# Cats and Predation

*Felis catus*, the domestic and feral cat, is a predator and carnivore. Like any predator, the cat is equipped with sharp teeth and claws, and highly developed sensory capabilities, such as heightened eyesight and sense of smell, and an extensive range of hearing. The cat also has very sensitive whiskers and guard hairs that increase its sense of touch. Along with being classified as a predator, cats are also considered scavengers; meaning they will eat whatever food is available, including human handouts, garbage, and carrion (dead animals).

Roger Tabor

*Cats are opportunistic feeders and will eat where food is available.*

To date, the diet of cats has been studied on four continents, including 16 studies in Europe, 12 from North America, 15 in Australia, and one study was performed in Africa. Thirty-one studies have been conducted on islands, with most occurring on remote oceanic islands (Fitzgerald and Turner, 2000). And although these studies have helped identify the most common prey cats feed on and the many contributing factors as to why they feed on certain prey, few studies have examined the *impact* of cat predation on such prey populations.

There simply is not sufficient information available to determine if cat predation has any detrimental effects on the overall populations of prey animals, including birds; yet environmental and bird groups, like the American Bird Conservancy, continue to push for the eradication of feral cats, claiming cats are in fact contributing to the decline of bird species and other wildlife. The few studies that have been conducted on cat predation are from remote islands with closed ecosystems, where local bird populations have not evolved with predators. Because cat predation on continents is very different from island environments, it is inaccurate and inappropriate to extrapolate data from these particular studies to predict predation on conti-

nents. (Continue reading the next chapter "Debunking the Myths and Misinformation" to learn more about the "bad science" these environmental groups are using to advocate for the banning of TNR and the eradication of outdoor cats.)

## Rodent Specialists and Scavengers

Scientists often categorize predators based on their prey preferences (are they generalists or are they specialists) and their mobility (are they residents to one area or are they more nomadic). The domestic cat (both house and feral) is considered to be a "generalist resident predator, exploiting a wide range of prey, and able to switch readily from one prey to another;" however, some also classify cats as "partially migrating generalists" because they will travel in order to scavenge for food (Fitzgerald and Turner, 2000).

Cats use two different types of strategies when hunting: mobile or the "M-strategy" and stationary or the "S-strategy." When using the mobile strategy, cats are observed moving between two points and stopping when potential prey is detected. For the stationary strategy, cats will sit and wait for any signs of prey movement and then ambush or pounce (Fitzgerald and Turner, 2000).

German zoologist and cat behaviorist, Paul Leyhausen has concluded that the cat has a preferred sit-and-wait strategy, which is much better suited to catching burrowing rodents (Leyhausen, 1979). Cats will wait for hours outside of burrows for these animals to come out. This preferred hunting method, says Leyhausen, is "definitely detrimental to success in bird hunting" (Berkeley, 2001). "Small songbirds are more mobile (faster and in three dimensions) and less predictable when they move than rodents" (Fitzgerald and Turner, 2000). Birds fly in any direction and make it more difficult for cats to catch them.

In her 2001 book, "Maverick Cats," author Ellen Perry Berkeley examines almost 50 years of studies conducted on the stomach and fecal content of feral and rural cats in the U.S. The results confirm that small mammals make up the largest percentage of the cat's diet. Listed below are some of the examples presented by Berkeley:

- 1940, Oregon: A study on the stomach analysis of 80 feral and rural cats concluded: mammals made up 61.8% of the stomach contents by volume; birds, 18.9%; carrion, 10.7%; garbage, 6.3%; cereal, 2%.

- 1941, Oklahoma: The examination of 107 cat stomachs concluded: mammals, 55% by volume; garbage, 26.5%; insects, 12.5%; birds, 4%; reptiles, 2%. Frank McMurry and Charles Sperry state "the data do not justify the common belief that every roadside or field-roaming cat is in search of avian food."

- 1949, Michigan: "In his article 'Farm Cat as Predator,' the head of a wild-

life experiment station described exactly that: one farm cat and the total prey it brought home over a period of eighteen months – 1,628 mammals and 62 birds. With restrained triumph, the article suggested that this 'positive statistical record,' while perhaps not typical, casts doubt on the negative reputation of the domestic cat, 'a scapegoat with few to speak up on his behalf.'"

- 1951, California: Food habits of the feral house cat of the Sacramento Valley were studied and the results found: "mammals were clearly the primary source of food (64.1% by volume), although birds were substantially represented (25.2%)."
- 1957, Missouri: "The stomachs of 110 cats killed on highways, away from towns or farm dwellings, showed that the primary foods were 'injurious rodents' and that 'the house cat's feeding is largely beneficial to man's interests.' These hunting house cats were found to feed upon small rodents 'more than four times as often as upon rabbit, the second most important food, and nearly nine times as often as upon birds.'"

A fecal analysis conducted in New Zealand's Orongorongo Valley of feral house cats found that mammals accounted for 93 percent of the food by weight, and birds 4.5 percent (Berkeley, 2001). And a study by Coman and Brunner, in Australia, found (by stomach analysis) that mammals made up 88 percent of cats' diets by volume, and birds made up 5.2 percent (Berkeley, 2001). A more recent study conducted around Lake Burrendong in central eastern North South Wales, Australia, found that 68 percent of the volume of cat scats was composed of rabbit, and a further 11 percent of carrion; which consisted of kangaroos killed by shooters and sheep who had died or been killed by a larger predator (Molsher et al., 1999).

In "The Domestic Cat: The Biology of Its Behavior," Fitzgerald and Turner conclude that dietary studies carried out by Leyhausen, Fitzgerald, and others support the findings that the domestic cat living on continents primarily preys on small mammals. The "remains of mammals were present in 33 to 90 per cent of guts and scats (on average 69 percent frequency of occurrence) whereas, contrary to the widely held view that cats prey heavily on birds, remains of birds were found on average at 21 per cent frequency of occurrence" (Fitzgerald and Turner, 2000).

And when cats are not hunting rodents, they are scavenging for food. Cats are opportunistic feeders and will eat what is most readily available. Cats will dig through trash, eating the leftover food that humans have tossed out. They hang outside of cafeterias at colleges, behind convenience stores, and hotel kitchens. Food scraps and discarded grease and cooking oils from restaurants provide high-calorie meals for cats. Dumpsters also provide a steady source of food for rodents, making them easy prey.

Through the years, cats have learned to recognize dumpsters and humans as

potential food sources. Biologist and cat behaviorist, Peter Neville says, "A deliberate strategy of scavenging has enabled many feral cats almost to give up hunting altogether. They may learn instead to lie around waste bins of hotels for fresh supplies or to cadge from well-meaning human providers in urban areas" (Neville, 1992). This behavior is one of the primary reasons cat domestication began more than 10,000 years ago.

Roy Pederson via Shutterstock

*Cats are resourceful and can often find sustenance in human refuse.*

In the above dietary studies, garbage was included in the data for two of the studies. In the Oklahoma study, behind mammals, garbage was listed as the second main source of food (26.5 percent) (Berkeley, 2001). Roger Tabor, states, "Although cats are superb hunters, it is their scavenging ability that allows them to survive as feral-living animals and live with us eating food off a saucer" (Tabor, 1995). Feral cats are very resourceful and have been able to survive on garbage and food scraps for centuries.

## Old, Sick, and Young Prey

Cats, like any predator, tend to feed on the most vulnerable prey, because they are the easiest to catch. These individuals include those who are young or old and those who are sick or in a weakened state. One study conducted by Liberg shows that cats preyed heavily on young, weakened, and dying rabbits, while another study revealed that cats living in a New Zealand forest "methodically hunted" a population of rabbits, targeting young individuals as they emerged from burrows (Fitzgerald and Turner, 2000). Studies by George and Carss also show that most of the prey brought home by cats was young animals (Fitzgerald and Turner, 2000).

In ecosystems that lack populations of rodents and rabbits, cats tend to focus their diet on birds; however, Paul Leyhausen says cats "almost always catch only old, sick or young specimens" (Berkeley, 2001). Research has shown that most birds caught by cats are a "doomed surplus" who would have died anyway. According to one study, researchers found that songbirds killed by cats tend to have smaller spleens than those killed through non-predatory events. They concluded that "avian prey often have a poor health status" (Møller and Erritzøe, 2000).

And the UK's Royal Society for the Protection of Birds (RSPB) states, "It is likely that most of the birds killed by cats would have died anyway from other causes before the next breeding season, so cats are unlikely to have a major impact on populations." Every year, many millions of birds die naturally due to starvation, disease, or other forms of predation. And most of the millions of baby birds hatched each year will die before they reach breeding age (RSPB, 2014).

## Ground-Feeding Birds

In examining the diet of birds on continents, Mead looked at records of banded birds in the U.K. and found that 31 percent of the birds recovered were caught by cats, whereas 69 percent died of other causes (Fitzgerald and Turner, 2000). He noted that all species of birds recovered "feed on the ground or low vegetation and regularly live in gardens" (Fitzgerald and Turner, 2000). Mead suggested that "cats did not affect the overall population levels of these birds, and because the birds in suburban and rural parts of Britain have coexisted with cats for hundreds of generations, they may now be under less pressure from cats than they were from the assorted natural predators in the past" (Fitzgerald and Turner, 2000).

Several other studies have also concluded that most species of birds eaten by cats on continents are ground-feeding ones. In Liberg's study, he recorded that mostly starlings and pheasants were caught, whereas Bradt and Borkenhagen recorded house sparrows, and Farsky, Hubbs, and Niewold recorded pheasants (Fitzgerald and Turner, 2000).

## Diet is Determined by Available Prey and Seasonal Cycles

Once again, cats are opportunistic feeders and will eat whatever food is most available. Dietary studies have revealed invertebrates (insects, spiders, isopods, crayfish, and molluscs) are frequently consumed by cats, but they provide little sustenance. More reptiles are eaten by cats living at low latitudes; whereas household food is highly common in the diet of cats at higher latitudes. Fitzgerald and Turner (2000) report that "in much of Europe it may be difficult to find places where cats do not have access to household food."

Several studies have been conducted that show how changes in the number of prey species available in a particular area are reflected in the diets of cats. One study conducted by Liberg revealed that cats preyed heavily on rabbits when the rabbit population was high, and as the rabbit population declined, cats began eating more rodents (Fitzgerald and Turner, 2000). Young rabbits were favored between May and September, because they were easy prey; just as weakened, dying, and dead rabbits were favored during the winter months. Another study carried out in the Netherlands showed a similar

correlation. When the vole population was high, most cat stomachs contained remnants of voles and more voles were counted per stomach. The converse was also true; when the vole population was low, fewer were eaten by cats (Fitzgerald and Turner, 2000).

After examining the stomach contents of 128 feral cats in Australia, Coman and Brunner concluded, "It appears that feral cats are opportunist predators and scavengers and the level of predation of any one prey type will depend largely on its relative availability" (Berkeley, 2001). Earl Hubbs made a similar discovery noting how the seasonal variability of a particular geographic location is reflected in a cat's diet. Hubbs remarked, "This seasonal variability of the cat's diet suggests a constant adjustment to availability of various types of prey and is not necessarily a direct reflection of preference" (Berkeley, 2001).

Judy M. Zukoski

*Cats are adaptable predators, and will consume the food or prey most readily available.*

## Other Factors that Affect Diet and Hunting

As cats grow older in age their hunting tends to decrease. This makes physiological sense, since senior cats do not have the physical ability to hunt as they did when they were younger, and their sensory skills have been reduced. Several studies support this conclusion, including one conducted by Borkenhagen that found that cats less than five years old brought home the largest number of prey (Fitzgerald and Turner, 2000).

Another important factor that drives hunting and affects diet is whether a female cat is eating only for herself or for a family. Several studies have shown a correlation between female cats with kittens and increased hunting. Studies conducted by Meister reveal that females with kittens are more efficient hunters than non-mother cats (female and male). In one of the studies, six mother cats captured more rodents than 17 non-mother cats, despite having spent much less time hunting than did the non-mother cats (Fitzgerald and Turner, 2000). Leyhausen also reported that mother cats catch considerably more prey when they have kittens, for "it is assumed that the kittens themselves provide the stimuli that promote carrying prey home" (Fitzgerald and Turner, 2000).

## Predators Do Not Destroy Prey

No matter who the predator or the prey, it is not part of the natural balance of life for a predator to *destroy* its prey. Oliver Pearson, who studies the complex interaction between predator and prey, said it's "absurd" to assume that predators cause permanent damage to prey populations, even when they kill almost every last prey specimen. Pearson told Ellen Perry Berkeley that "Feral cats have been terrorizing my study area for one hundred years and haven't done any noticeable damage yet" (Berkeley, 2001).

One of the few studies that actually looks at the effects of cat predation on prey, cautions the use of extrapolated estimates. Author of the study, D. G. Barratt says:

> Predation estimates alone do not necessarily reflect relative impacts on different prey types. Nor do apparently high rates of predation prove that prey populations are detrimentally affected, particularly in highly disturbed and modified environments. For birds, at least, habitat-related factors may be substantially more important in determining communal structure in suburbs than predation by house cats. (Barratt, 1998)

As seen in the above study by Liberg, when the local population of rabbits began to decline, cats switched over to eating rodents. The same was true with the mentioned Netherlands study, where cats fed on voles when the population was high, and less so when the population had decreased. Paul Errington, considered an international authority on predation, said:

> Preying upon a species is not necessarily synonymous with controlling it or even influencing its numbers to any predictable degree. Predation which merely removes an exposed prey surplus that is naturally doomed anyway is entirely different from predation the weight of which is instrumental in forcing down prey populations or in holding them at given approximate levels. (Berkeley, 2001)

Naturalist and ornithologist Roger Tory Peterson also remarked on surplus prey being taken when he said:

> Most thought-provoking of all is to discover the balance of nature: the balance between a bird and its environment ... that predation harvests only a surplus that otherwise would be leveled off in some different way; hence putting up fences and shooting all the hawks and cats will not raise the number of Red-eyed Vireos to any significant degree. (Peterson, 1996)

Nature always keeps animal populations in check; when a surplus of one species exists a shortage of another species will also exist. The number of each species will fluctuate up and down as nature

works to find balance between the two populations.

## Native Species Vs. Alien Species and Filling Empty Niches

The definition of a native species is an organism that is indigenous to a particular region. The definition of an alien or exotic species is an organism that is introduced either accidentally or deliberately by human actions into places beyond its natural geographical range. Famous examples of alien species include house sparrows, starlings, pigeons, several species of rats and mice, kudzu (a vine), and numerous bacteria and viruses, such as HIV, smallpox, influenza, and plague.

In today's world, most alien or exotic species come labeled as noxious, pests, vermin, invaders, introduced species, or invasive species. They are considered to have no beneficial place within the environment and many are said to compete with or out-compete native species for a place within local ecosystems. These "pests" are also considered not to have any monetary value, and in some cases they are said to cause monetary damage or profit loss when they interfere with livestock and farming operations. Lethal management practices are implemented to control the majority of these species. Feral animals fall under this label of "alien" and are often considered pests. Eradication programs exist for many of the planet's feral cats, dogs, rabbits, pigs, goats, sheep, horses, and camels.

Humans have been distributing animals, plants, and viruses around the world since their beginning. Thanks to their ability to travel, organisms are easily relocated to new parts of the world where they either survive and take up residence in their new habitat, or they succumb to their new environment and die. In the past, ships sailing to discover new lands carried stowaway rats and disease, but they also intentionally took with them pigs, sheep, rabbits, and crop seeds for food, as well as horses for transportation. As disease became a growing concern, sailors kept cats aboard their ships to eat rats. And as people began to colonize new lands, the animals, plants, and disease carried upon these ships, too, took up residence.

Today's landscape looks nothing like it did hundreds of years ago, let alone thousands or millions of years ago. Species have travelled to all corners of the globe with and without assistance from humans, meshing into new habitats and creating all new ecosystems with all new food webs. It is difficult to ascertain the origin of all of the species on the planet. The landscape is constantly changing, which makes it hard to label species as either native or exotic. Scientist James Carlton coined the term "cryptogenic" to label organisms that cannot with assurance be defined as either native or exotic (Low, 1999).

As travel and trade continue to increase exponentially, it is naive to deny the inevitability of globalizing the world's ecology. Even the utmost of precautions used by the travel and trade industries cannot

prevent the distribution of animals, plants, and disease across the planet. And as the line between native and exotic continues to blur, a new era will come to light. Biologist and author, Tim Low speaks of this phenomenon as a "cryptogenic future" where exotic species become accepted as native wildlife (Low, 1999).

New habitats are being created all the time, and not all native species are negatively affected by exotic species. Some native species become dependent on introduced species, and in most cases, exotic species are simply filling niches that have been vacated by native species because humans have driven them to extinction. Coman and Brunner state:

> Whether feral cats have been responsible for the decline in numbers of some native mammals is open to question. The once common Eastern Quoll, a carnivorous marsupial locally known as the eastern native cat (*Dasyurus viverrinus*) is now either rare or extinct in most parts of Victoria [Australia], and introduced feral cats may be doing little more than filling an ecological niche left vacant by the near disappearance of the indigenous carnivore. (Berkeley, 2001).

Feral cats are also filling the niche of natural predators who are not present in urban environments. Not many foxes, coyotes, hawks, or owls reside in cities, so feral cats fill that void and feed on rodent prey, which is abundant in urban areas.

# Cats on Islands

The dietary information just listed was derived from studies conducted on continents. In this section, we will examine the diet of cats living on islands, where birds have not evolved with mammalian predators. Island ecosystems are very different from continental ecosystems; however, the findings from these few island studies have been inappropriately applied to continents and this misinformation continues to be much publicized by conservationists and the media.

Cats were intentionally transported to islands around the world to control rodent stowaways, and rabbits were brought for food. "Although the islands where cats have been introduced differ enormously in size, climate, and native fauna, they tend to have the same few introduced mammals as prey and few, if any, native mammals" (Fitzgerald and Turner, 2000). House mice, black rats, brown rats, Polynesian rats, and European rabbits can be found on islands where cats have also been introduced.

Dietary studies of cats on islands that also have an introduced rabbit population have shown that rabbits, "usually form a large proportion of the [cats'] diet, on average 55 percent frequency of occurrence," and on islands without rabbits, "rats are usually present in more than 70 per cent of gut contents or scats" (Fitzgerald and Turner, 2000). On islands located at temperate latitudes, house mice are common in the diet of cats. However, on islands with no rabbit

populations and small rodent populations, birds are an important food source for cats. "On islands where seabirds are recorded in the diet, birds are present on average at 60 per cent frequency of occurrence" (Fitzgerald and Turner, 2000). And for islands that completely lack mammalian prey, cats survive by feeding on birds, skinks, and invertebrates.

Seabirds who have evolved on islands void of mammalian predators have not developed any "defensive behaviours," making them easy prey for introduced species (Fitzgerald and Turner, 2000). These birds are not used to living with nor defending themselves against predators, so many of them easily become prey. Most island birds who fall prey to cats also build their nests on the ground. Petrels, penguins, and terns "usually comprise a large proportion of the birds eaten on the smaller oceanic islands" (Fitzgerald and Turner, 2000). Van Aarde's analysis of the prey remains found in cat stomachs on Marion Island revealed that feral cats "feed mainly on nocturnal burrowing petrels" (Berkeley, 2001).

Island birds are not only eaten by cats, but they are also largely consumed by introduced rats. Rats destroy nests, eating eggs and feeding on fledglings. As illustrated previously, the removal of cats from islands subsequently results in the rapid increase of rat populations, which cause more damage to the very birds conservationists intended to protect. In the book, "Trophic Cascades: Predators, Prey and the Changing Dynamics of Nature," (2010) John Terborgh and Dr. James A. Estes include studies that further support the counterproductivity of eradicating feral cats and point out how cats actually protect birds from rats:

> Mesopredator release has also provided management lessons for eradication efforts that target both an invasive apex predator and an invasive mesopredator. Using multispecies models that accounted for the presence of two invasive predators (cats and rats) on native islands, for example, Courchamp et al. (1999), conclude that the eradication of cats alone could result in a release in the rat population and ultimately intensified bird declines. More sophisticated models, such as Fan et al. (2005) similarly predict that as an apex predator, cats offer birds some degree of protection from rats.

Removing cats from islands also leads to an increase in rabbit populations. When cats were eradicated from Macquarie Island, the rabbit population quickly increased, destroying the island's vegetation. This resulted in decreased plant materials for birds to build nests and left the native penguin population more susceptible to predators. Again, the very birds conservationists were trying to protect ended up being more vulnerable.

The fact is that whether cats live on continents or on islands, their diet consists mainly of small mammals (i.e., mice, rats, and rabbits); however, on some islands, particularly ones with low or no

mammalian prey populations and high bird populations, cats tend to feed more frequently on seabirds. (This makes sense since we discussed earlier how a cat's diet depends on what prey is available.) Island environments are closed systems, meaning they are shut off from surrounding areas and no new organisms enter the system. When a new species is introduced to an island ecosystem, there is great risk of upsetting the entire system, for island ecosystems are highly sensitive to change. Unfortunately, many conservationists use these few island studies that show high predation rates on birds to give the false impression that the same conditions exist on all islands and even on continents.

## Conclusion

As presented by the evidence here, cats mostly prey on rodents and rabbits, while relying on their scavenging skills to help supplement their diet. Cats provide an invaluable service of preventing the spread of disease by controlling rodent populations, and they have been protecting food storage from rodents for thousands of years. Their predation on rodents and rabbits, particularly on islands, has also been shown to protect vulnerable bird populations.

Again, there is currently not enough information available to even begin to predict how cat predation affects the overall populations of prey, in particular birds. Based on today's research, it is also difficult to estimate on average how many birds a cat kills each year, and organizations continue to disagree on the estimate of how many feral cats there are living in the U.S.

After extensively examining studies on the hunting and dietary behaviors of cats, Fitzgerald and Turner (2000) conclude, "Any bird populations on the continents that could not withstand these levels of predation from cats and other predators would have disappeared long ago ..." And Meade points out, as noted above, that birds living in England today are under *less* pressure from cats than they were in the past from natural predators.

Some of the planet's bird populations are in great decline and we support the need to increase protection for these birds and other threatened wildlife. However, it is not only irresponsible and a misuse of power to blame cats for decreased bird populations, but morally unacceptable — especially when conservationists advocate for total eradication of cats. National reports and world reports continue to provide evidence which points to human activity as the true culprit of declining bird populations. (We will go into more detail regarding the loss of bird populations in the chapter, "Where Have All the Birds Gone?")

Furthermore, we do not deny the island studies that record high levels of bird predation from cats, and we recognize that birds on islands are particularly vulnerable to cats because they lack the defense mechanisms possessed by birds living on continents. However, as stated

previously, we disagree with conservationists extrapolating the results from these studies across continents when these ecosystems and fauna are vastly different. Unfortunately, this "bad science" has only muddied the waters on cat predation and has made some conservationists dislike cats very intensely; like former Smithsonian bird researcher Nico Dauphine, who was convicted of attempted animal cruelty after she was caught on camera trying to poison a feral cat colony in Washington, D.C. (Cratty, 2011).

And while conservationists continue to spread this misinformation without offering any viable solution to the feral cat problem — nor to protecting birds — animal organizations across the U.S. and around the world, are implementing Trap-Neuter-Return (TNR) programs every day, which aim to benefit both cats and birds. Sterilizing outdoor cats stops the breeding cycle and prevents countless litters of kittens. Reduction in colony size not only reduces hunting pressures on local wildlife, but as depicted in the above studies, cats who do not have kittens to feed tend to kill less prey.

TNR programs also remove kittens and cats who can be socialized from colonies and any stray cats who have become lost, further reducing colony size. Mature and senior cats become the remaining colony residents, who studies have shown hunt less. Cats also consume whatever food source is most available and the easiest to procure; providing regular meals is part of a successful TNR program and aids in reduced hunting.

Eradication attempts for feral cats are highly counterproductive and inhumane to not only the cats being culled but to other animals who are simply considered "collateral damage." It makes no sense to kill one species in order to save another based on a classification system (native vs. exotic) that is clouded with uncertainty, and when there is no denying our planet is headed towards a cryptogenic future. Conservationists and cat rescue organizations must work *together* in order to protect both cats and birds.