

THE ENVIRONMENTAL, FINANCIAL AND PUBLIC HEALTH IMPACT OF
COMMUNITY CAT COLONIES

by

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Abstract

The issue of feral, free-roaming, abandoned and stray cats can lead to volatile discussions on how to manage their populations that would in turn reduce their impact on the environment and lessen risks to public health. The domesticated cat began its association with humans as a hunter of the vermin that threatened our food stores, and has evolved into one of the world's most popular pets. With that popularity has come a host of problems involving cat over populations namely involving free-roaming cats, owned and unowned. Animal-based organizations are at odds with one another on how to handle these cats that form loose colonies. The cats pose issues to the environment by hunting small animals and birds, sometimes to the point of extinction. Their waste is a source of zoonotic parasites and the colonies can become reservoirs of diseases that can affect human health and the health of other cats. There are organizations that promote programs such as Trap-Neuter-and Return (TNR) as a way to control the numbers of cats but this control measure does not help protect the environment or eliminate the risk of disease. These programs are mostly dependent on volunteers and donations and have not always demonstrated that they are an effective way to control community cat populations. Those that oppose TNR would like to see community cats either euthanized or re-homed.

Part of the problem may lie in lack of knowledge on the issues surrounding community cats. In order to measure the awareness of community cat issues, a survey was prepared and sent out to veterinarians in the mid-west and to other animal welfare and public health officials located nationwide. The survey results showed that many respondents were not aware of their own organization's policies or statements pertaining to community cats or that they were overly concerned with the risks associated with community cats. Those individuals involved with animal care, welfare and regulation need to be aware of all the issues surrounding community cats so that in turn, they can enlighten their clients and the public as to the risks they are exposed to with a community cat colony in their neighborhood and also to risks community cats face everyday living outside of a loving home.

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CHAPTER 1 - Introduction

The domestic cat is one of the world's most popular pets, even surpassing the dog, man's best friend. According to the Humane Society of the United States (HSUS), in 2009 it was estimated that there were 77.5 million owned dogs in the United States as opposed to 93.6 million owned cats (HSUS, 2009a).

Felis catus-A Brief History of Domestication

Cats have shared a diverse history with humans from being deified by the ancient Egyptians to being defiled as witches' familiars in medieval Europe. Although the Egyptians are usually credited with domesticating cats first, archaeologists found a burial site with a human and cat buried closely together, dating back 9,500 years (Pickrell, 2004). The burial site was found on the island of Cyprus, extracted from a Neolithic village (Pickrell, 2004). Researchers speculate that the joint burial could indicate a strong association between cats and humans and that this may be evidence of the world's oldest pet cat (Pickrell, 2004).

There are several schools of thought on whom the domestic cat descended from but the most popular idea involves *Felis libyca*, the African wildcat (Serpell, 2000). Many of the mummified cats found in Egyptian tombs were *F. libyca* along with some *Felis chaus*, the ring-tailed jungle cat, which is native to the Middle East (Pollard, 1999). Another contender for ancestor is *Felis silvestris*, the European wildcat. It is speculated they may have invaded settlements in the same way *F. libyca* had in Egypt and or it may have mated with Egyptian cats that were exported to Rome with either traders or arrived as stowaways (Pollard, 1999; Serpell, 2000). A possible fourth ancestor is *Felis manul* or the Pallas's cat, which has longer hair and may have introduced the longhair gene into the domestic cat lineage (Pollard, 1999). The domestic cat may only be descended from one of these cats or be a product of a mating mixture of all four cats.

Around 3000 BC, the first signs of cats started appearing in Egyptian history and over the next 1000 years, cats made themselves useful as vermin hunters and were finally promoted to a religious icon (Pollard, 1999). Other ancient civilizations such as Greece, Rome, China and Japan also depicted their respect of the cat as a hunter (Pollard, 1999). The Egyptians so revered

their cats that when a family's cat died, the entire household went into mourning with the head of the household shaving their eyebrows as a sign of grief (Pollard, 1999). Cat worshipping extended to their religious beliefs with a deity depicted as a cat, Bastet or Pasht, the goddess of fertility and femininity (Pollard, 1999). The cult of Pasht lasted approximately 1500 years and during this time it was forbidden to harm a cat in any way (Pollard, 1999). The Greeks' also associated cats with women and among their goddesses, Venus, being the goddess of farming, soon became associated with the cat (Pollard, 1999). But unlike the Egyptians, the Greeks reverence for the cat didn't extend to including them as being part of the family and neither did the Romans' (Pollard, 1999). Romans viewed the cat as a good hunter but didn't hold them in any reverence (Pollard, 1999). However, the Roman army actually carried cats with them on their campaigns to keep their food stores safe and the Roman colonial families in Britain and Gaul did keep cats, the small and large variety, as pets (Pollard, 1999).

In Islam, it is said that Mohammed had a favorite cat named Muezza (Pollard, 1999). It is related in stories that rather than disturb Muezza as the cat slept on his arm, he cut his robe sleeve off (Pollard, 1999). Meanwhile in Buddhism, the cat, along with the snake, is cursed for they are the two creatures that did not weep at the death of Buddha (Pollard, 1999). Chinese custom held that in order to avoid poverty, a cat statue was put outside of a house while cat pictures were hung inside (Pollard, 1999). In Japan, the cat helped keep the silk farms free of mice until people started keeping them as pets (Pollard, 1999). With the absence of cats, the silk industry became threatened and the Emperor ordered house cats to be released back onto the farms to resume their hunting (Pollard, 1999).

When Western Europe embraced Christianity, the cats moved into the monasteries since they were the storage houses for grains (Pollard, 1999). Cats were the only pets permitted to be kept by monks and nuns and were often depicted in the illuminated pages of gospels (Pollard, 1999). At some point however, things changed and the monastery cats were killed and their fur was used to line clerical habits (Pollard, 1999). Canon law only allowed cat pelts to be used for this purpose (Pollard, 1999).

Around the 1400's, attitudes toward the cat started to change. Cats had been busy after the Black Death, the plague carried by the fleas on black rats. After the massive die off of humans, there was little labor left to tend to the fields and what crops remained needed to be protected from rodents (Pollard, 1999). After this, the Christian Church, both the Catholic and,

later, the Protestant, started feeling superstitious about cats (Pollard, 1999). It is not known exactly why cats began to be despised but some propose it had to do with their association with pagan goddesses (Serpell, 2000). There was also a legend that when Satan appeared on Earth, he did so under the guise of a black cat (Pollard, 1999). Soon after the witch trials began, Pope Innocent VIII, ordered that when convicted witches were burned at the stake, their cats should also be burned (Pollard, 1999). Soon, cats that were not associated with witches were hunted down and killed; with Lent actually becoming a season to kill cats by either hanging them or burning alive (Serpell, 2000).

At the end of the 17th century, the witch trials came to an end and so did the slaughter of cats (Pollard, 1999). Cats even traveled to the new world aboard the Mayflower in order to protect the food stores (Pollard, 1999). During the age of Enlightenment of the 18th century, cats were bought into the home as pets (Pollard, 1999).

Cats have become one of the most popular companion animals in the world. According to the Humane Society of the United States, (HSUS, 2009a), a survey conducted by the American Pet Products Manufacturers Association in 2009-2010 on pet ownership, found the following (HSUS, 2009a):

- “-There are approximately 93.6 million owned cats in the United States.
- Thirty-three percent of U.S. households (or 38.2 million) own at least one cat.
- Fifty-six percent of owners own more than one cat.
- On average, owners have two cats (2.45).
- More female cats are owned than male cats (70 percent vs. 65 percent respectively).
- Twenty-two percent of owned cats were adopted from an animal shelter.
- Cat owners spent an average of \$203 on routine veterinary visits.
- Eighty-seven percent of owned cats are spayed or neutered.”

The population numbers of unowned, free roaming cat populations, sometimes referred to as feral cat colonies or community cats, is unknown but estimated to be on the level of pet cat populations, somewhere around >90 million (Levy, 2011). Community cats are usually considered stray and feral cats that form a colony. However, free-roaming owned cats can also be transient members of a colony (Patronek, 1998).

What defines a feral cat?

It would seem that defining a feral cat would be a straightforward process. However, organizations that are involved in animal welfare and or medicine have differing definitions. For example, the American Veterinary Medical Association (AVMA) does not really define feral cats, but in the beginning of a collection summary entitled “Feral Cats,” a description of “populations of unowned free-roaming cats” (AVMA, 2010a), is in reference to feral cats. The HSUS differentiates between stray and feral cats. It defines a stray cat as a pet cat that has been lost or abandoned, whereas a feral cat is the offspring of lost or abandoned pet cats or other feral cats (HSUS, 2010). Stray cats have had contact with people and are tame whereas feral cats have not had human contact and are usually too fearful or wild to be handled (HSUS, 2010).

The importance of clearly defining “stray” and “feral” can be illuminated by a survey conducted in New Zealand concerning the management of feral and stray cats (Farnworth, Campbell and Adams, 2011). Using the National Animal Welfare Advisory Committee’s (NAWAC) definitions of companion, stray and feral cats, the survey found that how cats are described can have a significant impact on the public’s acceptability of the methods used to control their populations and welfare (Farnworth, Campbell and Adams, 2011). The survey discovered that for a majority of the population polled, non-lethal methods, defined in the study as contraception and trap-neuter and re-home (TNRh), were preferred for stray cats whereas lethal control measures which included poison, trapping and hunting with dogs and/or firearms were acceptable for feral cats (Farnworth, Campbell and Adams, 2011). NAWAC’s cat definitions from its 2007 documentation were as follows (Farnworth, Campbell and Adams, 2011):

“Companion cat: A common domestic cat that lives with humans as a companion and depends on humans for care and welfare.

Stray cat: A companion cat who is lost or abandoned and who is living as an individual or in a group (colony). Stray cats have many of their needs indirectly supplied by humans and live around centers of human habitation. Stray cats are likely to interbreed with the unneutered companion cat population.

Feral cat: A cat who is not a stray cat and who has none of its needs provided by humans. Feral cats generally do not live around centers of human habitation. Feral cat population size fluctuates largely independently of humans, is self-sustaining, and is not dependent on input from the companion cat populations.”

CHAPTER 2 - Literature Review

A literature review was performed utilizing Pub-Med on relevant issues surrounding community cat colonies. The purpose was to summarize the major issues community cats pose and the solutions proposed to negate those issues.

Environmental Impacts of Cat Colonies

The trait that made small wild cats attractive to early populations of people, hunting, has now made them public enemy number one among wildlife biologists. It's impossible to really know and tabulate the actual numbers of wildlife that community cats kill every year. Many studies use software to try and calculate possible wildlife intakes by cats while others depend on wildlife rehabilitation centers for actual numbers of injured or dead wildlife submitted where the death or injury of the animal can be directly linked to cats. Another way to track the diet of cats is by studying the scat (Slater, 2004). The one behavior trait most all scientists and researchers can agree upon, even a well-fed cat will hunt. As one researcher stated, the cat's nature to hunt is in its telos, which Aristotle described as a function or activity that is intrinsic to an animal and has been determined by evolution and imprinted by genetics (Jessup, 2004). Cats require a diet high in protein which results in mammals and birds taken as food. For cats in urban settings, their diets may actually be made up of what society has deemed nuisance animals such as pigeons, mice, starlings and rats (Slater, 2004).

Cats depend on auditory and visual cues for hunting. They have better acoustic skills than dogs or humans when it comes to hearing the high-pitched sounds associated with mice (Fitzgerald & Turner, 2000). In addition, cats have over twenty muscles controlling their external ears which can move independently of each other, allowing them at close range to zero in on prey by sound alone (Fitzgerald & Turner, 2000). After the auditory clues have pinpointed a prey's location, the vision skills allow for identification of any movement and experienced cats can even identify immobile prey (Fitzgerald & Turner, 2000). Kittens learn by watching their mothers and will be more likely to hunt and kill prey species that they are familiar with (Fitzgerald & Turner, 2000). This learning mechanism makes it imperative to curb the birth of feral and stray kittens as they will mimic the hunting patterns of their mothers. If a mother is not

present, a kitten can learn from watching other cats and adopt their hunting preferences (Fitzgerald & Turner, 2000).

In ecosystems that are free of native terrestrial predators, stray and feral cats can pose a significant risk to native species that these cats see as potential prey (Farnworth, Campbell and Adams, 2011). In New Zealand, cats are responsible for a number of localized extinctions; and in Northern Europe, community cats have affected native felids through habitat competition and hybridization (Farnworth, Campbell and Adams, 2011). They also act as a disease reservoir that can affect companion cat populations (Farnworth, Campbell and Adams, 2011). Because of their impact on native species, cat populations in New Zealand are subject to control on main lands or eradication on small islands (Farnworth, Campbell and Adams, 2011).

Besides cats, humans have also had a hand in the reduction and extinction of native species by habitat destruction, use of pesticides and the introduction of non-native species (Slater, 2004). Arguments have been made that we need to protect native species from introduced species such as the cat but that reasoning is reversed when discussing domestic livestock that was introduced into this country. Indigenous wildlife such as wolves, coyotes, bear and cougars are hunted and killed when they take domestic livestock (Slater, 2004).

Another issue involving birds and cats is that there are birds that are protected by the Endangered Species Act and the Migratory Bird Treaty Act. If cat colony caretakers are legally responsible for the colony cats they care for, they could be charged with violations from both acts (Barcott, 2007).

Another environmental concern deals with fecal deposition by free-roaming cats. One study estimated that free-roaming cats which included community cats which may be feral or stray as well as owned cats may deposit an estimated 76.4 tons of outside fecal material a year (Dabritz, Atwill, Gardner, Miller and Conrad, 2006). Studies suggest that cat fecal material is contributing to the bacterial (such as *Escherichia coli*), and parasite (*Toxoplasma gondii*), loading of streams and coastal waters (Dabritz et al, 2006). *T. gondii* was implicated in the deaths of southern sea otters from 1998 to 2001 (Dabritz et al, 2006). Besides infecting wildlife, *T. gondii* is also zoonotic and can cause serious health risks for humans, especially pregnant women.

Public Health Concerns Involving Community Cats

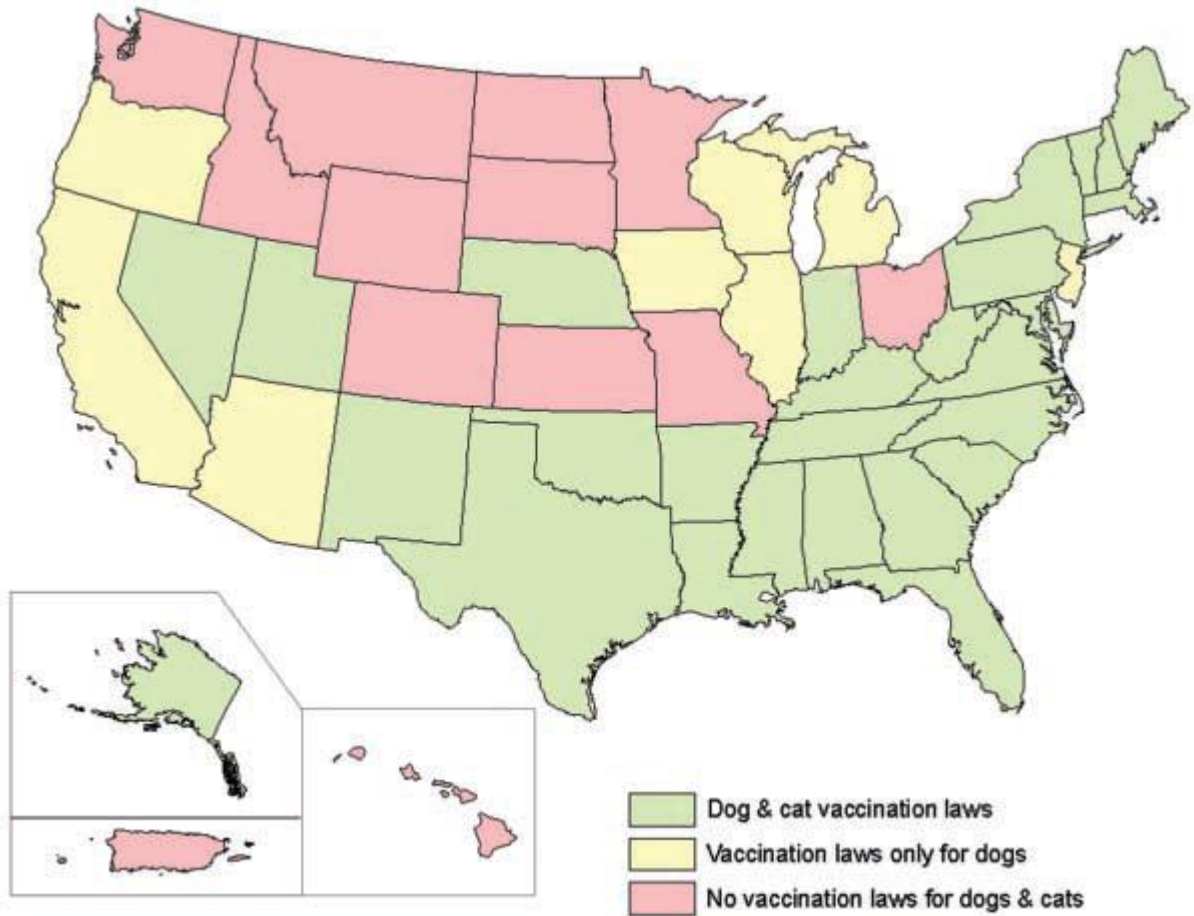
Even among the experts, there is not agreement as to how much of a public health risk community cats pose. At a recent conference in California, the state public health veterinarian commented that the public risk health from feral cats was low and that it was very hard to separate out the risks from feral cats from free-roaming owned cats (Ackerman, 2010). Whether you believe the risks are high or low, there has to be agreement that there are risks.

Cats are the definitive host for *Toxoplasma gondii*, the parasite responsible for toxoplasmosis. Cats shed the *T. gondii* oocytes in their feces which then contaminate the soil and water that people harvest food from or that their children and pets play in (Slater, 2004). Infection from *T. gondii* for cats and intermediate hosts which includes humans can be acquired by eating uncooked or undercooked meat that is contaminated with *T. gondii* cysts (Fredebaugh, Mateus-Pinilla, McAllister, Warner and Weng, 2011).

Infections with feline hookworms, another parasite, can result in skin lesions known as cutaneous larva migrans (CLM) as well as muscle and ocular infections (Gerhold, 2011).

Of the domestic animals in the United States, cats are the most common to be infected with rabies. Their numbers are not on the level as wildlife which makes up about 92% (6,185 cases) of all rabies cases compared to 4.5% (300 cases) for cats (Blanton, Palmer, and Rupprecht, 2010). In Europe, cat rabies cases that were reported to the World Health Organization (WHO) numbered 10,104 (Mutinelli, 2011). Cats with rabies in the U. S. may be rising because of population increases or because they are not vaccinated for rabies on a consistent basis and they roam more freely than other domesticated pets (Slater, 2004). One report initiated in 1998 stated that at the time of a biting incident involving “owned pets”, 65% of owned cats were unvaccinated and 28% of owned dogs were unvaccinated (Hensley, 1998). In the latest Centers for Disease Control (CDC) reports regarding rabies statistics, it was remarked that only 38 states, the District of Columbia and New York City have state or district laws that require rabies vaccination (Blanton et al, 2010). Many states that do not have state laws for rabies vaccination, however, individual counties and municipalities may have devised vaccination legislation (Blanton et al, 2010). See Figure 1, States that require rabies vaccination (Blanton et al, 2010).

Figure 1: States requiring rabies vaccination as of 2009. (Blanton et al, 2010).



Despite cats leading in rabies cases of domestic animals, there have been no human cases of rabies related back to cats for many years (Slater, 2004). But what makes the rise in cat rabies disturbing is that of all the domestic animal bites, cat bites result in the most postexposure prophylaxis (PEP) (Slater, 2004). Even though dog bites are more common, most cat bites come from an unowned cat that was not provoked (Slater, 2004).

PEP is given to an individual that has been bitten, scratched or had some other type of exposure to an animal that may be suspected of having rabies or has been determined to be infected with rabies (Moore, Sischo, Hunter and Miles, 2000). PEP process includes washing the wound, passive immunization with rabies immunoglobulin and then a series of 4 doses of rabies vaccine (Blanton, et al, 2010). Many times, PEP is given without definitive diagnosis of rabies, due to the animal not available for testing. PEP is expensive and there can be adverse reactions

ranging from localized reactions such as swelling and redness at the injection site to systemic effects that include fever, muscle aches and vomiting (Moore et al, 2000). In 2008, it was estimated that the total cost of PEP treatment could range from \$1600-\$5200 (CDC, 2008).

Other disease risks include cat scratch fever, associated with the bacteria *Bartonella* which can be also be spread by fleas and possibly ticks (Stoskopf & Nutter, 2004).

Cats are also susceptible to the H5N1 avian flu virus and there was a documented case of a cat dying from H5N1 off the coast of Germany (Skaer, 2006). If community cat colonies in the U. S. became reservoirs for the avian flu, the public health ramifications would present a serious and worrisome problem.

One group that has not openly engaged in the dispute concerning the health risks of community cats are physicians. A search of the American Medical Association's website for feral cat policies, feral cats or community cats revealed nothing. A search of cats brought up cat scans as well as veterinary findings concerning the human-animal bond and veterinary career possibilities. When a search of toxoplasmosis was performed, 9 entries were found, mostly dealing with food poisoning with a brief comment that cat feces can also expose a person to the parasite that causes toxoplasmosis (AMA, 2004). With the inception of the One Health Initiative, a collaboration between all fields of medicine in order to promote the health of humans, animals and the environment; it may not be in the AMA's realm to dictate policy concerning the management of feral cats but one might expect to find more information on the public health risks of handling or living near community cat colonies.

Other Community Cat Health Issues

The life of an outside cat is not easy. They fall victim to dog and other animal attacks, suffer injuries and death by vehicles, are poisoned, shot and tortured by individuals that consider them a nuisance, catch diseases and suffer from a wide assortment of ailments. Anything a pet cat can experience health wise, so does the feral without the benefit of a human caretaker to seek care for it. For example, male cats in the wild can develop blockages in their urethras from urinary tract infections and eventually die unless they receive medical attention. Wounds acquired during fighting can become infected and septicemic. The average lifespan of most feral cats is 2-5 years compared to the 15 years cats reared responsibly indoors can enjoy (ACA,

2010). Kittens born to community cats also experience dramatic mortality rates, as high as 75% (Nutter, Levine and Stoskopf, 2004).

Community cats also suffer from flea, tick, lice and ear mite infestations. Other diseases include feline immunodeficiency virus (FIV) and feline leukemia virus (FeLV) and infections from *Cytauxzoon* spp and *Mycoplasmas*, spp. (Mendes-de-Almeida et al, 2007).

Financial Costs of Community Cats

Those organizations that promote trap, neuter and return (TNR) programs also claim that TNR is more economical than eradication. In a Trap, Neuter and Return cost savings calculator (Figure 2) developed by Best Friends Animal Society (BFAS), it estimated that the cost of alteration and return per cat in Kansas could range from \$70 to \$150 per cat while eradication was estimated to be \$170 per cat (Tables 1, 2 and 3) (BFAS, 2010). This is all dependent on veterinarians discounting their work.

Figure 2: Best Friends Animal Society (BFAS) Trap, Neuter and Return Cost Savings Calculator, blank form (BFAS, 2010).

Calculate the saving associated with trap, neuter, and return programs for community cats in your city, county, or state by clicking on the links below.

State: select
Your browser does not support inline frames or is currently configured not to display inline frames.

County: select
Your browser does not support inline frames or is currently configured not to display inline frames.

City: select
Your browser does not support inline frames or is currently configured not to display inline frames.

- Trap, Neuter, Return Data Table
- Trap, Neuter, Return Local Talking Points
- Trap, Neuter, Return General Talking Points

Table 1: Estimated Costs Associated with Alteration and Return per Cat in Kansas (BFAS, 2010).

Trap/Fieldwork	\$50
Neuter/Spay	\$30
Physical Exams	\$40
Vaccinations	\$30
Estimated Cost of TNR in Kansas per cat	\$150

Table 2: Estimated Costs Associated With Discounted Packaged Alteration and Return per Cat in Kansas (BFAS, 2010).

Trap/Fieldwork	\$50
Packaged TNR Procedure	\$20
Estimated Cost of Discount Packaged TNR in Kansas	\$70

Table 3: Estimated Costs Associated With Feline Eradication per Cat in Kansas (BFAS, 2010).

Trap/Enforcement	\$50
Sheltering	\$40
Food/Supplies	\$40
Laboratory Tests	\$10
Eradication/Euthanization	\$40
Estimated Cost of Eradication in Kansas per Cat	\$170

In a report prepared for BFAS by John Dunham and Associates, Inc., dated March 4, 2010, it states that the TNR programs will cost less due to “discounted packages offered by veterinary volunteers” (Dunham, 2010). The report also states that through community support from feral cat networks that the total cost to maintain an average size colony would be approximately \$30 a month. The savings calculator was created by estimating the number of

feral cats in an area by extrapolating the number from a sampling of reliable population data on feral cats (Dunham, 2010). The associated costs were calculated by using national averages collected from research journals, veterinary journals, national media publications, federal government reports and animal welfare groups (Dunham, 2010). This data helped to establish a national cost average and then a standard price index was used to help account for price differences by state (Dunham, 2010). It should be noted that the report was funded by PetSmart Charities which supports TNR programs (Nolen, 2010). Several letters to the editor of the *Journal of the American Veterinary Medical Association (JAVMA)* questioned how the costs were determined and that the study failed to prove that TNR programs were effective for population control (Martin, 2010).

Another veterinarian also commented that she was offended that veterinarians were expected to subsidize the TNR programs through veterinary donations. Dr. Minta Keyes wrote that she already donated several thousands of dollars each year to charities and questioned why the veterinary community was expected to donate even more while the article went on to praise how much the TNR programs would save local governments (Keyes, 2010). Not all veterinarians feel this way and some even see the spay/neuter portion of TNR's as a way to provide recent graduates more practice and it can provide good public relations with their clients that support TNR (Rottenberg, 2010).

In addition to figuring out the costs of TNR programs and upkeep, one must also weigh in the costs that are not easily calculated such as damage to the environment, costs of PEP's from bites and scratches from unowned animals and treatments for other zoonotic diseases such as toxoplasmosis that may have been contracted by exposure to community cat colonies.

Solutions to Community Cat Colonies

The transition from companion cat to stray or feral can happen quickly, possibly within a single generation after abandonment (Farnworth, Campbell and Adams, 2011). Due to its biology, cats can be prolific since they reach an early sexual maturity, have seasonally polyestrous cycling and pregnancies with an average of 4-5 kittens (Levy, 2011). In controlling the populations of stray and feral cats, TNR is often considered the "gold standard" especially if total eradication is not feasible or desired (Farnworth, Campbell and Adams, 2011). TNR

involves the humane trapping of a cat, transporting the cat to a clinic where it is anesthetized, examined and hopefully tested for FeLV and FIV. If a cat tests positive for FeLV and/or FIV, it should be euthanized. The cats are then sterilized, possibly vaccinated for rabies but usually no core vaccines such as calicivirus, viral rhinotracheitis and panleukopenia. Cats are also ear-tipped or notched to identify that they have been altered. Socialized cats and kittens are put up for adoption while feral cats are returned to their colonies and monitored by caregivers who also provide food, water and shelter (Slater, 2004). A glaring issue with TNR programs is that for an animal to be vaccinated effectively for rabies there has to be booster shots given. Owned animals are usually given their first rabies vaccination at the age of 3 months and a booster annually, then afterwards, biannually, or triennially depending on an areas vaccination legislation and which vaccine is utilized (NASPHV, 2011). It is not clear that this is being achieved in all TNR programs.

One problem shelters and TNR groups face is in determining which cat is truly feral and which one is just afraid. In a survey conducted of several national organizations involved in animal welfare and spay/neuter clinics, it was discovered that there is no documented method for determining feral status in cats (Slater, Miller, Weiss, Makolinski and Weisbrot, 2010). A socialized but frightened cat can mimic a feral cat and sometimes it can take a few days for the frightened cat to calm down and start showing signs of friendliness (Slater et al, 2010). The survey showed that some shelters may not even hold a cat for a day while others may hold up to seven days (Slater et al, 2010). One day or less may not be enough time for a frightened cat to calm down and therefore, the possibility is high that frightened, socialized cats are being mistakenly labeled as feral and either being put back in colonies or euthanized instead of being put up for adoption (Slater et al, 2010). Other ways that shelter workers try to determine if a cat is feral is to see if the cat has been neutered but is not eartipped, indicating that the cat may have been owned when neutered (Slater et al, 2010). Others signs used to determine status were whether the cat was declawed, information from colony caretakers on the cat's behavior, and whether there were multiple scars or injuries (Slater et al, 2010).

Advantages of TNR include: maintenance of a non-breeding population which reduces the risks of reinvasion by another cat population; no mesopredator release in where smaller predators such as rats are released from the pressures of predation by the cats; and the decrease

of diseases such as FIV which is spread disproportionately by unneutered, roaming males (Farnworth, Campbell and Adams, 2011).

However, not everyone supports the claims made by TNR advocates. Opponents have pointed out that the return portion of TNR amounts to reabandonment which violates many state humane laws (Jessup, 2006). Studies have not wholeheartedly supported the claims made by TNR with regard to population control. One problem is that most of the studies are only 2-3 years in length and to really measure the TNR effect on population, longer studies are needed (Levy, Gale, D. W. and Gale, L. A., 2003). Another obstacle to the success of TNR is the starting number of cats in a colony. Those colonies with a small number of cats, 3-10, seem to enjoy more success than those with larger populations (Foley P., Foley, J. E., Levy, and Paik, 2005).

Another population control tool could be contraceptive vaccines. Recent studies targeting gonadotropin-releasing hormone (GnRH) have shown positive preliminary results in long-term contraception for male and female cats, even after only one shot was administered (Levy, 2011). Other contraception vaccines that were successful in wildlife and targeted the zone pellucida (ZP) showed little success when applied to cats. With GnRH, both pituitary and gonadal hormones are regulated and helps depress nuisance sexual behaviors as well as preventing conception (Levy, 2011).

Another idea that has been tried in Brazil is the hysterectomy of female cats, completed on a biannual time line (Mendes-de-Almeida et al, 2011). In a four year study, it was determined that there was a decline in the feral cat colonies population but they also acknowledge that as the cats got older, there were more infected with pathogens (Mendes-de-Almeida et al, 2011). The benefit to this program was that only the females were operated on and by maintaining the hormones in both the females and males, it kept fighting and mating behavior intact without the pregnancies (Mendes-de-Almeida et al, 2011). The reasoning behind keeping the hormones was that when the male cats were neutered, they became less territorial and often shared shelter and food with other migrating cats (Mendes-de-Almeida et al, 2011). Sometimes this behavior even got the neutered males run out of the colony by intact males, which then could go on to impregnate unaltered females (Mendes-de-Almeida et al, 2011). By performing hysterectomies on female cats, starting at the age of 6 months, the social structure within the colony is maintained with less tolerance given to other cats that wish to join the colony (Mendes-de-Almeida et al, 2011). The down side to this program is that the nuisance associated with breeding

cats is not eliminated, such as fighting and noise, and therefore cannot be executed in neighborhoods (Mendes-de-Almeida et al, 2011).

There are also lethal means to controlling feral cats that include poisoning and hunting with either firearms or dogs (Farnworth et al, 2010). In New Zealand, feral cats are considered pests and poisons such as 1080 (sodium fluoroacetate) are routinely used (Farnworth et al, 2011). The problem with poison is that it is indiscriminate and the distress the animal may experience before death, such as in the use of 1080 can turn into a public relations nightmare (Farnworth et al, 2011). Others have turned to using a gun to rid areas of feral cats especially those preying on birds. In a case from Texas, a bird lover shot and killed a feral cat that was stalking piping plovers which are on the federally listed endangered species list (Barcott, 2007). A local tollbooth attendant who had been feeding the feral cats heard the shot and got a description of the shooter's van which police pulled over later, with the gun still inside (Barcott, 2007). Texas charged the shooter with animal cruelty and the case went to trial which ended in a deadlocked jury (Barcott, 2007). It was also revealed but not proven that the cat that was shot was not the first one to be killed by the bird lover (Barcott, 2007).

Other suggestions include putting feral cats to work. An article in *Cat Fancy* claimed that the Los Angeles Police Department (LAPD) had a problem with rats eating their criminal files and were even spotted running across officer's desks (Kollus, 2010). A group working to find a viable solution for feral cats, Voice for the Animals Foundation (VFTA) started supplying the LAPD with feral cats to tackle their rodent problem and according to the police; it has worked (Kollus, 2010). VFTA has around 175 feral cats working in 20 sites to eliminate rodents (Kollus, 2010). However, as will be discussed in the Survey Results and Discussion section, there are studies that do not agree that feral and domestic cats are a good resource for initial rodent control.

State Laws and Group Policies Regarding Community Cat Colonies

There are many organizations that have official positions on the subject of feral cats. The following outlines the basic context of some of those organizations.

-American Association of Feline Practitioners (AAFP): supports humane population control including TNR, relocation to managed colonies/sanctuaries and adoption (AAFP, 2007).

-National Association of State Public Health Veterinarians (NASPHV) (Appendix C): is supportive of whatever actions undertaken to reduce stray cat populations by the local health departments, humane societies and animal control (Personal communication, April 15, 2011).

-American Veterinary Medical Association (AVMA): supports the reduction of the number of free-roaming abandoned and feral cats by humane capture by appropriate agencies such as humane societies, health departments and animal control officers. The AVMA does not support or oppose managed cat colonies but does oppose the placement of colonies in areas where there is an endangered or threatened wildlife habitat (AVMA, 2009).

-American Society for the Prevention of Cruelty to Animals (ASPCA): supports the principle of managed colonies using TNR programs that include the adoption of socialized cats. Cats put up for adoption must be tested for diseases such as FIV and FeLV. Colonies should not be placed where there are threatened or endangered wildlife or where communities are opposed to the colony. If a colony cannot be returned, capture and adoption or euthanasia is recommended (ASPCA, 2011).

-National Animal Control Association (NACA): believes in the enactment and enforcement of laws related to cats to manage populations. It also supports education and public and private partnerships for the control and care of cats. Properly regulated cat caretaker programs are encouraged (NACA, 2008).

-American Bird Conservancy (ABC): Does not support TNR and has changed its meaning to Trap, Neuter and Remove. They support legislation that requires cat owners to register their cats, spay and neuter and keep them indoors (ABC, 2010).

-Humane Association of the United States (HSUS): their policy is very similar to the ASPCA's policy found above. It is committed to a community wide approach to the feral cat population issue by implementing TNR's (HSUS, 2009).

Feral cats are not just a problem for the United States. In Italy, there is a national law, Number 281 and passed in 1991, which states a no kill policy for feral cats, TNR is encouraged and cat colonies are actually registered (Natoli et al, 2006). The colonies are monitored by the local Veterinary Public Services (VPS) and associations of cat caretakers (Natoli et al, 2006).

New Zealand has the Animal Welfare Act of 1999 which covers the welfare of animals, including cats, with the exception of feral cats which are labeled as pests (Farnworth, Campbell and Adams, 2011).

In the United States, there are only 13 states (California, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maine, Nebraska, New York, Rhode Island, Texas, Vermont and Virginia) and the District of Columbia that even mention feral cats in laws that deal with domestic animals (Fry, 2010). Most of the legislation only addresses the ownership of feral cats in regards to the length of time a person is providing food, water and/or shelter to a feral cat (Fry, 2010). Some laws state that if a person has provided food, water and/or shelter to a feral cat for a certain number of days, then the person owns that feral cat and is responsible for the cat (Fry, 2010). Other legislation states that if a cat caretaker is part of a rescue group, then the person's actions does not constitute ownership (Fry, 2010). These definitions are essential when determining cat ownership in cases of legal action especially if there has been damage done by the cats in question or nuisance complaints (Fry, 2010). It has also been shown that insuring feral cats are mentioned in laws, they then will be protected from acts of cruelty (Fry, 2010). Texas's definition of animal in its animal protection statute did not include feral cats and dogs and as a result, anyone accused of cruelty to feral animals was acquitted until the legislature amended the law (Fry, 2010).

Community Cat Advocate Groups

Besides local and national humane groups that support TNR and provide information and sometimes funding concerning feral cats and/or community cats, there are several other national organizations that routinely raise money to help fund TNR projects. A few of them include Alley Cat Allies and the National Feral Cat Resource. This is in addition to many local and state organizations. The HSUS website offers a state-by-state listing of known feral cat organizations (HSUS, 2011b). Alley Cat Allies has sponsored a National Feral Cat Day for the last 10 years where it encourages communities to come together to learn how to help feral cats with programs such as TNR (ACA, 2011).

CHAPTER 3 - Survey

Introduction

A questionnaire (survey) was designed to determine the level of knowledge concerning feral cat issues among mid-western veterinarians and other animal welfare and public health oriented individuals located nationwide.

Methods and Methodology

A survey (Appendix A and associated tables) utilizing Survey Monkey, a web-based survey generator, was created and sent out to various animal-based organizations. The survey was sent via email on April 10, 2011 to the webmaster of each organization. The email contained an introduction concerning the nature of the survey, the survey introductory statement, and a link to the survey itself. The closing date for the survey was May 6, 2011.

The organizations selected for participation in the survey were:

Kansas Veterinary Medical Association (KVMA): kmva@sbcglobal.net
Nebraska Veterinary Medical Association (NVMA): sent through website
Oklahoma Veterinary Medical Association (OVMA): info@okvma.org
Missouri Veterinary Medical Association (MVMA): mvma@movma.org
Colorado Veterinary Medical Association (CVMA): info@colovma.org
National Animal Control Association (NACA): naca@nacanet.org
National Association of State Public Health Veterinarians (NASPHV):
joni.scheftel@state.mn.us
The Animal Society for the Prevention of Cruelty to Animals (ASPCA):
outreach@aspca.org
Kansas Humane Association (KHS): mlara@kshumane.org

One veterinary organization, the KVMA responded via email their willingness to participate. Even though other veterinary organizations did not reply by email, when their websites were monitored,

each one posted the survey introductory statement and link on their respective websites, with the exception of the CVMA. No response was received and there was no evidence that the survey was posted on their websites from the KHS, ASPCA, or the NACA. The NASPHV communicated via email (personal communication, April 15, 2011), that they could not forward the survey onto their membership but did provide their organizations stance concerning free-roaming cats (Appendix C). Charts and graphs related to applicable survey questions can be found in Appendix B.

Statistical Analysis

Statistical analysis was performed by inputting survey responses into Minitab® Statistical Software (2007). Chi-square tests for independence and p -values were performed for pertinent questions and are included with their respective tables. The p -values that were calculated were significant since the p -values were less than the set value of 0.01.

A chi-square test for independence is applied when there are two categorical variables, values that are names or labels, from a single population (the survey population) and is used to determine whether there is a significant association between the two variables (Stat Trek, 2011). To determine the independence, a null hypothesis is stated such as for survey question 1, “there are no differences in the level of concern regarding feral cat colonies for the issues in the table.” By inputting the data into statistical software, the chi-square, degrees of freedom and the p -values are calculated. The significance level chosen was less than 0.01 and all p -values calculated were less than 0.01, therefore, it is determined that there are differences in the level of concern for different issues, thereby rejecting the null hypothesis. The chi-square value can also help reject the null in that the larger the chi-square value, the more evidence there is against the null hypothesis.

Results and Discussion

There were 126 responses to the survey. The exact number of possible responses is unknown. The number of responses seemed low with respect to the respondent pool and the reasons could be in that it was not emailed as requested but posted to websites. If a potential responder did not visit the website between April 10, 2011 and May 6, 2011, they would not be aware of the survey.

On question 1 of the survey, respondents were asked to rank their concern on issues related to feral cat colonies:

1. Please rate your level of concern about the following potential issues related to feral cat colonies.

Answer Options	Unconcerned	Somewhat concerned	Concerned	Highly concerned
Detrimental to wildlife (i.e., native species)	27	49	30	20
Detrimental to environment (i.e., feces, opportunistic sheltering, etc)	26	40	46	12
Public health risks (i.e., bites, infectious diseases, parasites, etc.)	9	37	47	32
Humane issues (domestic animals living in a semi-wild condition)	25	35	37	26
Other (please specify)				

($X^2=27.319$; DF=9; p -value=0.001)

It was disappointing to see the number of responses in the “unconcerned” column. Each of the four issues is serious in respect to either the survival of wildlife that may be preyed upon, the possible spread of disease and the welfare of feral cats. Possible explanations may include lack of knowledge of the situation surrounding feral cat colonies or lack of interest.

Question 2 was similar in the rating of public health issues in relation to cat colonies. Most of the issues generated a “somewhat concerned” response. As with Question 1, each of the options poses a serious public health risk that everyone that works with animals should be concerned about. Again, the possible explanations could include a lack of awareness of these issues or simply no interest in them.

2. Please rate your level of concern about each of the following public health issues with regard to feral cat colonies:

Answer Options	Unconcerned	Somewhat concerned	Concerned	Highly concerned
Bite injury to humans	15	45	46	19
Risk of rabies to cats and humans	6	47	37	34
Toxoplasmosis	20	54	31	20
Intestinal parasites	13	45	46	21
External parasites	16	46	43	19
Intermingling with opportunistic wildlife (i.e., skunks, opossum, raccoons)	17	45	44	19
Attractant for coyotes and other predators	42	46	26	11

($X^2=65.993$; DF=18; p -value=0.000)

Questions 1 and 3 (see Appendix B, Tables A.4 and A.6) also had an “other” section which afforded the responder the opportunity to record other thoughts related to the questions. In both questions, there was a comment in regards to feral cats controlling rodent populations. However, in a study that looked at different ideas for controlling rodent populations, it was found that feral and domestic cats usually only do well in controlling rodent populations after some other agent, such as poison, has removed a large part of the rodent population (Wodzicki, 1973). This was supported by the results of another study conducted in New Zealand which showed that, once helped in some way, either by poison or natural weather conditions that inhibited reproduction, cats could then control a rodent population (Newsome, 1990).

Question 4 was concerned with whether the respondents were aware of their employers’ stance on feral cats. Most answered “no” (71.7%), which could mean there is actually no stance or they are not aware of any stance even though “not sure” was also a choice.

4. Does your employer have a policy statement, rules or regulations in regard to feral cat colonies?		
Answer Options	Response Percent	Response Count
Yes	10.8%	13
No	71.7%	86
Not sure	16.7%	20
Under development	0.8%	1

Survey Question 5 actually did show that most responders did not know or were unsure whether their respective organizations had a policy or statement concerning feral cats. Twenty-five respondents stated that the AAFP did not have a feral cat policy, but yet the AAFP position statement was actually published in *Journal of Feline Medicine and Surgery* in 2004 (Richards, 2004). It is also available on their website (AAFP, 2007). The AVMA also has a policy on feral cat control and the application of TNR (AVMA, 2009). Most humane associations are affiliated through the HSUS or the ASPCA, which both have policies but those that are independent of either association may not have a group policy or statement concerning feral cats. The KVMA and the NVMA may not have separate policies but should adhere to what the AVMA has stated.

NACA also has a statement available concerning community cats and management (NACA, 2008). The NASPHV statement concerning feral cats can be found in Appendix C.

5. Which entity are you associated with and do they have a policy statement, rules or regulations in regard to feral cat colonies? Please check all that apply.

Answer Options	Yes	No	Not sure	Under development
American Association of Feline Practitioners	5	25	12	0
American Veterinary Medical Association	38	3	76	1
Humane Associations/Shelters	19	16	14	3
Kansas Veterinary Medical Association	5	21	15	0
National Association of State Public Health Veterinarians	0	24	9	0
National Animal Control Association	1	23	8	0
Nebraska Veterinary Medical Association	0	23	7	0
Other	15	10	18	0

(No statistical analysis computed due to cells with expected counts less than 1. To perform the chi-square test, the expected count of a cell needs to be at least 5 (Stat Trek, 2011)).

Question 7 was an attempt to measure how respondents felt about cats. A majority of responders disagreed concerning cats needing to go outside and hunt while others felt strongly that no cat should have to live a feral lifestyle and that there should be more restrictions on feral cat colonies.

7. Please rate your agreement with the following statements:

Answer Options	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
In a perfect world, no domestic cat would be feral; they all would have human companionship and veterinary medical care.	7	15	41	60
Despite potential controversy, more restrictions on feral cat colonies are needed to protect public and environmental health.	6	25	45	45
Cats need to go outside and hunt; they do very well in a feral setting.	41	52	22	7

$X^2=116.226$; $DF=6$; $p\text{-value}=0.000$

In Questions 8-14 (see Tables A.11-A.17), most respondents were familiar with TNR type programs, but when asked if they were effective in controlling populations most of the answers were split between not sure (38.1%), no (28.3%) and yes (33.6%).

A majority of respondents (71.2%) had not assisted or had experience in caring for a local feral cat colony. Of those that had helped with colonies, the approximate annual costs required to support the colony were reported to be \$500-\$1,200 per year (34.3%) followed by >\$500 per year (28.6%) and \$1,200-\$5,000 per year (25.7%). The approximate size of the colony was 10-20 cats (29.7%) followed closely by <10 cats (27.0 %) and >50 cats (24.3%). Most replied that they either paid out-of-pocket (37.8%) or took monetary donations (37.8%) to pay for the colony care. Others relied on veterinary donations (32.4%). Under the “other” option, funding was obtained from fundraisers, humane societies, concerned citizens and grants from charities.

Question 15 was meant to explore if respondents had any idea of the number of feral cat colonies located in the town, county or state. It can be difficult to determine how many colonies exist, especially if the caretakers are untrusting of local animal officials.

15. How many feral cat colonies do you think might exist in your local area or state?

Answer Options	Town	County	State
<5 colonies	25	3	0
5-20 colonies	42	13	1
20-50 colonies	16	34	1
>50 colonies	10	31	68
Not sure	26	35	42

$X^2=170.745$; DF=8; p-value=0.000

Most of those polled (52.8%) felt that sometimes adoption or placement of cats that could be socialized was a viable option for dealing with feral cat colonies (see Table A.19). Fifty-five percent felt that the humane euthanasia of non-socialized adult cats was acceptable (see Table A.20). Most (38.7%) did not think that feral cat colonies should be immediately eliminated except in cases of disease control (see Table A.21).

In eliminating feral cat colonies, placing socialized cats up for adoption and humanely euthanizing the unsocialized cats was the most popular choice (78.3%). Others supported trap, sedate and euthanize at 66.1%. Only 14.8% favored gun shot and 3.5% would use poison (see Table A.22).

The majority of those that responded were female (74) versus male (48), 25-39 years old (47), and from the Midwest-108. Most were DVM's (93), followed by vet students (20) and 1 shelter director (see Tables A.23-A.26).

Survey Conclusion

The response rate might have been improved if the survey had been emailed instead of posted to websites. Despite posting versus email, the number of responses is acceptable but not enough to make any generalized statements concerning mid-western veterinarians and other animal welfare and public health oriented individuals located nationwide. The survey could be used in order to design other surveys that continue looking at community or feral cat colony issues. The responses received did confirm issues concerning cat colonies such as whether people think TNR works and if they are aware of the health risks to humans and cats from these colonies.

CHAPTER 4 - Conclusion

Depending on which survey or study you examine, one can be led to believe that TNR is successful or not. The issues revolving around community cats can lead to dynamic and volatile arguments on what is the best course for cats, the environment, wildlife and humans. There isn't one easy answer for all the issues. Community cat colonies need to be examined individually with respect for the cat's welfare and the impact they are having on the surrounding areas. This romantic notion of cats enjoying the outside and living quality lives has to be balanced with the fact that most community cats suffer from a variety of medical conditions that affect their quality of life. The impact on the environment surrounding a community cat colony needs to be seriously considered especially if wildlife populations are being dramatically affected either through predation or the spread of disease. Domestic cats are not their ancestors and were not meant to be wild cats living off the land. They were initially domesticated to help us keep grain stores protected from vermin. Human kind has done a great disservice to domestic pets by then abandoning them and rationalizing it as if they were once wild, they will be able to survive in the wild again. Many communities have listed feral cats as pests since they are a non-native invasive species.

TNR may sound like a compassionate operation in that it spares the lives of feral cats but feral cats seem to be the only feral animal we return to the wild. When feral dogs are captured, most are euthanized unless the group capturing them has a specific plan on how to re-tame these dogs. One group stated that they may spend months working with a feral dog in order to get them to the point of adoption (Mott, 2003). In that same time frame, thousands of shelter dogs have been euthanized. Feral pigs are actively hunted and destroyed with firearms and dogs (Salwey, 2009). Even feral chickens have been destroyed when Newcastle disease breaks out in an area (Lee, 2011). If feral chickens are considered a nuisance, they can be trapped and either given to people interested in raising chickens or destroyed (Ako, 2007).

No one wants to be the villain that calls for the slaughter of millions of cats, but it happens every day in shelters across America and around the world. It is a matter of numbers; there are simply too many cats and not enough homes. If the shelters are already crowded, how do we take in more animals? The money spent on community cats might be better utilized on

community-wide spay/neuter events for pets; pet owner education concerning the dangers of letting pets outside; and legislation and tougher enforcement of laws concerning sterilization, vaccination and licensing of pets in general. If one is insistent of letting their pet outside, then a properly designed enclosure should be encouraged, one that allows the animal to enjoy the outside but keeps it from the dangers associated with freely roaming the neighborhood.

Of all of the groups involved in the community cat debate, veterinarians have the most difficult position. When one looks at the Veterinarians Oath, it would seem that promoting feral cat colonies may be a violation of that oath (AVMA, 2010b).

“Being admitted to the profession of veterinary medicine, I solemnly swear to use my scientific knowledge and skills for the *benefit of society through the protection of animal health and welfare, the prevention and relief of animal suffering, the conservation of animal resources, the promotion of public health, and the advancement of medical knowledge.*

I will practice my profession conscientiously, with dignity, and in keeping with the principles of veterinary medical ethics.

I accept as a lifelong obligation the continual improvement of my professional knowledge and competence” (AVMA, 2010).

And yet, if the veterinary community came out in support of mass extermination of feral cats, the public backlash could be detrimental to their reputations and profession. However, veterinarians also may have the key to helping communities come together over the feral cat issues by providing educational information to their clientele regarding the dangers of letting their cats roam, how they can help the pet overpopulation by spaying/neutering their pets and stressing the importance of proper and timely vaccinations.

CHAPTER 5 - References

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Appendix A - Feral Cat Issues Survey

Introductory statement:

This study is being conducted by Dr. Cathleen Hanlon and research colleagues at Kansas State University. If you would like additional information about this study or have questions before you participate, you can reach Dr. Hanlon at: The Rabies Laboratory, Kansas State University, 2005 Research Park, Manhattan KS 66502; by email at: chanlon@vet.k-state.edu; or by telephone at 785-532-4200.

This research protocol has been reviewed and approved by the K-State Institutional Review Board and has been exempted from further review (KSU IRB #5707).

Participation in this survey is strictly voluntary, you need not answer every question, and you may withdraw at any time. All responses are anonymous. By responding to this survey, you acknowledge that the researchers have your consent to publish materials obtained through the survey. Data collected will be kept confidential and reported only in the aggregate. There are no foreseeable risks or benefits to completing or not completing this survey.

Table A.4: Survey question 1-Please rate your level of concern about the following potential issues related to feral cat colonies.

1. Please rate your level of concern about the following potential issues related to feral cat colonies.				
Answer Options	Unconcerned	Somewhat concerned	Concerned	Highly concerned
Detrimental to wildlife (i.e., native species)	27	49	30	20
Detrimental to environment (i.e., feces, opportunistic sheltering, etc)	26	40	46	12
Public health risks (i.e., bites, infectious diseases, parasites, etc.)	9	37	47	32
Humane issues (domestic animals living in a semi-wild condition)	25	35	37	26
Other (please specify)				

$X^2=27.319$; $DF=9$; p -value=0.001

Other responses:

-“To the good, I think feral cats control rodent populations.”

-“Zoonosis.”

-“I would suspect that wild colonies are like they were when I was a kid - they are self-limiting in size due to disease. If we intervene and provide too much care they will not prosper very well.”

-“Animal rights issue.”

-“Disease and nutrition (leuk/fiv).”

Table A.5: Survey question 2-Please rate your level of concern about each of the following public health issues with regard to feral cat colonies.

2. Please rate your level of concern about each of the following public health issues with regard to feral cat colonies:				
Answer Options	Unconcerned	Somewhat concerned	Concerned	Highly concerned
Bite injury to humans	15	45	46	19
Risk of rabies to cats and humans	6	47	37	34
Toxoplasmosis	20	54	31	20
Intestinal parasites	13	45	46	21
External parasites	16	46	43	19
Intermingling with opportunistic wildlife (i.e., skunks, opossum, raccoons)	17	45	44	19
Attractant for coyotes and other predators	42	46	26	11

$X^2=65.993$; $DF=18$; p -value=0.000

Table A.6: Survey question 3-If you have any other public health concerns/issues, please list them below.

3. If you have any other public health concerns/issues, please list them below.

“I believe there is a greater risk of feral cats not being altered rather than ignoring the situation. I also believe that we humans have created the feral cat problems and it is our responsibility to this planet to ensure their right to live yet perform control mechanisms because of our inactions for decades by means of sterilization rather than euthanasia.”

“Again, I think they can be helpful in controlling rodents.”

“It seems that a lot of people that want to help "rescue or maintain" these colonies are not well educated to the risk to themselves or others they solicit to help with the cats. We also see a lot of these cats with FIP, FELV and FIV.”

“Exposure to owned pets and spread of disease including parasites and rabies.”

“If we intervene and try to "help" any more than trapping and euthanasia we are creating a much bigger problem.”

“Maintenance and spread of FIV, FeLV, and other feline diseases to owned cats that are free roaming.”

“Becoming established as a harbor or intermediate host for viral and bacterial zoonotic diseases more so than now.”

“Many populations of feral cats remain in very close proximity to the human population, which allows a serious potential for zoonotic disease transmission.”

”Mainly rabies and bites.”

“Spread of diseases like FeLV, FIP, FIV to other cats.”

Table A.7: Survey question 4-Does your employer have a policy statement, rules or regulations in regard to feral cat colonies?

4. Does your employer have a policy statement, rules or regulations in regard to feral cat colonies?		
Answer Options	Response Percent	Response Count
Yes	10.8%	13
No	71.7%	86
Not sure	16.7%	20
Under development	0.8%	1

Table A.8: Survey question 5-Which entity are you associated with and do they have a policy statement, rules or regulations in regard to feral cat colonies?

5. Which entity are you associated with and do they have a policy statement, rules or regulations in regard to feral cat colonies? Please check all that apply.				
Answer Options	Yes	No	Not sure	Under development
American Association of Feline Practitioners	5	25	12	0
American Veterinary Medical Association	38	3	76	1
Humane Associations/Shelters	19	16	14	3
Kansas Veterinary Medical Association	5	21	15	0
National Association of State Public Health Veterinarians	0	24	9	0
National Animal Control Association	1	23	8	0
Nebraska Veterinary Medical Association	0	23	7	0
Other	15	10	18	0

(No statistical analysis computed due to cells with expected counts less than 1. To perform the chi-square test, the expected count of a cell needs to be at least 5 (Stat Trek, 2011).

Table A.9: Survey question 6-If you answered “Other” in question #5, please list what organization you are affiliated with.

6. If you answered "Other" in question #5, please list what organization you are affiliated with.

- Missouri Veterinary Medical Association-18
- Oklahoma Veterinary Medical Association-5
- Arkansas Veterinary Medical Association-1
- American Association of Shelter Veterinarians-1
- University of Missouri Veterinary School-1
- Oklahoma Humane Society-1
- Wildlife Disease Association-1
- American Association of Wildlife Veterinarians-3
- American Association of Laboratory Animal Science-1
- University of Missouri-1
- American Association of Equine Practitioners-1
- Student-1

Table A.10: Survey question 7-Please rate your agreement with the following statements:

7. Please rate your agreement with the following statements:				
Answer Options	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
In a perfect world, no domestic cat would be feral; they all would have human companionship and veterinary medical care.	7	15	41	60
Despite potential controversy, more restrictions on feral cat colonies are needed to protect public and environmental health.	6	25	45	45
Cats need to go outside and hunt; they do very well in a feral setting.	41	52	22	7

$X^2=116.226$; $DF=6$; $p\text{-value}=0.000$

Table A.11: Survey question 8-Are you familiar with the different programs for dealing with feral cat colonies such as Trap-Neuter-Vaccine-Release (TNVR) or Trap-Test-Vaccinate-Alter-and-Release (TTVAR)?

8. Are you familiar with the different programs for dealing with feral cat colonies such as: Trap-Neuter-Vaccinate-Release (TNVR) or Trap-Test-Vaccinate-Alter-and-Release (TTVAR)?		
Answer Options	Response Percent	Response Count
Yes	84.8%	106
No	14.4%	18
Not sure	0.8%	1

Table A.12: Survey question 9-If you are familiar with TNVR or TTA VR, do you think these programs are successful in keeping feral cat colony populations stable?

9. If you are familiar with TNVR or TTA VR, do you think these programs are successful in keeping feral cat colony populations stable?		
Answer Options	Response Percent	Response Count
Yes	33.6%	38
No	28.3%	32
Not sure	38.1%	43

Table A.13: Survey question 10-Do you assist with or have you had experience caring for a local feral cat colony?

10. Do you assist with or have you had experience caring for a local feral cat colony?		
Answer Options	Response Percent	Response Count
Yes	28.8%	36
No	71.2%	89

Table A.14: Survey question 11-If you answered “Yes” to question #10, what were the approximate annual costs required to support the feral cat colony?

11. If you answered "Yes" to question #10, what were the approximate annual costs required to support the feral cat colony?		
Answer Options	Response Percent	Response Count
<\$500 per year	28.6%	10
\$500 to \$1,200 per year	34.3%	12
\$1,200 to \$5,000 per year	25.7%	9
\$5,000 to \$10,000 per year	8.6%	3
>\$10,000 per year	2.9%	1

Table A.15: Survey question 12-If you answered “Yes” to question #10, what was the approximate size of the feral cat colony?

12. If you answered "Yes" to question #10, what was the approximate size of the feral cat colony?		
Answer Options	Response Percent	Response Count
<10 cats	27.0%	10
10-20 cats	29.7%	11
21-49 cats	18.9%	7
>50 cats	24.3%	9

Table A.16: Survey question 13-If you answered yes to question #10, how was the funding obtained to care for the feral cat colony?

13. If you answered yes to question #10, how was the funding obtained to care for the feral cat colony? Please check all that apply.		
Answer Options	Response Percent	Response Count
I paid out-of-pocket	37.8%	14
Monetary Donations	37.8%	14
Veterinary Donations	32.4%	12
Pet Industry Donations	10.8%	4
Funded by government agencies	8.1%	3
Other	35.1%	13

Table A.17: Survey question 14-If you answered “Other” on question #13, please explain.

14. If you answered "Other" on question #13, please explain.

- “Fundraising events.”
- “Pawprints on the Heartland did the spays & neuters.”
- “Our humane society reimburses me a small fee to help with tnr cats- only \$15 per cat to test vx and spay/neuter and revolution.”
- “Concerned citizens in neighborhood, bring in for spay/neuter.”

- “Clients paid for them.”
- “Private citizen.”
- “Client traps cats and brings them to me and pays a discounted price to have them neutered and vaccinated.”
- “Private individual.”
- “Supporter of the colony paid for some vet services.”
- “Individual personal funding.”
- “Private individuals sometimes bring them to me for car and pay for them personally.”
- “A lesser fee was established for the group supporting the feral cat population.”
- “Grant money from charitable foundations.”

Table A.18: Survey question 15-How many feral cat colonies do you think might exist in your local area or state?

15. How many feral cat colonies do you think might exist in your local area or state?			
Answer Options	Town	County	State
<5 colonies	25	3	0
5-20 colonies	42	13	1
20-50 colonies	16	34	1
>50 colonies	10	31	68
Not sure	26	35	42

$X^2=170.745$; $DF=8$; $p\text{-value}=0.000$

Table A.19: Survey question 16-Do you think adoption or placement of cats that can be socialized is a viable option for dealing with feral cat colonies?

16. Do you think adoption or placement of cats that can be socialized is a viable option for dealing with feral cat colonies?		
Answer Options	Response Percent	Response Count
Yes	31.2%	39
No	16.0%	20
Sometimes	52.8%	66

Table A.20: Survey question 17-Do you think humane euthanasia of non-socialized adult cats is a viable option for dealing with feral cat colonies?

17. Do you think humane euthanasia of non-socialized adult cats is a viable option for dealing with feral cat colonies?		
Answer Options	Response Percent	Response Count
Yes	55.2%	69
No	13.6%	17
Sometimes	31.2%	39

Table A.21: Survey question 18-Do you think that feral cat colonies should be immediately eliminated?

18. Do you think that feral cat colonies should be immediately eliminated?		
Answer Options	Response Percent	Response Count
Yes	16.1%	20
No	21.8%	27
Sometimes	23.4%	29
Only in cases of disease control	38.7%	48

Table A.22: Survey question 19-In regard to question #18, through what means should a feral cat colony be eliminated?

19. In regard to Question 18, through what means should a feral cat colony be eliminated? Check all that you support.		
Answer Options	Response Percent	Response Count
Poison	3.5%	4
Gun shot	14.8%	17
Trap, sedate and euthanize	66.1%	76
Place socialized cats up for adoption and humanely euthanize the unsocialized cats	78.3%	90

Table A.23: Survey question 20-Please tell us about yourself. What is your gender?

20. Please tell us about yourself. What is your gender?			
Answer Options	Male	Female	Response Count
Gender	48	74	122

Table A.24: Survey question 21-What is your age?

What is your age?					
Answer Options	>25 years	25-39 years	40-55 years	56-65 years	>66 years
Age	11	47	37	22	6

Table A.25: Survey question 22-What region are you located in?

22. What region are you located in?						
Answer Options	North East	South East	Midwest	South West	West	Alaska or Hawaii
Area	2	2	108	13	0	0

Table A.26: Survey question 23-What is your occupational title?

23. What is your occupational title?	
Answer Options	Response Count
	120

DVM-85

Shelter Director-1

Veterinary student-20
 DVM/owner-6
 Retired DVM-2
 Lecturer- Shelter Medicine and Surgery- Oklahoma State University- 1
 Pathologist-1
 Veterinary Scientist-1
 Graduate professional student-1
 Associate Professor Veterinary Pathobiology-1
 Veterinarian-director of veterinary technology program at community college (in a small town with feral cat concerns)-1

Table A.27: Survey question 24-If you would like to be contacted for further discussion regarding feral cats, please enter your contact information below.

24. If you would like to be contacted for further discussion regarding feral cats, please enter your contact information below.		
Answer Options	Response Percent	Response Count
Name	100.0%	29
Email Address	100.0%	29

Appendix B - Figures

Figure B.3: Survey question 1-Please rate your level of concern about the following potential issues related to feral cat colonies.

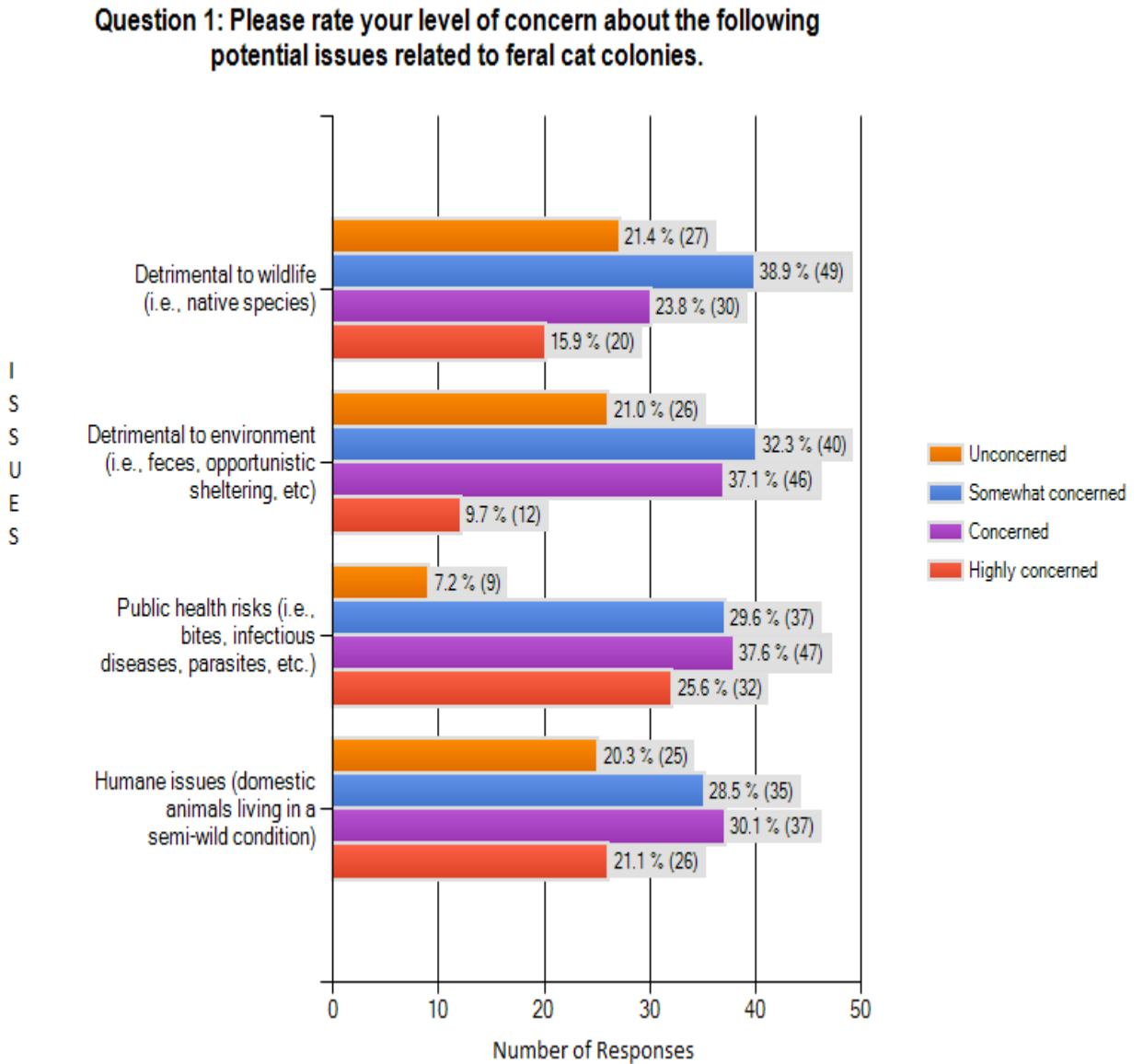


Figure B.4: Survey question 2-Please rate your level of concern about each of the following public health issues with regard to feral cat colonies.

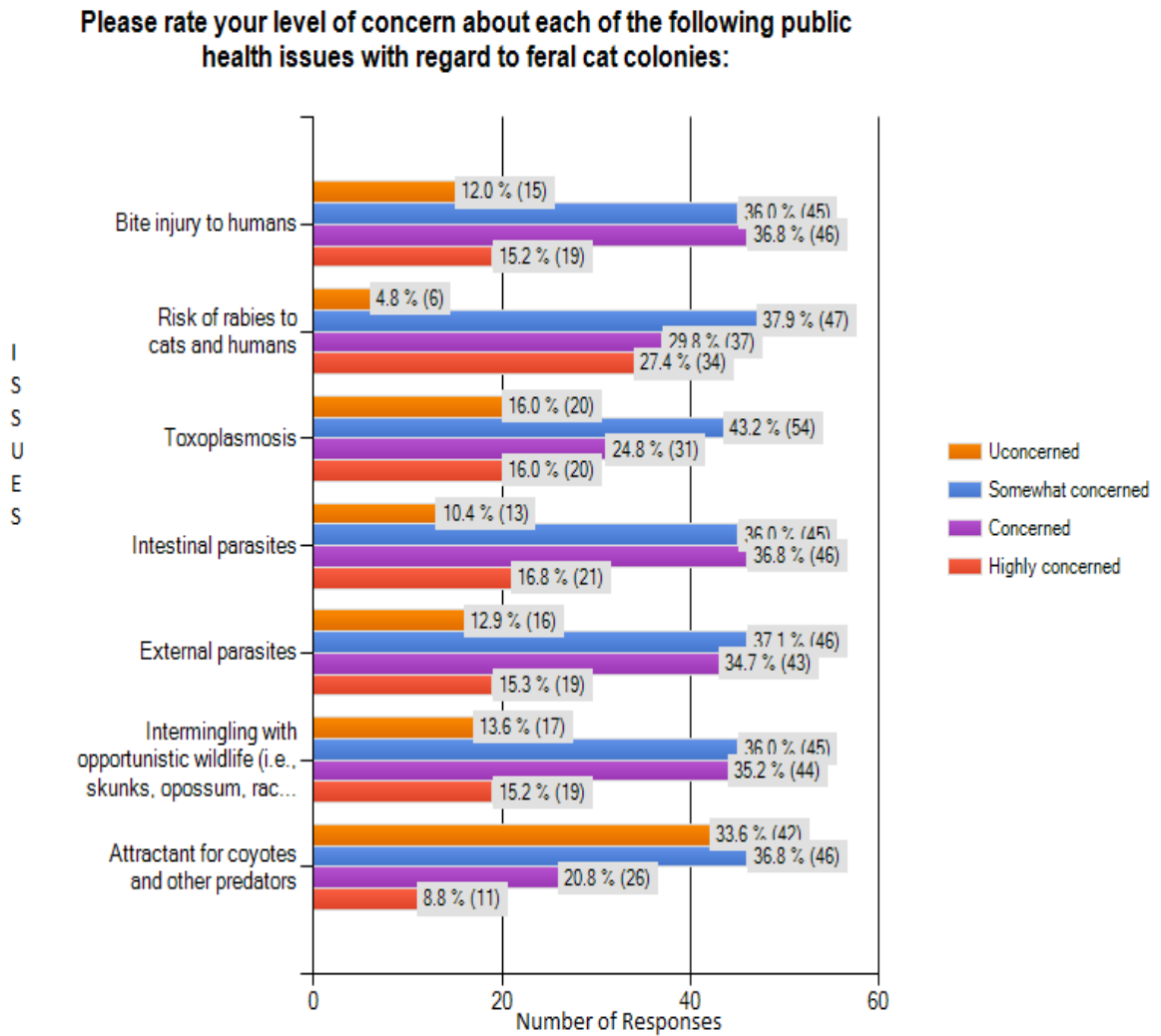


Figure B.5: Survey question 4-Does your employer have a policy statement, rules or regulations in regard to feral cat colonies?

Does your employer have a policy statement, rules or regulations in regard to feral cat colonies?

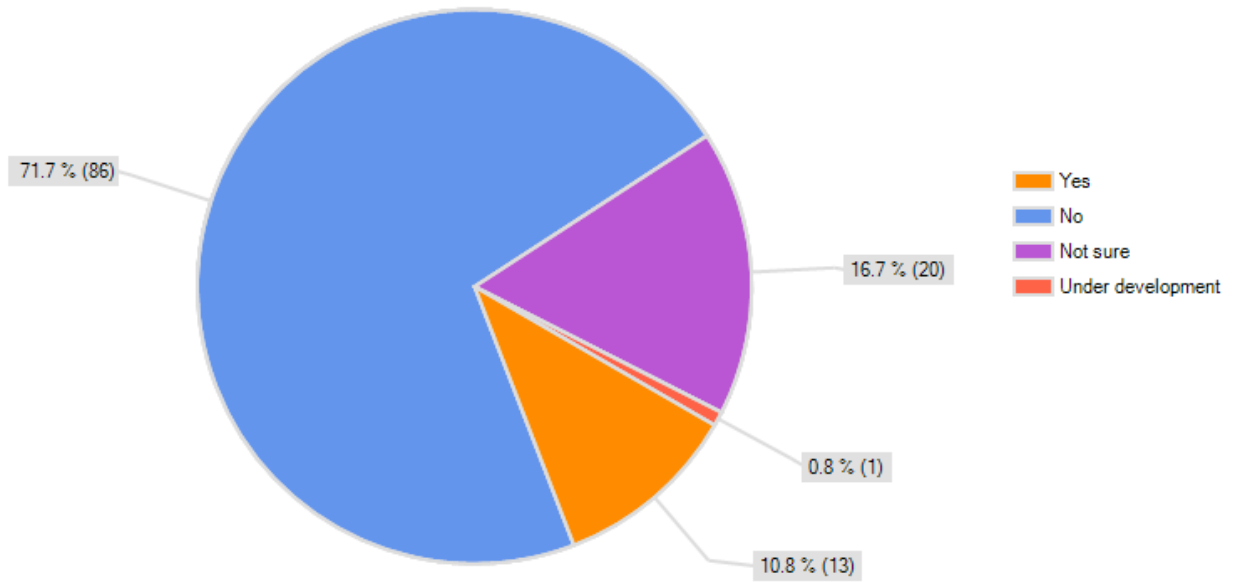


Figure 6: Survey question 5-Which entity are you associated with and do they have a policy statement, rules or regulations in regard to feral cat colonies?

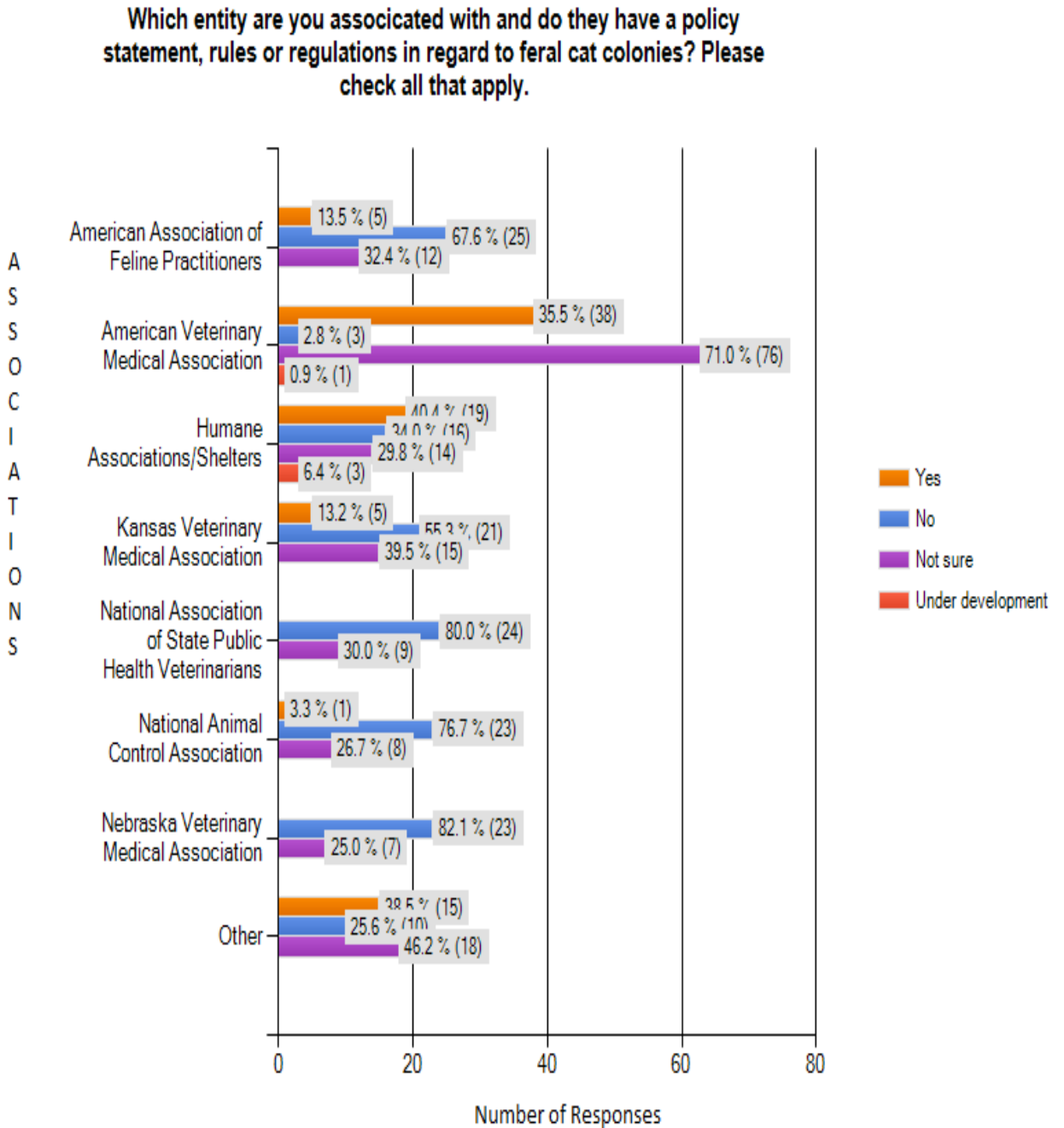


Figure B.7: Survey question 7-Please rate your agreement with the following statements.

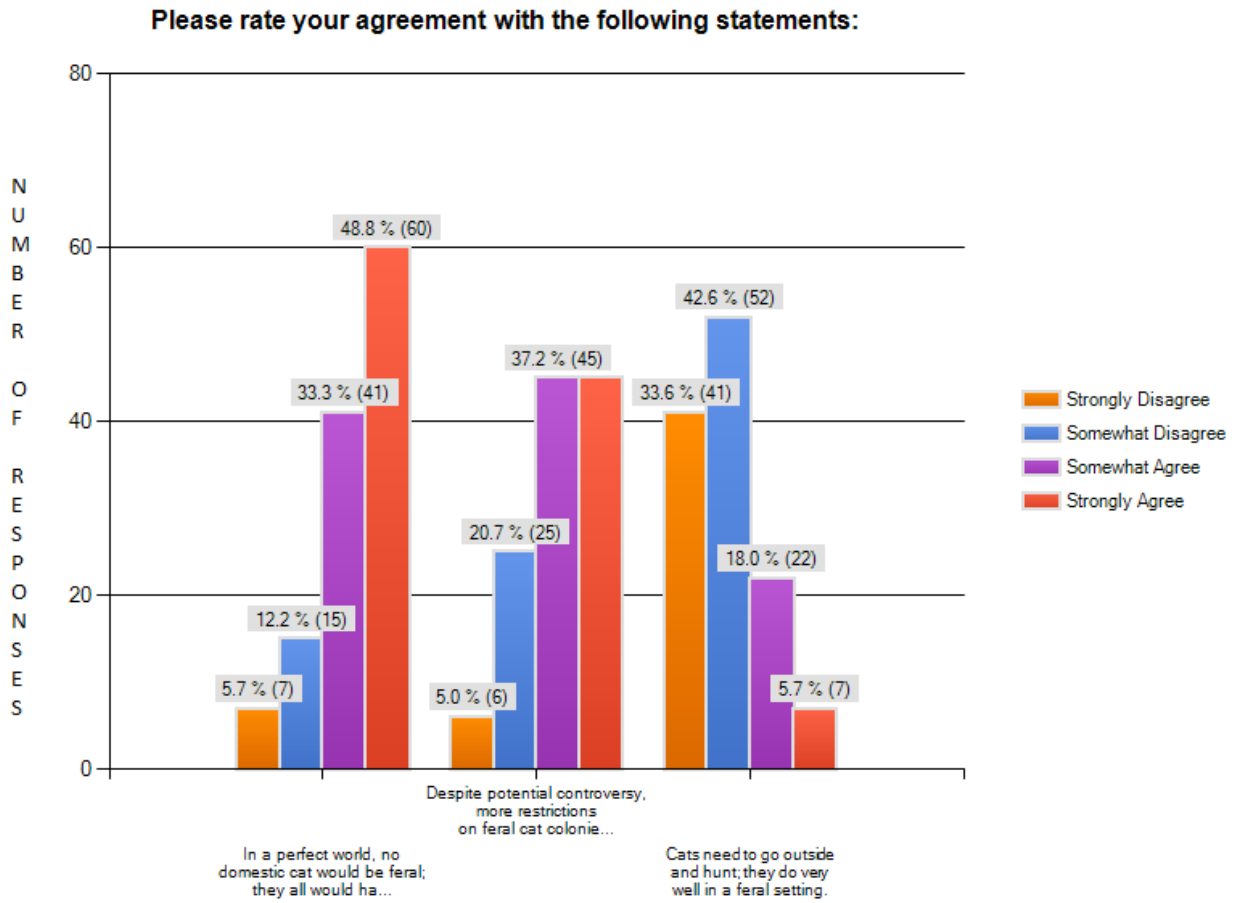


Figure B.8: Survey question 8-Are you familiar with the different programs for dealing with feral cat colonies such as: Trap-Neuter-Vaccinate-Release (TNVR) or Trap-Test-Vaccinate-Alter-and-Release (TTVAR)?

Are you familiar with the different programs for dealing with feral cat colonies such as: Trap-Neuter-Vaccinate-Release (TNVR) or Trap-Test-Vaccinate-Alter-and-Release (TTVAR)?

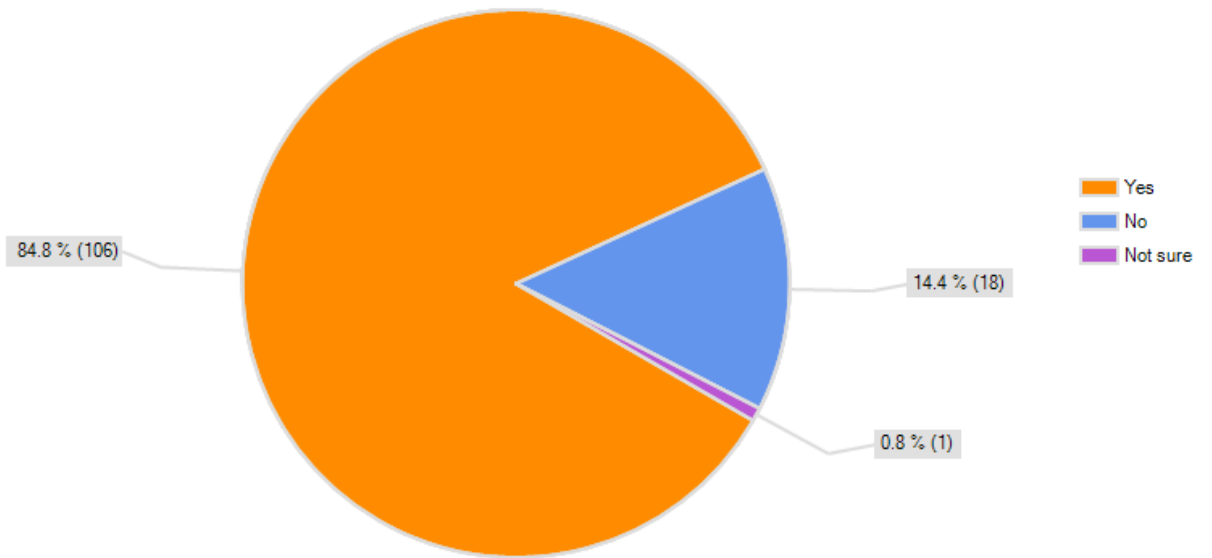


Figure B.9: Survey question 9-If you are familiar with TNVR or TTAVR, do you think these programs are successful in keeping feral cat colony populations stable?

If you are familiar with TNVR or TTAVR, do you think these programs are successful in keeping feral cat colony populations stable?

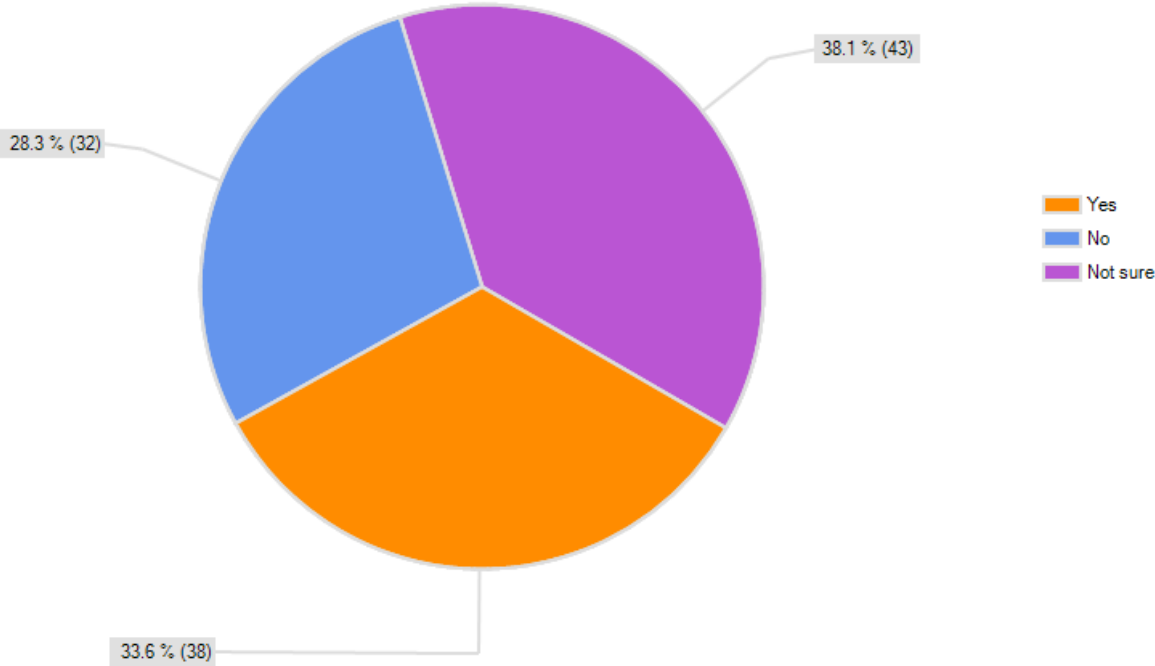


Figure B.10: Survey question 10-Do you assist with or have you had experience caring for a local feral cat colony?

Do you assist with or have you had experience caring for a local feral cat colony?

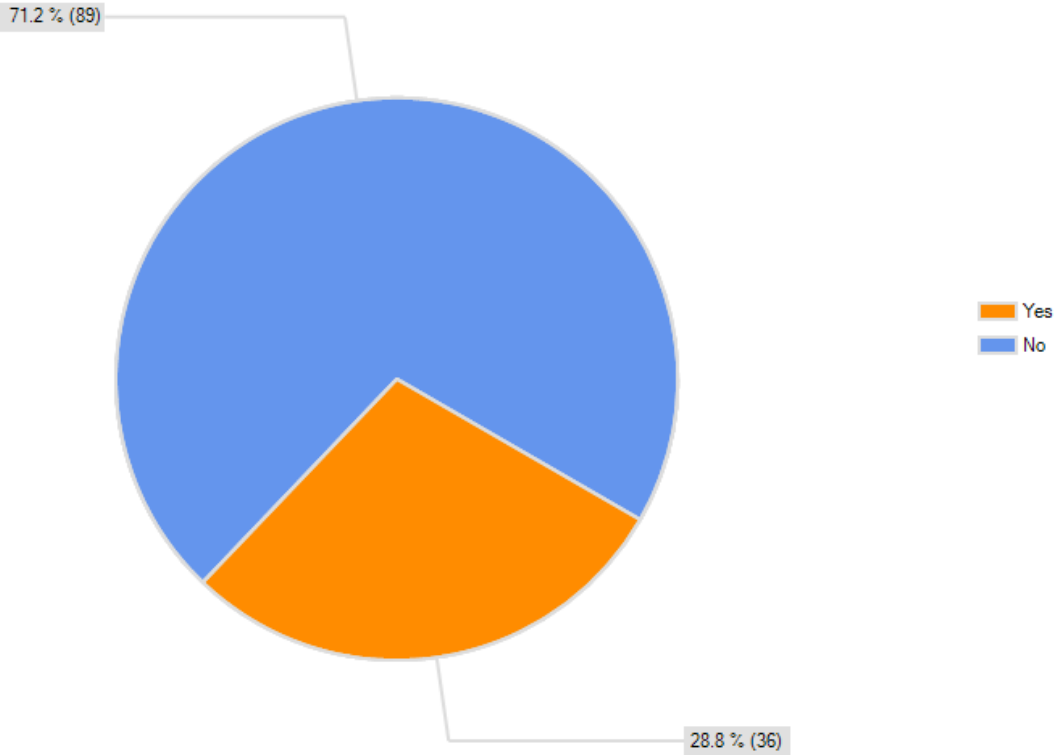


Figure B.11: Survey question 11-If you answered “Yes” to question #10, what were the approximate annual costs required to support the feral cat colony?

If you answered "Yes" to question #10, what were the approximate annual costs required to support the feral cat colony?

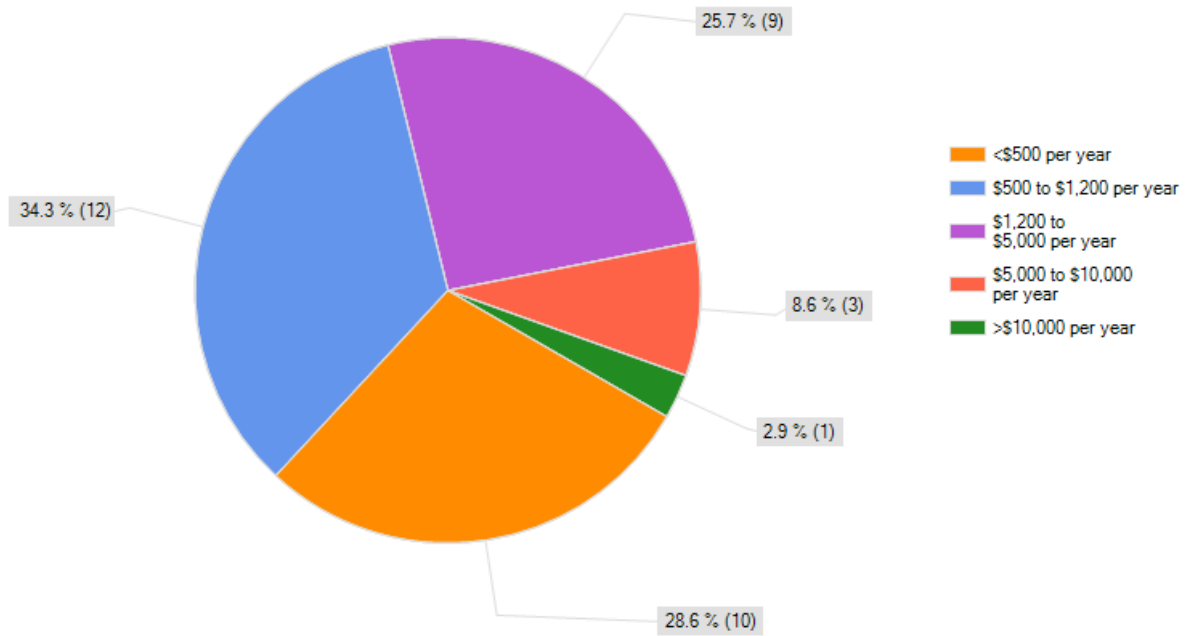


Figure B.12: Survey question 12-If you answered “Yes” to question #10, what was the approximate size of the feral cat colony?

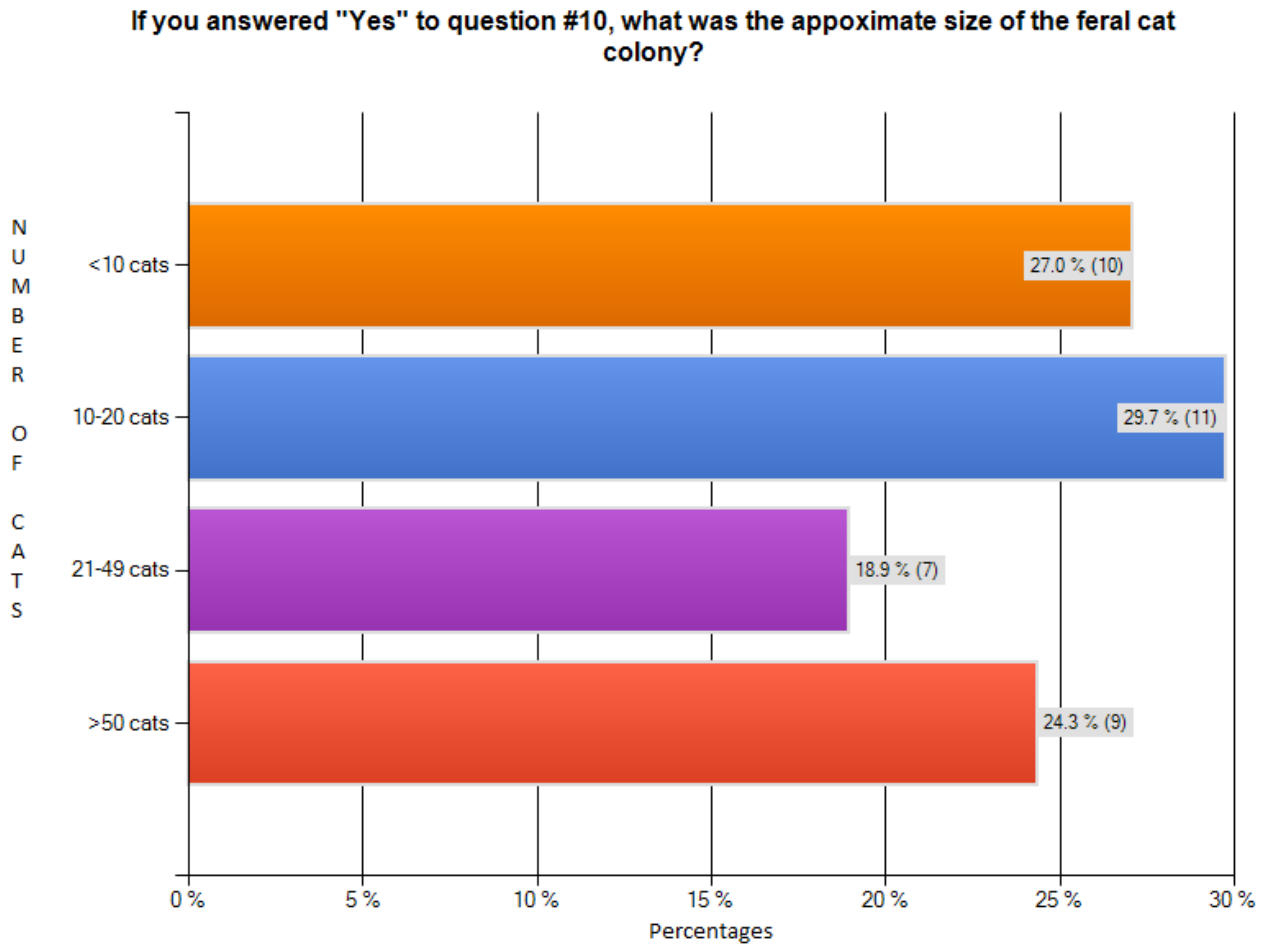


Figure B.13: Survey question 13-If you answered “Yes” to question #10, how was the funding obtained to care for the feral cat colony?

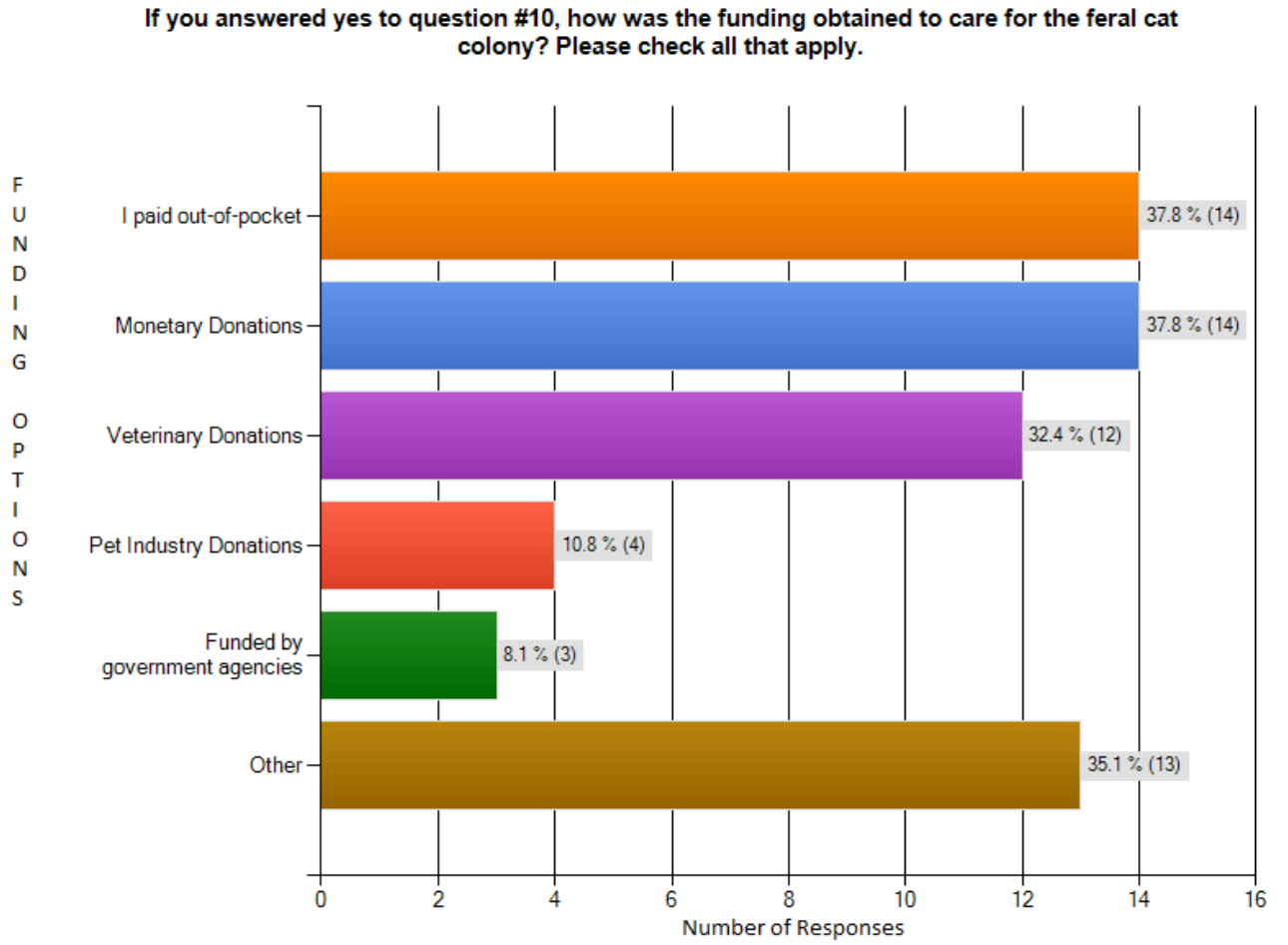


Figure B.14: Survey question 15-How many feral cat colonies do you think might exist in your local area or state?

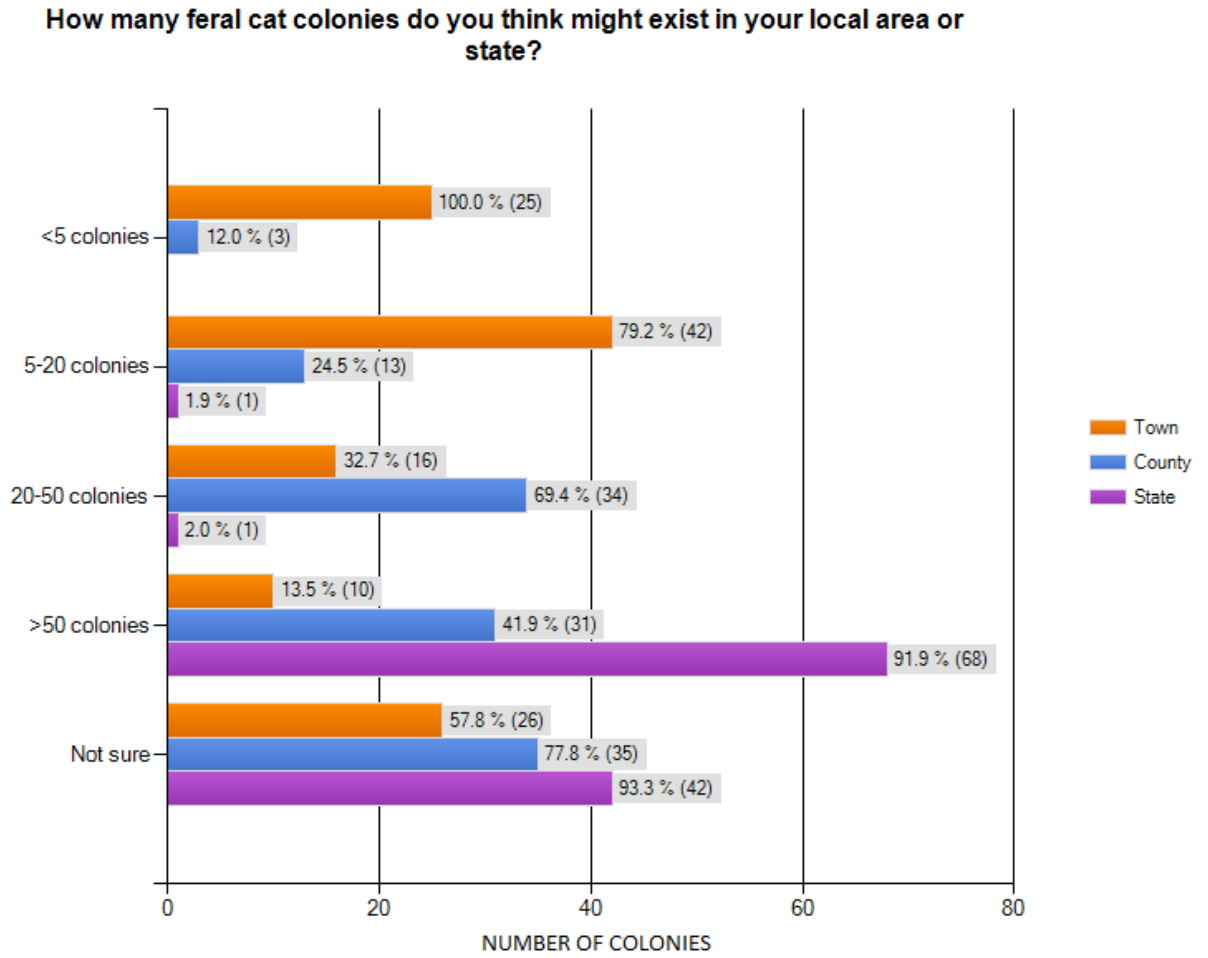


Figure B.15: Survey question 16-Do you think adoption or placement of cats that can be socialized is a viable option for dealing with feral cat colonies?

Do you think adoption or placement of cats that can be socialized is a viable option for dealing with feral cat colonies?

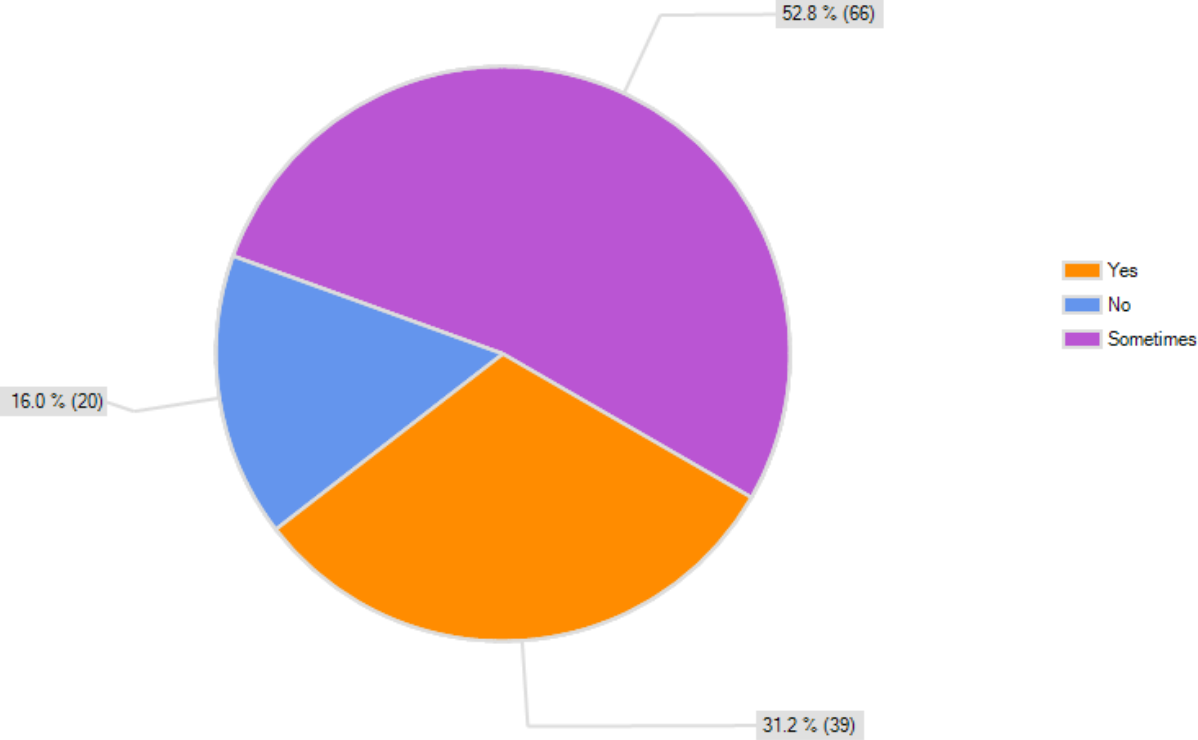


Figure B.16: Survey question 17-Do you think humane euthanasia of non-socialized adult cats is a viable option for dealing with feral cat colonies?

Do you think humane euthanasia of non-socialized adult cats is a viable option for dealing with feral cat colonies?

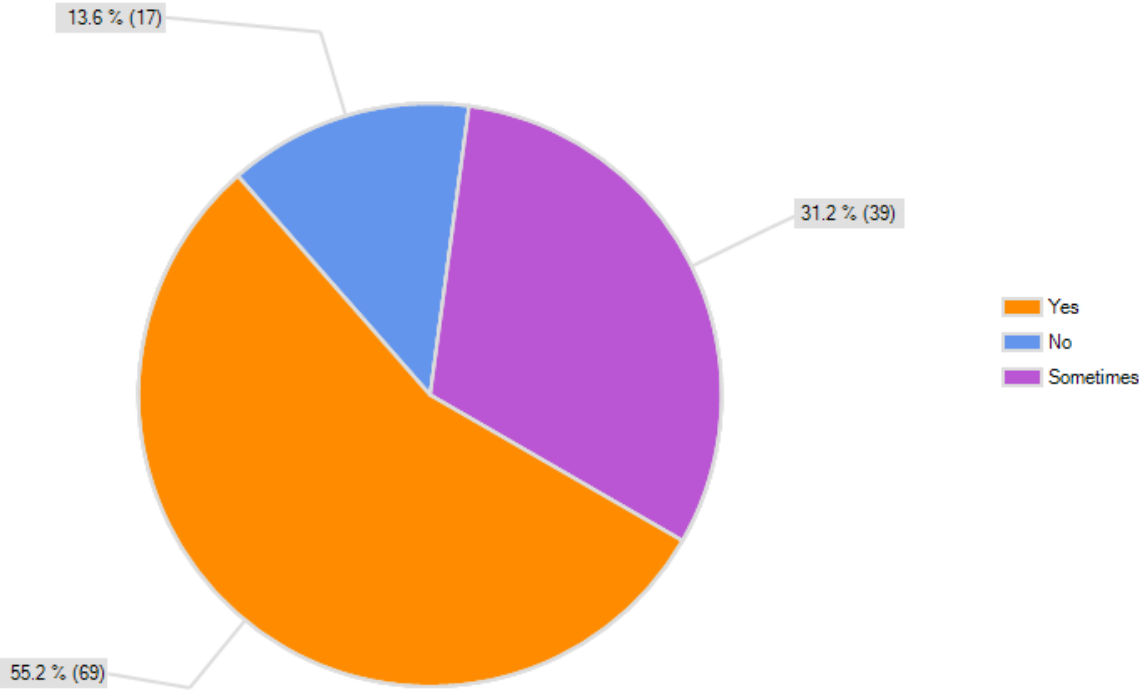


Figure B.17: Survey question 18-Do you think that feral cat colonies should be immediately eliminated?

Do you think that feral cat colonies should be immediately eliminated?

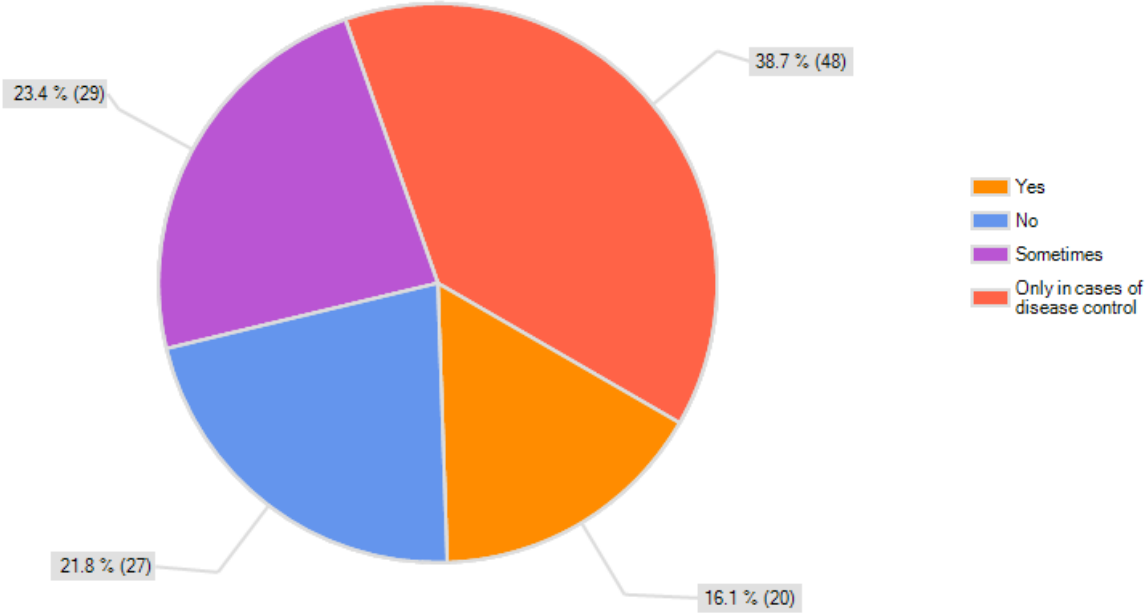


Figure B.18: Survey question 19-In regard to question 18, through what means should a feral cat colony be eliminated?

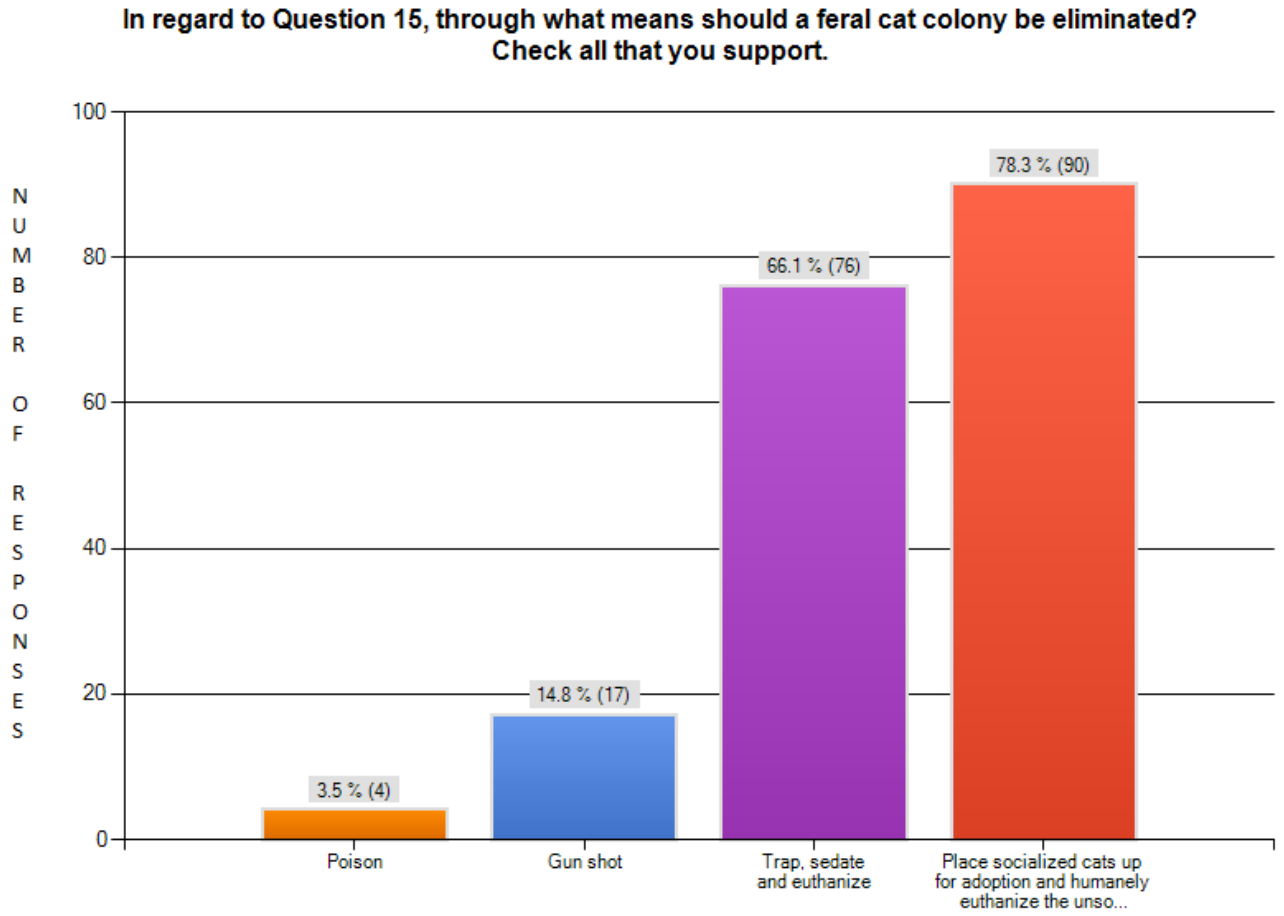


Figure B.19: Survey question 20-Please tell us about yourself. What is your gender?

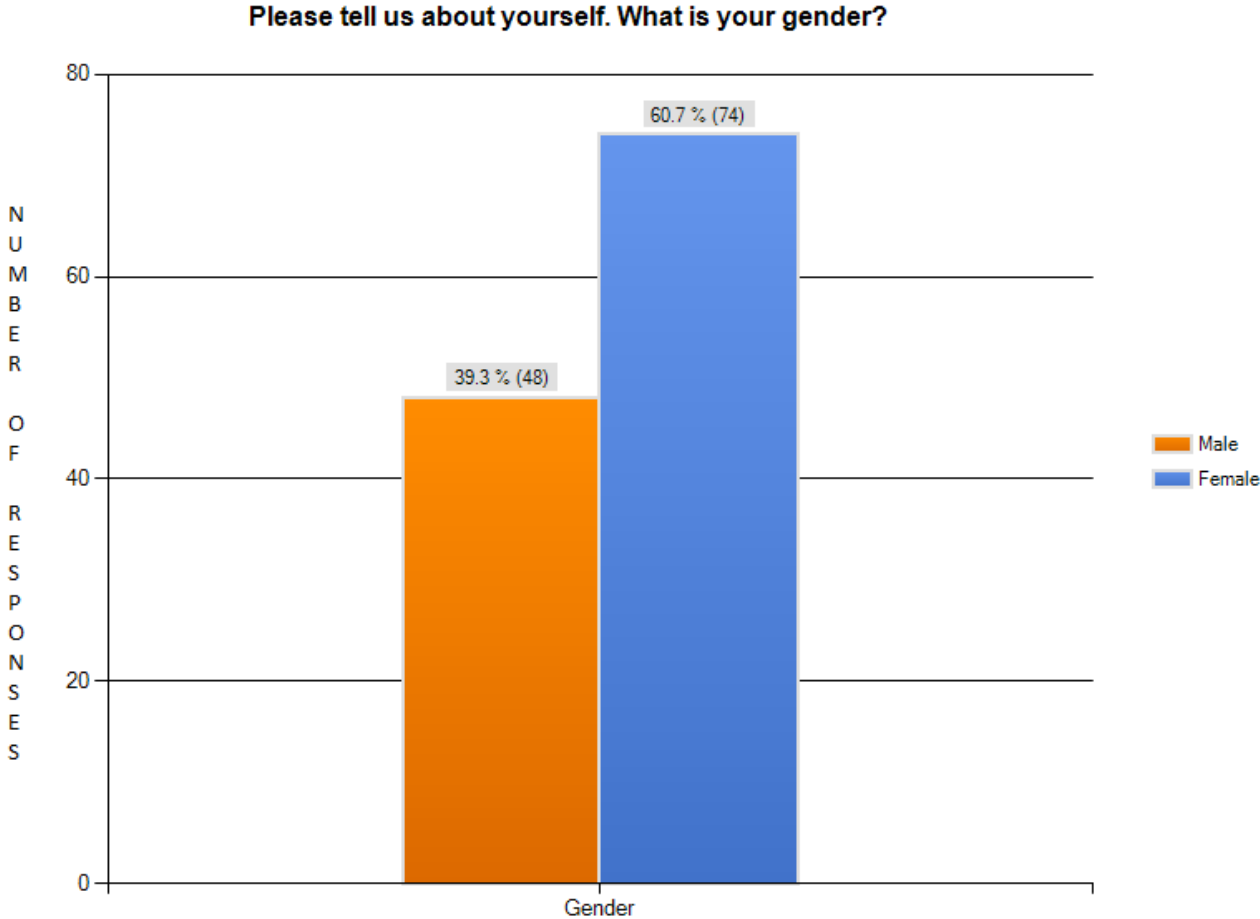


Figure B.20: Survey question 21-What is your age?

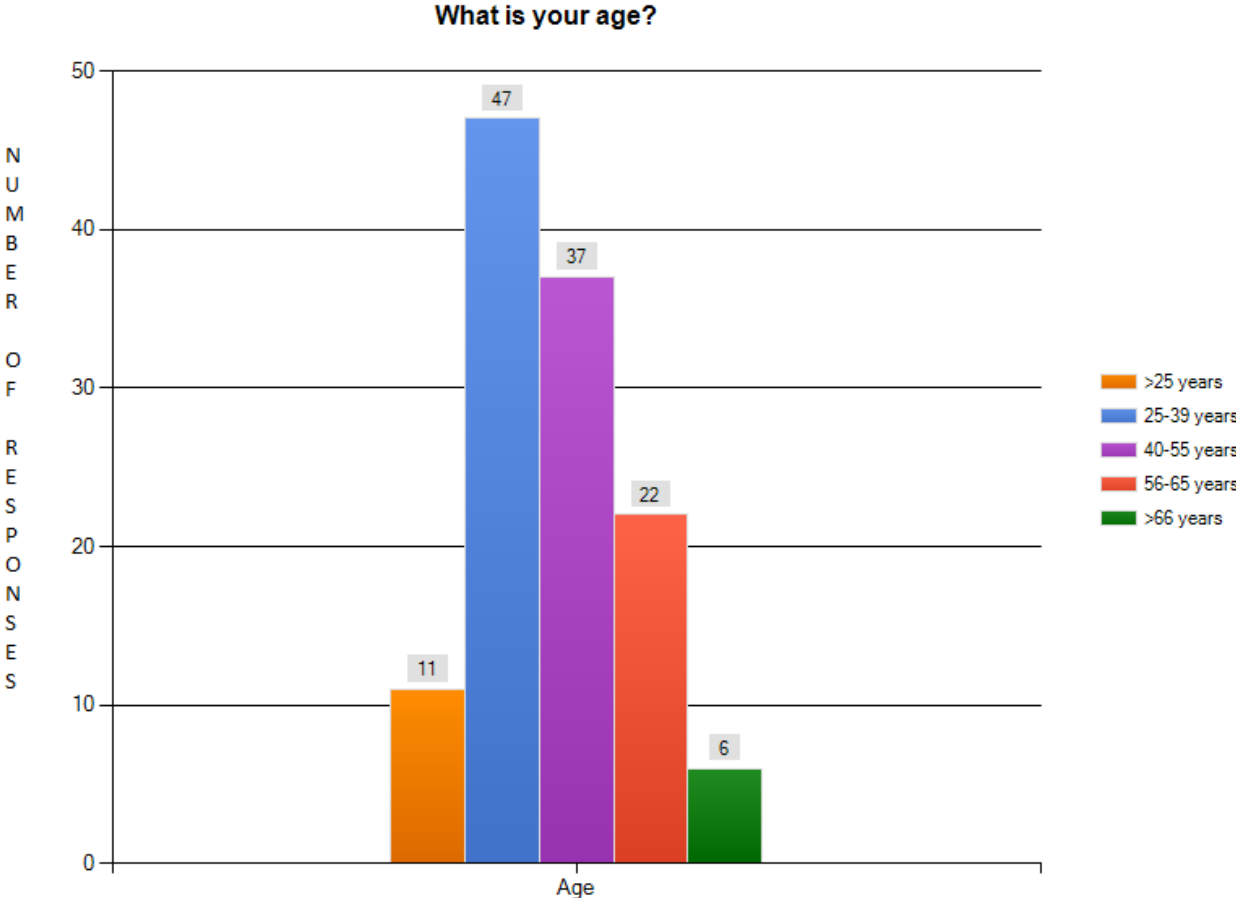
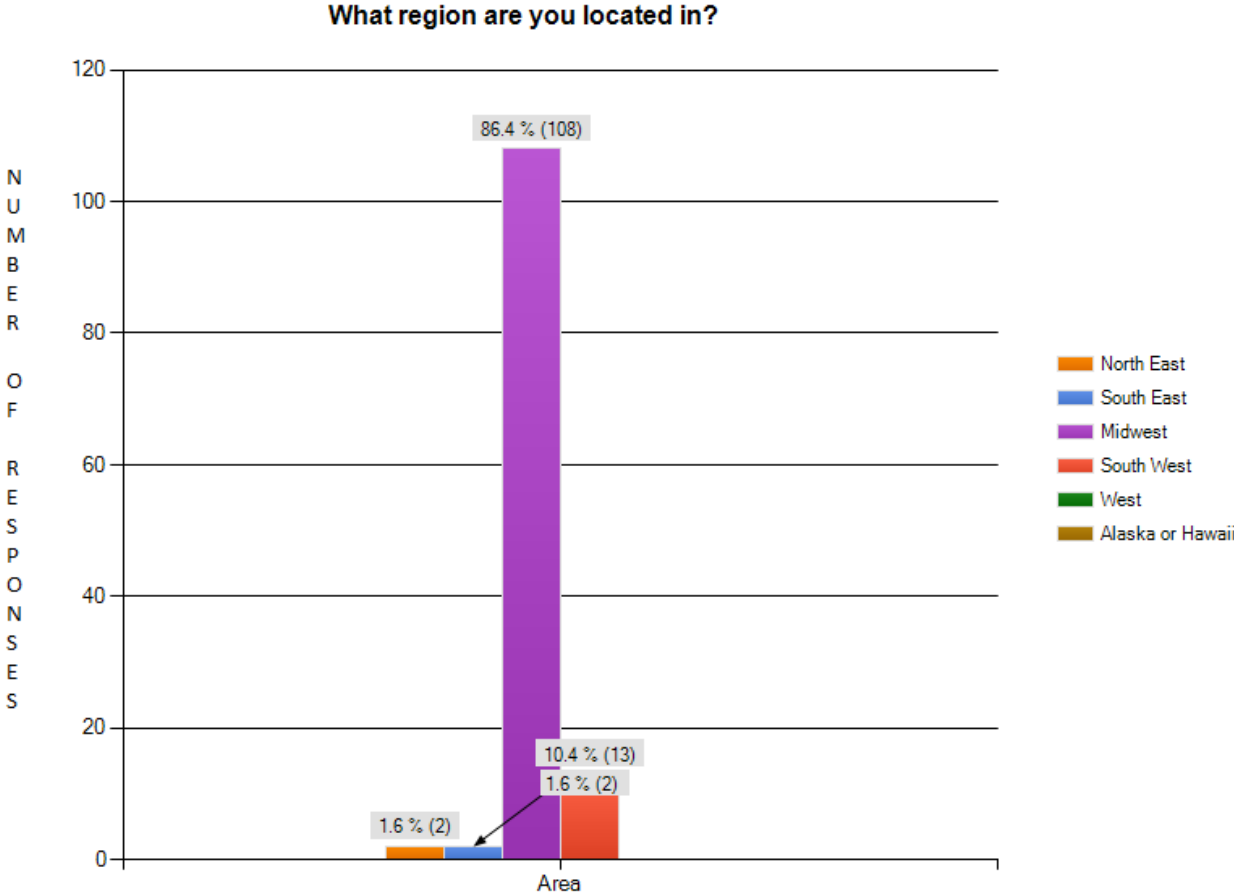


Figure B.21: Survey question 22-What region are you located in?



Appendix C - NASPHV Position Statement of Free-Roaming/Unowned/Feral Cats

(Personal communication, April 15, 2011).



NATIONAL ASSOCIATION of STATE PUBLIC HEALTH VETERINARIANS, INC.

Free-Roaming/Unowned/Feral Cats

Position Statement

The National Association of State Public Health Veterinarians
September, 1996

Issue: By definition, “feral” cats are introduced, established, non-native species. The impact of these animals on human public health is defined by zoonotic diseases including rabies and other bite infections, bartonellosis, plague, larval migrans, and toxoplasmosis. Additionally, free-roaming cats may be responsible for the decline in native species of birds, reptiles and small mammals, and may be associated with increased risk of disease for pets (e.g., transmission of feline leukemia virus and feline immunodeficiency virus). In attempts to avoid depopulation to control these risks, colonies of feral cats are sometimes maintained with neutering and vaccination. However, no evidence exists that maintained cat colonies adequately reduce human public health risks or appropriately address their impact on pets or native wildlife. Several reports suggest that support of “managed cat colonies” may increase the public’s likelihood of abandoning unwanted pets in lieu of more responsible options.

Whereas the benefits of the human/animal bond are recognized, and whereas the maintenance of free-roaming/unowned/feral cats can be detrimental to public and environmental health, the NASPHV:

1. Acknowledges there are potential human public health risks associated with free-roaming/unowned/feral cats. There is no evidence that colony management programs will reduce diseases such as bartonellosis, larval migrans, toxoplasmosis, and vector-borne zoonotic diseases. Rabies will also continue to be a risk, as such colonies are not closed.
2. Supports actions by local health departments, humane societies, and animal control groups in reducing the numbers of stray animals to minimize the impact of abandoned and/or feral cats.
3. Is concerned that managed cat colonies may foster irresponsible cat ownership and will promote the free-roaming of owned cats.
4. Encourages the timely neutering, regular veterinary care and maintenance of owned cats inside owners’ homes.