relationship of the caregiver to the feral cats. If the caregiver gives the feral cats food and water every day for a long period of time and has taken the feral cats to the vet, then ownership may be implied, whereas if someone feeds a feral cat every once in a while, then ownership would not be conveyed. Furthermore, if the caregivers provide shelter, then ownership may be more easily determined.

There are also additional legal aspects regarding federal regulations that are designed to protect native species and what can be done to control the damages caused by feral cats. The Endangered Species Act of 1973 (ESA) and the Migratory Bird Treaty Act of 1918 (MBTA) are the two federal regulations that could be applied to feral cats. The ESA is primarily concerned with the conservation of endangered and threatened species, whether they are mammals, birds, reptiles, amphibians, or even plants. This act prohibits the taking of these species and could possibly be used to eliminate feral cat colonies where feral cats can be found to kill or injure endangered species. Under the MBTA it is unlawful to take, kill, capture, or attempt to take any migratory birds or their eggs and nests. If the death of a migratory bird can be traced to a feral cat or colony of cats and colony keeper may be liable under MBTA.

## **DAMAGE PREVENTION AND CONTROL METHODS**

A combination of methods is recommended to reduce damage caused by feral cats.

**Habitat Modification.** One of the first things a homeowner can do to prevent feral cats from hanging around an area is to modify the habitat and eliminate anything that can provide food, water, or shelter. Feral cats will seek out shelter areas on a homeowner's property. Remove any piles of debris in the yard that may be considered a shelter area. Removing debris piles will eliminate rodents and thus one prey item that may be attracting cats. Remove open water sources in the yard and fill in depressions that collect water. When putting out garbage make sure to place it in a receptacle that has a heavy lid, or a lid that can be secured. If you feed birds, make sure the bird feeders are not in areas where cats can easily hide and capture the birds. Keep bird feeders/baths in open areas so the birds can watch for predators. Keeping the grass mowed will eliminate hiding areas for cats and reduce rodent populations.

**Exclusion.** The main way to exclude a feral cat from an area or your yard is to use a fence. Fences that are 4-6 feet high and have an unstable 24 inch overhang with 2" x 2" wire mesh have kept cats out in field trials. However, fencing with a cat repellent, such as cat spikes, atop the

fence or an odor repellent may work as well. If homeowners are worried about damage feral cats may have to animals they are raising, adding 1 to 2 electric wires near the top of the fence can prohibit cats from coming over the fence. Cats will readily climb up wooden corner posts, so avoid these if possible. In addition to fencing around the area, it may be prudent to install ¼” mesh screen in areas with holes to prevent cat intrusion. Feral cats like to take shelter under porches, so adding wire mesh would exclude them from living under the porch. Make sure that feral cats cannot get underneath the porch or house; seal holes with wire mesh, board, or insulating foam. Also make sure there are no loose boards that a cat can pry open to allow access. Feral cats can be kept out of your flowerbed or garden by using cat spike strips, cat scat mats (which are small mats of plastic spikes), or by putting chicken wire atop your garden/flowerbed. The chicken wire provides an unstable surface and the cats will not want to walk on the fencing.

**Harassment/Frightening.** Feral cats can be scared away from areas by a number of means. Dogs can be an effective deterrent to feral cats, as long as the dogs are kept in a confined enclosure or on a lead. Commercial products that may frighten feral cats are any number of products that are designed to sense the cat’s motion and then spray the cat with water, one such sprayer is the Scarecrow Water Jet Pack. Loud auditory devices can be used, such as screamers or bangers, but they may be less pleasant than mitigating damage another way. Additionally, they are not constant forms of harassment and therefore may be less effective. Cats may become accustomed to stationary devices and they may need to be moved around in order to have the greatest effect.

**Repellents.** The EPA list of registered cat repellents includes but is not limited to: lemongrass oil, mustard oil, anise oil, methyl nonyl ketone, limonene, and thymol. There are also commercially available repellents, although their effectiveness is unknown. The *Coleus canina* plant, also known as the scaredy cat plant, can be used in planters in and around gardening areas. Homeowners can then move the potted plants around as they need to cover more area. This plant can be invasive in warmer climates; therefore keeping it maintained in a pot is a better option. The plant emits an odor and cats will avoid the area. Other suggestions for garden areas are orange and lemon peels, cayenne pepper, coffee grounds, pipe tobacco, lavender oil, and citronella oil. None of these repellents are tested so effectiveness is questionable and anecdotal.

**Trapping.** Individuals trapping feral cats should have knowledge about trapping and be trained professionals. Individuals trapping feral cats should use proper personal protection equipment to prevent injury. Leather gloves and a catch pole may be necessary. There are a number of factors that can influence capture success including season, cat density, cat wariness, trap type, trapper experience, prey or food abundance, and the proximity to dwellings.

Cage traps that are used for feral cats include large (about 12” x 12” x 29”) and small (about 9” x 9” x 22”) with wire mesh ½” x ½”. One trap should be set for each cat that is to be removed, if possible. Over time cat shyness of cage traps may increase. Cage traps can be single door or double door and may need to be wired open with bait for a few days for the cats to become acclimated to the cage in the area. Additionally, covering the trap or placing the trap in a highly secluded area may result in higher capture success or a solid walled trap may be used. Setting traps along fencerows or cat trails can also increase success. To encourage cats to enter traps,

newspaper, grass, leaves, or dirt from the area can be placed on the cage floor. Be sure to set traps so that they are stable, as cats will not enter an unstable trap. Instability can also cause injuries. Traps should be checked several times per day or at least the minimum required by local law and bait should be changed regularly. Once in the trap the cat should be euthanized on site unless options for veterinary care exist. The AVMA defines acceptable methods of euthanasia for cats. Always check with animal shelters and county or state officials before euthanizing wild animals.

Foothold traps can be used in addition to or instead of cage traps. Some feral cats will be wary of the cage traps and foothold sets may need to be used to capture feral cats. Foothold traps have been found to be effective even when repetitive capture is required. Victor soft catch No. 1 and No. 1½ are the most commonly used; however, studies have used No. 2 and No. 3 as well. These traps all have rubber inserts on the jaws of the trap to minimize injury, which can be replaced if damaged. Double swivel sets should be used to minimize injury to the animal. Traps should be checked several times during the day or at least the minimum required by local law.

There are two types of lures that can be used with trapping, scent lures and food lures. Food lures that can be used with trap sets include mouse carcasses, rabbit carcasses, liver, meat scraps, tuna, smoked fish, or fishmeal. Feral cats in different locations may prefer different bait types; therefore multiple sets with different lures should be used. Rabbit carcasses and mouse carcasses have been most successful. Scent lures that can be used include catnip, cat urine, or commercially available products such as Canine call, Cat-man-do, and Bobcat Anal Gland. Canine call and Cat-man-do have been found to be the most effective attractants to feral cats. As with all methods described, trapping should be performed by professionals and all applicable state and local laws should be consulted prior to trapping.

**Other Lethal Control.** Other forms of lethal control include removal with a firearm. Firearms that have been successfully used for feral cat removal include a .22 caliber rifle or 12-gauge shotgun with No. 6 shot or larger. Most cities prohibit discharging firearms within city limits, unless an imminent threat is posed. Even in these cases, officials are most likely to dispatch of an imminent threat. Always consult local regulations for legality in your area.

**Toxicants.** No toxicants are currently registered for feral cats.

## **DISCUSSION**

Feral cat control is a controversial topic. Management should be based on sound science and include the impact feral cats have on the environment and native wildlife. The best way to prevent increases in feral cat populations is through responsible pet ownership and education. While this may prevent a further increase in the problem, it does not address current problems. There are many ways to control feral cats around your home and you should always consult local laws and regulations governing feral cats. Trapping and euthanasia should always be performed by a trained professional. Presented within this material are a range of solutions to feral cat damage and ways to manage feral cats. By educating the public regarding feral cat management it is hoped that individuals can make informed decisions. Many current activities that are advocated as management are not scientifically based. Often local management is dictated by



vocal yet uninformed advocacy groups and pet supply retailers. Science based management is essential and proactive colony reduction may be the best long-term solution to overabundant feral cat colonies. Stricter laws and better enforcement are often necessary.

## **FURTHER READING**

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Warnell School of Forestry and Natural Resources  
Athens, Georgia 30602-2152  
Telephone 706.542.2686 Fax 706.542.8356

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