

Human Behaviour and Perceptions of Outdoor Pet Cats in an Urban Environment

by

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## **ABSTRACT**

The risks that face both wildlife and cats while cats are outside unsupervised is high and momentum surrounding the global issue of outdoor domestic cats (*Felis catus*) and their impact on wildlife, especially birds, is gaining the attention of experts working in the fields of wildlife conservation and animal welfare. The purpose of this research is to gain an understanding of cat owner behaviour, and the views of non-cat owners and their role, with respect to outdoor pet cats, in the community of Kamloops, BC. The thesis chapters include views and opinions about wildlife and outdoor pet cats and their owners in general, as well as an analysis of Kamloops residents' perceptions of the risks outdoor pet cats impose on the environment and incur while outdoors. It explores economic theories, such as, the value of a statistical life of a cat, negative externalities and Coase Theorem. An online survey was used for data collection; 584 valid survey responses were received and respondents were comprised of 155 outdoor cat owners, 221 indoor cat owners and 208 non-cat owners. Key findings include: the outdoor cat owners, despite their perceived risks, see outdoor pet cats living happier lives, and that they play a useful role as predators; the average value of a statistical life of a cat in Kamloops is \$7,485 to \$8,726; nearly 40 percent of the outdoor cat owners are willing to reduce the number of hours they allow their cat outdoors unrestricted/unsupervised to keep their cat safe; and 37 percent of non-cat owners are willing to pay to keep their neighbours cat in the cat owner's yard. Coase Theorem application suggests the solution that would create the least conflict in the community, yet still allow the cat owners to have supervised outdoor cats, is with the application of a bylaw coupled with licensing. In general, though, cat owners do not see how licensing would be useful. The best immediate use of limited resources that will be impact-driven and community-specific, will be a campaign targeting potential cat owners and new cat owners, while working towards a longer term solution that includes mandatory licensing, a bylaw, and delivery of practical information for cat owners on how to keep their cat under their care and control while outdoors.

Key words: cat owner behaviour, outdoor pet cats, value of a statistical life of a cat, negative externalities, Coase Theorem, conservation, community, licensing

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The work was approved by the Thompson Rivers University's Research Ethics for Human Subjects Board, protocol no. 101623.

## Dedication

*I dedicate this research to all the cats I have had in my life, but most recently to O'Malley and Purlene.*

*O'Malley, you died too young, but your time with me had such great impact.*



*Purlene, you are my 'acrobat chatty cat' who makes me smile every day. I promise to enrich your indoor life, and keep you safe while outdoors, for years and years to come.*





## Chapter 1 - Introduction



Figure 1-1 Heubach Cat, before 1924  
(Source [https://commons.wikimedia.org/wiki/File:Heubach\\_cat.jpg](https://commons.wikimedia.org/wiki/File:Heubach_cat.jpg))

Momentum surrounding the global issue of outdoor domestic cats (*Felis catus*) and their impact on wildlife, especially birds, is gaining the attention of experts working in the fields of wildlife conservation and animal welfare (Wald, Lohr, Lepczyk, Jacobson, & Cox, 2016; Flockhart & Coe, 2018; Cove, Gardner, Simons, Kays, & O'Connell, 2018; Marra & Santella, 2016; Blancher, 2013; Loss, Will, & Marra, 2013; van Heezik, Smyth, Adams, & Gordon, 2010; Roetman, Tindle, & Litchfield, 2018; Loss & Marra, 2017). Bringing conservationists and animal welfare professionals together for consensus on risk-mitigating strategies is a challenge because of the different perspectives and approaches each stakeholder brings to issues that involve human behaviour and wildlife (Dubois & Fraser, 2013). Wildlife conservationists, especially ornithologists, are alarmed by research results which estimates bird mortality in North America, due to cats, in the range of 1.4 to 4.0 billion per year (Blancher, 2013; Marra & Santella, 2016; The Stewardship Centre for BC, n.d.). Animal welfare advocates are equally concerned because outdoor cats, whether pet, stray or feral is stretching their resources to uphold the welfare of the cats. Clearly, a multi-pronged approach to reduce the number of cats on the landscape is necessary for the reasons listed above, and strategies will differ depending on whether the cat is owned, stray or feral. One approach is to focus on the owned/pet cats, or rather the cat owner, and there are national, provincial and community initiatives striving to change the behaviour of cat owners in an effort to reduce the number of unsupervised cats outside (Nature Canada, 2019 a; The Stewardship Centre For BC, 2016; Guelph Cat Population Task Force, c). With the focus on the cat owner community-based research becomes even more important. According to Schultz (2011), conservation is a goal that can only be achieved by changing behaviour.

Conversations are occurring between the previously divisive stakeholders in wildlife conservation and animal welfare, so collaboration is now possible (The Stewardship Centre for BC, 2018).

Previous research on cat owners' attitudes, perceptions and views on outdoor pet cats spans the globe (Mameno, Kubo, & Suzuki, 2017; Kikillus, Chambers, Farnworth, & Hare, 2016; Hall, et al., 2017; Walker, Bruce, & Dale, 2017; Gramza, Teel, Vande Woude, & Crook, 2016).

In Canada, an estimated 8.5 million (The Stewardship Centre For BC, 2016) to 9.3 million (Canadian Federation of Humane Societies, 2017) households have cats. Of those household cats, 28 percent of the households with cats allow them outdoors unsupervised (Canadian Federation of Humane Societies, 2017). In addition to the number of birds killed by outdoor cats (1.4 - 4.0 billion) in North America, by their very presence outdoors, cats have been proven to alter foraging habits of bird species (Bonnington, Gaston, & Evans, 2013). Wildlife native to the Kamloops area that is at risk from cat predation is extensive and varied. Rick Howie is Kamloops' resident bird expert who compiled a list (see Appendix A) of the types of birds most at risk from cat predation based on their general ecology, ground feeding habits or tendency to visit bird feeders at certain times of the year (Howie, 2016). Other species that visit feeders, such as woodpeckers, tend to feed higher up and are less vulnerable. None of the listed species is considered to be "species at conservation risk" and are not listed under the Species at Risk Act or by the BC Conservation Data Centre as being at risk (BC Government, n.d.). Mammal species that could be preyed upon by cats include Red Squirrels, Yellow Pine Chipmunk, House Mouse, Black Rat, Wandering Shrew, Montane Vole, Long-tailed Vole, White-footed Mouse and Pocket Gopher. Species at risk of cat predation depend upon how far out into natural and rural habitats cats roam. They may even take small garter snakes and small Rubber Boa snakes, as well as butterflies and grasshoppers.

The risks outdoor cats impose on wildlife is not just about predation, outdoor cats can spread diseases. Rabies and toxoplasmosis are two of the most common diseases outdoor cats, pet or otherwise, can spread to other domestic animals, wildlife and humans. Cats that have not been in the care of a veterinarian and vaccinated for rabies may spread rabies. Outdoor cats (free-roaming) account for the most cases of human rabies exposure among

domestic animals in the US (Gerhold & Jessup, 2013). Cats can become infected with toxoplasmosis, a parasite, by eating infected rodents, birds, or other small animals and the parasite can then be passed in the cat's feces. When cat owners change the litter box of a cat infected by toxoplasmosis, it is important to wash hands to prevent accidental ingestion (Centre for Disease Control and Prevention, n.d.). This is of concern especially for pregnant women.

Outdoor cats contribute to the stray and feral cat populations as well as the number of cats entering shelters. Based on the latest report from the Canadian Federation of Humane Societies of the 175 organizations that participated in the survey, 114,131 cats were brought to the shelters across Canada (Canadian Federation of Humane Societies, 2017). Of those cats 20,753 were euthanized. In understanding the relationship between owned outdoor cat populations and the number of stray, feral and cats in shelters shows that the “root” of the cat populations on the landscape comes down to the cat owner. For example, if the owned outdoor cat is not spayed or neutered (intact), it can mate with other intact cats. If the pregnant cat has an owner, then that owner now has to find homes for kittens, which reduces the number of kittens being adopted from a shelter. A kitten adopted from a shelter will be vaccinated and spayed/neutered at the time of adoption, or a voucher supplied which allows the new cat owner to get the kitten vaccinated and spayed/neutered. Alternatively, the owner could surrender the kittens to the animal shelter, thus adding to the burden of the already overflowing supply of adoptable cats. If the pregnant cat is unowned, then those kittens will be born outdoors and considered feral, because it is unlikely those kittens will interact or socialize with people. Socialization of kittens begins early, from 2 to 7 weeks (Bateson & Turner, 2014). Even if the owned outdoor cat is spayed or neutered, they are susceptible to getting lost and could potentially end up in a shelter or in a feral cat colony. The cost of cat care weighs heavily on communities through financial support of animal shelters, the morale of shelter staff who must make decisions about euthanizing cats, and the management of feral cat colonies with trap-neuter-return programs.

Despite the years of domestication, cats remain skilled hunters and are praised for their ability to kill and manage rodent populations, but chastised for preying on birds and other small mammals in our ecosystem. Wildlife conservationists want to remove outdoor cats from the landscape (Marra & Santella, 2016) because they deem the problem persists,

not only because of stray and feral cat populations, but because cat owners allow their cats to go outdoors. The risks outdoor cats pose to wildlife and communities is clear, but there is another aspect of outdoor cats that also needs to be considered, namely the welfare of the cat.

Outdoor cats, whether they are owned or unowned, are at risk of being killed or injured by predators such as coyotes, wildcats and even large birds. It is difficult to gather solid data on the number of cats killed by predators. For owned cats, the cat owner may not know the cat died from a predator and may claim the cat was lost. Any number of outcomes may occur with a lost cat, especially if the cat has not been licensed or registered or microchipped/tattooed, such as being killed or injured by a car, being fed by another person, and becoming part of the stray cat population or ending up in a shelter and being adopted out or euthanized.

Based on research conducted in England (O'Neill, Churs, McGreevy, Thompson, & Brodbelt, 2015), 60 percent of premature mortality of cats was due to road traffic accidents and for cats below the age of five, 47.3 percent of cats died by this means. Again, unless the driver of the car that hit the cat seeks out the cat owner, or the cat owner sees the cat hit by the car, the cat may remain “lost or missing” and presumed dead.

Disease is another risk and left untreated will kill the cat. The diseases outdoor cats are susceptible to contract include: Feline Panleukopenia, Feline Rhinotracheitis and Calicivirus, Feline Leukemia Virus and Rabies (Canadian Veterinary Medical Association, 2019). The SPCA collects data related to cat mortality, but only if the cat has been registered with the SPCA (ie. the cat was adopted from the SPCA) or the cat was microchipped with identification, and the owner updates the data regarding how the cat died. City bylaws officers who dispose of a cat killed on the road may also have some data, however in Kamloops, only the number of animals removed from the road is recorded, not the type of animal (personal communication, City of Kamloops Bylaw Manager; 2018) The next best method for gathering data will be from the cat owners themselves.

The risks that face both wildlife and cats while cats are outside unsupervised is high. This research will not only explore the risks outdoor pet cats impose on wildlife, but will also examine the risks outdoor pet cats incur while being outdoors. The purpose of this research is gain an understanding of cat owner behaviour and the views of non-cat owners and their role with respect to outdoor pet cats, to explore economic theories that may shed light on new

approaches, and to provide baseline data that will guide future conservation initiatives that are impact-driven and community-specific. Previous research on cat owner behaviour and non-cat owners' views of outdoor pet cats has not been done for Kamloops, BC.

## Methods and Design

The methodology for data collection was an online survey modelled after the survey used in similar research in Colorado, USA with permission granted by the lead researcher, Ashley Gramza (Gramza, Teel, Vande Woude, & Crook, 2016). This quantitative approach to descriptive research with a survey was chosen because it is the most effective and efficient way to gather baseline data from a representative sample of the residents of Kamloops regarding their beliefs, perspectives or opinions of cat owner behaviour and outdoor pet cats. The methodology for each of the chapters in this thesis utilizes data gathered from the survey. Instead of repeating the methodology within each chapter, I will summarize it here as an overview, and within each chapter a more detailed explanation of the sections that pertain to the chapter will be described.

The survey is divided into seven sections, with a total of 47 questions (Appendix B). The sections are identified as follows:

- Section 1 - Wildlife
- Section 2 - Opinions about Outdoor Pet Cats
- Section 3 - Outdoor Pet Cats and Risks to Wildlife
- Section 4 - Risk Mitigation for Outdoor Pet Cats
- Section 5 - Cat Ownership and Outdoor Cats - Cat Owners Only
- Section 6 - Cat License and Enforcement - Non-Cat Owners Only
- Section 7 - Sociodemographics

A 5-point Likert scale used for many of the questions with the neutral responses [mean = 3] suggesting indifference, lack of comfort with personal level of knowledge, or a perceived lack of information on the topic.

The survey was created using Fluid Survey, an online survey tool, and ethics approval was received from the TRU Research Ethics Committee (Appendix C). Hard copies, with postage paid return envelopes, were available upon request to reduce sampling bias. The target population was the community of Kamloops BC, cat owners and non-cat owners alike. Participation in this research was voluntary and the distribution of the survey was as

widespread throughout the community as possible within the time constraints and budget for the research.

The representative sample size required, at a 95 percent confidence level and +/-5 percent margin for error, with the number of households listed for Kamloops as 55,722 (BC Statistics, 2018), is 382. In total, 729 surveys were submitted, however, after removing those respondents who lived outside of the Kamloops area, and thus ineligible to be part of the survey, 584 survey responses were utilized for this analysis. Of those 584 responses, 376 were cat owners (155 outdoor cat owners and 221 indoor cat owners) and 208 non-cat owners. For further details of the demographics see Table 1-1.

Common errors with surveys include sampling error, measurement error, coverage error and non-response error. Sampling error is always present since the whole population is not surveyed. Measurement errors occur, but an attempt was made to reduce these errors by carefully wording the survey questions so they remained neutral. Coverage error indicates the representative sample does not accurately reflect the population being measured. This was addressed by distributing the survey through several different methods in an attempt to reach all demographics. Respondents were solicited through three methods of engagement. First, interviews took place with local media outlets. Kamloops This Week newspaper (Petruk, 2017), which is distributed to over 30,000 households in Kamloops; Kamloops CBC Radio morning show hosted by Shelley Joyce (CBC News, 2017), and a follow-up story that included a link to the survey; and finally, CFJC TV included a clip on the evening news along with an article on the station website (Donnelly, 2017). Second, the survey was sent to Thompson Rivers University's (TRU) employees via email distribution lists for staff, faculty and administration. TRU has a total of 1,543 employees, including faculty (Thompson Rivers University, 2019). The email included a brief description of the purpose of the research and a link was distributed to each of these groups. Thirdly, through community collaboration and relationships building with the Kamloops Naturalist Club (Kamloops Naturalist Club, 2019), a research summary was provided with a link to the survey to the executive who then distributed it to their member list of 41 family memberships (82 people) and 67 single memberships. Plus, with support from the Kamloops SPCA, and the provincial office in Vancouver, the research summary and link to the survey was posted on their Facebook page (BC SPCA Kamloops & District Branch, 2019). Finally, the local North Shore newsletter,

The Echo, published a story along with the link to the survey (Edge Publishing, 2019). Despite all these attempts, the number of female respondents outweighed the male respondents. This is not uncommon and previous research has demonstrated that females are more likely to participate in online surveys than males (Smith, 2008). Non-response error is the final error that is to be considered and that was accommodated for by posting the survey online, which helps alleviate such an error.

Utilizing non-probability sampling was necessary as resources were not available to engage a research company to provide a random sample for Kamloops and then direct the survey accordingly. There is a risk that a representative sample would not be reached, however many forms of distribution of the survey link were employed to reduce the risk and the representative sample was achieved. In gathering baseline data for Kamloops part of the purpose of this research was to gauge the community's interest in the subject, and gather their opinions and perceptions, as would be demonstrated by the number of valid survey received which exceeded the representative sample required. The types of non-probability sampling utilized include convenience sampling because, as noted earlier, there was no budget for purchasing a list of all members in Kamloops. Snowball sampling would have also been an inherent factor when the methods for distributing the survey were media, email and websites (including Facebook) where "sharing" occurs. It is understood that when measuring opinions and attitudes there may be an unwillingness to provide honest answers, which comes from the respondents desire to provide socially acceptable answers. As mentioned earlier, this research provides baseline data and represents those who deem the topic of concern or interest.

Minitab 2018 and excel was utilized mainly for analysis of the descriptive statistics, the t-tests, and Mann Whitney-U tests. By using Minitab, I analysed the data with t-tests to compare differences in means and Mann Whitney U tests to check for variations around the median, thus reducing the impact extreme results can have on data. I also utilized descriptive statistics.

*Table 1-1 Survey Demographics*

	Cat Owners	Non-Cat Owners
	%	%
Sex:		
Female	83	66
Male	16	33
Other	1	1
Age:		
18 - 24 years old	7	4
25-39 years old	33	24
40-64 years old	48	56
65-79 years old	11	15
80 years or older	1	0
Education:		
Less than high school diploma	1	1
High school diploma or equivalent (GED)	12	9
Certificate, diploma, or trade	39	33
4-year university degree	31	31
Post-graduate degree	17	25
Homeowner	72	83
Have a backyard	87	89
Have a dog	41	45
Income:		
Less than \$40,000	22	14
\$40,001 to \$80,000	30	33
\$80,001 to \$120,000	25	29
\$120,001 or more	22	24

This thesis is composed of six chapters inclusive of this introductory chapter. Chapter two will examine Kamloops residents' levels of interest and opinions about wildlife in general, and about outdoor pet cats, in particular. It will analyse the differences and similarities between outdoor cat owners, indoor cat owners and non-cat owners' interests and opinions about wildlife and outdoor pet cats. The question explored in this chapter is whether there a difference between the three stakeholder groups with respect to their views on wildlife and opinions about outdoor pet cats. The purpose of this chapter is to present baseline data in the areas noted above of the residents of Kamloops.



Chapter three seeks to understand perception of risks that outdoor pet cats incur and impose on our environment in Kamloops, and the factors that may be influencing those perceptions. Understanding peoples' perceptions of risks that outdoor cats incur and impose on our ecosystems is an important step to knowing the starting point and focus for risk mitigation strategies. Results will identify the differences in those perceptions between cat owners and non-cat owners; and cat owners who allow their cats outdoors versus those with indoor cats. The evidence indicates that risk perceptions are influenced by the history of issues with outdoor cats in neighbourhoods (Gramza, Teel, Vande Woude, & Crook, 2016). These issues are categorized in terms of outdoor cat owners, indoor cat owners, and non-cat owners. The breakdown of the history of reported issues with outdoor cats by geographical area may highlight areas of specific concern. Based on prior work, it is anticipated that those residents, who perceived the risks, both for imposing and/or incurring, to be high, would keep their cats indoors or implement some form of risk mitigation while their cat is outdoors, such as a harness, or a cat enclosure. Cat owners can thus reduce the risks outdoor pet cats impose and incur on the environment, however, that will require a change in behaviour. This chapter will analyse the results to see if there is a relationship between perception and cat owner behaviour.

Chapter four will apply the value of the statistical life economic theory to that of a cat in Kamloops. There is a perception that cats have little value and this perception contributes to the concerns being raised by wildlife conservationists because despite the risks outdoor pet cats face, cat owners continue to allow their cats outdoors unsupervised and these unsupervised outdoor pet cats then have an impact on the environment and neighbourhoods in Kamloops. The amount Kamloops residents are willing to pay to reduce the risk of a cat dying prematurely will be assessed, as will views on licensing and the price of licensing. The focus of this chapter is to explore a unique approach to influencing behaviour change, namely having people reconsider the value of a statistical life of a cat (VSL).

Chapter five will examine negative externalities, another economic theory, and non-cat owners' role in outdoor cat enforcement. Cat owners who allow their cats outside unsupervised would appear to not consider the impact their decision to do so has on the surrounding environment. Numerous campaigns to increase awareness of the impact outdoor pet cats have on our communities and the environment have been somewhat effective, but

there is room for new and innovative approaches which may influence cat owners who allow their cats outside unsupervised. Coase Theorem provides parameters for exploring scenarios that measure marginal private benefits and marginal social costs in an effort to determine if a situation can be resolved without government (in the case of this research, city bylaws) intervention.

The outdoor cat issue challenges wildlife conservationists and animal welfare advocates to become allies working on management options that focus on risk-mitigating behaviour changes in communities. The final chapter will provide an overview of the outdoor pet cat owner behaviour and provide recommendations for risk mitigation strategies for Kamloops.

## Chapter 2 - Kamloops Residents' Opinions About Wildlife and Outdoor Pet Cats

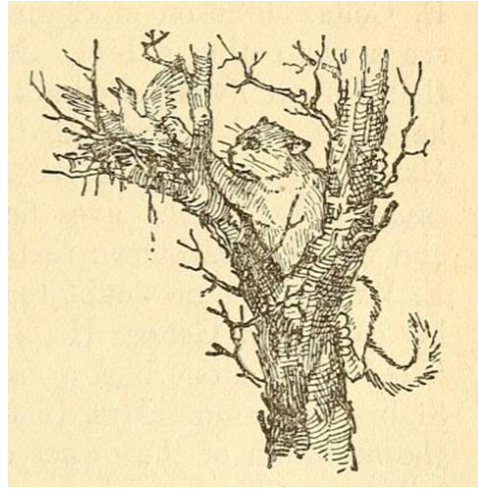


Figure 2-1 Cat raiding nest, 1916  
(Source: <https://www.flickr.com/photos/internetarchivebookimages/20803190680/>)

### Introduction

This chapter will examine Kamloops residents' levels of interest and opinions about wildlife in general, and about outdoor pet cats, in particular. It will examine the differences and similarities between outdoor cat owners, indoor cat owners and non-cat owners' interests and opinions about wildlife and outdoor pet cats. The purpose of this chapter is to understanding Kamloops residents' views and opinions for baseline data to be considered when developing conservation, animal welfare and policy initiatives.

It has become clear that human behaviour can both cause and alleviate social problems in a variety of domains (Fishbein & Ajzen, 2010), including conservation. According to Schultz (2011), conservation is a goal that can only be achieved by changing behaviour and in order to change behaviour an understanding of the similarities and differences between the stakeholders may help guide conservation initiatives. Manfredo (2008) delves into theories regarding feelings, values and attitudes towards wildlife and suggests that many initiatives "...may depend upon identifying value similarity among stakeholders and building upon shared values to support engagement and seek compromise...". Attitudes have a strong influence on some environmental behaviours, but the behaviours rely upon the ease of use and/or accessibility (Steel, 1996). Subjective norms are a culmination of social pressure from others to engage or not engage in the specified

behaviour. Research that directly related to subjects bringing in their cats at night looked at how subjective norms influence behaviour (MacDonald, Milfont, & Gavin, 2015). In the field of psychology, subjective norms can be divided into two type of norms: descriptive norms or what is commonly done by others and injunctive norms, what is commonly approved/disapproved of by others. Injunctive norms, i.e. what others approve of, were more powerful predictors of intention for the subjects already engaging in the desired behaviour, but descriptive norms, i.e. what others commonly do, were more predictive of intention for subjects not already bringing their cats in at night. The research results also indicated that veterinarians, more than any other normative authoritative figure, are a key injunctive influence for visitors who intermittently bring cats inside (MacDonald, Milfont, & Gavin, 2015).

Therefore, consideration of the views and opinions that currently are in place with Kamloops residents who participated in this research may provide guideposts from which to begin initiatives or campaigns to influence and change behaviours that are having a negative impact on the environment.

## Methods

As noted in the introductory chapters, an online survey was used to collect the data. For the purposes of this chapter, data from Section 1 was utilized, Wildlife, which gathered information about how cat owners and non-cat owners felt about wildlife issues and Section 2, Opinions about Outdoor Pet Cats, which asked general questions on interests and opinions about outdoor pet cats and cat owners who allow their cats outdoors. As a reminder, the 5-point Likert scale used with the neutral responses [mean = 3] suggesting indifference, lack of comfort with personal level of knowledge, or a perceived lack of information on the topic, was used to rank various questions in sections 1 and 2. All statistical analysis of the survey data for this chapter is performed using Minitab 2018. By using Minitab I analysed the data with t-tests to compare differences in means and Mann Whitney U tests to check for variations around the median, thus reducing the impact extreme results can have on data. I also utilized descriptive statistics.

## Results

### Comparing Views on Wildlife and Outdoor Pet Cats

#### *Outdoor versus Indoor Cat Owners*

Both outdoor cat owners and indoor cat owners (Table 2-1) were interested in local wildlife issues (mean = 3.91 and 3.75 respectively). They both disagreed with the statement that humans should manage wildlife population so that humans benefit, as well as with the statement 'Wildlife are on earth primarily for people to use.' They agreed that all living things are part of one big family (outdoor cat owner mean = 4.07 and indoor cat owner mean = 4.10). The only area with significant differences in the means (-0.26) was with respect to wildlife being like their family and they want to protect them with the indoor cat owners agreeing (mean = 4.00) and the outdoor cat owners agreeing less (mean = 3.74).

There were significant differences for each of the questions on opinions about outdoor pet cats between outdoor and indoor cat owners for Section 1 Question 1 (Table 2-1). Indoor cat owners claimed to be more informed about outdoor pet cats (mean = 3.97) than the outdoor cat owners (mean = 3.73), as well the indoor cat owners were more interested in outdoor pet cat issues in their neighbourhood than outdoor cat owners (means = 3.86 and 3.54 respectively). Outdoor cat owners viewed having outdoor pet cats in their neighbourhood as slightly above neutral towards 'good' (mean = 3.38) and the indoor cat owners were skewed in the opposite direction with outdoor pet cats in the neighbourhood as being just above 'bad' towards neutral with a mean = 2.37. With respect to the level of approval for people allowing their cats outdoors, the outdoor cat owners leaned towards approve (mean = 3.85) and the indoor cat owners were more disapproving (mean = 2.50).

Section 2 Question 2 presented a series of positive and negative statements regarding outdoor pet cats, for example, they are a nuisance or they live happier lives. The respondents could choose on a Likert scale of 1-5 with strongly disagree = 1, disagree = 2, neutral = 3, agree = 4 and strongly agree = 5. There were significant differences between the means of outdoor cat owners and indoor cat owners for all of the statements. The top 3 greatest differences in means occurred first with the statement that outdoor pet cats in my neighbourhood live happier lives than cats that remain indoors with outdoor cat owners mean = 3.72 and the indoor cat owner with a mean of 2.40 ( $p < 0.001$ ). The second greatest difference in the means occurred with the statement that outdoor pet cats should be allowed

to roam freely without restrictions with the outdoor cat owners mean = 3.11 and the indoor cat owners mean = 2.10 ( $p < 0.001$ ). The third greatest difference in means was with the statement that outdoor pet cats play a useful role as predators in the natural environment with the outdoor cat owners mean = 3.62 and the indoor cat owners mean = 2.83 ( $p < 0.001$ ). Interestingly, out of all the statements presented, the outdoor cat owners agreed mostly with: outdoor pet cats are at risk of being harmed while outdoors (mean = 4.02) followed by outdoor pet cats in my neighbourhood are enjoyable to have around (mean = 3.86) and then outdoor pet cats in my neighbourhood live happier lives than cats that remain indoors with mean = 3.72. For the indoor cat owners, the statements they agreed most strongly with was outdoor pet cats are at risk of being harmed while outdoors (mean = 4.51), followed by outdoor pet cats should be protected by their owners from possible harm while spending time outdoors with a mean of 4.12 and finally they agreed that outdoor pet cats live shorter lives than cats that remain indoors (mean = 4.10).

Table 2-1 Outdoor and Indoor Cat Owners

	Outdoor Cat Owners (N=155)	Indoor Cat Owners (N=221)	Differences in means	t-test for differences in means	Mann-Whitney test for differences	Mann-Whitney test
<b>Section 1</b>						
<u>Question 1 - Wildlife</u>	Mean	Mean		p-value	p-value	Significance
Overall, how interested would you say you are in local wildlife issues?	3.91	3.75	0.16	0.159	0.158	
Humans should manage wildlife populations so that humans benefit.	2.20	2.31	-0.11	0.278	0.475	
I view all living things as part of one big family.	4.07	4.10	-0.03	0.722	0.983	
Wildlife are on earth primarily for people to use.	1.54	1.55	-0.01	0.870	0.802	
Wildlife are like my family and I want to protect them.	3.74	4.00	-0.26	0.004	0.007	***
<b>Section 2</b>						
<u>Question 1 - Opinions about Outdoor Pet Cats</u>						
How well informed are you on the topic of outdoor pet cats?	3.73	3.97	-0.24	0.040	0.008	***
How interested are you in outdoor pet cat issues in your neighborhood?	3.54	3.86	-0.32	0.007	0.003	***
Overall, do you think having outdoor pet cats in your neighborhood is good, bad, or neither?	3.38	2.37	1.01	<0.001	<0.001	***
Please rate your overall level of approval of people allowing their cats to spend time outdoors in your neighborhood.	3.85	2.50	1.34	<0.001	<0.001	***
<u>Question 2 - Outdoor pet cats in my neighbourhood...</u>						
...are a nuisance (cause problems).	2.26	2.88	-0.62	<0.001	<0.001	***
...are enjoyable to have around.	3.86	3.24	0.62	<0.001	<0.001	***
...play a useful role as predators in the natural environment.	3.62	2.83	0.79	<0.001	<0.001	***
...are harmful to wildlife.	3.11	3.47	-0.36	0.003	0.003	***
...disrupt the balance of nature.	2.57	3.01	-0.44	<0.001	<0.001	***
...are at risk of being harmed while outdoors.	4.02	4.51	-0.49	<0.001	<0.001	***
...live happier lives than cats that remain indoors.	3.72	2.40	1.32	<0.001	<0.001	***
...live shorter lives than cats that remain indoors.	3.38	4.10	-0.72	<0.001	<0.001	***
...should be protected by their owners from possible harm while spending time outdoors.	3.46	4.12	-0.66	<0.001	<0.001	***
...should be allowed to roam freely without restrictions.	3.11	2.10	1.01	<0.001	<0.001	***
Note: *** significant at the 1%, ** significant at the 5%, * significant at the 10%						

### *Outdoor Cat Owners versus Non-Cat Owners*

There were no significant differences in the means between the outdoor cat owners and the non-cat owners with respect to views on wildlife, except for the statement that I view all living things as part of one big family. The non-cat owners were less in agreement (mean = 3.87) than the outdoor cat owners (mean = 4.07), however that result is still closer to 'agree' than 'neutral'. Not surprising though there were significant differences in the opinions about outdoor pet cats with respect to how informed they were about the topic of outdoor pet cats with cat owners claiming to be more informed (mean = 3.72) than non-cat owners who were more neutral (mean = 3.15); in regards to whether they thought outdoor pet cats in the neighbour was good, bad or neither, as mentioned earlier, the outdoor cat owners' mean was slightly above neutral towards good (mean = 3.38), whereas the non-cat owners was closer to bad (mean = 2.23). Finally, for the overall level of approval of people allowing their cats to spend time outdoors, the outdoor cat owners leaned towards approve (mean = 3.85) and the non-cat owners were closer to neutral on the disapprove side (mean = 2.40).

For the final question in Section 2, the greatest differences in the means between outdoor cat owners and non-cat owners occurred with non-cat owners close to agreement with respect to outdoor pet cats in their neighbourhood being a nuisance (mean = 3.47) and the outdoor cat owners closer to disagreeing (mean = 2.26), a difference in the means being - 1.20 (Table 2-2). The second largest difference in the means (1.18) was with the statement outdoor pet cats are enjoyable to have around. As noted earlier, the outdoor cat owners were in agreement (mean = 3.86) whereas the non-cat owners leaned towards disagree with a mean of 2.68. The third largest difference in the means was 1.13 with the statement regarding should outdoor pet cats be allowed to roam freely without restrictions. The outdoor cat owners claimed to be just slightly above neutral with a mean of 3.11, whereas the non-cat owners were clearly in disagreement with a mean of 1.98. Interestingly, both the outdoor cat owners and the non-cat owners agreed that the outdoor pet cats are at risk of being harmed while outdoors with means being 4.02 and 4.08 respectively.



Table 2-2 Outdoor Cat Owners and Non-Cat Owners

	Outdoor Cat Owners (N=155)	Non-Cat Owners (N=208)	Differences in means	t-test for differences in means p-value	Mann-Whitney test for differences p-value	Mann-Whitney test Significance
<b>Section 1</b>						
<u>Question 1 - Wildlife</u>	Mean	Mean		p-value	p-value	Significance
Overall, how interested would you say you are in local wildlife issues?	3.91	3.82	0.09	0.440	0.545	
Humans should manage wildlife populations so that humans benefit.	2.20	2.35	-0.15	0.160	0.239	
I view all living things as part of one big family.	4.07	3.87	0.20	0.046	0.042	**
Wildlife are on earth primarily for people to use.	1.54	1.70	-0.16	0.053	0.137	
Wildlife are like my family and I want to protect them.	3.74	3.68	0.05	0.589	0.532	
Note: *** significant at the 1%, ** significant at the 5%, * significant at the 10%						
<b>Section 2</b>						
<u>Question 1 - Opinions about Outdoor Pet Cats</u>						
How well informed are you on the topic of outdoor pet cats?	3.73	3.15	0.58	<0.001	<0.001	***
How interested are you in outdoor pet cat issues in your neighborhood?	3.54	3.64	-0.10	0.41	0.259	
Overall, do you think having outdoor pet cats in your neighborhood is good, bad, or neither?	3.38	2.23	1.15	<0.001	<0.001	***
Please rate your overall level of approval of people allowing their cats to spend time outdoors in your neighborhood.	3.85	2.40	1.45	<0.001	<0.001	***
<u>Question 2 - Outdoor pet cats in my neighbourhood . . .</u>						
...are a nuisance (cause problems).	2.26	3.47	-1.20	<0.001	<0.001	***
...are enjoyable to have around.	3.86	2.68	1.18	<0.001	<0.001	***
...play a useful role as predators in the natural environment.	3.62	2.65	0.97	<0.001	<0.001	***
...are harmful to wildlife.	3.11	3.65	-0.54	<0.001	<0.001	***
...disrupt the balance of nature.	2.57	3.35	-0.78	<0.001	<0.001	***
...are at risk of being harmed while outdoors.	4.02	4.08	-0.06	0.471	0.345	
...live happier lives than cats that remain indoors.	3.72	2.98	0.74	<0.001	<0.001	***
...live shorter lives than cats that remain indoors.	3.38	3.60	-0.22	0.038	0.071	*
...should be protected by their owners from possible harm while spending time outdoors.	3.46	3.77	-0.32	0.005	0.005	**
...should be allowed to roam freely without restrictions.	3.11	1.98	1.13	<0.001	<0.001	***
Note: *** significant at the 1%, ** significant at the 5%, * significant at the 10%						

### *Indoor Cat Owners vs Non-Cat Owners*

Indoor cat owners and non-cat owners have similar views regarding wildlife with respect to being quite interested in local wildlife issues and not agreeing the wildlife populations should be managed by humans nor are wildlife on earth primarily for people to use (Table 2-3). However, indoor cat owners do agree more so than non-cat owners in the view that wildlife are like their family and they want to protect them (mean = 4.00 compared to 3.68 respectively; difference in mean = 0.32). Relatively significant difference in means (0.23;  $p=0.019$ ) for the indoor cat owners viewing all living things as part of one big family (mean = 4.10) compared to the non-cat owners (mean = 3.87).

On the opinions about outdoor pet cats, the indoor cat owners claimed to be significantly more informed on the topic of outdoor pet cats than the non-cat owners (mean = 3.97 and 3.15 respectively; difference in means = 0.82). And with the level of interest in outdoor pet cat issues, the indoor cat owners were more interested (mean = 3.86) than the non-cat owners (mean = 3.64). The final two opinion statements regarding outdoor pet cats pertained to firstly, whether the respondents saw them as good, bad or neither and there was no significant differences for the two groups as both indoor cat owners and non-cat owners had the opinion that outdoor pet cats were closer to bad than good (mean = 2.37 and 2.23 respectively, where 2 = bad). Plus the level of approval of people allowing their cats to spend times outdoors was closer to neutral for both groups with the means = 2.50 for indoor cat owners and slightly closer to disagree with a mean of 2.40 for non-cat owners.

For Section 2 Question 2 (Table 2-3), the statements regarding outdoor pet cats in the neighbourhood, the non-cat owners were more in agreement that the outdoor pet cats were a nuisance (mean = 3.47) compared to the indoor cat owners who leaned towards disagreement with the mean = 2.88 (difference in means = -0.58). The same difference in means (-0.58) was found with the statement that outdoor pet cats live happier lives than cats that remain indoors. The indoor cat owners were closer to disagree (mean = 2.40) and the non-cat owners were closer to neutral with mean = 2.98. The third greatest difference in means occurred with the statement about outdoor pet cats being enjoyable to have around. Not surprisingly, the indoor cat owners were only a bit above neutral with mean = 3.24 and the non-cat owners leaning to disagree with a mean of 2.68.

Table 2-3 Indoor Cat Owners and Non-Cat Owners

<b>Section 1</b>	Indoor Cat Owners (N=221)	Non-Cat Owners (N=208)	Differences in means	t-test for differences in means p-value	Mann-Whitney test for differences p-value	Mann-Whitney test Significance
<b>Section 1</b>	Mean	Mean		p-value	p-value	Significance
Question 1 - Wildlife						
Overall, how interested would you say you are in local wildlife issues?	3.75	3.82	-0.07	0.52	0.426	
Humans should manage wildlife populations so that humans benefit.	2.31	2.35	-0.03	0.74	0.640	
I view all living things as part of one big family.	4.10	3.87	0.23	0.01	0.019	**
Wildlife are on earth primarily for people to use.	1.55	1.70	-0.15	0.05	0.166	
Wildlife are like my family and I want to protect them.	4.00	3.68	0.32	<0.001	<0.001	***
<b>Section 2</b>						
<u>Question 1 - Opinions about Outdoor Pet Cats</u>						
How well informed are you on the topic of outdoor pet cats?	3.97	3.15	0.82	<0.001	<0.001	***
How interested are you in outdoor pet cat issues in your neighborhood?	3.86	3.64	0.22	0.055	0.079	*
Overall, do you think having outdoor pet cats in your neighborhood is good, bad, or neither?	2.37	2.23	0.14	0.180	0.131	
Please rate your overall level of approval of people allowing their cats to spend time outdoors in your neighborhood.	2.50	2.40	0.10	0.414	0.191	
<u>Question 2 - Outdoor pet cats in my neighbourhood . . .</u>						
...are a nuisance (cause problems).	2.88	3.47	-0.58	<0.001	<0.001	***
...are enjoyable to have around.	3.24	2.68	0.56	<0.001	<0.001	***
...play a useful role as predators in the natural environment.	2.83	2.65	0.18	0.149	0.151	
...are harmful to wildlife.	3.47	3.65	-0.19	0.099	0.089	
...disrupt the balance of nature.	3.01	3.35	-0.34	0.003	0.006	
...are at risk of being harmed while outdoors.	4.51	4.08	0.43	<0.001	<0.001	***
...live happier lives than cats that remain indoors.	2.40	2.98	-0.58	<0.001	<0.001	***
...live shorter lives than cats that remain indoors.	4.10	3.60	0.51	<0.001	<0.001	***
...should be protected by their owners from possible harm while spending time outdoors.	4.12	3.77	0.34	<0.001	<0.001	***
...should be allowed to roam freely without restrictions.	2.10	1.98	0.11	0.334	0.167	
Note: *** significant at the 1%, ** significant at the 5%, * significant at the 10%						

## Discussion

Kamloops residents' levels of interest and opinions about wildlife in general, and about outdoor pet cats, in particular have provided interesting results. The similarities and differences between outdoor cat owners, indoor cat owners and non-cat owners' interests and opinions about wildlife and outdoor pet cats provide solid baseline data for consideration.

Outdoor and indoor cat owners have similar views about wildlife in that they are interested in local wildlife issues and that they agree all living things are part of one big family. There are significant differences when it comes to opinions about outdoor pet cats. Indoor cat owners state they are more informed and more interested in outdoor pet cat issues than outdoor cat owners. Outdoor cat owners don't see issues with outdoor pet cats in that they approve of people allowing cats outdoors and don't see them as bad, whereas indoor cat owners see them as bad and disapprove of people allowing pet cats outdoors. With respect to the opinions about outdoor pet cats, outdoor cat owners see outdoor pet cats living happier lives, they should be allowed to roam, and they play a role as useful predators. However, outdoor cat owners did recognize there are risks, which would support the view that outdoor cat owners see the risks, but are of the opinion that because outdoor pet cats live happier lives that outweighs the risks. These results align with the behaviour of why cat owners choose to allow their cats outdoors unsupervised. Campaigns to encourage outdoor cat owners to keep their cats indoors, or under their care and control while outdoors, will need to be paired with options for allowing the cats outdoors in a safe environment (safe for the cat and safe for the wildlife), such as a catio, cat run or leash training. It would be beneficial to broaden the scope of the awareness of the outdoor cat owners to understand "responsible pet ownership" behaviour in an urban setting.

When it comes to outdoor cat owners and non-cat owners with respect to the views of wildlife they have similar views about wildlife, namely the viewpoint that wildlife are like their family and they want to protect them, but when it comes to the view that they view all living things as part of one big family, the outdoor cat owners were in more agreement with that statement than the non-cat owners. For the opinions about outdoor pet cats the differences were significant, but again predictable. The opinions for outdoor cat owners is already listed above. For the non-cat owners they were less informed about outdoor pet cats, viewed them as more "bad" and closer to a disapproving of cat owners who allow their cats

to spend time outdoors. The opinions are aligned with both groups agreeing that outdoor pet cats are at risk of being harmed while outdoors. With respect to the other opinion statements about outdoor pet cats, they are closer in alignment with the indoor cat owners and are summarized in the following section.

In comparing the indoor cat owners and non-cat owners the results are similar to those listed with the outdoor cat owners when it comes to views on wildlife, except the indoor cat owners lean more towards strongly agreeing with the view that all living things are part of one big family; and they are in solid agreement with the view that wildlife are like my family and want to protect them. Indoor cat owners are also more informed and more interested in outdoor pet cat issues. The differences arise with the opinion statements about outdoor pet cats. Indoor cat owners are closer to neutral with respect to the outdoor pet cats being a nuisance, than the non-cat owners. Non-cat owners lean towards the neutral position with the outdoor pet cats living happier lives as compared to indoor cat owners who lean closer to disagreeing. Both stakeholders agree that the outdoor pet cats are at risk of being harmed when outdoors, but the indoor cat owners lean more so towards strongly agreeing with the statement and that is the same with the statement that outdoor pet cats should be protected by their owners from harm while outdoors. The opinions are aligned between these two groups with respect to close to neutral opinions for outdoor pet cats playing a useful role as predators in the natural environment, and they disrupt the balance of nature, and agreeing that they are harmful to wildlife and disagreeing with the statement that outdoor pet cats should be allowed to roam freely without restrictions.

In essence, the outdoor, indoor and non-cat owners have similar views about wildlife, except the cat owners, both outdoor and indoor do see wildlife as part of their family and they want to protect them, more so than the non-cat owners.

In using the above results as baseline data it is clear that current cat owners who allow their cats outdoors believe their cat is happier and the risks they face while outdoors is worth it for their cat's happiness. The outdoor cat owners don't view the impact the cats have on wildlife as of great concern. Research on the impact outdoor pet cats have on wildlife could be beneficial from a scientific standpoint, however, research in the area of animal welfare communication indicates that marketing the negative impacts with scientific facts is not an effective way to change behaviour (Cooney, 2011; McLeod, Driver, Bengsen, & Hine, 2017).

Though there is research that does provide evidence that messaging to cat owners regarding keeping cats indoors that includes both the wildlife benefit and cat protection have a positive influence, namely the cat owners' motivation to contain their cat increased (McLeod, Hine, Bengsen, & Driver, 2017). Influencing a change in behaviour with current cat owners who allow their cats outdoors is definitely a challenge and requires careful consideration of resources. It is worth noting that outdoor cat owners responded closer to neutral (mean = 3.11) to the statement 'cats should be allowed to roam freely without restriction', which could be attributed to respondents swayed to answer in a socially responsible way. With that in mind, it also demonstrates an opportunity to influence behaviour with social pressure with "nudging" (Thaler & Sunstein, 2009). This concept will be explored more deeply in the final chapter of the thesis.

Other options will be examined in Chapter 5 including consideration of reducing the number of hours cat owners allow their cats outdoors. There are plenty of options with potential and new cat owners to influence behaviour, such as how exactly to be a responsible cat owner and options for enriching indoor cat's lives as well as the many ways to allow cats outdoors supervised like in a catio (like a patio for a cat), or with leash training. As mentioned earlier, an assessment of resources will influence strategies. Previous research supports the delivery of the information about responsible cat ownership from veterinarians to be effective (MacDonald, Milfont, & Gavin, 2015), however that is an avenue that was not explored in this research, but would be beneficial and possibly a project for research in the near future.

The results provided here on the viewpoints and opinions are valuable for baseline data, but more information is needed. Chapter 3 will dig deeper into understanding the perceptions of the risks outdoor pet cats impose and incur while outdoors, which will provide even more clarity on the areas where conservation action will be effective.

### Chapter 3 - Kamloops Residents' Perceptions of Risk Regarding Outdoor Pet Cats

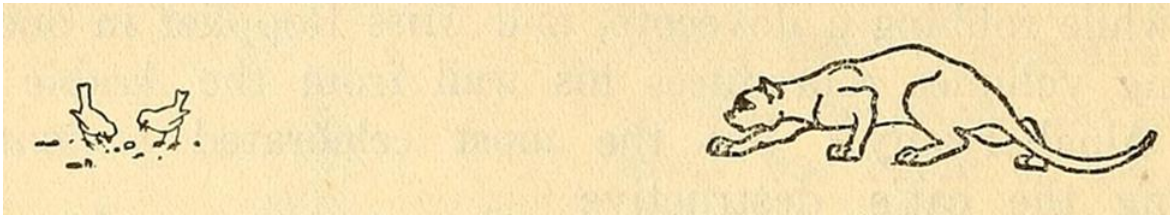


Figure 3-1 Cat stalking birds, 1916  
(Source: [https://commons.wikimedia.org/wiki/File:Cat\\_stalking\\_birds.png](https://commons.wikimedia.org/wiki/File:Cat_stalking_birds.png))

#### Introduction

This chapter seeks to understand perception of risks that outdoor pet cats incur and impose on our environment in Kamloops, BC and the factors that influence those perceptions. Results will identify the differences in those perceptions between cat owners and non-cat owners; and cat owners who allow their cats outdoors versus those with indoor cats. The evidence indicates that risk perceptions are influenced by the history of issues with outdoor cats in neighbourhoods. These issues are categorized in terms of outdoor cat owners, indoor cat owners, and non-cat owners. The breakdown of the history of reported issues with outdoor cats by geographical area will assess areas of specific concern. Based on prior work, it is anticipated that those residents, who perceived the risks, both for imposing and/or incurring, to be high, would keep their cats indoors or implement some form of risk mitigation while their cat is outdoors, such as a harness, or a cat enclosure. Cat owners can thus reduce the risks outdoor pet cats impose and incur on the environment; however, that would require a change in behaviour or regulations.

The risk-perception items I used were modelled after the Gramza research (Gramza, Teel, Vande Woude, & Crook, 2016) with slight modifications to the Kamloops area predators. The risks imposed on the wildlife from outdoor pet cats is identified as predation, spreading disease, and anthropogenic concerns, such as, cats damaging people's property or injuring/killing small farm animals (Figure 3-2). The risks incurred by outdoor pet cats are predators, contracting disease, and anthropogenic risks, such as, being hit by a car or getting lost (Figure 3-3). Previous research in this area of cat ownership is growing as understanding cat owner perceptions and behaviours is gaining in importance for implementing conservation initiatives or risk mitigation strategies that will be most effective. Conservation social science (Bennett, et al., 2016) is an area that could provide more in-depth insight into community-

based research, especially in this area of outdoor cats and cat owner behaviours. Individual communities have unique ecosystems to consider, so it's even more important that each community conducts its own survey to assess the risks and the residents' perceptions of that area (Kikillus, Chamberes, Farnworth, & Hare, 2016; Mameno, Kubo, & Suzuki, 2017; Walker, Bruce, & Dale, 2017).

Questions this chapter investigates includes: What are the differences in the risk perceptions of the non-cat owners from the cat owners? What are the differences in the risk perceptions between the cat owners who allow their cats outdoors compared to those who keep their cats indoors? And finally, is there an area of Kamloops where the concern regarding outdoor cats is greater than in other areas? Understanding the factors that influence the risk perceptions will help guide the next steps for risk mitigation.

## Methods

For the purpose of this chapter, for the survey sections, I utilized questions from sections 3, 5 and 7. Section 3, "Outdoor Pet Cats and Risks to Wildlife", which addressed opinions regarding the possible risks associated with pet cats spending time outdoors and previous issues with outdoor cats. Section 5 Question 13, "Cat Ownership and Outdoor Cats - Cat Owners Only", focused on cat ownership behaviour including the type of prey items brought by cats to the house. Section 7 Question 17, "Sociodemographics", identified the area of Kamloops residents lived.

All statistical analysis of the survey data for this chapter was performed using Minitab 2018. From the data collected via surveys from the residents, a t-test and a Mann-Whitney U test, using 95 percent confidence intervals, statistical significance at  $p \leq .05$  level, was run on cat owners (n=376) and non-cat owners (n=208) to determine if there were differences in the means of the risk perceptions of outdoor pet cats.

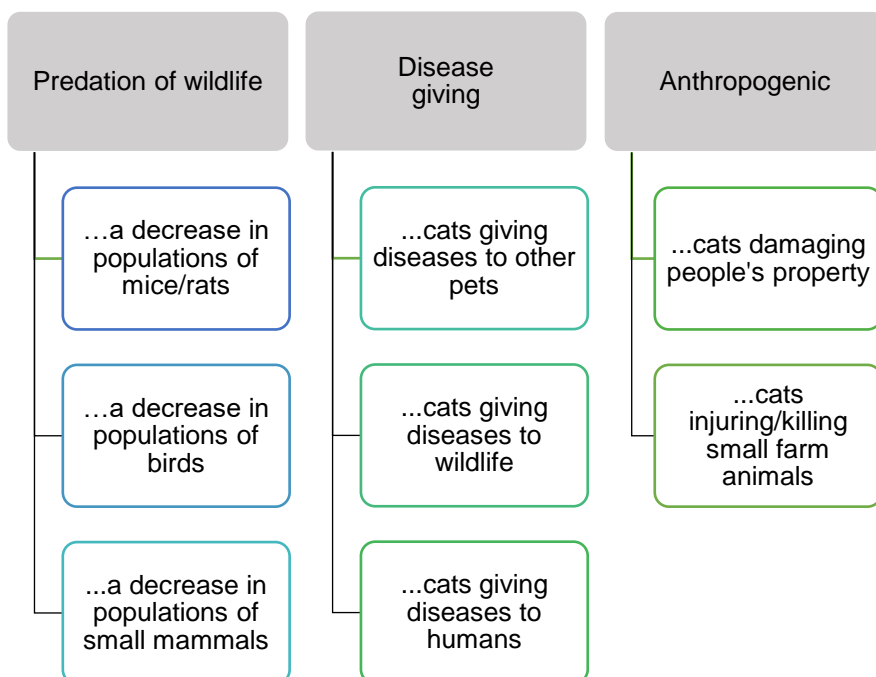
## Risk Perception Categories

The risk-perception items I used were also modelled after the Gramza research (Gramza, Teel, Vande Woude, & Crook, 2016) with slight modifications to the Kamloops area predators. Risk perception categories were divided between risks that outdoor pet cats impose on wildlife and risks pet cats incur while outdoors (Figure 3-2 & 3-3). The risks that are imposed on wildlife are categorized first as predation of wildlife and includes a decrease in



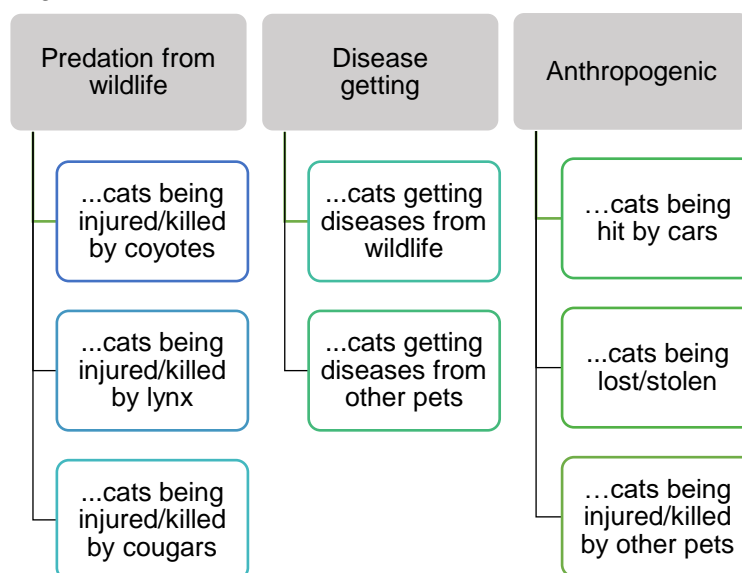
populations of mice or rats, a decrease in populations of birds and a decrease in populations of small mammals (examples: squirrels or gophers). Disease giving is identified as cats giving diseases to other pets, cats giving diseases to wildlife and cats giving diseases to humans. Anthropogenic risks, such as cats damaging people's property (for example, going to the bathroom in yards and digging up gardens), and cats injuring or killing small farm animals like chickens was the third risk.

*Figure 3-2 Risks Outdoor Cats Impose on the Environment*



The risks that are incurred by cats being outdoors are categorized as predation from wildlife, such as cats being injured or killed by coyotes, cats being injured or killed by lynx, or cats being injured or killed by cougars. Disease getting is the second category for risks cats incur while outdoors and includes, cats getting diseases from wildlife and cats getting diseases from other pets like other cats and/or dogs. The final category is anthropogenic, which looks at the risks of cats being hit by cars, cats being lost or stolen and cats being injured or killed by other pets (Figure 3-3).

Figure 3-3 Risks Outdoor Cats Incur From the Environment



This chapter will also outline history of outdoor cat issues by geography of Kamloops and summarize how often cat owners' cats bring home common prey items (whether alive or dead), such as small mammals, rats, mice and birds.

## Results

### Cat Owner Versus Non-cat Owner Risk Perceptions

#### *Perception of Risks Outdoor Pet Cats Impose on Environment*

Survey results from Section 3 (Table 3-1) indicate that cat owners perceive the highest risk outdoor pet cats impose on the environment as a decrease in the populations of mice or rats (mean = 3.93), followed by cats damaging people's property with a mean of 3.88 and finally a decrease in the population of birds (mean = 3.76). Non-cat owners deemed cats damaging people's property as the highest risk cats impose on the environment with a mean of 4.34, followed by the decrease in population of birds as the next most likely risk with a mean of 3.96 and finally a decrease in the population of mice/rats with a mean of 3.67.

For cat owners the least likely risk for outdoor pet cats was cats giving diseases to humans (mean = 2.41) followed by cats injuring or killing farm animals (mean = 2.63) and next being cats giving diseases to wildlife (mean = 2.74). For non-cat owners the least likely risk was also cats giving diseases to humans, they were neutral with the statement regarding

cats giving diseases to wildlife (mean = 3), followed by cats injuring or killing small farm animals, which was deemed moderately likely with a mean of 3.06.

*Perception of Risks Outdoor Pet Cats Incur by Being Outside*

Results from the survey support a similar level of perception of risk when looking at the three highest risks outdoor pet cats incur while outdoors. Cat owners perceived cats being hit by cars as the greatest risk (mean = 4.27), followed by cats being injured or killed by coyotes (mean = 4.17) and cats being lost or stolen with a mean of 3.94. The least likely risk outdoor pet cats are exposed to while outside was cats being injured or killed by lynx (mean = 3.13) and cougars (3.2) and then cats getting diseases from wildlife with a mean of 3.35. For non-cat owners, the highest risk to outdoor pet cats while outside was also cats being hit by cars with a mean of 4.13 and cats being injured or killed by coyotes (mean = 4.13) and finally cats being lost or stolen (mean = 3.86). The least likely risk for non-cat owners was cats being injured or killed by lynx (mean = 3.13) and cats getting diseases from wildlife with a mean of 3.19 and cats being injured or killed by cougars (mean = 3.25).

To assess the results for risk neutrality, lower and upper bound means were created at the 5 percent level of significance level (two-tailed test) and if the lower and upper bounds fell on either of side of neutral (3 = neutral), then neutrality could not be rejected. As noted earlier, the neutral responses (mean = 3) is defined as suggesting indifference, lack of comfort with personal level of knowledge, or a perceived lack of information on the topic was used to rank various questions. For cat owners, risk neutrality was rejected for all levels of risk perceptions. For non-cat owners neutrality was not rejected for two risk perceptions. For risks imposed by outdoor pet cats they included cats giving diseases to wildlife (lower and upper bound means = 2.86 and 3.13 respectively) and cats injuring or killing small farm animals (lower and upper bound means = 2.91 and 3.22 respectively). For the risks outdoor pet cats incur, the only risk perception that resulted in a lower and upper bound mean on either side of 3 was cats being injured or killed by lynx (mean = 2.97 and 3.30 respectively).

Table 3-1 Risk Perceptions of Cat and Non-Cat Owners

		Cat Owner (N = 376)				Non-Cat Owners (N = 208)			
S3Q1: Pet cats spending time outdoors in my neighborhood would result in...		95% Confidence Interval				95% Confidence Interval			
Risk Categories		Mean	Lower bound	Upper bound	Reject neutrality	Mean	Lower bound	Upper bound	Reject neutrality
<b>IMPOSE</b>	... a decrease in populations of mice/rats	3.93	3.82	4.03	Yes	3.67	3.52	3.81	Yes
	... a decrease in populations of birds	3.76	3.66	3.86	Yes	3.96	3.81	4.11	Yes
	... a decrease in populations of small mammals	3.34	3.23	3.44	Yes	3.33	3.18	3.48	Yes
	... cats giving diseases to other pets	3.2	3.10	3.31	Yes	3.23	3.10	3.35	Yes
	... cats giving diseases to wildlife	2.74	2.63	2.85	Yes	3	2.86	3.13	No
	... cats giving diseases to humans	2.41	2.31	2.52	Yes	2.73	2.59	2.87	Yes
	... cats damaging people's property	3.88	3.78	3.98	Yes	4.34	4.22	4.47	Yes
... cats injuring/killing small farm animals	2.63	2.51	2.74	Yes	3.06	2.91	3.22	No	
<b>INCUR</b>	... cats being injured/killed by coyotes	4.17	4.08	4.27	Yes	4.13	4.01	4.25	Yes
	... cats being injured/killed by lynx	3.13	3.01	3.25	Yes	3.13	2.97	3.30	No
	... cats being injured/killed by cougars	3.2	3.08	3.32	Yes	3.25	3.09	3.42	Yes
	... cats getting diseases from wildlife	3.35	3.24	3.46	Yes	3.19	3.06	3.32	Yes
	... cats getting diseases from other pets	3.49	3.39	3.59	Yes	3.26	3.13	3.39	Yes
	... cats being hit by cars	4.27	4.19	4.36	Yes	4.13	4.01	4.25	Yes
	... cats being lost/stolen	3.94	3.84	4.04	Yes	3.86	3.72	3.99	Yes
... cats being injured/killed by other pets	3.61	3.51	3.71	Yes	3.43	3.29	3.57	Yes	

Note: Neutrality tested at the 5% level of significance (two-tailed test)

When addressing the significance of the differences between the means of the two groups, a t-test and then a Mann-Whitney test were used to see if there were any differences between the two groups (Table 3-2). There were significant differences between the means of cat owners and non-cat owners for a majority of the risks cats impose on the environment. The greatest differences was with cats damaging people's property with the difference being -0.46 ( $p < 0.001$ ) with non-cat owners the highest mean at 4.34 compared to cat owners at 3.88. The next largest differences in the means lies with cats injuring or killing small farm animals (-0.43,  $p < 0.001$ ) and cats giving diseases to humans (-0.32,  $p < 0.001$ ) which were both deemed unlikely. The only results that did not have significant differences were the likelihood that cats would decrease the populations of small mammals ( $p=0.971$ ) and cats giving diseases to other pets ( $p=0.775$ ).

With respect to the risks outdoor pet cats incur, most results had little difference in the means. The most significant difference was with the cats getting diseases from other pets. The cat owners perceived the risk to be higher (mean = 3.49) than the non-cat owners (mean - 3.26) with the differences in means at 0.23 ( $p=0.005$ ).

Table 3-2 Risk Perceptions of Cat and Non-Cat Owners – Difference in Means

		Cat Owners (N=376)	Non-Cat Owners (N=208)	Differences in means	t-test for differences in means	Mann-Whitney test for differences	Mann-Whitney test
S3Q1: Pet cats spending time outdoors in my neighborhood would result in...		Mean	Mean		p-value	p-value	Significance
<b>IMPOSE</b>	...a decrease in populations of mice/rats	3.93	3.67	0.26	0.005	<0.001	***
	...a decrease in populations of birds	3.76	3.96	-0.20	0.026	0.004	***
	...a decrease in populations of small mammals	3.34	3.33	0.01	0.971	0.987	
	...cats giving diseases to other pets	3.2	3.23	-0.03	0.775	0.891	
	...cats giving diseases to wildlife	2.74	3	-0.26	0.004	0.002	***
	...cats giving diseases to humans	2.41	2.73	-0.32	<0.001	<0.001	***
<b>INCUR</b>	...cats damaging people's property	3.88	4.34	-0.46	<0.001	<0.001	***
	...cats injuring/killing small farm animals	2.63	3.06	-0.43	<0.001	<0.001	***
	...cats being injured/killed by coyotes	4.17	4.13	0.04	0.575	0.332	
	...cats being injured/killed by lynx	3.13	3.13	0	0.987	0.968	
	...cats being injured/killed by cougars	3.2	3.25	-0.05	0.593	0.585	
	...cats getting diseases from wildlife	3.35	3.19	0.16	0.068	0.047	**
<b>INCUR</b>	...cats getting diseases from other pets	3.49	3.26	0.23	0.005	0.003	***
	...cats being hit by cars	4.27	4.13	0.14	0.055	0.022	**
	...cats being lost/stolen	3.94	3.86	0.08	0.310	0.197	
	...cats being injured/killed by other pets	3.61	3.43	0.18	0.042	0.050	**

Note: \*\*\* significant at the 1%, \*\* significant at the 5%, \* significant at the 10%

## Outdoor Cat Owner Versus Indoor Cat Owner Risk Perceptions

### *Perception of Risks Outdoor Pet Cats Impose on Environment*

When analyzing the differences in risk perception between cat owners who allow their cats outside compared to the cat owners who indicated they have an indoor only cat, risk perceptions were the highest for the same three risks, however the differences in the means were significant (Table 3-3).

Cat owners who allow their cats outdoors constitute 41 percent of the cat owners (N = 155), thus cat owners who indicate they have an indoor only cat make up the remaining 59 percent (N = 221). When just comparing the means for the risks outdoor pet cats impose on the environment, the greatest likelihood of risks for cat owners who allow their cats outdoors were a decrease in the populations of mice or rats (mean = 4.19), then cats damaging people's property (mean = 3.66) and then a decrease in the populations of birds (mean = 3.63). For indoor cat owners the greatest risk cat incur while outdoors was cats damaging people's property (mean = 4.03), then a decrease in the populations of birds (mean = 3.85) and then a decrease in populations of mice or rats (mean = 3.74).

### *Perception of Risks Outdoor Pet Cats Incur by Being Outside*

When it comes to the risks incurred by cats spending time outdoors, the outdoor cat owners rated the risks as follows, the most likely risk with a mean of 3.96 was cats being hit by cars, then cats being injured or killed by coyotes (mean = 3.85) and then a mean of 3.59 for cats being lost or stolen. For indoor cat owners, the greatest perceived risk was cats being hit by cars (mean = 4.49), then cats being injured or killed by coyotes (mean = 4.40) and then cats being lost or stolen with a mean of 4.19.

Once again, risk neutrality was assessed with the lower and upper bound means tested at the 5 percent level of significance level (two-tailed test) and if the lower and upper bounds fell on either of side of neutral (3 = neutral), then neutrality could not be rejected. Again neutrality is defined as a response that suggests indifference, lack of comfort with personal level of knowledge, or a perceived lack of information on the topic was used to rank various questions. For the outdoor cat owners, risk neutrality was deemed neutral for only one area of the risks outdoor pet cats impose on the environment and that was for cats giving diseases to other pets (2.71, 3.01). With respect to risk neutrality and the risks outdoor pet cats incur while outdoors there were more statements that would be deemed

neutral and they include (listed in the order they appear in the chart) cats being injured/killed by lynx (2.67, 3.04), cats being injured/killed by cougars (2.70, 3.08) and cats getting diseases from wildlife (2.83, 3.15). For the indoor cat owners neutrality could not be rejected for only one area and that's in the category of the risks outdoor pet cats impose on the environment and it's cats giving diseases to wildlife (lower bound mean = 2.73; and upper bound mean = 3.02).



Table 3-3 Risk Perceptions of Outdoor Versus Indoor Cat Owners

		Outdoor Cat Owner (N = 155)				Indoor Cat Owners (N = 221)			
S3Q1: Pet cats spending time outdoors in my neighborhood would result in...		95% Confidence Interval				95% Confidence Interval			
Risk Categories		Mean	Lower bound	Upper bound	Reject neutrality	Mean	Lower bound	Upper bound	Reject neutrality
<b>IMPOSE</b>	... a decrease in populations of mice/rats	4.19	4.06	4.33	Yes	3.74	3.59	3.89	Yes
	... a decrease in populations of birds	3.63	3.47	3.78	Yes	3.85	3.72	3.99	Yes
	... a decrease in populations of small mammals	3.25	3.09	3.41	Yes	3.39	3.25	3.54	Yes
	... cats giving diseases to other pets	2.86	2.71	3.01	No	3.44	3.30	3.59	Yes
	... cats giving diseases to wildlife	2.55	2.39	2.70	Yes	2.87	2.73	3.02	No
	... cats giving diseases to humans	2.17	2.03	2.32	Yes	2.58	2.44	2.73	Yes
	... cats damaging people's property	3.66	3.52	3.81	Yes	4.03	3.89	4.16	Yes
	... cats injuring/killing small farm animals	2.38	2.21	2.55	Yes	2.80	2.65	2.94	Yes
<b>INCUR</b>	... cats being injured/killed by coyotes	3.85	3.70	3.99	Yes	4.40	4.29	4.51	Yes
	... cats being injured/killed by lynx	2.85	2.67	3.04	No	3.33	3.18	3.48	Yes
	... cats being injured/killed by cougars	2.89	2.70	3.08	No	3.42	3.26	3.57	Yes
	... cats getting diseases from wildlife	2.99	2.83	3.15	No	3.60	3.46	3.74	Yes
	... cats getting diseases from other pets	3.17	3.02	3.32	Yes	3.72	3.59	3.84	Yes
	... cats being hit by cars	3.96	3.84	4.09	Yes	4.49	4.38	4.60	Yes
	... cats being lost/stolen	3.59	3.44	3.75	Yes	4.19	4.06	4.31	Yes
	... cats being injured/killed by other pets	3.37	3.21	3.53	Yes	3.77	3.65	3.90	Yes

Cat Owner Risk Perceptions and Influence of Previous Issues with Outdoor Cats  
*Outdoor only cats and cat owner risk perceptions*

For cat owners who allow their cats outside (41 percent of cat owners), 75 percent had no previous issues with outdoor cats and 25 percent have had issues in the past with outdoor cats (Table 3-4). Please note that in these cases there is no distinction between pet cats, stray or feral cats, merely outdoor cats.

When it comes to the perception of risks outdoor pet cats impose on the environment, whether the group has had previous issues or not, the ranking of the top three highest risk perceptions were the same. Namely, a decrease in population of mice or rats with a mean of 4.19 for those without issues (with previous issues: mean = 4.21). Next was cats damaging people's property (mean = 3.53 for those without previous issues, and mean = 4.08 for those with previous issues) and finally a decrease in the population of birds (without previous issues: mean = 3.47, and with previous issues: mean = 4.08).

When it comes to the risks incurred by cats, cat owners who have not had previous issues, the highest perception of risk to cats was cats being hit by cars (mean = 3.87) and the second highest risk incurred by cats when outside are cats being killed or injured by coyotes (mean = 3.80) and cats being lost/stolen (mean = 3.47). For those who do allow their cats outside and have had issues with outdoor cats in the past, the highest perception of risk was cats being hit by cars with a mean of 4.23 and then cats being lost or stolen and cats being killed or injured by coyotes with means = 3.95 and cats being killed/injured by other pets (mean = 3.82).

The differences in the means between the outdoor cat owners who have not had previous issues and those who have had previous issues, demonstrates the greatest difference in means for the risks outdoor pet cats impose on the environment occurs with: cats giving diseases to humans (-0.69; p-value = 0.001); cats giving diseases to wildlife (-0.64; p-value = 0.002); cats decreasing the population of birds (-0.60; p-value = 0.001); and cats damaging people's property (-0.55; p-value = 0.001). For the category of risks outdoor pet cats incur, for outdoor cat owners, the greatest differences in means occurs with the perception of risks for cats getting injured or killed by other pets (-0.60; p-value = 0.001); followed by cats getting diseases from wildlife (-0.56; p-value = 0.004) and finally cats being lost or stolen (-0.48; p-value=0.005). Thus, previous issues with outdoor cats for outdoor cat owners does

appears to have an influence on the risk perceptions, except when it comes to decreasing the population of mice/rats. And previous issues with outdoor cats doesn't appear to influence the perception of the risk imposed on outdoor cats when it comes to predation from wildlife, namely cats being injured/killed by coyotes, lynx or cougars.

Table 3-4 Outdoor Cat Owner Risk Perception Based on History of Cat Issues

		No Issues (N=116; 75%)	Issues (N=39; 25%)	Differences in means	t-test for differences in means	Mann-Whitney test for differences	Mann-Whitney test
S3Q1: Pet cats spending time outdoors in my neighborhood would result in...		Mean	Mean		p-value	p-value	Significance
<b>IMPOSE</b>	...a decrease in populations of mice/rats	4.19	4.21	-0.01	0.921	0.978	
	...a decrease in populations of birds	3.47	4.08	-0.60	<0.001	0.001	***
	...a decrease in populations of small mammals	3.14	3.59	-0.45	0.023	0.024	**
	...cats giving diseases to other pets	2.77	3.13	-0.36	0.077	0.057	*
	...cats giving diseases to wildlife	2.39	3.03	-0.64	0.003	0.002	***
	...cats giving diseases to humans	2.00	2.69	-0.69	0.001	<0.001	***
<b>INCUR</b>	...cats damaging people's property	3.53	4.08	-0.55	0.001	0.001	***
	...cats injuring or killing small farm animals	2.22	2.85	-0.63	0.009	0.010	**
	...cats being injured/killed by coyotes	3.80	3.97	-0.17	0.329	0.209	
	...cats being injured/killed by lynx	2.88	2.77	0.11	0.643	0.529	
	...cats being injured/killed by cougars	2.88	2.92	-0.04	0.851	0.892	
	...cats getting diseases from wildlife	2.85	3.41	-0.56	0.006	0.004	***
...cats getting diseases from other pets	3.05	3.49	-0.43	0.026	0.016	**	
<b>INCUR</b>	...cats being hit by cars	3.87	4.23	-0.36	0.007	0.017	**
	...cats being lost/stolen	3.47	3.95	-0.48	0.012	0.005	***
	...cats being injured/killed by other pets	3.22	3.82	-0.60	<0.001	0.001	***

Note: \*\*\* significant at the 1%, \*\* significant at the 5%, \* significant at the 10%

*Indoor only cats and cat owner risk perception*

For cat owners, 59 percent stated they have an indoor-only cat, and of those indoor-only cat owners, 62 percent had no previous issues with outdoor cats, and 38 percent have had issues in the past with outdoor cats (Table 3-5).

For those indoor-only cat owners who have not had previous issues, when it comes to the risks outdoor pet cats impose on the environment, the highest perception of risk occurred with the decrease in population of mice or rats with a mean of 3.92, decreasing the population of birds (mean = 3.70) and cats damaging people's property (mean = 3.65). For those who have had previous issues with outdoor cats, when it comes to the risks outdoor cats impose on the environment, the highest perception of risk was cats damaging property (mean = 4.62) and cats decreasing bird populations (mean = 4.09) and cats giving diseases to other pets (mean = 3.81).

When it comes to the risks incurred by cats, those indoor-only cat owners who have not had previous issues with outdoor cats in the past, the highest perception of risk cats being injured or killed by coyotes (mean = 4.36), the second highest risk incurred by cats when outside is cats being hit by cars (mean = 4.29) and then cats being lost or stolen with a mean of 3.96. Those who have had issues, the highest perception of risk was cats being hit by cars with a mean of 4.81, then cats being lost or stolen (mean = 4.54) and finally cats being injured/killed by coyotes (mean = 4.47).

The differences in the means between the indoor-only cat owners who have not had previous issues and those who have had previous issues were significant (at the 1 percent) for almost every statement with respect to the risks outdoor pet cats impose on the environment. The one statement where there was significance at the 5 percent was decreasing populations of small mammals (-0.32; p-value=0.033). For the category of risks outdoor pet cats incur, there are significant differences in means at the 1 percent for all statements, except for two: cats being injured/killed by lynx (-0.23; p-value=0.184) and cats being injured/killed by cougars (-0.12; p-value=0.424). Thus, previous issues with outdoor cats would appear to influence the risk perceptions for indoor-only cat owners.

Table 3-5 Indoor Cat Owner Risk Perceptions Based on History of Cat Issues

		No Issues (N=136; 62%)	Issues (N=85; 38%)	Differences in means	t-test for differences in means	Mann-Whitney test for differences	Mann-Whitney test
S3Q1: Pet cats spending time outdoors in my neighborhood would result in...		Mean	Mean		p-value	p-value	Significance
	Risk Categories						
<b>IMPOSE</b>	...a decrease in populations of mice/or rats	3.93	3.48	0.45	0.004	0.001	***
	...a decrease in populations of birds	3.70	4.10	-0.40	0.003	0.007	***
	...a decrease in populations of small mammals	3.28	3.59	-0.30	0.036	0.033	**
	...cats giving diseases to other pets	3.20	3.82	-0.61	<0.001	<0.001	***
	...cats giving diseases to wildlife	2.65	3.22	-0.57	<0.001	<0.001	***
	...cats giving diseases to humans	2.41	2.85	-0.45	0.003	0.005	***
<b>INCUR</b>	...cats damaging people's property	3.64	4.60	-0.96	<0.001	<0.001	***
	...cats injuring or killing small farm animals	2.54	3.22	-0.68	<0.001	<0.001	***
	...cats being injured/killed by coyotes	4.35	4.47	-0.12	0.289	0.092	*
	...cats being injured/killed by lynx	3.24	3.44	-0.20	0.206	0.184	
	...cats being injured/killed by cougars	3.36	3.46	-0.10	0.521	0.424	
	...cats getting diseases from wildlife	3.43	3.83	-0.39	0.005	0.007	***
...cats getting diseases from other pets	3.52	4.05	-0.52	<0.001	<0.001	***	
<b>INCUR</b>	...cats being hit by cars	4.27	4.80	-0.54	<0.001	<0.001	***
	...cats being lost/stolen	3.95	4.53	-0.58	<0.001	<0.001	***
	...cats being injured/killed by other pets	3.57	4.09	-0.53	<0.001	<0.001	***

Note: \*\*\* significant at the 1%, \*\* significant at the 5%, \* significant at the 10%

*Non-cat owner perception of risk and influence of previous issues with outdoor cats*

For non-cat owners, 59 percent of them stated that they have had previous issues with outdoor cats in their neighbourhood (Table 3-6). Again, please note that in these cases there is no distinction between pet cats, or stray or feral cats, merely outdoor cats. For those non-cat owners who have not had previous issues (41 percent), when it comes to the risks outdoor cats impose on the environment, the highest risk perception occurred with the decrease in population of mice or rats with a mean of 3.76, damaging people's property (mean = 3.74) and decreasing populations of birds (mean = 3.55). For those who have had previous issues with outdoor cats, the highest perception of risk was cats damaging property (mean = 4.76) and cats decreasing bird populations (mean = 4.25) and decreasing population of mice/rats (mean = 3.61).

When it comes to the risks incurred by cats, those non-cat owners who have not had previous issues, the highest perception of risk remained with cats being hit by cars (mean = 4.06), the second highest risk incurred by cats when outside is cats being injured or killed by coyotes (mean = 4.01) and finally cats being lost/stolen (mean = 3.71). For the non-cat owners who have had previous issues, the highest perception of risks was cats being hit by cars (mean = 4.18), followed by cats being lost/stolen (mean = 3.96) and then cats being injured/killed by coyotes (mean = 3.61).

The differences in the means between the non-cat owners who have not had previous issues and those who have had previous issues were significant (at the 1 percent) for almost every statement with respect to the risks outdoor pet cats impose on the environment. The one statement where there was no significant difference was in decreasing populations of mice/rats (0.15; p-value=0.221). For the category of risks outdoor pet cats incur, it's interesting, that the greatest differences in the means, at the 1 percent, for non-cat owners resides with the cats getting diseases from wildlife (-0.37; p-value=0.005) and cats getting diseases from other pets (-0.34; p-value=0.010), but the means show responses close to neutral on those statements.

Table 3-6 Non-Cat Owners Risk Perceptions Based on History of Cat Issues

		No Issues (N=114; 75%)	Issues (N=37; 25%)	Differences in means	t-test for differences in means	Mann-Whitney test for differences	Mann-Whitney test
S3Q1: Pet cats spending time outdoors in my neighborhood would result in...		Mean	Mean		p-value	p-value	Significance
<b>IMPOSE</b>	...a decrease in populations of mice or rats	3.76	3.61	0.15	0.320	0.221	
	...a decrease in populations of birds	3.55	4.25	-0.70	<0.001	<0.001	***
	...a decrease in populations of small mammals	3.00	3.57	-0.57	<0.001	<0.001	***
	...cats giving diseases to other pets	2.98	3.40	-0.43	0.001	0.001	***
	...cats giving diseases to wildlife	2.74	3.17	-0.43	0.002	0.001	***
	...cats giving diseases to humans	2.31	3.02	-0.70	<0.001	0.001	***
<b>INCUR</b>	...cats damaging people's property	3.74	4.76	-1.02	<0.001	<0.001	***
	...cats injuring or killing small farm animals	2.69	3.33	-0.64	<0.001	<0.001	***
	...cats being injured/killed by coyotes	4.01	3.61	0.40	0.102	0.057	**
	...cats being injured/killed by lynx	2.94	3.27	-0.33	0.053	0.048	**
	...cats being injured/killed by cougars	3.07	3.39	-0.32	0.067	0.074	*
	...cats getting diseases from wildlife	2.98	3.34	-0.37	0.005	0.005	***
...cats getting diseases from other pets	3.06	3.40	-0.34	0.010	0.010	***	
	...cats being hit by cars	4.06	4.18	-0.12	0.303	0.153	
	...cats being lost/stolen	3.71	3.96	-0.25	0.065	0.044	**
	...cats being injured/killed by other pets	3.29	3.53	-0.24	0.109	0.116	

Note: \*\*\* significant at the 1%, \*\* significant at the 5%, \* significant at the 10%



*Cat owners and non-cat owners with outdoor cat issues by location*

From the 17 regions listed in the survey, 6 locations were created based on geographical groupings and survey respondents. East Kamloops was composed of Barnhartvale; Dallas; Juniper, Rose Hill/Knutsford; and Valleyview. West Kamloops was composed of Heffley; Rayleigh; Westmount/Batch; and Westsyde. North Kamloops had areas Brocklehurst and North Shore. Aberdeen and Dufferin were another area. Lower and Upper Sahali were aggregated into one. Finally, Downtown and West End were combined.

In all locations, non-cat owners reported more issues with a history with outdoor cats than cat owners. The locations that reported the most issues with outdoor cats by percentage was North Kamloops for the cat owners (45.7 percent) and for the non-cat owners it was West Kamloops at 70.4 percent. The next location with the highest number of respondents who indicated they had issues with outdoor cats in the past 12 months, was East Kamloops for the cat owners (37.3 percent) and Aberdeen for non-cat owners (62.5 percent) (Table 3-7).

*Table 3-7 Outdoor Cat Issues by Location*

Location	Number of Cat Owners	Number of Cat owners with History of Outdoor Cat Issues	%	Number of Non-Cat Owners	Number of Non-Cat Owners with History of Outdoor Cat Issues	%
East Kamloops	67	25	37.3	38	22	57.9
West Kamloops	53	17	32.1	27	19	70.4
North Kamloops	81	37	45.7	40	24	60.0
Aberdeen	45	8	17.8	24	15	62.5
Sahali	64	19	29.7	42	18	42.9
Downtown	50	14	28.0	34	21	61.8
Total*	360	120	33.3	205	119	58.0

\*8 Cat Owners and 3 Non-Cat Owners did not list a location

*Prey items by type and location*

Based on the reports of the prey items outdoor cat owner's cats bring to their house, the most common prey item is mice with the highest count of mice in East Kamloops (Table 3-8). It is worth noting that previous research states cats only bring 25 percent of their prey home (The Stewardship Centre for BC, n.d.)

Table 3-8 Prey Items by Type and Location

	<b>Prey</b>	<b>Never</b>	<b>Rarely</b>	<b>Occasionally</b>	<b>Often</b>	<b>Very Often</b>
Total	Small Mammals	128	18	5	1	1
	Rats	129	18	5	0	1
	Mice	47	45	16	27	19
	Birds	67	58	22	7	0
East Kamloops: Barnhartvale; Dallas; Juniper; Rose Hill/ Knutsford; Valleyview	Small Mammals	18	6	3	0	1
	Rats	22	5	0	0	1
	Mice	5	7	3	7	6
	Birds	11	12	4	1	0
West Kamloops: Heffley; Rayleigh; Westmount/ Batchelor Heights; Westsyde	Small Mammals	19	4	1	0	0
	Rats	20	3	1	0	0
	Mice	6	9	2	4	4
	Birds	13	4	6	2	0
North Kamloops: Brocklehurst; North Shore	Small Mammals	29	1	0	0	0
	Rats	25	4	1	0	0
	Mice	11	13	3	3	0
	Birds	14	14	2	0	0
Aberdeen: Aberdeen; Dufferin	Small Mammals	13	0	0	1	0
	Rats	13	0	1	0	0
	Mice	4	3	0	3	4
	Birds	4	7	2	1	0
Sahali: Lower Sahali; Upper Sahali	Small Mammals	12	2	1	0	0
	Rats	11	4	0	0	0
	Mice	4	4	3	3	1
	Birds	5	4	5	1	0
Downtown: Downtown; West End	Small Mammals	24	0	0	0	0
	Rats	24	0	0	0	0
	Mice	10	5	5	4	0
	Birds	12	9	3	0	0

## Discussion

The bidirectional risks that outdoor pet cats impose on the environment and incur while outdoors has an impact on both the wildlife/environment, as well as the welfare of the cat. Gaining an understanding of the residents of Kamloops' perceptions of those risks is an important step in determining risk mitigation strategies that will be effective. This chapter categorized perceptions of risk into three main areas, predation of/from wildlife; disease giving/getting; and anthropogenic, for both impose and incur in order to understand the risk

perceptions and the differences in those risk perceptions for both cat owners and non-cat owners. Within the survey respondents who were cat owners, a further breakdown in the responses was evaluated between the outdoor cat owners and the indoor-only cat owners.

Out of all the risks outdoor cats impose on the environment, the highest perception of risk for outdoor cat owners was the decrease in the population of mice and for indoor cat owners it was damaging people's property. This is interesting in that it could provide insight into a reason why outdoor cat owners allow their cats outdoors, namely they see cats as providing a service to the community with rodent control. One can see how decreasing the population of mice or rats could be seen as a result with positive impact, which aligns with the evidence from chapter two that showed the outdoor cat owners agree that cats play a useful role as predators. However, there is research that demonstrates reducing mice or rat populations is effectively achieved by its natural predator, the owl (Great Horned and Barn Owls). The indoor cat owners see outdoor cats causing damage to people's property, thus perhaps that contributes to why they keep their cat indoors, ie. to reduce the nuisance to neighbours. Those results do not align with the results regarding indoor cat owners seeing outdoor cats as a nuisance (in chapter two the mean = 2.88 which is close to 3/neutral). These variations in results may be an example of respondent inconsistency.

Non-cat owners perceived the risks to be more likely for outdoor pet cats decreasing bird populations and damaging people's property, which is understandable given those are the two highest concerns most mentioned in any dialogue with non-cat owners (Haydee et al., 2006). There was no significant differences in the risks of outdoor pet cats being lost or stolen, or cats being killed or injured by coyotes, both groups deemed those risk to be very likely.

When looking at the three highest risks outdoor pet cats incur while outdoors. Cat owners perceived cats being hit by cars as the greatest risk, followed by cats being injured or killed by coyotes, and cats being lost or stolen. Through analysis of the risk perceptions based on previous history of issues with outdoor cats in neighbourhoods in the past 12 months, the results indicated significant differences in the risk perceptions for those cat owners and non-cat owners, which supports it as an influencing factor. As noted in the results section, the locations which reported the most issues with outdoor cats for the cat owners was North Kamloops (45.7 percent) and East Kamloops (37.3 percent), and West Kamloops (32.1

percent). For the non-cat owners it was West Kamloops at 70.4 percent, Aberdeen (62.5 percent), and then Downtown (61.8 percent). So any kind of education campaign would be beneficial to most areas in Kamloops.

Outdoor cat owners who perceive risks incurred and imposed by outdoor pet cats are the cat owners who are putting their cats at the most risk and are potentially having an impact on the environment with their behaviour. In this research, outdoor cat owners comprised of 41 percent of the respondents (n=155). Of the 155 survey respondents, if each respondent has only one cat, that's 155 cats roaming unsupervised. The following chapter will look at the value of a statistical life of a cat, which may be useful for influencing the behaviour of the outdoor cat owner and guide risk mitigation strategies.

## Chapter 4 - The Value of a Statistical Life of a Cat in Kamloops



Figure 4-1 Cat Drawing  
(Source: <https://www.maxpixel.net/>)

### Introduction

The Humane Society of Canada reports that even though cats and dogs are the most popular companion animal, cats don't receive the same "care and consideration in society" as dogs (The Canadian Federation of Humane Societies, 2017). This lack of care and consideration of the cat, which may be seen as the cat having less value than the dog, may be demonstrated in the Cats in Canada Report by the number of cats admitted to the shelters, number of cats reclaimed, the number sterilized, by the estimates of the stray and feral cat populations, and number of cats euthanized each year. This perception of the value of cats contributes to the concerns that are being raised by wildlife conservationists because despite the risks outdoor pet cats face, cat owners continue to allow their cats outdoors unsupervised and these unsupervised outdoor pet cats then contribute to the issues identified in the Cats in Canada report listed above. This would lead one to believe that perhaps those cat owners don't value their cats, but measuring value of a pet cat is challenging. When it comes to human behaviour, in relation to their cat, there are several factors to consider. As the results from chapter two provided, some cat owners believe their cat is happier outside, thus allowing their cat outdoors would seem to indicate they place a high value on their cat and their happiness. Some cat owners see cat predation as a positive outcome from the cat being outdoors, especially when it comes to rodent control, as was demonstrated in both chapter two and three. Cat owners do see the predation on birds as an issue, but believe that their cat is not responsible or that their cat does not successfully prey upon enough birds to have a negative impact (Crowley, Cecchetti, & McDonald, 2019). However, cat owners also consider the risks their cat faces when outside in terms of dying prematurely due to being hit

by a car, getting lost or being preyed upon by coyotes. Cat owners who let their cats outside must think that the benefits their cat gets from being outside exceeds the costs measured in the risk their cats faces when roaming outside unsupervised. Cat owners who do not let their cats outside believe the risk far exceed the benefits otherwise their cats would be also roaming unsupervised. However, cat owners may be willing to pay to reduce marginally the risks a cat faces while many other do not. This is the theme of this chapter to determine if cat owners are willing to pay to reduce the risks of cats dying prematurely.

Implementing risk mitigation strategies to address the above cat owner beliefs about risks remains a challenge. Campaigns that present the science behind bird mortality and outdoor cats have been deemed ineffective (McLeod, Driver, Bengsen, & Hine, 2017). Other campaigns have appealed to the cat owners from the direction that the cat is at risk while outdoors and if the cat owners want a safe and happy cat, mainly, if the cat owner values their cat, they will not allow it outdoors unsupervised (Cats and Birds, n.d.). As with a multi-pronged issue, a multi-pronged approach is necessary.

This chapter will look at a unique approach to finding the value of a statistical life of pet cats, namely through the application of the economic theory on the value of a statistical life (VSL) of humans. VSL will be explored within the realm of Kamloops cat owners' willingness to pay to reduce the risk of outdoor pet cats dying prematurely through cat bylaw officers or increasing support to a local animal welfare organization. VSL can help assess the effectiveness of municipality programs that attempt to reduce the risks. The benefits are in dollars of the benefits of avoided premature deaths and the costs are in terms of implementing the risk mitigation programs. This chapter also examines the view on cat licensing for both outdoor and indoor cat owners as well as the defensive measures outdoor cat owners employ to keep their cat safe while outdoors reducing the risks of their cats. Since defensive measures cost money, it shows that cat owners are willing to pay to reduce the risks and hence place a value on the statistical life of a cat. Each of the above strategies may provide insight into cat owner behaviour and identify unique options that may help guide risk mitigation campaigns.

## The Value of a Statistical Life Theory

The value of a statistical life (VSL) theory places a value on how much people are willing to pay (WTP) for a small reduction in the risk of dying prematurely from any number of risks (Andersson & Treich, 2008; Viscusi, 2005). This terminology can raise controversy if misinterpreted, namely people may think it's about how much individuals are willing to pay for an *identified life*. Thus other terms used in literature attempt to clarify the concept by using the following terms instead: value per statistical life (Howard, 1984), value per life saved (Jones-Lee, 1976), and value of prevented fatality (Jones-Lee, 2004). The VSL approach is best applied, according to economists, when changes in the risk are small and similar among the affected population (Andersson & Treich, 2008). Mortality risk reductions is a non-marketed good and therefore estimating the VSL relies on non-market valuation methods. The methods can be divided into two categories, the revealed preference (RP) method and the stated preference (SP) method (also called contingency valuation method). The revealed preference method uses information from choices made by individuals, and stated preferences utilize hypothetical market scenarios. RP is preferred by economists because they are based on actual behaviour and deemed more consistent, however the method does assume the respondents are informed on the topic. SP method is useful when market data does not exist and it is more flexible because it allows the researcher to tailor the survey questions to gather the necessary data for the topic, thus it's employed for estimating VSL for a wide variety of areas (Andersson & Treich, 2008).

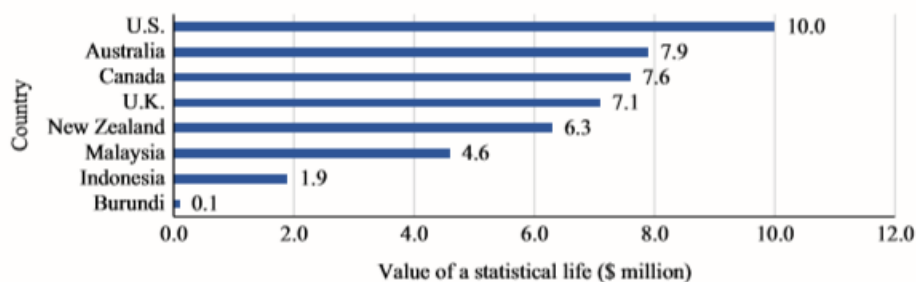
Viscusi's work in this area also discusses how presenting hypothetical questions to ascertain the willingness to pay amount is often used in the literature on the value of life (Viscusi, 2005). Once again, he refers to studies that can be classified as contingent valuation surveys or stated preference surveys. The survey evidence is most useful when addressing issues that can't be assessed using market data. Many environmental policies, which may address standards for air pollution or contaminants in drinking water, conduct analysis to determine if the costs of the risk mitigation is worth the potential lives saved from those risk mitigation strategies (Harris & Roach, 2018). Thus, somehow a value of a human life needs to be calculated. To calculate value of a life, Viscusi explains two principal value-of-life concepts, namely the optimal insurance amount and the value needed for deterrence.

Insurance value is, essentially, how much an individual will be paid following an accident that is equal to how much they would have earned if the accident hadn't occurred. With the value needed for deterrence, Viscusi poses the question: "What value for a fatality sets the appropriate incentives for those avoiding the accident?" (Viscusi, 2005) or how much are people willing to pay to prevent a small risk of death? (Schelling, 1968). Government regulations use VSL to place a dollar value on risk reduction benefits. The example provided by Viscusi outlines if people are willing to pay \$700 to eliminate risk of death of 1/10,000 the VSL is the \$700 multiplied by the inverse of 1/10,000 = \$7 million. Thus, the value of a statistical life in this example is \$7 million.

In a recent publication by Viscusi, he summarizes representative VSL values used throughout the world (Viscusi, 2018) (Figure 4-2). In essence, VSL is utilized in many arenas of decision-making, such as with the policy value for mortality risks, for corporate risk decisions, in regulatory sanctions, and in personal injury litigation. Given the flexibility and adaptability of WTP and VSL, it will be interesting to see how it can be adapted to animal welfare, and for the purposes of this chapter, outdoor pet cats.

*Figure 4-2 VSL Estimates*

*International VSL Estimates Based on US Values [Colour figure can be viewed at wileyonlinelibrary.com]*



### The VSL Applied to Outdoor Cat Owners

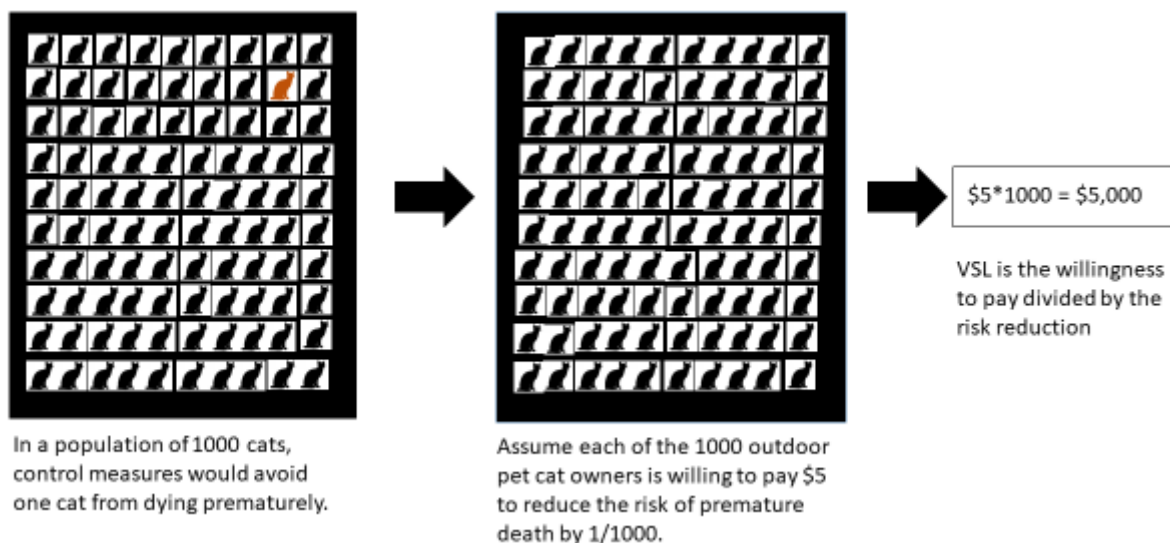
The revealed or the stated preference method can be useful to make inference on the value of a statistical life of a cat. First, by looking at how much households spend to protect their cat from dying prematurely would fall into revealed preferences methodology. Spending on defensive measures would be an approach to use to assess the value of a statistical life of a cat. Alternatively, one can use the stated preference methodology by asking people how much they are willing to pay to reduce the risk marginally of their pet cat dying prematurely from risks when outdoors. To illustrate, consider a population of one thousand pet cats



roaming outdoors in the city. There is a risk that one will die prematurely from predators. Control measures, if taken, would avoid this one premature death and thus reduce the risk by 1/1,000. Assume each household has one cat and each is willing to pay \$5 on average to reduce the risk of premature death. Then the value of a statistical life of a cat is \$5,000.

Figure 4-3 illustrates.

Figure 4-3 Visual Depiction of VSL Theory



In the above example, the value of a statistical life of a cat is \$5,000. Another way of looking at this \$5,000 figure is think of it as the benefits of the control measures undertaken for each avoided death of a cat from predators. Hence, if control measures taken in a particular community avoids say one hundred cats from dying prematurely every year, then the benefits of these measures is \$500,000 per year. If the costs of the control measures are lower than \$500,000 per year, then the community should take these measures.

#### Defensive Measures Supporting VSL

Within the revealed preferences methodology one approach is the use of defensive measures, or defensive expenditures, to reduce exposure to environmental harm (Harris & Roach, 2018). Harris & Roach (2018) use the example regarding concerns with drinking water and how some may purchase bottled water, while others would install a water purification method. The information gathered from the amount of money spent or time for improvements to environmental quality can be used to infer the WTP. Another study looked

at the averting actions that households take to avoid exposure to arsenic-contaminated water and used this information to frame the parent's valuation of their own and their child's health (Aziz, Boyle, & Crocker, 2015). An example of defensive expenditures is demonstrated through research Lanz & Provins (2016) conducted on England and Wales residents' purchases of water filter to address the aesthetics of water (taste, colour etc.) or a water softener to address the issues that arise with hard water (Lanz & Provins, 2016). Yet another example of this approach is with respect to air pollution and the purchase of air masks. Zhang and Mu gathered "new empirical evidence of pollution avoidance that Chinese urban residents purchase particulate-filtering facemasks to protect against ambient air pollution" (Zhang, 2018). By using the data gathered from the amount the money people spend to reduce environmental risks, or the time spent to improve conditions, that information can be used to determine WTP for quality changes. In this chapter, monetary assignment to defensive measures was not part of the survey, so determining WTP for the changes in the risks to cats can't be quantified, however using descriptive statistics to demonstrate the kinds of defensive measures cat owners take when allowing their cat to roam unsupervised will assist in understanding the cat owners' behaviour and potentially the value of a statistical life they place on a cat.

#### Defensive Measures Applied to Outdoor Cat Owners

Risk mitigation strategies, or defensive measures, cat owners employ to reduce the risks their cat faces when outdoors vary from minimal restriction such as an ID collar to greater restriction as with an outdoor enclosure. In the survey, outdoor cat owners were provided with seven restrictions to choose from and they could choose more than one, plus they had the option of revealing their own restriction not listed, as well as no restrictions, in other words their cat can roam unsupervised. This information provides insight into another level of value of a cat for Kamloops cat owners.

#### Cat Licensing as a Defensive Measure

As part of the BC SPCA's ongoing work in the field of animal welfare they have been working to improve the laws surrounding care of animals. They have "Partnered with municipalities to adopt humane bylaws that help to end animal suffering and supporting

communities to increase restrictions on exotic pets.” (BC SPCA, n.d.). Included in their work to improve the laws, the BC SPCA developed a Model Animal Responsibility Bylaw and within that document is a section on companion animal licensing and identification which includes details regarding cat registration and licensing (BC SPCA, 2017). The reasons for the BC SPCA’s push for municipalities to adopt mandatory identification or licensing comes from a rise in the number of lost or stolen animals who are in shelters and remain unclaimed.

In 2015, the BC SPCA reviewed current bylaws from all of BC’s municipalities and regional districts and found that “Nearly every B.C. municipality... has bylaws in place for the following purposes: licensing of dogs, prohibition of dogs at large, operating pounds for the housing of stray dogs, subsidized licensing of sterilized dogs, requirements for greater control of dangerous dogs.” (BC SPCA, 2015). It is noted that not only are the number of cats that come into the shelter higher than that of dogs, but that the number of cats reclaimed is lower which exacerbates the issue of the number of cats in shelter care. In the BC’s Municipal Animal Bylaws report the statistics, which are based on 2013 numbers, indicate that approximately 76 percent of stray dogs are reclaimed by owners from the BC SPCA, compared to approximately 12.5 percent of stray cats. In the most recent study by the Humane Society (The Canadian Federation of Humane Societies, 2017) in 2016, as a proportion of total intake, 30 percent of dogs and 5 percent of cats were reclaimed by their guardian. The report does state that a better indicator of reclaim rates is the percentage of stray animals returned to their guardians and those percentages were that 63 percent of stray dogs and 10 percent of stray cats were reclaimed. The BC SPCA 2017 Annual Report provides only a total number of lost pets reunited with their guardians at 3861 and doesn’t distinguish between the cats and the dogs, which constitutes 7.88 percent of the total number of animals assisted across BC (BC SPCA, 2017).

According to the BC SPCA Model Animal Responsibility Bylaw (BC SPCA, 2017), the BC SPCA takes in more than 14,000 cats each year of which half are stray cats. Few municipalities require cat licensing. Based on their research cat welfare improves with regulatory and educational initiatives. Cat licensing has demonstrated numerous benefits which include higher “return-to-owner” rates, reducing cat overpopulation with incentives to spay/neuter with differential licensing fees, and licensing raises revenue for a community to improve animal control services.

In Kamloops, there is a general Animal Control Bylaw 34-11, which applies to dogs, cats, farm animals, urban hens, beekeeping, registered guide dogs and personal assistance dogs, aggressive dogs, dogs in parks, kennels, pounds, and penalties (City of Kamloops, 2004). Specific bylaw 34-21 applies to cats and refers to voluntary licensing of one cat is \$40 for its lifetime. In discussion with the Bylaw Manager, currently no cats are registered (personal communication, City of Kamloops Bylaw Manager, 2017). The City of Kamloops does have a bylaw specific for dog licensing which indicates a mandatory licensing of each dog with rates adjusted based on a neutered dog at \$30 per year, un-neutered dog \$65 or a nuisance/potentially dangerous dog at \$105 and a dangerous dog at \$205 (City of Kamloops, 2019). Based on the research and data collected by animal welfare organizations in Canada it would appear that mandatory licensing and identification (microchip and tattoo) are measures that would reduce the risk of cats being harmed due to animal control officers being able to return the cat to its' owner, and provide support for the animal control services. However, for the licensing and identification to be effective there needs to be supports in place to implement the bylaws and often there is a lack of confidence in the effectiveness of such regulations.

The Guelph Cat Population Taskforce has key information on their webpage in relation to identification (Guelph Cat Population Task Force, a) that clearly outlines the need and the benefits of cat identification.

This chapter will examine the application of VSL to the topic of outdoor pet cats, explore defensive measures cat owners may take to keep their cat safe which includes cat owners' interest in licensing. These strategies may provide a unique perspective for animal welfare advocates and policy makers to utilize when exploring ways to influence behaviour change in cat owners. Clearly animal welfare stakeholders support bylaws that would implement mandatory licensing and some endorse mandatory no roaming bylaw. Conservation stakeholders obviously would endorse the same, especially the latter. The barrier remains with municipalities and outdoor cat owners. Kamloops city council was approached in 2013 by a concerned citizen which garnered little traction (Young, 2013). By demonstrating the value of a cat through VSL and WTP may appeal to municipalities and cat owners and sway resistance to bylaws and licensing as conservation initiatives.

## Methods

For the purposes of this chapter, I utilized the Scenario Section and Section 5 (both for cat owners only). The Scenario Section presented a case in which cat owners could reduce the risk of outdoor pet cats dying prematurely for a fee. The reduction was from a risk of 5 in 1000 dying prematurely to 1 in 1000 a 4/1000 reduction in risk (i.e., a small reduction). Figure 4-4 and 4-5 illustrates the scenario:

*Figure 4-4 Risk Reduction Scenario*

**SCENARIO SECTION - Please answer the following in relation to the scenario.**

Across Canada the risk to outdoor pet cats dying prematurely from any cause is approximately 5 in 1000. Suppose controls would reduce the risk to 1 in 1000 (or by 20%).

*Figure 4-5 Willingness to Pay*

Would you be willing to pay to reduce the risk of outdoor pet cats dying prematurely?

- Yes - proceed to question 2.
- No - proceed to question 3.

How much more per year would you be willing to pay to reduce the risk of outdoor pet cats dying prematurely (for example, through the hiring cat bylaws officers or increasing support to a local animal welfare organization)?



- \$10.00
- \$20.00
- \$30.00
- \$40.00
- \$50.00
- Other amount \_\_\_\_\_

If the cat owners were not willing to pay a fee, then they were asked to give reasons as to why this was the case. Reasons respondents could choose from included the following: I don't believe outdoor pet cats are at risk while outdoors; I can't afford to pay for controls; I'm not interested in paying for controls; I'm not interested in paying for controls, because I'm only concerned about my indoor cat; and other, please specify. Respondents could choose more than one and had space to provide their own reason(s). Section 5 Question 7 provides results on situations that have occurred with a cat in their current residence. Namely

has their cat been injured or killed by a predator, gotten a disease, or lost/stolen, or killed/injured by a car etc. Next, WTP answers were compared to answers from Section 5 Question 14, the defensive measures or restrictions.

Using Minitab, I conducted descriptive statistics to determine the average WTP, which were then utilized in the VSL equation. Excel spreadsheets and the formulas were applied to lower and upper bounds, calculation of ‘# of’ and “%”.

## Results

### Applying the VSL to Cats

The outdoor cat owners who were willing to pay for control measures constituted 43 percent of the outdoor cat owners (N=67). For the outdoor cat owners the highest frequency for the value of a statistical life is \$2,500 (N=22), \$5,000 and \$12,500 (N=17 for both). The indoor cat owners who were willing to pay constituted 61 percent of the indoor cat owners (N=103), the highest frequency observed for VSL was \$5,000 (N=33), \$12,500 (N=27) and \$2,500 (N=22). Comparison of the lowest to the highest VSL value vary significantly from \$2500 to \$75000. The average VSL of a cat in Kamloops for outdoor cat owners is \$7,485 and 95 percent CI [\$6,160, \$8,809]. The average WTP was \$29.94 to reduce the risk of a cat dying prematurely by 0.004 or 4/1000. The VSL of a cat in Kamloops for indoor cat owners is \$8,726 (average WTP is \$34.90) and 95 percent CI [\$6842, 10,610]. The difference in the means is not statistically significant (p-value 0.286). The median VSL is \$5000 for both owners and a Mann-Whitney U test shows difference in the distributions is not statistically significant (p-value 0.468). For outdoor cat owners the highest VSL was \$30,000, while for indoor pet cats the highest VSL was \$75,000. Figure 4-6 provides the frequency distribution, which is exponentially declining. Table 4-1 provides a summary.

Figure 4-6 VSL Frequency Comparisons

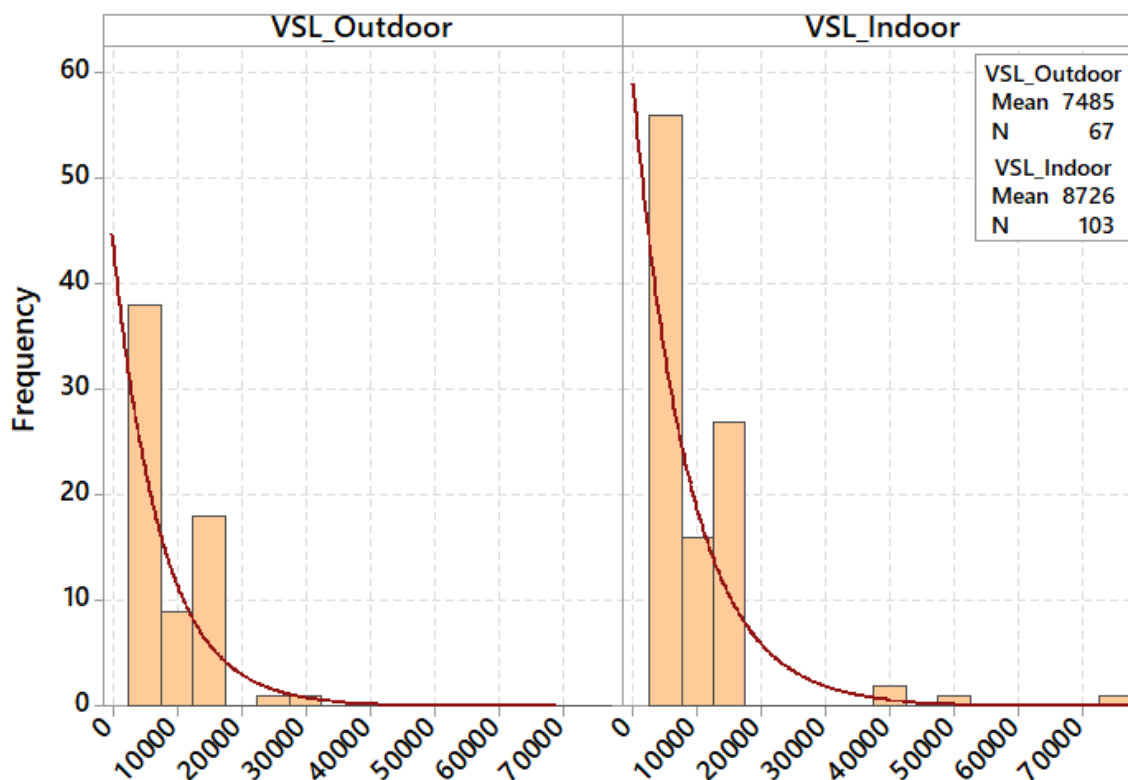


Table 4-1 Descriptive Statistics for the Value of a Statistical Life of a Cat

	Median VSL	Avg VSL	95% Confidence Interval	
			Lower Bound	Upper Bound
<b>Outdoor Cat Owners</b>	\$5000	\$7,485	\$6,160	\$8,809
<b>Indoor Cat Owners</b>	\$5000	\$8,726	\$6,842	\$10,610
<b>p-value for differences</b>	0.468	0.286		

#### Reasons For Not WTP

For the outdoor and indoor cat owners who were not willing to pay, the popular reasons varied and respondents could choose more than one (Table 4-2). Of the outdoor cat owners, 44 percent chose that they just weren't interested in paying for controls. Only 14 percent chose that they don't believe outdoor pet cats are at risk while outdoors. For the indoor cat owners, 52 percent chose that they weren't interested in paying for controls because they are only concerned about their indoor cat and 26 percent chose that they just

weren't interested in paying for controls. As is evident, many of the respondents chose to list their own reasons for not being willing to pay for enforcement measures - see Appendix D.

*Table 4-2 Scenario Section; Not Willing to Pay for Controls*

Reasons for not WTP (respondents can choose more than one)	Outdoor Cat Owners	Indoor Cat Owners
I don't believe outdoor pet cats are at risk while outdoors	14%	2%
I can't afford to pay for controls	8%	16%
I'm not interested in paying for controls	44%	26%
I'm not interested in paying for controls, because I'm only concerned about my indoor cat	9%	52%
Other	58%	41%

#### Defensive Measures Supporting VSL

Taking into consideration the defensive measure method as explained in the chapter introduction, the method can be applied to cats. If cat owners refuse/resist keeping cats indoors, risk mitigation strategies can be considered as another way to show that cat owners value their cat. As outlined in Table 4-3, of the outdoor cat owners who agreed to pay for measures to reduce the risks outdoor cats face (N=67), 41.8 percent allowed their cats outdoors during daylight hours, 34.3 percent have a fenced-in yard, and 25.4 percent have an ID collar on their cat. For those outdoor cat owners who were not willing to pay for measures (N=88), 38.6 percent indicated that they would not engage in any restrictions and their cat is allowed to roam freely, 36.4 percent allow their cat out during the daylight hours, and 19.3 percent have a fenced-in yard.

*Table 4-3 Restrictions applied to cat(s) being allowed to spend time outdoors*

Restrictions (outdoor cat owners only)	WTP = Yes N=67		WTP = No N=88		Total N = 155	
	# of	%	# of	%	# of	%
...with an ID collar	17	25.4	13	14.8	30	19.4
...with a bell on the collar	12	17.9	8	9.1	20	12.9
...under someone's supervision	13	19.4	10	11.4	23	14.8
...during the daylight hours	28	41.8	32	36.4	60	38.7
...in a fenced-in yard	23	34.3	17	19.3	40	25.8



...in an outdoor enclosure (example: a cat run)	6	9.0	2	2.3	8	5.2
...on a leash or harness	7	10.4	3	3.4	10	6.5
Other, please specify...(for comments see Appendix E)	12	17.9	11	12.5	23	14.8
None of the above: my cat(s) can roam freely without restrictions	12	17.9	34	38.6	46	29.7

When looking at the outdoor and indoor cat owners and WTP with respect to the risks incurred by their cats while outdoors in their current residence (keep in mind that the current cat owners who keep their cat indoors may not have always kept their cat indoors), for the outdoor cat owners who are willing to pay (43.23 percent), 25.4 percent have had one of their cats injured/killed by other pets and 11.9 percent have had their cat lost or stolen (Table 4-4). Of the outdoor cat owners who are not willing to pay, 21.6 percent have had their cat injured/killed by other pets and 18.2 percent have been injured/killed by predators. Indoor cat owners who are willing to pay (48.9 percent), 11.1 percent stated they have had one of their cats injured/killed by other pets and 11.1 percent claimed their cat had been lost or stolen. For the indoor cat owners who are not willing to pay, 12.4 percent indicated that they have had one of their cats injured/killed by other pets and 10.6 percent stated they had a cat injured/killed by predators and 10.6 percent have had their cat lost or stolen.

*Table 4-4 Risks to Cats and WTP*

Outdoor and indoor cat owners that have had the following situations happen to one of their cats in their current residence.	Outdoor WTP N=67		Outdoor Not WTP N=88		Indoor WTP N=108		Indoor Not WTP N=113	
	# of	%	# of	%	# of	%	# of	%
...been injured/killed by predators.	4	6.0	16	18.2	9	8.3	12	10.6
...gotten a disease from wildlife.	1	1.5	1	1.1	1	0.9	1	0.9
...been injured/killed by other pets.	17	25.4	19	21.6	12	11.1	14	12.4
...been hit by a car.	3	4.5	7	8.0	4	3.7	8	7.1
...been lost or stolen.	8	11.9	9	10.2	12	11.1	12	10.6

Table 4-5 provides the data for just the outdoor cat owners, regardless of WTP or not WTP. For the respondents who have outdoor cats, and based on the cat ownership in their current residence, 13 percent have had their cat injured or killed by a predator, 1 percent had/have a cat that got a disease from wildlife, 23 percent have had/have a cat that's been injured or killed by other pets, 6 percent have had/have a cat that's been hit by a car and 11

percent have had a cat that's been lost or stolen. This demonstrates how, for outdoor cat owners, a history of cat injury/killed does not seem to impact their current cat owner behaviour, i.e., they have not changed to supervising their cat while outdoors or keeping their cat indoors.

*Table 4-5 Risks to Outdoor Cats*

Have any of the following situations happened to one of your cats in your current residence? Respondents could choose more than one.	Yes	
	# of	%
...been injured or killed by predators.	20	12.90
...gotten a disease from wildlife.	2	1.29
...been injured or killed by other pets.	36	23.23
...been hit by a car.	10	6.45
...been lost or stolen.	17	10.97

### Cat Licensing

Despite the benefits cat licensing can provide cat owners in a municipality it remains an option most don't consider valuable. As per Table 4-6, only 27.7 percent of outdoor cat owners believe cat owners should license their cats compared to 38.5 percent of indoor cat owners, while some remained undecided. Of those outdoor cat owners who did not believe cat owners should license their cats, 64.3 percent indicated that they did not see how licensing is useful and 52.7 percent chose that they didn't believe licensing was necessary. Since survey respondents could choose more than one option, there could be overlap in the responses. For the indoor cat owners who chose that they didn't believe Kamloops cat owners should have to license their cats, the main reason why not was because they don't allow their cat outdoors so no need for a license (66.2 percent), followed by not seeing how licensing was useful (37.5 percent), nor necessary (30.2 percent).

Table 4-6 Cat Licensing

Do you believe Kamloops cat owners should have to license their cats?	Outdoor N=155		Indoor N=221	
	# of	%	# of	%
Yes	43	27.7	85	38.5
No/Undecided	112	72.3	136	61.5

Please select from the list of reasons why you do not believe (or are undecided) about whether Kamloops cat owners should have to license their cats. (more than one option can be chosen)	N=112		N=136	
	# of	%	# of	%
I don't believe licensing is necessary	59	52.7	41	30.2
I don't see how licensing is useful	72	64.3	51	37.5
I can't afford to pay for a license every year	15	13.4	19	14.0
I do not allow my cat(s) outdoors, so no need for a license	5	4.5	90	66.2
Other, please specify... See Appendix F	33	29.5	33	24.3

## Discussion

Utilizing the economic theory of the value of a statistical life in the arena of outdoor pet cats provides information on the value of a statistical life of a cat. Based on the results from the analysis of the data from the survey completed by Kamloops residents, the median VSL for both outdoor and indoor cat owners is \$5000. The average VSL between the two groups, though not statistically different, is \$7,485 for outdoor cat owners and \$8,726 for indoor cat owners. If the extreme values are considered, for the outdoor cat owners the highest VSL is \$30,000, while for indoor cat owners the highest VSL is \$75,000. If the residents of Kamloops, cat owners and non-cat owners alike, had the above information perhaps it could influence the perception that cats are disposable, or require less care and consideration than other pets. In essence, by showing the value of a statistical life of a cat could raise awareness that as a community the residents are willing to reduce the risk of a statistical cat dying prematurely. As with a lot of research, comparisons usually provide perspective, so further research that assesses the value of other pets, based on similar survey questions, could be interesting. However, the focus of this research is on pet cats and thus the above information will be useful when considering risk mitigation strategies and introduction of bylaws that lead to avoided harm to outdoor pet cats. For example, cat owners VSL is approximately \$8,000 per cat saved. If control measures in a particular community avoids twenty cats from dying prematurely every year, then the benefits of these measures is

\$160,000. Therefore, if the costs of the control measures is lower than \$160,000, then the community should take these measures. Costs associated with control measures includes bylaw officer whose expertise is in the area of cat control.

With respect to the reasons why some cat owners are not WTP, the results vary between the two groups. For the outdoor cat owners, 57 percent were not WTP, and of that 57 percent, the reasons for not WTP (and more than one reason could be chosen) ranged from the most option chosen as not being interested in paying for controls (44 percent) to the lowest as not being able to afford to pay for controls (8 percent). On a positive note, only 14 percent selected that they didn't believe cats were at risk while outdoors, which aligns with results from chapters two and three regarding outdoor cat owners deeming risks high for cats outdoors. We also know that there is a core opinion that outdoor cat owners hold in that outdoor cats are happier and enjoyable to have around. According to research in evolutionary psychology it is in our genes from our ancestors that animals domesticated or otherwise belong outdoors (Driscoll, Macdonald, & O'Brien, 2009). Evolutionary psychology is not the scope of this paper, but it is worth noting and perhaps thinking about how human behaviour has not adjusted to urbanization with respect to cats. Indoor cats is a new concept that has arisen in the last 60 to 70 years due to the rise in densely populated urban environments which bring houses (and neighbours) closer together and that brings more traffic (risk to outdoor cats); housing developments encroach and occupy natural wildlife habitats and the risk from predators rises. Add in the advancement of kitten control with spay/neuter procedures, the invention of cat food and kitty litter, which provides further support for cat owners to keep cats indoors (Alley Cat Allies, 2017). However, the quest to change cat owner behaviour, or at least introduce other options for outdoor pet cats, leads us to the defensive measures method which provides some insight and will be discussed further on.

Keeping on track with respect to understanding Kamloops cat owners' willingness to pay, it's not surprising that half of the indoor cat owners are not interested in paying because they have an indoor cat. The other half though, are willing to pay and even though the question wasn't asked I surmise it's due to the indoor cat owners hoping for more cat owners to keep their cats indoors, through whichever means is necessary.

When it comes to cat owners and being willing to pay or not willing to pay and risks their previous cats incurred while outdoors, the results are interesting. Firstly, for the outdoor

cat owners who are willing to pay, 25.4 percent claimed they have had one of their cats injured/killed by other pets and 11.9 percent have had their cat lost or stolen, so those factors may be influencing their WTP. However, that would seem to not be the case for outdoor cat owners who are not WTP, because 21.6 percent have had their cat injured/killed by other pets and 18.2 percent have been injured/killed by predators. But as noted above the main reason outdoor cat owners are not WTP is because they just aren't interested in paying. Some clarity may be gleaned from the defensive measures, which will be discussed later.

When it comes to the indoor cat owners, it's important to understand that not all of the current indoor cat owners always kept their cats indoors. So for the current indoor cat owners, they may be willing to pay due to previous (bad) experiences with allowing their cat outdoors. As noted in the results, almost half of the indoor cat owners are willing to pay, and of those, 11.1 percent stated they have had one of their cats injured/killed by other pets and 11.1 percent claimed their cat had been lost or stolen. So those situations may have been a factor for keeping their current cat indoors. For the indoor cat owners who are not willing to pay, 12.4 percent indicated that they have had one of their cats injured/killed by other pets and 10.6 percent stated they had a cat injured/killed by predators and 10.6 percent have had their cat lost or stolen. These results support the above noted results that the reasons why they are not willing to pay is simply because they now have an indoor cat.

Given the results of the risk mitigation strategies (defensive measures) the outdoor cat owners employ, they believe that allowing the cat outside only during daylight hours and/or in a fenced yard reduces the risks. One aspect of the survey that could have been changed would be to separate the risk mitigation strategies between those that could be assigned a dollar value and those that can't, which would provide another value to be considered. For example, \$10 for a collar with a bell, \$35 for an ID collar, and estimated fencing price etc. In addition, it would have been beneficial if the survey had distinguished between a fenced yard and a "cat fenced" yard. Most fenced yards do little to restrict the cat from roaming beyond their own yard, however a "cat fenced" yard would restrict the cat to its yard, or a portion of the yard. There are many options for installing fencing that keeps cats in the yard, or in a portion of the yard (Nature Canada, 2019 d; Audubon Society of Portland and Feral Cat Coalition of Oregon , n.d.). Despite the above limitations, the responses for the defensive measures provides some understanding of the outdoor cat owner behaviour and that they do

place value on their cat. However, it also provides further support for the lack of awareness of the impact outdoor cats have on wildlife that is active during the day, namely birds.

Cat licensing as a defensive measure can be explored through the options provided by the BC SPCA to municipalities (BC SPCA, 2017). In addition to the benefits to the cat and the cat owner with cat licensing as outlined earlier, licensing can provide a source of funding for the municipality to pay for enforcement, and there are options to consider when looking to implement licensing in a municipality, such as paid versus free; mandatory versus voluntary; lifetime versus annual; tag versus no tag.

In January 2018 cat licensing became mandatory in Guelph (City of Guelph, n.d.). Guelph has contracted the Guelph Humane Society to enforce animal bylaws in the city, however currently there are no consequences for not complying with the cat licensing bylaw. The licensing service provider DocuPet is canvassing door-to-door with information on mandatory licensing. With this new mandatory licensing there has been considerable media attention (Seto, 2017), including a letter to the City of Guelph from one of the Guelph Cat Population Task Force stakeholders, Nature Canada's Keep Cats Safe and Save Bird Lives (Nature Canada, 2019 a). This cat licensing initiative has faced a lot of resistance as is outlined in a news story from 2016 (Hallett, 2016). The Guelph Cat Population Task Force's primary goal "...is to facilitate community understanding and decision-making regarding cat overpopulation in the region" (Guelph Cat Population Task Force, b). Even though progress to this point has been arduous, hopefully reports in the following year will provide clarity on the success of instituting mandatory licensing.

Also noted earlier, in BC the only pet registry in place is the BC Pet Registry (Registry, n.d.) and the fees are \$12 per year or \$45 for lifetime, so this can be either a yearly cost or a one-time cost. Based on research done on the annual cost of caring for a cat in Canada from The Calgary Humane Society, the total is approximately \$1,011 per year, plus 554.50 one-time costs (Calgary Humane Society, n.d.) (Figure 4-7). The costs will vary depending on your cat and it's health, plus the cost for veterinary care will also fluctuate depending on the cat owners veterinary fees and some of the cat care costs, such as trimming nails, cat owners do themselves.

*Figure 4-7 Annual Cost of Caring for a Cat (Calgary Humane Society, n.d.)*

#### CAT BUDGET

For a spayed female, 12-pound, domestic long haired cat:

##### Minimum Cost Per Year (Approximate)

Food and Treats	
4 cans of cat food (396g) per month @ \$2.00 a can	\$96.00
4lb bag of dry food per month @ \$20.00 each	\$240.00
3oz bag of cat treats per month @ \$5.00 each	\$60.00
Veterinary Care	
Yearly visit – exam and vaccinations	\$120.00
Nail trimming every 2 months @ \$15.00 a trim	\$90.00
Litter and Supplies	
20lb bag of cat litter per month @ 10.00 a bag	\$120.00
1 tube of anti-furball medication	\$10.00
License	
City Of Calgary license fee per year	\$18.00
Vacation	
2 weeks cat care @ 15.00 per day	\$210.00
Subtotal	\$963.00
GST	\$48.15
<b>TOTAL</b>	<b>\$1,011.15</b>

##### One Time Costs

Spaying (female) and tattoo (incl. w/ adoption from CHS)	\$300.00
Metal food and water dishes	\$20.00
Collar, leash and harnesses	\$40.00
Brush	\$15.00
Litter pan and scoop	\$13.00
Scratching post	\$45.00
Cat Carrier	\$45.00
Toys	\$30.00
Cat bed	\$20.00
Subtotal	\$528.00
GST	\$26.40
<b>TOTAL</b>	<b>\$554.40</b>

One possible way to compare this information to the VSL estimate is to compute the present value of the costs of a cat living on average for 13 years [calculations are to the lower end of the spectrum - 13 - 20 years - based on the BC SPCA. Assuming a nominal discount rate of 6 percent and inflation rate of 2 percent, the present value of the costs of a cat is approximately \$10,500. What this dollar figure means is that by owning a cat you forego spending \$10,500 on other second best choices, and hence reflects the opportunity cost of having a pet cat over an average lifetime of 13 years. This value is slightly higher than the VSL of outdoor pet cat owners but within the 95 percent confidence interval of the indoor pet cat owners of \$6,842 and \$10,610 (Table 4-7).

*Table 4-7 Calculation of Costs of Cat Care*

Year	Costs with 2% inflation	Discount factor with interest rate at 6%	Present Value
1	1011.15	0.943	953.92
2	1031.37	0.890	917.92
3	1052.00	0.840	883.28
4	1073.04	0.792	849.95
5	1094.50	0.747	817.88
6	1116.39	0.705	787.01
7	1138.72	0.665	757.31
8	1161.49	0.627	728.74
9	1184.72	0.592	701.24
10	1208.42	0.558	674.77
11	1232.59	0.527	649.31
12	1257.24	0.497	624.81
13	1282.38	0.469	601.23
		PV of annual costs	\$9947.36
		Add one-time costs	\$10,501.76

It is clear based on the results from the survey that most cat owners do not see why licensing is necessary or useful so this supports the need for more education on the benefits of licensing for cat welfare in Kamloops. The comments provided interesting insight into cat owner views on licensing and further research conducting qualitative analysis on those comments to find common threads of beliefs would be valuable.



As mentioned earlier, the concept of placing value on a statistical life of a cat is multi-pronged. Given the application in this research, though, perhaps there is a way to educate the public on the value of a cat and the cost and revenue generated from control measures, such as licensing, or presenting potential sales of cat fencing for local businesses that could be undertaken in a community. Understanding the intricacies of assigning value to a pet, as well as what costs are associated with the control measures aren't the only factors that can be considered with respect to outdoor pet cats and impact on the environment. An interesting future extension to this research would be to conduct a multivariate regression analysis. For example, the value of a statistical life of a cat could depend on a number of factors such as the age of the cat, previous issues with outdoor cats, and respondent's demographical information (income, gender and education).

In the next chapter, the theory of environmental externalities will be explored. Environmental externalities is defined as "Impacts that affect the well-being of those outside of a market transaction." (Harris & Roach, 2018). This theory could provide further insight into ways to influence behaviour change in cat owners who allow their cats outdoors unsupervised.

## Chapter 5 - Negative Externalities and Outdoor Pet Cats: Coase Theorem and the Role of Non-Cat Owners in Outdoor Pet Cat Enforcement



Figure 5-1 Painting by Yi Am  
(Source: [https://fr.wikipedia.org/wiki/Fichier:Birds,\\_Flowers,\\_Cats\\_and\\_Dogs.png](https://fr.wikipedia.org/wiki/Fichier:Birds,_Flowers,_Cats_and_Dogs.png))

### Introduction

The challenge continues to understand and change the behaviour of the cat owners who continue to allow their cats outside unsupervised, despite their interest in wildlife, perceptions of the bidirectional risks, previous issues with outdoor cats and actual incidents of injury or death of a previous cat, and their “value” of a statistical life of a cat being significant (\$7,485). National campaigns such as Nature Canada’s Keep Cats Safe Save Bird Lives use a multi-pronged approach to educate cat owners and work to engage communities across Canada to bring the campaign direct to their cities and towns (Nature Canada, 2019 a). Provincial projects have been led by The Stewardship Centre for BC, in collaboration with Nature Canada, to provide educational resources and guides regarding keeping cats and birds safe (The Stewardship Centre for BC, n.d.). Animal welfare organizations like the Kamloops and District SPCA are part of the provincial BC SPCA, which has a website with information on responsible pet ownership (Provincial BC SPCA, n.d.). The Kamloops and District SPCA recently received \$50,000 for a spay and neuter campaign for the North Shore and Brocklehurst communities because those areas require a targeted campaign to reduce the cat populations for owned cats (Kamloops and District SPCA, 2019). Nature conservation groups, such as the Kamloops Naturalist Club sometimes host guest speakers from TRU and the community on bird conservation. They have shown great interest in this research and supported the distribution of the survey. Despite efforts of the above noted groups to increase

awareness of the impact outdoor pet cats have on our communities and the environment cat owners continue to allow their cats outdoors unsupervised, so there is room for new and innovative approaches to conservation initiatives. Another economic theory that could provide that new and innovative approach is called the theory of externalities.

In environmental economics one of the core concepts is the theory of externalities in which an externality is defined as "...the impacts that affect the well-being of those outside of a market transaction" (Harris & Roach, 2018). Externalities can be positive or negative and the following examples of each will explain the theory in a more concrete manner. A positive externality will benefit those 'external' to the market. For example, if a landowner plants trees, those trees will provide scenery, absorb carbon dioxide and provide habitat to wildlife. In essence, the society surrounding the landowner (those external to the market) benefit from the landowner planting the trees. On the other hand, negative externalities is an externality which has a negative impact on those not involved in the transaction. Common examples of negative externalities is evident with industries that produce a product, but in the process of producing said product the air is polluted or the water is subject to certain levels of contamination. The product the industry produces is not necessarily consumed/benefited by all of the folks who live in the area, however all of the folks in the area may be negatively impacted by the pollution or the contaminated water. With the presence of a negative externality a competitive market produces too much of the product which results in too much pollution relative to a social optimum level. The bigger the externality costs, the lower is the optimum level of production. In order to achieve the socially optimum level, external costs need to be factored in to the market analysis and environmental economists identify this as internalizing externalities to correct an inefficient market. The most common method to internalize externalities is to impose a tax, which is known as a Pigovian (pollution) tax or a polluter pays principle (Harris & Roach, 2018). Thus those who are responsible for the pollution pay for the associated external costs. The issue that arises with the above noted tax is not only that the consumer also pays because the product price will increase, but that estimating the correct tax amount takes research and analysis, plus administrative costs to enforce and collect the tax, so such a process is not always viable. Not all negative externalities can be controlled with Pigovian taxes, and thus other theories rise to address those situations.

Ronald Coase, a Nobel prize winning economist, discusses property rights and externalities in the situations where business firms have a negative impact on others (Coase, 1960). He uses the example of a factory that produces harmful smoke. Traditional economists would address the issue in trying to find ways to restrict the factory from producing the harmful smoke, but Coase argues that the optimal solution depends on the benefits associated with the factory producing the product with its harmful smoke in relation to the costs associated with the harmful smoke. If the benefits of producing the product exceed the costs associated with the harmful smoke, then it is optimal to keep on producing the product, while if the costs exceed the benefits of producing the harmful product then it is optimal to reduce the harm caused by the product. Coase argues that with well defined property right, low transaction and negotiation costs the parties involved will solve the problem through negotiation irrespective of who has the rights. Coase sees the question more in line with asking: does the factory have the right to produce harmful smoke? For the factory to stop producing smoke would mean to harm the factory, ie. no production and thus no income to workers and no profit to the firm. Do the communities inflicted by the harmful smoke have the right to stop the factory from producing smoke? For example, if the benefits are less than the costs of the harmful smoke and the factory has the right to emit pollution then it is in the community's interest to pay the factory to reduce pollution to the optimum level. If on the other hand, the community has the right to cleaner air then the factory will reduce pollution as it will not be able to buy the rights from the community. In both cases, negotiations, or not, depending on who has rights, will result in the optimal pollution level. What if the benefits to the factory exceed the costs to the community? Who has the rights? In this case too it does not matter who has rights. If the community has the right to clean air, then the factory will pay the community to buy the rights and continue its harmful smoke. While if the factory has the rights, then it will continue its harmful smoke since the community will not be able to buy those rights from the factory. The solution lies in well-defined property rights and low transaction and negotiation costs.

Transaction costs are costs involved in reaching an agreement, which could be administrative costs, research, costs of enforcing an agreement, etc. Negotiations depends on the number of people involved in the negotiations and also friction and irrationality between the parties in finding a solution. The larger the number of people involved the higher the cost

of negotiations the lower the chances of the private parties finding a solution. Also not well defined property rights will result in negotiations failing to achieve the socially efficient outcome. In cases where the property rights are not well defined the government or the courts will intervene to assign these rights.

Anderson applies the Coase Theorem to land conservation and further emphasises how the low transaction costs and clear property rights come into play in that arena, especially when the transactions are private. He explains that "...land conservation is a matter of demanders of conservation amenities purchasing land or contracting with its owners for land use" (Anderson, 2004). Ideally, the goal is to conduct private negotiations with low conflict between the parties.

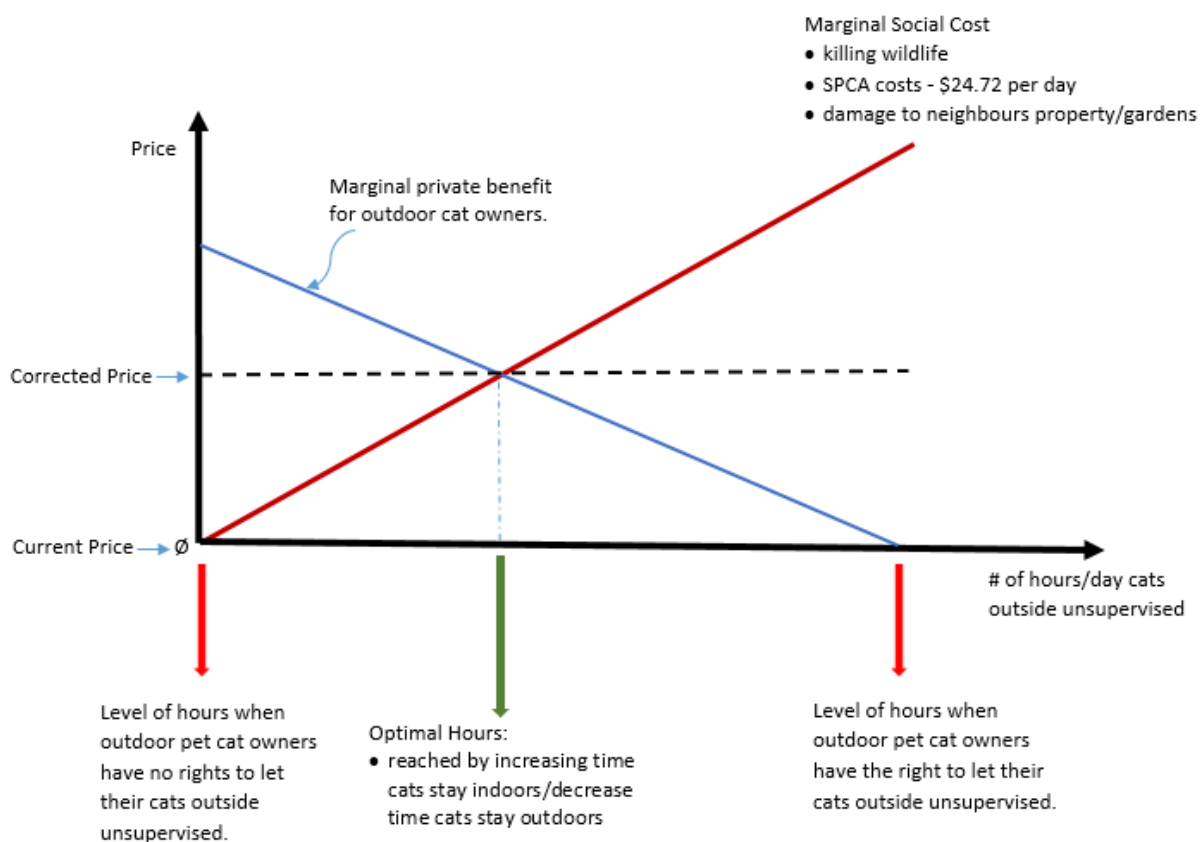
#### Negative Externalities and Coase Theorem and Outdoor Cat Owners

In this section, the theory of negative externalities and the Coase Theorem is applied to outdoor pet cats. In a community with cat owners who allow their cats outdoors unsupervised, the neighbours face the negative externalities of the unrestricted outdoor pet cat in that it will come into their yard, may dig in their garden and use it like a kitty litter, and it may stalk the birds at the bird feeder. The bird and wildlife lovers also see that unrestricted outdoor pet cats cause harm to wildfire and birds. The action of one creates a negative impact for others. To internalize the negative externality there is the option of a tax, change in regulations as in a no-roaming bylaw, such as a few communities in BC have instituted (BC SPCA, 2015), implementing licensing fees for cat owners, or the neighbours could negotiate.

To illustrate the Coase theorem as an application consider Figure 5-2. The cat owners that let their cat outdoors are happy. The downward sloping marginal private benefit curve (blue line) shows cat owners' happiness for cats being outside. Outdoor cat owners have a maximum willingness to pay to have their cats outdoors shown by the height of the marginal benefit curve as a function of the number of hours per day cats are outside unsupervised. The more a cat stays outside the lower is the maximum willingness to pay for an extra hour of being outside. The red line shows the marginal social cost in terms of the damages cats inflict on others. These social costs are assumed to increase the more hours per day cats stay outside unsupervised.

Now assume that the cat owners have the “right” to let their cats roam unsupervised/unrestricted. The cat owners will continue to let the cats roam freely until their maximum willingness to pay is zero for the last hour. This occurs where the blue line intersects the x-axis far to the right. At that level of hours per day for outside roaming cats, the marginal social cost far exceeds the marginal private benefit. Hence, it is to the interest of the affected party (the victim/neighbour) to pay the cat owners to reduce the number of hours cats stay outside since the benefits in terms of reducing damages exceeds the price in terms of payment per hour a day a cat is outside. In addition, since the marginal private benefit is zero at the unsupervised level, the cat owners will agree to reduce the number of hours their cat is outdoors unsupervised with payment since the loss in the marginal private benefit is less than the price that will be paid from the victims/neighbours. Both parties are better off with a reduction in the hours cats roam unsupervised. This will continue until the marginal social cost is equal to the marginal private benefit shown in Figure 5-2 as the corrected price and the optimal hours is less than the current level. This situation presents the optimal hours at a level that creates the least conflict between cat owners and their neighbours (who could be indoor cat owners or non-cat owners).

Figure 5-2 Coase Theorem - Unsupervised Outdoor Pet Cats



Coase showed that the solution is unchanged if the neighbors and bird lovers have the rights to keeping cats indoors. The starting point is that all cats stay inside and at that level of zero hours per day it is socially inefficient since the marginal private benefit for the first hour exceeds the marginal social cost for the first hour. Hence, it would be to the interest of cat owners to pay the bird lovers and neighbors, so they can let their cats outdoors. As long as their maximum willingness to pay exceeds the marginal social costs which represents the minimum amount neighbors and bird lovers will accept as a payment to sell their rights, then a price can be negotiated. The cat owners will benefit since their maximum willingness to pay exceeds the price they pay, and the neighbors and wildlife lovers will benefit since the price they receive exceeds the marginal social costs. This increase in the hours cats stay outside will continue until the marginal social benefit equals the marginal social costs shown where the two curves intersect. The price negotiated to achieve the efficient level is in the figure as the “corrected price”. Notice that in this example the optimal hours are not zero.

Nor are the optimal hours at the unrestricted free roaming level. The optimal hours are somewhere in between.

For the optimal hours to be zero and cats should be indoors occurs only if the marginal social cost of the first hour a cat is allowed to be outdoors exceeds the cat owners maximum willingness to pay for the first hour. This would be true if the marginal social cost at zero hours started above the marginal private benefit curve for the first hour. Figure 5-3 shows this case which is advocated by many bird lovers and conservationists claiming that cats do not belong outside, which is the situation that has been created over time by outdoor cat owners (Marra & Santella, 2016). This is an unrealistic scenario and hence cats should be allowed outdoors but only under supervision/restriction of the cat owner.

However, it is unlikely the above negotiations will reach the optimal level, because property rights may not be well defined, transaction and negotiation costs maybe too high to find the solution, as there are too many people on both sides to come together for negotiations to take place. If this is the case, then the government (i.e., the municipality) has to have bylaws that either reduce the number of hours a cat is outdoors unrestricted or implement that cats need to be “under the care and control of their owner” bylaw or in other words, supervised. When bylaws are such that cats are supervised while outdoors this shifts the marginal social cost curve downwards towards the x-axis. In this case, the optimal hours per day can be the same as the level of hours when cat owners have rights to let their cats outdoors, but this imposes a cost to the outdoor cat owners which will shift the marginal private benefit curve downwards and as a result cats will be outdoors for less hours. This is illustrated in Figure 5-3.



Figure 5-3 Coase Theorem - All Cats Indoors

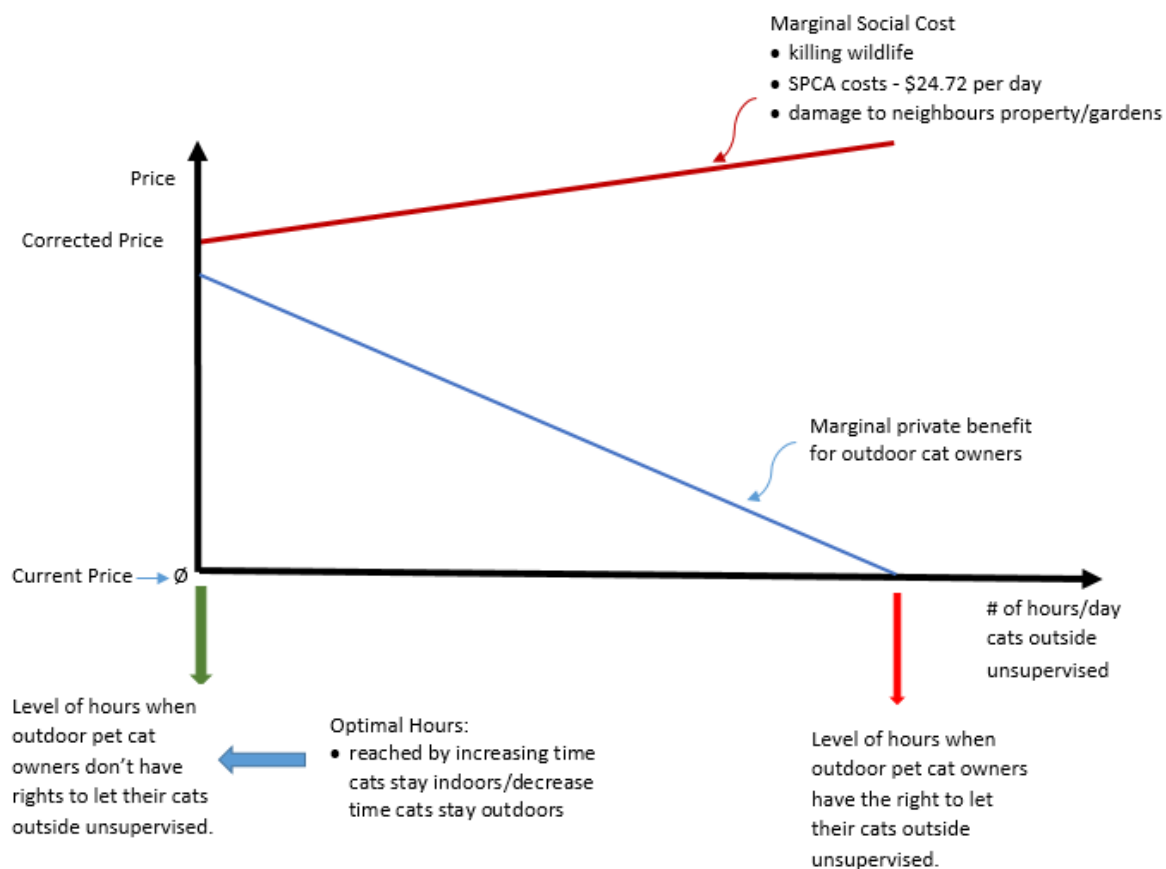
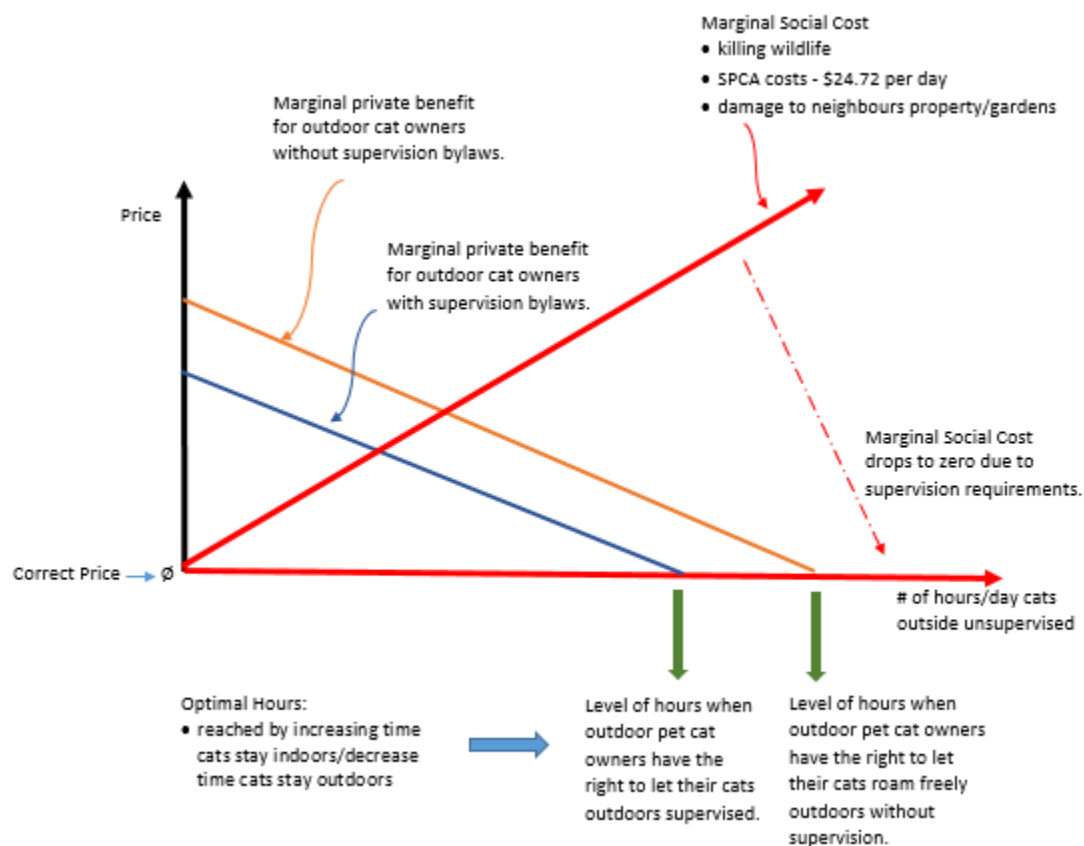


Figure 5-4 Coase Theorem - Supervised Outdoor Cats due to Bylaws



In the Kamloops community there are currently no bylaws restricting cats to their own yard or indoors. The above theoretical application of the three scenarios provides interesting insight into supporting a bylaw that would have cat owners only allow their cat outdoors under supervision or with a restriction such as a catio, a cat run or on a leash. This chapter will examine cat owner behaviour and possible changes in behaviour by analysing the number of hours outdoor cat owners allow their cat to roam freely outdoors depending on time of day and seasonal influences. This chapter will also assess the role non-cat owners play with respect to cat control enforcement to keep their neighbours' cat contained in the owner's yard.

### Cat Owners Behaviour Towards Externality

With respect to outdoor cat owners, this chapter utilized the data gathered from the Statement section, which provided cat owners with the statement:

Animal welfare advocates encourage cat owners to keep their cats indoors so they will be safe. Alternatively, if cat owners allow their cats outdoors, they strongly recommended the cat is kept under the care and control of their owner (on a leash or in an enclosure).

Following the statement, the respondents were asked if they would decrease the number of hours they allowed their cat to roam freely outdoors in order to keep their cat safer. Three options were provided: yes, no, and not applicable - I have an indoor only cat. Those who had an indoor only cat were then directed to Section 7 - Sociodemographics. Those that answer yes were prompted to the next part which asked the respondents to choose from 4 options: 1 hour less; 2 hours less; 3 hours less; and other, to which they could respond with their own number of hours. Those respondents who answered no to reducing the number of hours they would allow their cat to roam freely were then prompted to number 3 which asked for them to select from a list of reasons why they would not decrease the number of hours their cat spends outside, such as: I don't believe my cat is at risk while outdoors; I believe my cat needs time outside; Not applicable: I do not allow my cat(s) outdoors; and Other reasons, to which respondents could provide their own answer.

Section 5 examines cat owner's behaviour with respect to the average number of hours cat owners allow their cat outdoors and further breaks it down on a daily basis by the time of day, such as dawn, day, dusk and night; and again looks at the changes in outdoor cat activity based on seasons. This information will provide baseline data in order to assist in areas where behaviour change is the greatest.

#### Non-cat Owner Behaviour Towards Externality

Section 6 was the only section dedicated to non-cat owners. In that section non-cat owners were asked about cat licensing and paying for enforcement to ensure their neighbour's cat would be contained in the owner's yard. Data from the survey was analyzed using descriptive statistics in Minitab.

## Results

### Cat Owners and Their Cats

The cat owners who allow their cats outdoors are the main source of the impact on the environment. The following is a brief description of the outdoor cat owners and their cats. On average they have 1.5 cats. Of the outdoor cat owner respondents who answered Section 5 Question 6A: If you have male cats are they neutered (N=135; please note, some cat owners have more than one cat), 67 percent claimed yes, and 38 percent take their male cats to the veterinarian for annual check-ups. Of the respondents who answered Section 5 Question 6B: If you have female cats are they spayed (N=134), 65 percent claimed yes, and 35 percent take their female cats to the veterinarian for annual check-ups. Indoor cat owner data is included here merely for comparison as it's clear that the indoor cat owners have a higher percentage for each question (Table 5-1; data for indoor and a total for all cat owners is included here as it will be necessary for the discussion section).

*Table 5-1 Cat Owners and Cat Care*

	Outdoor N = 135*		Indoor N = 185*		All Cat Owners N = 320*	
	# of	%	# of	%	# of	%
If you have male cats, are they neutered?	91	67.4	131	70.8	222	69.4
Do you take your male cat(s) to the veterinarian for annual check-ups?	51	37.8	96	51.9	147	45.9
	N = 134		N = 195		N = 319	
If you have female cat(s), are they spayed?	87	64.9	142	72.8	229	71.8
Do you take your female cat(s) to the veterinarian for annual check-ups?	47	35.1	100	51.3	147	46.1

\*numbers vary from total respondents (due to non-response)

Of the outdoor cat owners who answered the question regarding how often their cat is outdoors, 77 percent claimed to do so “very often”, namely more than 5 times per week (Table 5-2).

Table 5-2 Frequency Outdoors

In a typical week, how often does your cat(s) go outdoors?	N = 150		95% CI	
	# of	%	Lower bound	Upper bound
Rarely (< 1 time/week)	11	7.3	3.1	11.5
Occasionally (1-2 times/week)	7	4.7	1.2	8.1
Often (3-5 times/week)	17	11.3	6.2	16.5
Very Often (>5 times/week)	115	76.7	69.8	83.5

Of all the cat owners who allow their cats outdoors, the number of hours per time of day varies. On average, based on all outdoor cat owners (N=155) cats are outdoors 43 minutes at dawn, 2 hours and 40 minutes during the day, 50 minutes at dusk and 1 hour and 32 minutes during the night. If the outdoor time is assessed on average per person and as a percent of the actually amount of time per time of day, the percent data is interesting in that the outdoor cat owners allow their cats outdoors for 22.8 percent of the time during dawn, 28.7 percent during the day, 30.1 percent at dusk and 20.1 percent during the night. Seasonally, on average based on all the outdoor cat owners, the cats are outdoors, on a daily basis 4 hours and 35 minutes during the Fall, 2 hours and 20 minutes in the Winter, 4 hours and 43 minutes in the Spring and 5 hours and 56 minutes in the Summer. Assessing the same data but on a per person basis, the time for each season increases to 5 hours and 7 minutes during the Fall, 3 hours and 5 minutes during the Winter, 5 hours and 21 minutes in the Spring and 6 hours and 40 minutes during the Summer (Table 5-3).

With respect to restrictions while the cats are outdoors, the most common option selected was during daylight hours (39 percent) followed by allowing the cat to roam without restrictions (30 percent), next popular choice was in a fenced yard (26 percent), followed by with an ID collar (19 percent) and then 13 percent have their cat with a bell on its collar (Table 5-4).

Table 5-3 Hours Outdoor Each Day and Each Season

	Total hrs	total/155	Avg min/hrs	Mode	Median	Avg hrs/person	Avg min/person	Avg min/hrs/person	As a % of the amount of hours/time of day
In a typical week, how often does your cat(s) go outdoors?	3.57								
Dawn (3 hours) 4 AM - 7 AM	101.71	0.66	43 mins	0	0	0.68	41.0	41 min	22.8
Day (10 hours) 7 AM - 5 PM	416.6	2.69	2 hrs 40 mins	1	2	2.87	172.4	2 hrs 52 min	28.7
Dusk (3 hours) 5 PM - 8 PM	130.8	0.84	50 mins	0	1	0.90	54.1	54 min	30.1
Night (8 hours) 8 PM - 4 AM	238	1.54	1 hr 32 mins	0	0	1.61	96.5	1 hr 36 min	20.1
Fall	710.75	4.59	4 hrs 35 mins		4	5.11	307	5 hrs 7 min	
Winter	363.86	2.35	2 hrs 20 mins		1	2.58	155	3 hrs 5 min	
Spring	732.05	4.72	4 hrs 43 mins		4	5.34	321	5 hrs 21 min	
Summer	919.9	5.93	5 hrs 56 mins		6	6.67	400	6 hrs 40 min	

Table 5-4 Restrictions

We are now interested in knowing whether any restrictions apply to your cat(s) being allowed to spend time outdoors.	N = 155	
	# of	%
...with an ID collar	30	19.4
...with a bell on the collar	20	12.9
...under someone's supervision	23	14.8
...during the daylight hours	60	38.7
...in a fenced-in yard	40	25.8
...in an outdoor enclosure (example: a cat run)	8	5.2
...on a leash or harness	10	6.5
Other, please specify...(for comments see Appendix E)	23	14.8
None of the above: my cat(s) can roam freely without restrictions	46	29.7

### Cat Owners Behaviour Towards Externality

Of the outdoor cat owners who answered yes to decreasing the number of hours they allowed their cat to roam freely outdoors (N = 61; 39.35 percent), 29.51 percent said they would decrease the time by one hour, 20 percent by 2 hours and 10 percent by 3 hours. For those who answered no (N = 85; 54.84 percent), the reasons why they would not decrease the number of hours their cat is allowed to roam freely outdoors is as follows (respondents could choose more than one): 64 (75.29 percent) chose I believe my cat needs time outside; 13 (15.29 percent) chose the statement: I don't believe my cat is at risk while outdoors; and 35 chose other reasons (Table 5-5). The other reasons are listed in Appendix G.

Table 5-5 Statement Section - Outdoor Cat Owners

Animal welfare advocates encourage cat owners to keep their cats indoors so they will be safe. Alternatively, if cat owners allow their cats outdoors, they strongly recommended the cat is kept under the care and control of the owner (on a leash or in an enclosure).		
To keep your cat safer would you decrease the number of hours you allow your cat to roam freely outdoors?		N=155
	# of	%
Yes	61	39.35
No	85	54.84
Not applicable - I have an indoor-only cat	9	5.81
Please indicate the decrease in the number of hours you would allow your cat to roam freely outdoors:		N=61*
	# of	%
1 hour less	18	29.51
2 hours less	12	19.67
3 hours less	6	9.84
Other**:	24	39.34
* 1 respondent didn't answer question 2 despite indicating yes to question 1		
** Respondents answers in this field was not usable, so no appendix provided		
Please select from the list of reasons why you would not decrease the number of hours your cat spends outdoors (more than one can be chosen)		N=85
	# of	%
I don't believe my cat is at risk while outdoors	13	15.29
I believe my cat needs time outside	64	75.29
Not applicable: I do not allow my cat outdoors	2	2.35
Other reasons (see Appendix G)	35	41.18

### Prey Items by Type of Prey

For the outdoor cat owners, the prey item brought very often and often to the house is mice and occasionally is birds and mice. Please note that based on previous research, cats only bring 25 percent of their prey to the house (Table 5-6).

Table 5-6 Types of prey brought to house

Prey	Never	Rarely	Occasionally	Often	Very Often
Small Mammals	128	18	5	1	1
Rats	129	18	5	0	1
Mice	47	45	16	27	19
Birds	67	58	22	7	0



### Non-Cat Owners, Cat Licensing and WTP

Section 6 was designated to non-cat owners only and the questions focused on cat licensing and if they would be willing to pay anything towards enforcement to ensure their neighbour's cat was contained in its yard. For the non-cat owners, 145 agreed with the question as to whether they believe Kamloops cat owners should have to license their cats, whereas there were 30 who stated no and 33 undecided.

When asked about the reasons why they didn't agree with licensing, a majority of the 66 who answered no or undecided chose that they didn't see how licensing was useful (46), followed by they didn't believe licensing was necessary (24) and 4 respondents stated they don't have free roaming cats in their neighbourhood. Of the other option which allowed the respondents to list their own reasons, the claims were varied (see Appendix H).

The next question was in regards to whether the non-cat owners were willing to pay (WTP) anything towards enforcement to ensure their neighbour's cat was contained in the cat owner's yard. Based on the responses, 77 (37 percent) were willing to pay towards enforcement with a majority, 27 of the 77, willing to pay \$20 (Table 5-7).

*Table 5-7 Non-Cat Owners WTP*

N = 77		
# of	\$	%
15	\$5	19.48
18	\$10	23.38
3	\$15	3.90
27	\$20	35.06
Avg WTP	\$10.91	

With respect to the reasons why the non-cat owners were not willing to pay to keep their neighbour's cat contained in the cat owner's yard, the highest number of respondents (96) chose that they don't believe non-cat owners should have to pay for any kind of cat control (Table 5-8). 40 non-cat owners provided other reasons for not WTP and the responses are listed in Appendix I.

Table 5-8 Non-cat owners' reasons for not WTP

Please select from the list of reasons why you would not be willing to pay for your neighbour to keep their cat indoors (more than one reason can be chosen):	N = 131	
	# of	%
I don't believe my neighbour's cat is at risk while outdoors	29	22.13
I don't think the wildlife is at risk from my neighbour's cat	26	19.84
I think cats should be allowed to roam freely	45	34.35
I don't have free-roaming cats in my neighbourhood	10	7.63
I don't think non-cat owners should pay for any kind of cat control	96	73.28

## Discussion

Cat owners who allow their cats outside unsupervised would appear to not consider the impact their decision has on the surrounding environment. The surrounding environment is inclusive of their neighbours and the neighbourhood, the wildlife, and the landscape. Some of the markers for a responsible pet owner, other than the five freedoms all animals have the right to (BC SPCA, n.d.), which are: freedom from hunger and thirst; freedom from pain, injury and disease; freedom from distress; freedom from discomfort; freedom to express behaviours that promote well-being, is annual visits to the veterinarian for vaccinations and ensuring cats are spayed/neutered. Based on the Cats in Canada report, 94 percent of cat-owning respondents spay/neuter their cats. In this research the results from the survey indicate that the percentage of outdoor cat owners who have spayed/neutered their cat is lower than the indoor cat owners and combined the average is lower than the national average. As noted earlier, the Kamloops and District SPCA will be spearheading a spay/neuter campaign in the North Shore and Brocklehurst areas of Kamloops, so that will indeed help.

When it comes to the number of hours cats are on the landscape in Kamloops, the results are interesting. As would be expected more cats are outdoors during the day and during Fall, Spring and Summer, with Summer having the greatest number of hours per day. If we compare the results of the time of day and the seasons with bird activity, the impact can be predicted to be quite high. Rick Howie, Kamloops' resident bird expert, provided information regarding the types of birds most at risk from cat predation based on their general ecology, ground feeding habits or tendency to visit bird feeders at certain times of the year (personal communication December 2016) (Appendix A). Based on the list there are

quite a few birds that are at risk of predation by cats. The listed local birds are most vulnerable because they will feed on the ground and be at risk from a cat attack. There are other species that visit feeders such as woodpeckers, but they tend to feed higher up and are less vulnerable to ground attacks. None of the species on the list are considered to be species at conservation risk and are not listed under the Species at Risk Act or by the BC Conservation Data Centre as being at risk. Given the number of hours cats are roaming unsupervised, reducing the number of cats outside and the number of hours they are outside is imperative to ensure the bird populations remain off the “at risk” list.

Belief systems are challenging to change and the results from Section 5 Question 14 regarding restrictions reinforces some of the belief systems people hold regarding outdoor cats. The highest percentage of outdoor cat owners claimed as a restriction was: allowing their cat outdoors during daylight hours, and in a fenced-in yard, a further third of the respondents don't practice any type of restriction and allow their cat outdoors unsupervised. There is hope though with the results from the Statement Section where outdoor cat owners can choose to reduce the hours their cat is outdoors in order to keep the cat safer. Nearly 40 percent are willing to reduce the number of hours they allow their cat outdoors unrestricted/unsupervised. Of those 40 percent, almost 30 percent are willing to decrease their cat's outdoor time by one hour and 20 percent are willing to decrease their cat's outdoor time by two hours. It's important to keep in mind the possibility of survey bias when reviewing these results. For those outdoor cat owners who are not willing to reduce the number of hours their cat is outdoors, 75 percent claim their cat needs time outside. This is a long-standing belief that is challenging to change. When looking at how cat owners value their cats, the outdoor cat owners would say they place high value on their cat's happiness and thus they allow their cat outdoors.

The non-cat owners in this survey provided some thought provoking results. Non-cat owners are willing to pay to keep their neighbours cat in the cat owner's yard. Despite the fact that only 37 percent are willing to pay, the results are truly interesting and lends to the fact that in a community the interest in cat-related issues is not confined to cat owners only. For those non-cat owners who are not willing to pay, 73 percent stated it was because they don't believe it is the responsibility of non-cat owners to pay. A surprising result is that 34 percent of the non-cat owners who were not willing to pay chose the option that they

believed cats should be allowed to roam. Another demonstration that beliefs are truly hard to change. Though beliefs of non-cat owners does not carry the same implication to the environment as does similar beliefs of cat owners.

Findings that a sizeable number of non-cat owners are willing to pay to keep cats safer supports Coase's theorem in that the victim/neighbour is willing to pay to have a reduction in the damages outdoor cats impose on their interest. Since many non-cat owners are willing to pay to have cats more controlled and others believe cats should be allowed to roam freely, outdoor cat owners seem to have the right to let their cats roam freely. Since negotiations are not feasible due to transaction and negotiation costs, and the fact that there are many people involved on both sides, the optimal solution through private negotiations, as illustrated by the Coase Theorem, will not materialize. According to the theoretical application of the Coase Theorem, the solution that would create the least conflict in the community, yet still allow the cat owners to have outdoor cats, albeit supervised/restricted, is with the application of a bylaw coupled with licensing. Specifically, it's deemed most reasonable to have the municipality create a bylaw that enforces cat owners keep their cats under their care and control coupled with licensing, much like dog owners. Cat owners would have the flexibility to choose how they wish to keep their cat under their care and control, whether it's with a catio, cat run, leash training, or cat fencing. This option would ideally decrease the cats on the landscape, and provide funding for enforcement. Looking to Guelph or Calgary as a guide to implementing these measures, it's clear that a step-by-step, gradual approach is necessary for such a contentious issue.

## Chapter 6 – Recommendations

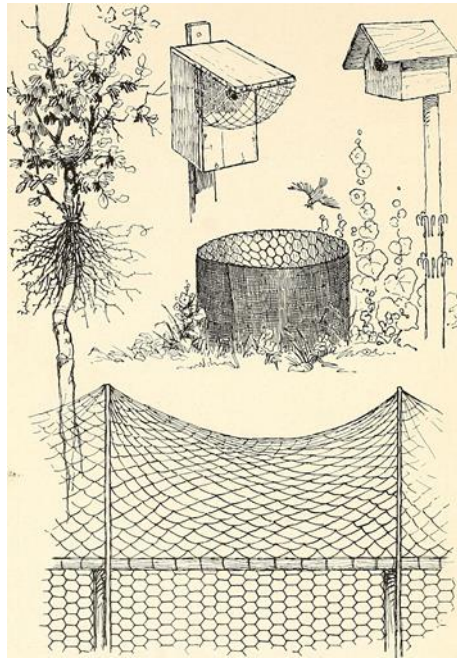


Figure 6-1 The domestic cat; bird killer, mouser and destroyer of wild life 1916  
(Source: [https://commons.wikimedia.org/wiki/File: 20804489779](https://commons.wikimedia.org/wiki/File:20804489779))

The outdoor cat issue challenges wildlife conservationists, animal welfare advocates, and municipal governments to become allies working on management options that focus on risk-mitigating behaviour and changes in communities. This chapter provides a summary of the results and the implication of the results from this research to provide evidence and baseline data for the final suggested action items stakeholders may utilize for developing a long-term plan for Kamloops and the outdoor pet cat population.

Chapter two examines the views and opinions about wildlife and outdoor pet cats and their owners. The similarities between the cat owners and the non-cat owners provides a solid basis from which to start as it is clear that all the groups are interested in wildlife issues in Kamloops and see all living things as part of one group/family that is to be protected. The outdoor cat owners do not view outdoor pet cats in the same way that the indoor cat owners and the non-cat owners do. The outdoor cat owners see outdoor pet cats: living happier lives; that they should be allowed outside unsupervised; and that they play a useful role as predators (for mice and rats). Outdoor cat owners did recognize there are risks, which would support the view that outdoor cat owners see the risks, but are of the opinion that because

outdoor pet cats live happier lives that outweighs the risks. For the indoor cat owners, it is clear why they have their cats indoors because the results show their views are as follows: outdoor pet cats are at risk while outdoors; pet cats should be protected by their owners when outside; and outdoor pet cats live shorter lives than cats that remain indoors. Non-cat owners' results were not surprising in that they: are less informed than the cat owners about outdoor pet cats; see outdoor pet cats as close to bad on the 5-point Likert scale; and lean towards neutral (on the disapprove side) in regards to people allowing their cats to spend time outdoors. In summary, on the positive side, these results demonstrate residents of Kamloops value wildlife, and the negative outcome is that the outdoor cat owners do not view their cat being outside as an issue.

Chapter three provides insight into the perceptions of the bidirectional risks for outdoor and indoor cat owners and non-cat owners. The results demonstrate for those risks that cats impose on the environment the most commonly deemed as the highest risk (for all three groups) includes predation on mice/rats, predation on birds, and damage or annoyance to neighbours property. For the risks cats incur those include predation of coyotes or fighting with other outdoor pets, getting hit by a car or going missing. The level of risk perception for the diseases cats impose and incur continues to rate low and that may be because it is hard to identify how the disease they contract or spread is directly related to their outdoor activity. In summary, Kamloops residents' perceptions of risks are in line with other research on perceptions of risk, for both impose and incur, are in line with challenges other communities face and their animal control services work to address.

The two economic theories presented in chapters four and five provide interesting and unique perspectives on cat owner behaviour and non-cat owners' views of outdoor pet cats. Chapter four demonstrates how the average value of a statistical life of a cat is between \$7,485 and \$8,726. This value is determined by how much people are willing to pay to reduce the risk of a cat dying prematurely. This value also provides a measure of the benefit from public authorities taking action to reduce such risks. The benefits of public action are in the range of \$8000 per cat saved or death avoided. Implementing a program that saves 100 cats per year from dying prematurely has a benefit of \$800,000 per year to the community. If the cost of the program is less than the benefits, then the program should be implemented. Determining the cost of a program for Kamloops is an area that needs further exploration as

it was not covered in this research and would involve the municipal government and animal control services. Presenting the value of the statistical life of a cat does provide an opportunity to discuss and consider the statistical value of a cat and hopefully give cat owners and potential cat owners pause prior to allowing their cat outside unsupervised. Licensing was also considered in chapter four, but most cat owners do not see why licensing is necessary or useful, so if stakeholders wish to implement licensing as a risk-mitigation strategy for Kamloops there would need to be more education on the benefits of licensing for cat welfare in Kamloops. The benefits of licensing include higher “return-to-owner” rates, reducing cat overpopulation with incentives to spay/neuter through differential licensing fees, and licensing raises revenue for a community to improve animal control services.

Chapter four also addressed the defensive measures most outdoor cat owners engage in to keep their cat safe while outdoors. In the survey, respondents could choose from seven options. Of the seven options, four can be assigned an estimated explicit cost (see Table 6-1). I have also included the results from the survey with respect to the number of respondents who chose which option to provide insight into those options that may be easier to promote.

*Table 6-1 Defensive Measures and Costs*

<b>Defensive Measures (outdoor cat owners)</b>	<b>Costs per unit</b>	<b>N = 155</b>	
		<b>#of</b>	<b>%</b>
...with a bell on the collar	5 - 20	20	12.9
...on a leash or harness	10 - 30	10	6.5
...in an outdoor enclosure	100 - 5000	8	5.2
...in a fenced-in yard (\$15-60/foot; based on city backyard: 60-130 lft)	900 - 7800	40	25.8

When trying to determine which defensive measure may be embraced more readily by the community it is helpful to demonstrate the different costs with the corresponding benefits to the cat, the cat owner, and the environment. A full analysis of the different options with the corresponding impact levels for the risks outdoor pet cats impose and incur was not addressed in this research, but it does pose an avenue for further exploration. For example, with Table 6-1, by simply comparing the estimated costs of the defensive measures, the most popular option chosen was a fenced-in yard, which is also the most expensive option, and the least popular option is the outdoor enclosure. It is interesting that the two most costly items are on the opposite ends of the choice spectrum for outdoor cat owners. It is important to keep in mind, though, that it is much more common for urban lots to have fencing already in

place, compared to the less common outdoor enclosure. Research on the number of outdoor cat enclosures that currently exist in Kamloops would be valuable data to have for any kind of campaign that encourages cat owners to consider it as an option for risk mitigation. It is clear that the leash and harness option is not popular and again this may be due to a lack of knowledge that such an option exists, but even if the information is presented to cat owners, engaging in such a risk mitigation strategy requires time from the outdoor cat owner. As noted above, a full analysis that includes calculating the cost of cat owner's time is a factor for consideration with defensive measures, such as, the time spent building an outdoor enclosure or a fence or leash training your cat. The bell on the collar option is the least expensive option, and research has shown that belled collars on cats does reduce predation rates (Willson, Okunlola, & Novak, 2015), but it does little to reduce risks cats incur while outdoors. In summary, the value of the statistical life of a cat opens up the possibilities for a program that reduces the risks of cats dying prematurely in a community, clarity on licensing and it's benefits, and the defensive measures which could gather traction more readily in the community.

Chapter five examines the economic theory of negative externalities and the Coase Theorem to examine the impact outdoor pet cats impose on our environment. The results demonstrate that outdoor pet cats impose a negative externality on their neighbour's property, on birds and other wildlife. This implies that without regulation outdoor pet cats roam outside for a lot longer than is socially optimum. It is highly unlikely that the social optimum is one where cats are kept inside all the time as this would imply that cats inflict a huge external cost to society even for an hour being left outside. The evidence is not supportive of such extreme external damages from cats roaming outside unsupervised. The social optimum is for cats to roam outside for the length of time that is less than the current level. The good news from the survey is that cat owners are willing to reduce the number of hours their cat is outdoors, in an effort to keep their cat safe. This is encouraging and provides an opportunity for small changes in behaviour, but action needs to happen. With respect to application of the Coase Theorem to outdoor pet cats, it won't be surprising to have outdoor cat owners push back on those concepts and applications presented, because of the difficulty of defining property rights, as well as frictionless negotiations to find a solution. It is difficult to have outdoor cat owners negotiate with their neighbours to find a



balanced solution where both benefit from reducing the amount of time cats roam unsupervised outside. What is very interesting is the result that shows some non-cat owners are willing to pay to keep their neighbours cat in the cat owners yard, though in reality that would be challenging to implement, but will hopefully show the outdoor cat owners that their actions have an impact beyond themselves and their cat.

The best-case scenario is to move away from a market that is unregulated and introduce bylaws to reduce the social marginal costs as well as the private benefits cat owners get from having cats roam unsupervised. There needs to be a means to cover the extra costs incurred for implementation of bylaws, thus licensing comes into play. Current outdoor cat owners are not going to embrace any kind of risk-mitigation that restricts their cat's outdoor activity, especially leash training, thus there is even greater need to present other options such as cat fencing or catio's which doesn't conflict with the "cats are happier outdoors" view. However, success in that arena would require simple, affordable options backed by clear explanation of what it means to keep your cat from roaming the neighbourhood. As is listed above, the cost of a catio may be too much of a financial burden to some households. As part of the City of Victoria bylaw, there is a clause that indicates cats are to not trespass on private property without permission of the owner/occupier of the private lands (City of Victoria, 2019). This bylaw makes clear the property rights of neighbors which allows Coase's solution to evolve which is also the socially optimal solution to the problem. Cat owners will not let their cats roam unsupervised to the other people's private property with the bylaw except if the property owners accept a payment from the cat owners through a negotiated solution.

In using the above results as baseline data it is clear that current cat owners who allow their cats outdoors believe their cat is happier and the risks they face while outdoors is worth it for their cat's happiness. The outdoor cat owners don't view the impact the cats have on wildlife as of great concern. Research on the impact outdoor pet cats have on wildlife could be beneficial from a scientific standpoint, however, research in the area of animal welfare communication indicates that marketing the negative impacts with scientific facts is not an effective way to change behaviour (Cooney, 2011; McLeod, Driver, Bengsen, & Hine, 2017). What does have a positive influence, namely the cat owners' motivation to contain their cat increased, is messaging to cat owners regarding keeping cats indoors that includes both the

wildlife benefit and cat protection (McLeod, Hine, Bengsen, & Driver, 2017). There is evidence that cat bibs or collars deter and decrease the predation rate on birds and wildlife (Willson, Okunlola, & Novak, 2015).

In Kamloops, influencing a change in behaviour with current cat owners who allow their cats outdoors is definitely a barrier and requires careful consideration of resources. There are plenty of options with potential and new cat owners to influence behaviour, such as how exactly to be a responsible cat owner and options for enriching indoor cat's lives as well as the many ways to allow cats outdoors supervised like in a catio, or with leash training. As mentioned earlier, an assessment of resources will influence strategies. Previous research supports the delivery of the information about responsible cat ownership from veterinarians to be effective (MacDonald, Milfont, & Gavin, 2015), however that is an avenue that was not explored in this research, but would be beneficial and possibly a project for research in the near future.

There is research that supports cat owners who believe cats are happier outside with the "it's in our genes" theory, which is research not examined in this paper, however it is worth noting that the evolution of our thinking and views may not be keeping pace with the reality of our urban environments (Driscoll, Macdonald, & O'Brien, 2009). Namely, even though few urban environments have barns full of grain or hay or other produce that requires rat or mice control for maintaining a level of livelihood, cat owners continue to view cat predation on rodents as something good and necessary. There is research that cat predation on such wildlife interferes with the food supply for other predators, such as owls or hawks, however it would be challenging to convince anyone that the supply of rats or mice in Kamloops is diminishing and there isn't enough for "everyone". Promotion of alternative ways to reduce the rats or mice populations in Kamloops neighbourhoods would be beneficial and divert the resistance to risk-mitigation strategies.

At the outset there would appear to be a strong case for Kamloops to implement licensing and bylaws for cats. There are communities in other provinces who have embarked upon a similar path for bylaws and responsible cat owner policies, such as Calgary, AB (Nature Canada, 2019 b) and Guelph, ON (Nature Canada, 2019 c). Victoria, BC most recently implemented a no roaming/trespassing bylaw and mandatory licensing. In reading the comments section of the news articles in relation to this city decision provides a snapshot

of the familiar challenges and standard negative reactions in those communities (CBC, 2019; CTV News Vancouver Island, 2019; Victoria News, 2019). Guelph took a step-by-step approach with introducing voluntary licensing in 2017 and then mandatory licensing in 2018 (no collar or license tag be required if cat is microchipped and info is kept current). The \$25 annual fee allotted \$5 of that fee to Animal Control Working Group, Guelph Humane Society and City Staff to address health and welfare issues for cats. They will review the option of no cats roaming free/at large in 5 years. In Kamloops, collaborative work with the Kamloops and District Branch of the SPCA would be beneficial because they already have the BC Pet Registry program in place for the adopted cats, which may serve as a cost-effective way to license cats not adopted through the SPCA.

Creative solutions that could reduce negative reactions to licensing and bylaws is possible with the Nudge Theory (Thaler & Sunstein, 2009), which incorporates subtle cues and positive reinforcement to engage the community. The Nudge Theory outlines that in order for this theory to be effective, campaigns need to tap into the instinctive/subconscious mindset of people by making the desired behaviour really easy, socially acceptable and/or attractive. Nudge Theory aligns with the importance of the language used in messaging surrounding outdoor pet cats and encouraging responsible cat owner behaviour. For example, compare the two questions: Do you allow your cat to roam free? Do you allow your cat to trespasses? Certainly most would concur that the tone of “roam free” is much more positive than “trespasses”, thus the choice of words can have an influence on behaviour in a very simple, and subtle manner. The Victoria bylaw incorporates this language in their regulations: “Cats must not trespass on private property without permission of the owner/occupier of the private lands” (City of Victoria, 2019).

Nudge Theory is also about freedom of choice within the confines of the behaviour a campaign is designed to encourage. Thus, providing outdoor cat owners options that allow their cats outdoors, but keeps them in their yard, is an example of choices within a desired outcome. As mentioned earlier with the defensive measures, the least costly measure is the bell on a cat collar and leash/harness options, but again the benefits of each option needs to be weighed in light of the risks imposed and incurred. Namely, the bell on a cat collar does little to keep the cat in the yard or protect the cat while it is outdoors, and the leash/harness

option does keep the cat in the yard thus protecting the cat, but a factor for consideration is the cat owner's time.

Community engagement projects are also an effective method for creating positive conversations around a contentious issue. A good example of a community engagement project are the catio tours that are gaining attention. Great success with such an initiative is evident in Portland, Oregon (Feral Cat Coalition of Oregon, 2019). Most recently the Vancouver SPCA announced it is hosting its inaugural catio tour on June 9, 2019 in Kitsilano and Mount Pleasant neighbourhoods. It would be worthwhile to find out how those communities inspired cat owners to build the catios in the first place, as obviously to have a successful catio tour there needs to be catios already in place. Perhaps there are cat owners in Kamloops who have catios, so finding that out would be beneficial.

At the outset of this research, I had hoped to compare the perceptions of the risks to the reality of the risks for Kamloops, however, gathering the data on the reality of the risks facing wildlife and outdoor pet cats proved to be a research project in and of itself. Perhaps that project could be pursued given appropriate resources.

It is worth noting some of the limitations of this research as was noted in the introduction. Namely, with any kind of survey, a sampling error occurs since only one sample drawing is used to make an inference about the population. Measurement errors play a factor and was addressed by carefully wording the survey questions so they remained neutral. Coverage error was addressed by distributing the survey through several different methods in an attempt to reach all demographics. Despite all these attempts, the number of female respondents outweighed the male respondents. This is not uncommon and previous research has demonstrated that females are more likely to participate in online surveys than males (Smith, 2008). Non-response error is the final error to take into consideration and that was accommodated for by posting the survey online, which may alleviate such an error.

As noted earlier, due to a lack of resources, and to execute the survey in a timely manner, utilizing non-probability sampling was necessary. There is a risk that a representative sample would not be reached, however many forms of distribution of the survey link were employed to reduce the risk and the representative sample was achieved. In gathering baseline data for Kamloops part of the purpose of this research was to gauge the community's interest in the subject and gather their opinions and perceptions as would be demonstrated by the

number of valid survey received, which exceeded the representative sample required. The types of non-probability sampling utilized included convenience sampling because there was no budget for purchasing a list of all members in Kamloops. Snowball sampling would have also been an inherent factor when the methods for distributing the survey were media, email and websites (including Facebook) where “sharing” occurs. It is understood that when measuring opinions and attitudes there may be an unwillingness to provide honest answers, which comes from the respondents desire to provide socially acceptable answers. As mentioned earlier, this research can only provide baseline data and provide a representation of those who deem the topic of concern or interest.

Also mentioned earlier, an interesting future extension to this research would be to conduct a multivariate regression analysis for variables of interest including, but not limited to, the value of a statistical of a cat, the willingness to pay by non-cat owners, the perception of risks. For example, the value of a statistical life of a cat could depend on a number of factors such as the age of the cat, previous issues with outdoor cats, respondent’s demographical information (income, gender and education). An exciting part of research is that more often than not it leads to more research.

The first order of action with this research is to distribute it to the key stakeholders in Kamloops, such as City of Kamloops Bylaws and Environment & Sustainability Departments, Kamloops and District SPCA, and BC members of the Stewardship Roundtable who participated in the Cats and Birds Living in Harmony theme. During the distribution of the survey, respondents asked for an executive summary of the results, so I will need to honour those requests. Following distribution of the results to key stakeholders, a meeting could be called to determine what action is most feasible within the next year. Shelley Joyce of the CBC Morning Show in Kamloops suggested I return to the show with the results. It would be beneficial at that time to have some kind of a plan in place, even if it is prioritizing further research. If we are to learn from other municipalities, such as Victoria BC, Guelph ON and Calgary AB, the key to moving forward requires all the stakeholders to work collaboratively and develop a plan for implementing initiatives specific to their communities. A goal will be to engage the community in risk-mitigation driven by the quest to create a safe and enriching environment for cats and to protect the wildlife, which we, as residents of Kamloops, have shown to have an interest in protecting. Bringing the expertise of the

wildlife conservationists, animal welfare advocates and this research to the public is sure to elicit meaningful conversations and act as a springboard for action that achieves the overarching goal, namely to protect the wildlife and reduce the outdoor pet cat population.

## Appendices

### Appendix A: Birds Most at Risk in Kamloops, BC (Howie, 2016)

American Goldfinch	House Sparrow
American Robin	Mourning Dove
Bohemian Waxwing	Northern Flicker
Cassin's Finch	Pine Grosbeak (winter only)
Chipping Sparrow	Pine Siskin
Chukar - predation of young	Red Crossbill
Common Redpoll	Red-winged Blackbird
Dark-eyed Junco	Ring-necked Pheasant - predation of young (very low local populations)
Eurasian Collared Dove	Rock Pigeon
European Starling	Ruffed Grouse - predation of young but low valley bottom grouse populations
Evening Grosbeak	Song Sparrow
Fox Sparrow (rare in winter)	Spotted Towhee
Harris's Sparrow (rare in winter)	Varied Thrush
House Finch	White-crowned Sparrow

## Appendix B: Survey

### Outdoor Pet Cats and Wildlife

#### Exploring the Bidirectional Risks and the Value of Conservation

#### BACKGROUND INFORMATION

I am a student at Thompson Rivers University in the Master of Science in Environmental Science (MSc) program requesting your participation in this survey as part of my thesis for the MSc degree. The purpose of this study is to understand how people feel about outdoor pet cats in their neighborhoods, as well as how these cats and their interactions with wildlife, especially birds, may be managed. In this survey, when we refer to outdoor pet cats, we mean pet cats that spend at least some of their time outdoors.

Please note, you must be 18 years or older to complete the survey.

The results from this survey will contribute to understanding Kamloops residents' cat ownership behaviour and perception of risks for both pet cats and wildlife.

Your feedback is important to us. Your participation is voluntary and the survey should take about 15 minutes to complete. Your answers will be completely confidential.

Thank you for your participation.

If you wish to receive an executive summary of the results please feel free to contact my thesis supervisor, TRU Research Ethics Board Chair, or myself.

Denise S King, MSc Candidate - Thompson Rivers University. Contact email: [dking@tru.ca](mailto:dking@tru.ca)

Faculty supervisor: Dr. Peter Tsigaris. Contact email: [ptsigaris@tru.ca](mailto:ptsigaris@tru.ca)

TRU Research Ethics Board approval (June 27, 2017). Contact information [TRU-REB@tru.ca](mailto:TRU-REB@tru.ca); 250.828.5000

#### Consent, Risk, Privacy and Right to Refuse

**Consent:** By completing the survey questionnaire, you the participant are providing your consent for the information you provided to be used for the purpose of this study.

The Stewardship Centre of BC (a subsidiary organization of Nature Canada) will also utilize data gathered from questions in this survey.

**Risk:** There are no risks associated with completing the survey.

**Privacy and storage:** No identifying information will be collected. Information you provide will be filed and stored in a cabinet at the office of the supervising faculty and after the conclusion of the study, kept for 5 years and then destroyed.

**Right to refuse:** You have the right to refuse or cease participation at any time during the survey.

If you agree to participate and understand the purpose of the study, please select yes.

Yes



### Section 1 - Wildlife

The first section of this survey is to understand, in general, how you feel about wildlife issues.

	Not at all interested	Somewhat interested	Interested	Quite interested	Very interested
Overall, how interested would you say you are in local wildlife issues?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Below are statements representing different ways that people might think about wildlife. Even if you don't know or care much about wildlife, we are interested in your opinions.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Humans should manage wildlife populations so that humans benefit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I view all living things as part of one big family.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wildlife are on earth primarily for people to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wildlife are like my family and I want to protect them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Section 2 - Opinions about Outdoor Pet Cats

There is a wide range of opinions about outdoor pet cats. For example, some people feel that pet cats live happier, healthier lives outside, while others feel that outdoor pet cats have negative effects on wildlife and the environment. Even if you are uninterested or unaware of the topic of outdoor pet cats, we're interested in knowing how you feel about these issues.

	Not at all informed	Somewhat informed	Neutral	Informed	Very informed
How well informed are you on the topic of outdoor pet cats?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not at all interested	Somewhat interested	Neutral	Interested	Very interested
How interested are you in outdoor pet cat issues in your neighborhood?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Very bad	Bad	Neutral	Good	Very good
Overall, do you think having outdoor pet cats in your neighborhood is good, bad, or neither?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly disapprove	Disapprove	Neutral	Approve	Strongly approve
Please rate your overall level of approval of people allowing their cats to spend time outdoors in your neighborhood.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Below are statements representing different ways that people might think about outdoor pet cats. We are interested in knowing your opinions about outdoor pet cats in your neighborhood.

Outdoor pet cats in my neighborhood...

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
...are a nuisance (cause problems).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...are enjoyable to have around.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...play a useful role as predators in the natural environment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...are harmful to wildlife.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...disrupt the balance of nature.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...are at risk of being harmed while outdoors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...live happier lives than cats that remain indoors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...live shorter lives than cats that remain indoors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...should be protected by their owners from possible harm while spending time outdoors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...should be allowed to roam freely without restrictions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### SECTION 3 – Outdoor Pet Cats and Risks to Wildlife

We are now interested in learning more about your opinions regarding the possible risks associated with pet cats spending time outdoors in your neighborhood. These could include risks that pet cats may pose to wildlife, people, and other pets, as well as risks that pet cats may encounter while they are outdoors.

How unlikely or likely do you think it is that the following would occur as a result of pet cats spending time outdoors in your neighborhood?

Pet cats spending time outdoors in my neighborhood would result in...

	Very unlikely	Unlikely	Neutral	Likely	Very likely
...a decrease in populations of mice or rats	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...a decrease in populations of birds.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...a decrease in populations of small mammals (examples: squirrels or gophers).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats getting diseases from wildlife.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats getting diseases from other pets (examples: other cats, dogs).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats giving diseases to other pets.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats giving diseases to wildlife.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats giving diseases to humans.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats being injured or killed by coyotes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats being injured or killed by lynx.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats being injured or killed by cougars.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats being injured or killed by other pets (examples: other cats, dogs).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats being hit by cars.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats being lost or stolen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats damaging people's property (examples: going to the bathroom in yards, digging up gardens).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...cats injuring or killing small farm animals (example: chickens).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In the past 12 months, have you experienced problems with outdoor pet cats in your neighborhood?

Yes  No

If yes, please briefly explain the problem(s) and how often it occurred (once during the year, once a month, once a week, etc.), in the space below:

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**SECTION 4 – Risks to Outdoor Pet Cats**

Now, we want to know how you feel about certain actions to address possible risks associated with pet cats spending time outdoors in your neighborhood.

Is it unacceptable or acceptable to ...

	Very unacceptable	Unacceptable	Neutral	Acceptable	Very acceptable
...require pet cats to be kept indoors at all times?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...require pet cats to be restrained when outdoors (for example: on a leash or in a cat enclosure)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...require owners to obtain a license for outdoor pet cats?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...require owners to vaccinate outdoor pet cats?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...require owners to spay or neuter outdoor pet cats?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...require owners to spay or neuter all pet cats, regardless of whether they are indoor or indoor/outdoor cats?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you currently own one or more cats?

- Yes – proceed to SECTION 5, page 7.
- No – proceed to SECTION 6, page 14.

SECTION 5 – Cat Ownership and Outdoor Cats – cat owners only

How many cats do you currently own?

- 1  
 2  
 3  
 4  
 4 or more

How many of your cats are male?

- 0  
 1  
 2  
 3  
 4 or more

How many of your cats are female?

- 0  
 1  
 2  
 3  
 4 or more

Answer the following question, if and only if, you have 3 or less male cats?

	Birth to 6 months	7 months to 2 years	3 to 6 years	7 to 10 years	11 to 14 years	15 years plus
Age of male cat 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Age of male cat 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Age of male cat 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Answer the following question, if and only if, you have 3 or less female cats?

	Birth to 6 months	7 months to 2 years	3 to 6 years	7 to 10 years	11 to 14 years	15 years plus
Age of female cat 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Age of female cat 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Age of female cat 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Yes	No	Not applicable
If you have male cats, are they neutered?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you take your male cat(s) to the veterinarian for annual check-ups?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If you have female cat(s), are they spayed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you take your female cat(s) to the veterinarian for annual check-ups?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Have any of the following situations happened to one of your cats in your current residence?

	Yes	No	I don't know
...been injured or killed by predators (examples: coyotes, lynx, cougars).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...gotten a disease from wildlife.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...been injured or killed by other pets (examples: other cats, dogs).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...been hit by a car.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...been lost or stolen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In a typical day, how often do you play with your cat(s)?

Number of times per day:

Number of minutes per day:

Do you have an "indoor-only" cat?

- Yes - proceed to page 11.
- No – proceed to the next page – page 9.

In a typical week, how often does your cat(s) go outdoors?



We are now interested in knowing whether any restrictions apply to your cat(s) being allowed to spend time outdoors. Restrictions could include, for example, keeping your cat indoors or allowing your cat to spend time outdoors only under certain circumstances such as during the day, under your supervision, on a leash, etc. (Check all restrictions that apply.)

I only allow my cat(s) outside...

- ...with an ID collar
- ...with a bell on the collar
- ...under someone's supervision
- ...during the daylight hours
- ...in a fenced-in yard
- ...in an outdoor enclosure (example: a cat run)
- ...on a leash or harness
- Other, please specify... \_\_\_\_\_
- None of the above: my cat(s) can roam freely without restrictions

Do you believe Kamloops cat owners should have to license their cats?

- Yes - skip the next question and proceed to the SCENARIO SECTION, page 12.
- No - proceed to the next question.
- Undecided - proceed to the next question.

Please select from the list of reasons why you do not believe (or are undecided) about whether Kamloops cat owners should have to license their cats - you may choose more than one, or provide your own explanation.

- I don't believe licensing is necessary
- I don't see how licensing is useful
- I can't afford to pay for a license every year
- I do not allow my cat(s) outdoors so no need for a license
- Other, please specify... \_\_\_\_\_

 Please proceed to the SCENARIO SECTION, page 12.



SCENARIO SECTION - Please answer the following in relation to the scenario.

Across Canada the risk to outdoor pet cats dying prematurely from any cause is approximately 5 in 1000. Suppose controls would reduce the risk to 1 in 1000 (or by 20%).

Would you be willing to pay to reduce the risk of outdoor pet cats dying prematurely?

- Yes - proceed to question 2.
- No - proceed to question 3.

How much more per year would you be willing to pay to reduce the risk of outdoor pet cats dying prematurely (for example, through the hiring cat bylaws officers or increasing support to a local animal welfare organization)?

- \$10.00
- \$20.00
- \$30.00
- \$40.00
- \$50.00
- Other amount \_\_\_\_\_

Please select from the list of reasons why you are not willing to pay to reduce the risk of outdoor pet cats dying prematurely - you may choose more than one or provide your own explanation.

- I don't believe outdoor pet cats are at risk while outdoors
- I can't afford to pay for controls
- I'm not interested in paying for controls
- I'm not interested in paying for controls, because I'm only concerned about my indoor cat.
- Other, please specify:


\_\_\_\_\_

-

STATEMENT SECTION - Please answer the following in relation to the statement.

Animal welfare advocates encourage cat owners to keep their cats indoors so they will be safe. Alternatively, if cat owners allow their cats outdoors, they strongly recommended the cat is kept under the care and control of the owner (on a leash or in an enclosure).

To keep your cat safer would you decrease the number of hours you allow your cat to roam freely outdoors?

- Yes - proceed to question 2.
- No - proceed to question 3.
- Not applicable - I have an indoor-only cat -  **Please proceed to SECTION 7 - page 16.**

Please indicate the decrease in the number of hours you would allow your cat to roam freely outdoors:


- 1 hour less

- 2 hours less
- 3 hours less
- Other, please specify: \_\_\_\_\_

**Please proceed to SECTION 7 - page 16.**

Please select from the list of reasons why you would not decrease the number of hours your cat spends outdoors - you may choose more than one, or provide your own explanation.

- I don't believe my cat is at risk while outdoors
- I believe my cat needs time outside
- Not applicable: I do not allow my cat(s) outdoors
- Other reason(s): \_\_\_\_\_

 **Please proceed to SECTION 7 - page 16.**

**SECTION 6 (for non-cat owners only)**

Do you believe Kamloops cat owners should have to license their cats?

- Yes - skip question 2 and proceed to question 3.
- No - proceed to question 2.
- Undecided - proceed to question 2.

Please select from the list of reasons why you do not believe (or are undecided) about whether Kamloops cat owners should have to license their cats - you may choose more than one, or provide your own explanation.


- I don't believe licensing is necessary
- I don't see how licensing is useful
- I don't have free-roaming cats in my neighbourhood
- Other, please specify: \_\_\_\_\_

Would you be willing to pay anything towards enforcement to ensure your neighbour's cat is contained in its yard?

- Yes - proceed to question 4.
- No - skip question 4 and proceed to question 5 - page 15.


How much are you willing to pay per year for cat control enforcement?

- \$5.00
- \$10.00
- \$15.00
- \$20.00
- Other, please specify: \_\_\_\_\_

 **Please proceed to SECTION 7 - page 16.**

Please select from the list of reasons why you would not be willing to pay for your neighbour to keep their cat indoors - you may choose more than one, or provide your own explanation.

- I don't believe my neighbour's cat is at risk while outdoors
- I don't think the wildlife is at risk from my neighbour's cat
- I think cats should be allowed to roam freely
- I don't have free-roaming cats in my neighbourhood
- I don't think non-cat owners should pay for any kind of cat control
- Other, please specify: \_\_\_\_\_

 **Please proceed to SECTION 7 - page 16.**

SECTION 7 (for cat owners and non-cat owners)

The following background information will be used to help make general conclusions about residents in your area. Your responses will remain completely confidential.

What is your gender?

- Female
- Male
- Other

What is your age?

- 18-24 years old
- 25-39 years old
- 40-64 years old
- 65-79 years old
- 80 years or older

What is the highest level of education you have achieved?

- Less than high school diploma
- High school diploma or equivalent (GED)
- Certificate, diploma, or trade
- 4-year university degree
- Post-graduate degree

Do you rent or own your home?

- Rent
- Own

Please indicate the total number of individuals in your household (including yourself):

- 1
- 2
- 3
- 4
- 5 or more, please specify: \_\_\_\_\_

Do you have children below the age of 18 residing in your household?

- Yes - please specify how many: \_\_\_\_\_
- No

Are you or another member of your household retired?

- Yes
- No

Do you have a backyard?

- Yes
- No

Do you have a dog?

- Yes
- No

How many cats do you see roaming freely in your neighbourhood on average a day?

- 0
- 1
- 2
- 3
- 4
- 5 or more, please specify: \_\_\_\_\_

Which part of Kamloops do you currently live?

- Aberdeen
- Barnhartvale
- Brocklehurst
- Dallas
- Downtown
- Heffley Creek
- Juniper
- Lower Sahali
- Mount Dufferin
- North Shore
- Rayleigh

- Rose Hill/Knutsford
- Upper Sahali
- Valleyview
- West End
- Westmount/Batchelor Heights
- Westsyde
- None of the above.

If you answered "none of the above", please provide the part of Kamloops you currently live in the space below:

Please indicate your total annual pre - tax household income

- Less than \$40,000
- \$40,001 to \$80,000
- \$80,001 to \$120,000
- \$120,001 or more

Please provide any other comments you may have about outdoor pet cat issues in the space provided below.

***Thank you for participating in this study!***

## Appendix C: Research Ethics Board Approval



June 27, 2017

Mrs. Denise King  
Faculty of Science  
Thompson Rivers University

File Number: 101623  
Approval Date: June 27, 2017  
Expiry Date: June 26, 2018

Dear Mrs. Denise King,

The Research Ethics Board has reviewed your application titled 'Outdoor Pet Cats and Wildlife: Exploring the Bidirectional Risks and the Value of Conservation'. Your application has been approved. You may begin the proposed research. This REB approval, dated June 27, 2017, is valid for one year less a day: June 26, 2018.

Throughout the duration of this REB approval, all requests for modifications, renewals and serious adverse event reports are submitted via the Research Portal. To continue your proposed research beyond June 26, 2018, you must submit a Renewal Form before June 26, 2018. If your research ends before June 26, 2018, please submit a Final Report Form to close out REB approval monitoring efforts.

If you have any questions about the REB review & approval process, please contact the Research Ethics Office via 250.852.7122. If you encounter any issues when working in the Research Portal, please contact the Research Office at 250.371.5586.

Sincerely,



Andrew Fergus  
Chair, Research Ethics Board



## Appendix D: Scenario Section Question 3

Please select from the list of reasons why you are not willing to pay to reduce the risk of outdoor pet cats dying prematurely - you may choose more than one or provide your own explanation.

Indoor cat owners

I think all cats should be contained!
I have and provide care for my indoor cats. I feel that people who have outdoor cats, who choose to put them at risk, should pay for these reduction of risks, licensing, and nuisance fees.
I believe the burden of an outdoor cats should be on the owner and not on the general public.
They should not be allowed to roam freely, just as dogs aren't
When I allow my cat outside I keep a watch on it as I would on a toddler.
I look after and am responsible for all my pets. I do not want to pay for someone who is too lazy to be responsible
I'm not paying to look after someone else's cat
I feel it is the owners responsibility for financing if they are allowing their cats to go out
I'm not interested in paying for other people's ignorance or inability to look after their pets properly.
The reduction from 5 to 1/1000 is not really a big enough reduction. I would rather pay for more education throughout people's lives so they understand outdoor living is not good for the cats or the wildlife.
Who decides what controls and at what cost.
I shouldn't have to pay for other people's poor choices
Not convinced that controls would be effective. Cats are able to roam further - they can scale fences, etc.
It is not a societal problem to have outdoor cats who are at risk of harm.
Pet owners should pay for their own pets, as I do. Perhaps I'm not understanding the previous question.
People who let their cats outside should pay or keep cats indoors.
my cats are indoor cats now
People who allow their cats outdoors are responsible for their own cats
If I had an outdoor cat I would pay, but my cat is indoor only. Why should I pay for someone else's cat?
Not sure how to answer that question
This question is manipulative. You want us to answer yes so that you can justify paying someone to trap and kill outdoor cats. CAT LICENSING DOES NOT WORK!!!! A LOT of cats died when Calgary brought in their misguided licensing laws.
A cat's life its own responsibility if it is an outdoor cat.
Control cat colonies is the way to go and no one seems to understand the need for them.
If a cat is allowed outside, it is at risk of dying young, and the owner should know this and accept it. There is no shortage of cats in the world. I don't see why anyone should want to

save more cats while still allowing them to roam free outside. If anything, we should reduce cats being allowed outside in order to increase birds and small mammals from dying prematurely.
They have tried to get rid of the feral colony in the Tranquille market for years with no success. They being municipal government.
This is a hypothetical situation with no proof, therefore how can I pay for something that may or may not be a result of someone "paying" to decrease risk of cats dying prematurely....
If you don't want your cat to be at risk, don't let it outside.
Cat licensing does not protect cats from the dangers of outdoor life because they don't have to stay indoors. This is ridiculous.
We budget our modest income carefully. Why should we pay for the indifference of others?
Owner should be responsible and not have outdoor cats
People should keep their cats indoors

#### Outdoor cat owners

A fenced yard won't keep my cats in. They know how to better protect themselves because they are outside cats.
Individuals should look after their own pets
This question makes no sense
Cats are not dogs. We cannot contain them in homes like cats. They are curious and need to explore, and be in nature. it is their instincts. Keeping them inside is like prison
I understand the risks
I wouldn't change anything I am doing now or have been for 30 years. My cats have all been indoor/outdoor cats and they all have lived for 15 or more yrs with a good life. I don't need to pay for changes.
Risk is a part of nature
I think Cat Owners should be responsible enough to do the best for their cats and keep them inside. This is less expensive for the owner in the long run.
What are the controls? How much?
I know the risk is higher to outdoor cats. My cats are happy outside and it's a risk that I'm ok with.
People who are in control of their cat(s) should not have to pay the same fee as people who allow their cat(s) to roam free. I do not mind paying a small fee that could potentially be given to SPCA in the form of a donation.
I accept the risks of my cat going outdoors. My first cat passed away at 17 yrs... he was an indoor/outdoor cat
I think your stats are wrong... how would you know how many outdoor cats die without there being a control on what cats are out there? Are you taking into account people who have barns full of them? Our neighbourhood is rampant with feral cats. How do you know how long they live? I think you need to revise your questionnaire. When I'm responsible for my animals, why should I pay for those who aren't? That's where changes need to be made.

I don't know what kind of controls we could use
Would want more information regarding what the controls are and the cost
There are risks of having cats remain in or allowing them out. The risks are just different. Having animals in your life also means you lose them eventually. Let them be as natural as possible
Paying who for what?
What controls? some are acceptable, some are not
I would pay but not if it means taking away the ability of cats to go outdoors, I feel that may lead to a reduced quality of life
There are always risks in life, not everything requires licensing and regulation. When we start licensing panhandlers I'll consider licensing my cat.
I don't mind paying for my cat but would not subsidize others. More interested in ensuring animals are spayed or neutered.
Natural selection
Had cats all my life. Life happens whether they're indoor or outdoor cats.
A cats life is not that valuable
They take their chances. Just like we do in a car every time we drive. There are lots of cats and there is no need to reduce their premature death.
Over-regulation
If I want to reduce the risk of my cat dying pre-maturely, I will keep my cat in the house. I have no idea how paying for something will keep my cat safer. It may satisfy the dog owners who have to pay a license, but it has nothing to do with keeping my cat safe. I love my cats like family and believe it is cruel to keep a cat locked in a house. They are an animal and animals deserve to experience life out doors, even if their safety is compromised. At least they lived, not caged in a house for their existence. Quality over quantity. .
I already pay for tattoo and chipping. That's enough ID. There are better thing to spend money on. Cats as a rule do not attack people like dogs.
It is not necessary. All life faces risk that is part of nature.
I think that outdoor cats have a better quality of life which compensated for the risks
My cat grew up rural and is quite happy
Too many extra charges already
I don't believe it is going to reduce risk by buying a license.
I don't see that paying anything to anybody would reduce the risk
We have had cats in our neighborhood since 1990. All these indoor/ outdoor cats lived until age 15 or older, a good and happy life.
The risk is too small to be a cash cow for someone/some company
My cat is happier outside and if he lives a shorter life and he is happy hunting I'm ok with that
Another waste of money. Also not explained well. What would I be paying for exactly? Where would the money go? How would it directly benefit my cat?
I believe outdoor cats live fuller cat lives
There are far too many cats as there is

I'd like it to be clearer how the controls will reduce harm to both wildlife and my cat e.g. every cat that goes outdoors has to wear one of the large frilly, colourful collars that the TRU student found helpful for birds

Both my cats are indoor/outdoor cats but spend most of their time indoors. I live in a rural area where having a cat is all but essential else one is soon swimming in mice. My cats rarely roam outside my acreage; even my neighbours say they never see them except when, in the evening, I take them for a walk, something I've trained them to do from kittens. As noted, both are neutered.

Quantity of life isn't quality of life.

Appendix E: Section 5 Question 14  
(Restrictions - Other Comments)

Outdoor Cat Owners

after 10 to 5am
Cat fence. But one cat meows non-stop if not allowed out front. Other remain in back yard in cat fence so, they can go out whenever they want.
Cat lives in garage, may come and go as she pleases during the day, locked in at night. Usually stays in during the winter.
Cats are trained to come when called, they stick to about a 1-2 block radius of our area
Electric collar
He has his own door so he does as he pleases.
He'll walk beside me when I walk down the street sometimes (no leash)
I create a water grid with the sprinklers as I water my lawn in the summer. They won't run through it, but can roam freely within the dry space.
In the summer with a neoprene bib to restrict hunting. She learned work arounds on bells.
Most of his outdoor time is spent in our fenced back yard, though occasionally he will climb over the fence and go for a short tour around the neighbourhood.
my cat is free to go in and out in an enclosed pen at his pleasure - never allowed to roam free
Never
Never in negative degree weather
Not in the winter typically unless observed.
Not overnight
Only at night
She has almost always stayed in our yard, and seldom wandered.
Tried ID collars and they did not work - were always falling off
Try to have him inside for the night when we go to bed
Try to keep cats indoors at night
We've lost many collars as they come home without them
When camping in a large carrier
with tattoo

## Appendix F: Section 5 Question 16

## Other Reasons (Why cat owners should not have to license their cat)

## Outdoor Cat Owners

Absolute waste of time, effort, and money for both the animal owner and the government.
Administration costs better used on spay/neuter subsidy
All cats should be microchipped and owners fined if their cats are caught roaming
Already having to pay for chips and tattoos. I think that's enough
Cash grab
Cat not allowed to wander.
Cats provide a useful service by killing rodents
Cats, especially scared cats, are very sneaky creatures. I doubt most people have the ability to catch such a cat to see if it's licenced.
Collecting a licencing fee would not change the anything about outdoor cats expect the city budget gets a boost. Just another tax that goes into general revenue. How does the fee change the outdoor cat situation?
Come on we know the reason why cats will never be licensed...it saved the world from the black plague many many, many years ago....hellllo
Disapprove of over-regulation
Don't know much about licensing
Helpful in identifying lost cats, but virtually unenforceable so I don't see any point.
I am undecided because I don't fully know the pro/cons for licensing
I believe collars on cats are dangerous - even break always - and thus having them licences could only work via microchip number or tattoos
I don't want to pay to licence them. It's ridiculous.
I don't care either way.
I feel it is unsafe to put a collar on a cat and puts them at great risk of harm/death
I live on a farm (in the City) so my circumstances are different
If we were to licence, I would like to know what the value would be other than the city collecting more money from me.
I'm not exactly sure what licensing a cat would accomplish?
It is a stupid idea people won't pay for it
Licensing is hard to regulate and I don't believe outdoor pets actually cause that much harm.
licensing is just a way for the city to make money
Licensing would be unenforceable
My cats do not roam outside of my yard so I see no reason to license.
Not sure the point?
One more tax...
There is British Common Law that forbids licensing of cats.
Veterinarians routinely tattoo the inner portion of the ear and can be used as reference. This practise should be mandatory.

<p>What good is a license when bylaw officers can't keep up with the number of bylaws we have? An exercise in futility!</p>
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### Indoor Cat Owners

Arbitrary 2 cat per household limit could then be enforced
Cat licensing does not work. Compliance is low and costs to the city are very high. Licensing does not mean that cats will be kept indoors so it will have no effect on the cat's interaction with wildlife. The purpose of this survey seems to be that we need to license cats in order to save wildlife. It doesn't work that way.
Cats that go outdoors should be licensed. They have been in Calgary for years now.
Difficult to enforce, lots of backlash in the community
difficult to enforce, probably impossible to enforce
Dog owners get pound services for their license fees. The city does not keep cats. There would be no services provided for the fees paid. If the city provided pound services for cats, I would consider it.
he would not like to wear a collar and could get hung up on something if roaming around
I do not believe most cat owners would comply. More bylaw staff. More govt. intrusion in our lives. Dogs are licensed and yet problems abound
I don't believe the money you would pay to the city for licensing has any benefit to the owner. At least with dog licences there is some benefits (dog parks, re uniting me if he runs off and gets lost) but charging a fee for my indoor only cat is just a money grab
I don't know that licensing would be effective - difficult to enforce
I don't see how it will change anything or make anything better???
I don't think it's anybody's business to force this on anybody!!
I have not heard any discussion in Kamloops city council on the topic
I think this is over-regulation - we have enough licences to buy!
I'd like to see the pros and cons of a licensing scheme
If it is an outside cat, then yes
Impossible to monitor this.
It would be difficult to enforce so is it worth the time and money
It would just be a money grab by the city.
It's not enforceable. Tattoo them all instead.
Licensing leads to a lot of cats being euthanized. Also, the municipality will have to pay to have a special building where all of these fugitive felines can be housed. Cat licensing DOES NOT WORK!!!!
Licensing is government thievery of its population
Licensing should be necessary for outdoor cats only
Micro managing by municipal government and a way to generate money for a city within a province that has provided extremely limited ways for municipalities to generate income. Feel it would be a poor urban planning decision and a multi-disciplinary approach would be necessary to determine if this was actually a good idea.
Mine are tattooed and microchipped already
my cat has a microchip and she is tattooed

No point in licencing an indoor cat as by-laws would not be aware of it.
Our cats go out on a catio or on a leash...if they ran away accidentally a license would not help locate them...their tattoos/chips will
Pet ownership should not be profitable for others
Too difficult to enforce
Undecided, I can see both points of view, licenses are good to lead to more spaying/neutering maybe
We've tried it here before. Major belly flop. Enforcement is problematic, and therefore no one bothered to do it.
What would the funds be used for? What would the city do with information? I see no benefits for cats or their owners.



## Appendix G: Statement Section Question 3

Other Comments (Reasons why you would not decrease the number of hours your cat spends outdoors)

I can't control when they come back
Have already completely reduced to no outside time, due to one cat disappearing.
On average my cat is outside less than 15 minutes a day - always under my supervision. She stays in our backyard during that time.
Mine is only out 1-2 hours max
it wouldn't be specific to amount of time but to time of day, ie. no outdoor time at and after dark
If I could afford to enclose my yard I would do so to minimize risk.
They go outside w/ me for approx 15 mins a time just during day light hrs.
Daylight hours
None unless it is in a compound
Not outside at night
We live on Peterson Creek (ravine) with bountiful wildlife. I do not let my outdoor loving cat go outside overnight when it is dark. Evening prancing around is okay as I leave my big dog outside to protect him and scare away wildlife.
They aren't allowed to roam freely outdoors
I don't let her out, and when i do its on a leash
Fewer days outside...fewer hours is not an option
My cats are always supervised outside.
My cats are only allowed out under supervision
N/A as my cat is an indoor cat
depends on the day
My cats are never allowed free roaming.
Daytime
Cat never roams freely
I would keep my cat indoors at night if I lived in a neighbourhood where coyotes/lynx were likely to be.
Depends on season
Keeping them in at night less chance of coyotes / other predator (owls) getting them
depends on the season
I already keep it to a minimum
they already spend little time outdoors unless in enclosure
Only when I'm outside with her
keep them in at night
would not allow her to roam freely
as I now do, try to keep them in during night and early morning when wildlife predators are more likely to be around
Reduce time to zero if I can convince other family member.

I am handicapped and cannot stop my cat from getting out when I open a door from a wheelchair, otherwise it would never get out

## Appendix H: Section 6 Question 2

Non-Cat Owners - Please select from the list of reasons why you would not be willing to pay for your neighbour to keep their cat indoors - you may choose more than one, or provide your own explanation.

I wouldn't expect non dog owners to pay any fees for the control of my dog. But when there are licensing rules as well as leash rules etc. for dogs, the same should go for cats. Not just because both can be potentially dangerous for humans if they are unattended, but also for the safety of the animal.
Too difficult to enforce
it's the owner responsibility to keep his/her pet in check
Wouldn't licensing fees help with this?
I think cat owners should pay for enforcement through their licensing fee
It's a money grab, and would be extremely hard to enforce.
It's the owners responsibility to look after their cat(s), including litter box and food so it can be kept indoors. The owner is also responsible to exercise the cat indoors, putting it outside for "exercise" is not responsible behaviour for the owner.
It is my neighbour's responsibility co cover all costs associated with owning a cat.
My neighbour doesn't pay to keep my dog enclosed in the yard or leashed so why would I pay for them to keep their cat safe?
I think that cats should be monitored/leashed while outside
I pay for my fence to keep my dog in my yard, I pay for a license for my dog which does not roam free, I pay to have shots to keep my dog up to date - why don't cat owners?
I think cats are at risk but to some degree that's nature. Should we say deer have to be kept inside to protect them?
It's their cat, we pay to license our dogs. Their cat, their responsibility.
I feel money from Cat licenses could go towards this cost, although I see it being hard to enforce a cat staying in it's own yard (and unlikely)
I would rather funds go to education
I don't feel it is my responsibility to pay for my neighbour's choice to have a pet. Pets are a responsibility - if you take one on you must accept that responsibility and the bills that come with it not your neighbor!
The whole idea of licensing cat is ridiculous and impossible to in force.
While cats may be more at risk outdoors, I do not believe we should dictate that a cat must remain indoors.
I think it would be helpful to have rules in place, but don't feel there needs to be an added expense involved.
Cat owners need to take responsibility, just like dog owners
I do not believe this would require more Bylaw officers or increased costs
We have 3 farrow cats that we have made houses for. We feed and water them daily
I have to care confine and license my dogs. Cat owners should be required to do the same.
There is plenty of budget room in city coffers - budgets just need to be realigned to ensure bylaw has funds required.
Cat owners should pay

I really believe people should be responsible for their own cats (or other pets) and I think bylaws can't really manage all the dog problems - and we already pay for that - I think it would be to overwhelming
Dog owners have to be financially responsible for their pets, (and license them) so I believe the same rules should apply to cat owners.
It is not my choice for my neighbour to have a cat. I think cat licensing fees should be used to increase enforcement.
The money could come from licensing cats
I don't believe I should pay for my neighbour's cat. If they choose to have one, payment should be from them
22's are cheap. 3 cats permanently solved per penny!
The cost of pet ownership and management should be the responsibility of the pet owners (i.e., through licenses, fines, registration, or taxes on acquiring a pet or perhaps pet-related services or purchases).
Unenforceable
Cat owners need to be responsible for their pets
Cat owners should've responsible for ensuring their animals are not allowed to roam the neighbourhood of different that dog owners.
It's their choice to have a cat and need to be responsible for it. By law, I am not allowed to harm the songbirds in my back yard, yet they knowingly allow their cats to kill songbirds.
Outdoor cats pose minimal risk for all concerned including mice and birds
Not my responsibility and don't recognize a material benefit
We probably already pay for dog control.

## Appendix I: Section 6 Question 5

Other Comments - Please select from the list of reasons why you do not believe (or are undecided) about whether Kamloops cat owners should have to license their cats - you may choose more than one, or provide your own explanation.

## Non-Cat Owners

Unsure about implementation
Strictly indoor cats, especially those in high rise apartments may be fine left unregistered
It's a money grab.
I don't think cats in my neighborhood is an issue
Don't really care
I have found licensing does not meet needs as well as programs like the SPCA spay and neuter program.
this is simply another money grab for pet owners - I would rather see pet owners put this investment towards better vet care, pit tagging, and creating a happy environment for their pets. My cat of 17 plus years just recently passed away - she was an indoor cat with outdoor access while on a lead...she was a happy cat, and a healthy cat her entire life.
I do not have enough information or knowledge about why licensing would be beneficial.
outdoor cats should be licensed, but I do not think indoor pets should require licensing
then again, dogs have to be licensed, why not cats?
Very unsafe for cats to wear collars and license tags.
It's unenforceable. How would you catch the cat, or identify the owner?
cats are part of our outdoor wildlife
undecided

## References

- Alley Cat Allies. (2017). *The Natural History of the Cat*. Retrieved from Resources: [http://4fi8v2446i0sw2rpq2a3fg51-wpengine.netdna-ssl.com/wp-content/uploads/2015/12/Natural-History-of-the-Cat\\_317P.pdf](http://4fi8v2446i0sw2rpq2a3fg51-wpengine.netdna-ssl.com/wp-content/uploads/2015/12/Natural-History-of-the-Cat_317P.pdf)
- Anderson, T. (2004). Viewing Land Conservation Through Coarse-Colored Glasses. *Natural Resources Journal*, 361-381.
- Andersson, H., & Treich, N. (2008). *The Value of a Statistical Life*.
- Audubon Society of Portland and Feral Cat Coalition of Oregon . (n.d.). *Catio Construction Resources*. Retrieved from Cats Safe at Home: <https://www.catssafeathome.org/catio-resources#anchor-fencing+doors>
- Aziz, S., Boyle, K., & Crocker, T. (2015). Parental decisions, child health and valuation of avoiding arsenic in drinking water in rural Bangladesh. *Journal of Water & Health*, 152-167.
- Bateson, P., & Turner, D. (2014). *The Domestic Cat: The Biology of Its Behaviour*. New York: Cambridge University Press.
- BC Government. (n.d.). *BC Species & Ecosystems Explorer*. Retrieved from Environmental Protection and Sustainability: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/species-and-ecosystems-explorer>
- BC SPCA. (2015). *BC's Municipal Animal Bylaw: Summary of the BC SPCA Review*. Retrieved from BC SPCA: <https://spca.bc.ca/wp-content/uploads/bc-municipal-animal-bylaw.pdf>
- BC SPCA. (2017). *Model Municipal Bylaws*. Retrieved from BC SPCA: [https://spca.bc.ca/programs-services/working-for-better-laws/](https://spca.bc.ca/programs-services/working-for-better-laws/model-municipal-bylaws/)
- BC SPCA. (2017, November 1). *News*. Retrieved from <https://spca.bc.ca/news/free-kittens-project-focuses-on-b-c-s-cat-overpopulation-problem/>
- BC SPCA. (2017). *Reports*. Retrieved from BC SPCA: <https://spca.bc.ca/wp-content/uploads/2017-annual-report.pdf>
- BC SPCA Kamloops & District Branch. (2019). *BC SPCA Kamloops & District Branch*. Retrieved from Facebook: <https://www.facebook.com/BCSPCA.Kamloops/>
- BC SPCA. (n.d.). *Working for Better Laws*. Retrieved from BC SPCA: <https://spca.bc.ca/programs-services/working-for-better-laws/>
- BC Statistics. (2018). *Sub-Provincial Population Projections 2016*. Retrieved from BC Statistics: <https://www.bcstats.gov.bc.ca/apps/PopulationProjections.aspx>

- Bennett, J., Roth, R., Klain, S., Chan, K. C., Clark, D., Cullman, G. C., . . . Wyborn, C. (2016). Conservation Social Science: Understanding and Integrating Human Dimensions to Improve Conservation. *Biological Conservation*, 94-101. doi:10.1016/j.biocon.2016.10.006
- Blancher, P. (2013). Estimated Number of Birds Killed by House Cats (*Felis catus*) in Canada. *Avian Conservation and Ecology*. doi:10.5751/ACE-00557-080203
- Bonnington, C., Gaston, K., & Evans, K. (2013). Fearing the Feline: Domestic Cats Reduce Avian Fecundity Through Trait-mediated Indirect Effects that Increase Nest Predation by Other Species. *Journal of Applied Ecology*, 15-24. doi:10.1111/1365-2664.12025
- Calgary Humane Society. (n.d.). *Pet Budget*. Retrieved from Calgary Humane Society: <https://www.calgaryhumane.ca/adopt/pet-calculators/>
- Canadian Federation of Humane Societies. (2017). *Cats In Canada 2017: A Five-year Review of Cat Overpopulation*. Retrieved from Humane Canada: [https://www.humanecanada.ca/cats\\_in\\_canada\\_2017](https://www.humanecanada.ca/cats_in_canada_2017)
- Canadian Veterinary Medical Association. (2019). *Animal Owners: Cats*. Retrieved from Canadian Veterinary Medical Association: <https://www.canadianveterinarians.net/resources/animal-owners-cats>
- Cats and Birds*. (n.d.). Retrieved from [www.catsandbirds.ca](http://www.catsandbirds.ca)
- CBC. (2019). *News*. Retrieved from CBC: <https://www.cbc.ca/news/canada/british-columbia/cat-license-victoria-1.4981510>
- CBC News. (2017, November 27). TRU Researcher to Study Consequences of Keeping Cats Outside. Kamloops, BC, Canada. Retrieved from <https://www.kamloopsthisweek.com/news/tru-researcher-wants-input-for-cat-study-1.23219180>
- Centre for Disease Control and Prevention. (n.d.). *Epidemiology and Risk Factors*. Retrieved from Parasites - Toxoplasmosis (Toxoplasma infection): <https://www.cdc.gov/parasites/toxoplasmosis/epi.html>
- City of Guelph. (n.d.). *Animal Licensing*. Retrieved from City of Guelph: <https://guelph.ca/living/pets-and-animals/animal-licensing/>
- City of Kamloops. (2004). *Animal Control Bylaw 34-11*. Retrieved from City of Kamloops: <https://kamloops.civicweb.net/document/8206>
- City of Kamloops. (2019). *Dog Licenses & Pet Ownership*. Retrieved from City of Kamloops: <https://www.kamloops.ca/safety-bylaws/bylaws-enforcement/dog-licences-pet-ownership>
- City of Victoria. (2019). Retrieved from Bylaw Regulations: <http://www.vacs.ca/bylaw-regulations/cats>
- Coase, R. (1960). The Problem of Social Cost. *Journal of Law & Economics*, 1-44.
- Cooney, N. (2011). *Change of Heart: What Psychology Can Teach Us About Spreading Social Change*. Brooklyn: Lantern Books.

- Cove, M., Gardner, B., Simons, T., Kays, R., & O'Connell, A. (2018). Free-ranging domestic cats (*Felis catus*) on public lands: estimating density, activity, and diet in the Florida Keys. *Biological Invasions*, 333-344. doi:10.1007/s10530-017-1534-x
- Crowley, S., Cecchetti, M., & McDonald, R. (2019). Hunting Behaviour in Domestic Cats: An Exploratory Study of Risk and Responsibility Among Cat Owners. *People and Nature*, 1-13. doi:10.1002/pan3.6
- CTV News Vancouver Island. (2019, January 18). *CTV News*. Retrieved from CTV News Vancouver Island: <https://vancouverisland.ctvnews.ca/cats-should-be-licensed-and-on-leash-just-like-dogs-group-1.4260071>
- Donnelly, A. (2017, November 2017). TRU Researcher Investigating Impact of Outside Cats. Kamloops, BC, Canada. Retrieved from <http://cfjctoday.com/article/599022/tru-researcher-investigating-impact-outside-cats>
- Driscoll, C., Macdonald, D., & O'Brien, S. (2009). From Wild Animals to Domestic Pets, An Evolutionary View of Domestication. *PNAS*, 106, 9971-9978. doi:10.1073
- Dubois, S., & Fraser, D. (2013). Rating Harms to Wildlife: A Survey Showing Convergence Between Conservation and Animal Welfare Views. *The Humane Society Institute for Science and Policy: Animal Studies Repository*, 49-55.
- Edge Publishing. (2019). *North Shore Echo*. Retrieved from <https://www.kamloopscity.com/local-publication/north-shore-echo/>
- Feral Cat Coalition of Oregon. (2019). *Get Inspired: Portland Catio Tours*. Retrieved from Feral Cat Coalition of Oregon: <http://www.feralcats.com/catio>
- Fishbein, M., & Ajzen, I. (2010). *Predicting and Changing Behavior: The Reasoned Action Approach*. New York: Psychology Press.
- Flockhart, T., & Coe, J. (2018). Multistat Matrix Population Model to Assess the Contributions and Impacts on Population Abundance of Domestic Cats in Urban Areas Including Owned Cats, Unowned Cats and Cats in SHeters. *PLoS one*. doi:10.1371/journal.pone.0192139
- Gerhold, R., & Jessup, D. (2013). Zoonotic Diseases Associated with Free-roaming Cats. *Zoonoses and Public Health*, 189-195.
- Gramza, A., Teel, T., Vande Woude, S., & Crook, K. (2016). Understanding Public Perceptions of Risk regarding Outdoor Pet Cats to Inform Conservation Action. *Conservation Biology*, 276-286. doi:10.1111/cobi.12631
- Guelph Cat Population Task Force. (a). *Identification*. Retrieved from Guelph Cats: <http://www.guelphcats.org/strategies/identification>
- Guelph Cat Population Task Force. (b). *About Us*. Retrieved from Guelph Cats: <http://www.guelphcats.org/home/about-us>
- Guelph Cat Population Task Force. (c). Retrieved from Guelph Cat Population Task Force: <http://www.guelphcats.org/home>



- Hall, C., Adams, N., Bradley, J., Bryant, K., Davis, A., Dickman, C., & Calver, M. (2017). Community Attitudes and Practices of Urban Residents Regarding Predation by Pet Cats on Wildlife: An International Comparison. *Journal of Wildlife Rehabilitation*, 11-31.
- Hallett, D. (2016, December 6). *News Story*. Retrieved from Guelph Mercury: <https://www.guelphmercury.com/news-story/7006013-divisions-remain-on-cat-roaming-issue-in-guelph/>
- Harris, J., & Roach, B. (2018). *Environmental and Natural Resource Economics*. New York, NY: Routledge.
- Howard, R. A. (1984). On Fates Comparable to Death. *Management Science*, 407-422. Retrieved from <https://doi.org/10.1287/mnsc.30.4.407>
- Howie, R. (2016, December). Birds of Kamloops. (D. King, Interviewer)
- Jones-Lee, M. (1976). *The Value of Life: An Economic Analysis*. Chicago IL USA: University Press.
- Jones-Lee, M. (2004). Valuing International Safety Externalities: Does the 'Golden Rule' Apply? *Journal of Risk and Uncertainty*, 277-287.
- Kamloops and District SPCA. (2019). Retrieved from News: <https://spca.bc.ca/news/kamloops-cat-overpopulation-petsmart-charities-grant/>
- Kamloops Naturalist Club. (2019). *About Us*. Retrieved from Kamloops Naturalist Club: <http://kamloopsnaturalistclub.com/about-us/>
- Kelowna Now. (2019, January 25). *Water Cooler News*. Retrieved from Kelowna Now Stuff that Matters: [https://www.kelownanow.com/watercooler/news/news/Kelowna/No\\_plans\\_in\\_Central\\_Okanagan\\_to\\_force\\_cats\\_to\\_wear\\_leashes\\_and\\_be\\_licensed/](https://www.kelownanow.com/watercooler/news/news/Kelowna/No_plans_in_Central_Okanagan_to_force_cats_to_wear_leashes_and_be_licensed/)
- Kikillus, K., Chamberes, G., Farnworth, M., & Hare, K. (2016). Research Challenges and Conservation Implications for Urban Cat Management in New Zealand. *Pacific Conservation Biology*, 15-24. doi:10.1071/PC16022
- Lanz, B., & Provins, A. (2016). The demand for tap water quality: Survey evidence on water hardness and aesthetic quality. *Water Resources and Economics*, 52-63.
- Lepczyk, C., Mertig, A., & Liu, J. (2004). Landowners and Cat Predation Across Rural-to-Urban Landscapes. *Biological Conservation*, 191-201. doi:10.1016/S0006-3207(03)00107-1
- Loss, S., & Marra, P. (2017). Population Impacts of Free-ranging Domestic Cats on Mainland Vertebrates. *Frontiers in Ecology and the Environment*. doi:10.1002/fee.1633
- Loss, S., Will, T., & Marra, P. (2013). The Impact of Free-ranging Domestic Cats on Wildlife of the United States. *Nature Communications*.
- MacDonald, E., Milfont, T., & Gavin, M. (2015). What Drives Cat-Owner Behaviour? First Steps Towards Domestic-Cat Impacts on Native Wildlife. *Wildlife Research*, 257-265. doi:10.1071/WR14164

- Mameno, K., Kubo, T., & Suzuki, M. (2017). Social Challenges of Spatial Planning for Outdoor Cat Management in Amami Oshima Island, Japan. *Global Ecology And Conservation*, 184-193. doi:10.1016/j.gecco.2017.03.007
- Manfredo, M. (2008). *Who Cares About Wildlife*. New York: Springer.
- Marra, P., & Santella, C. (2016). *Cat Wars: The Devastating Consequences of a Cuddly Killer*. New Jersey: Princeton University Press.
- McLeod, L., Driver, A., Bengsen, A., & Hine, D. (2017). Refining Online Communication Strategies for Domestic Cat Management. *Anthrozoös*, 30(4), 635-649. doi:10.1080/08927936.2017.1370237
- McLeod, L., Hine, D., Bengsen, A., & Driver, A. (2017). Assessing the Impact of Different Persuasive Messages on the Intention and Behaviour of Cat Owners: A Randomised Control Trial. *Preventive Veterinary Medicine*, 136-142.
- Nature Canada. (2019 a). *Keep Cats Safe and Save Bird Lives*. Retrieved from Cats and Birds: <https://catsandbirds.ca/>
- Nature Canada. (2019 b). *The Calgary Model: Encouraging Responsible Pet Ownership*. Retrieved from Blog: <https://catsandbirds.ca/blog/the-calgary-model/>
- Nature Canada. (2019 c). *Media*. Retrieved from Cats and Birds: <http://catsandbirds.ca/cats-matter/open-letter-to-guelph/#sthash.RXWfsCgB.dpbs>
- Nature Canada. (2019 d). *Cat Fencing*. Retrieved from Research and Resources: <http://catsandbirds.ca/research/cat-fencing/#sthash.k9wQM7xd.dpbs>
- O'Neill, D., Churs, D., McGreevy, P., Thompson, P., & Brodbelt, D. (2015). Longevity and Mortality of Cats Attending Primary Care Veterinary Practices in England. *Journal of Feline Medicine and Surgery*, 125-133.
- Petruk, T. (2017, November 25). TRU Researcher Wants Input for Cat Study. *Kamloops This Week*. Kamloops, BC, Canada. Retrieved from <https://www.kamloopsthisweek.com/news/tru-researcher-wants-input-for-cat-study-1.23219180>
- Provincial BC SPCA. (n.d.). *Caring for Cats*. Retrieved from SPCA: <https://spca.bc.ca/faqs/cats/>
- Registry, B. P. (n.d.). *BC Pet Registry*. Retrieved from BC Pet Registry: <https://bcpetregistry.ca/>
- Roetman, P., Tindle, H., & Litchfield, C. (2018). Management of Pet Cats: The Impact of the Cat Tracker Citizen Science Project in South Australia. *Animals*, 190. doi:10.3390/ani8110190

- Schelling, T. (1968). The life you save may be your own. In S. Chase (Ed.), *Problems in Public Expenditure Analysis* (pp. 127-62). Washington, DC: Brookings Institution.
- Schultz, P. (2011). Conservation Means Behaviour. *Conservation Biology*, 1080-1083.
- Seto, C. (2017, November 17). *Community Story*. Retrieved from Guelph Mercury: <https://www.guelphmercury.com/community-story/7928580-cat-licences-to-become-mandatory-in-guelph-in-2018/>
- Steel, B. (1996). Thinking Globally and Acting Locally?: Environmental Attitudes, Behaviour and Activism. *Journal of Environmental Management*, 47(1), 27-36. doi:10.1006/jema.1996.0033
- Thaler, R., & Sunstein, C. (2009). *Nudge: Improving Decisions About Health, Wealth, and Happiness*. New York: Penguin Books.
- The Canadian Federation of Humane Societies. (2017). *Cats In Canada: A Five Year Review of Cat Overpopulation*. Ottawa: Humane Canada.
- The Lacombe Globe. (2019, March 11). *The Lacombe Globe*. Retrieved from News: <https://www.lacombeglobe.com/news/local-news/lacombe-passes-responsible-animal-ownership-bylaw>
- The Stewardship Centre For BC. (2016). *Resources*. Retrieved from The Stewardship Centre For BC: [https://www.stewardshipcentrebc.ca/PDF\\_docs/CatsBirds/SPGuide\\_ReducingImpactCatsBirdsWildlife2016.pdf](https://www.stewardshipcentrebc.ca/PDF_docs/CatsBirds/SPGuide_ReducingImpactCatsBirdsWildlife2016.pdf)
- The Stewardship Centre for BC. (2018). *Stewardship Roundtable Action Plan*. Retrieved from The Stewardship Centre for BC: <https://stewardshipcentrebc.ca/srtatioc-action-plan/>
- The Stewardship Centre for BC. (n.d.). *Cats and Birds*. Retrieved from The Stewardship Centre for BC: <http://stewardshipcentrebc.ca/cats-and-birds/>
- Thompson Rivers University. (2019). *Facts and Figures*. Retrieved from Thompson Rivers University: <https://www.tru.ca/about/facts.html>
- van Heezik, Y., Smyth, A., Adams, A., & Gordon, J. (2010). Do Domestic Cats Impose an Unsustainable Harvest on Urban Bird Populations? *Biological Conservation*, 121-130. doi:10.1016/j.biocon.2009.09.013
- Victoria News. (2019, January 24). *News*. Retrieved from Victoria News: <https://www.vicnews.com/news/leash-your-cat-or-face-a-150-fine-in-victoria/>
- Viscusi, W. (2005). The Value of Life. *The Harvard John M. Olin Discussion Paper Series*.
- Viscusi, W. (2018). Pricing Lives: International Guideposts for Safety. *Economic Record, Special Edition*, 1-10.
- Viscusi, W., & Aldy, J. (2003). The value of a statistical life: a critical review of market estimates throughout the world. *Journal of Risk and Uncertainty*, 5-76.

- Wald, D., Jacobson, S., & Levy, J. (2013). Outdoor Cats: Identifying Differences between Stakeholder Beliefs, Perceived Impacts, Risk and Management. *Biological Conservation*, 414-424. doi:10.1016/j.biocon.2013.07.034
- Wald, D., Lohr, C., Lepczyk, C., Jacobson, S., & Cox, L. (2016). A Comparison of Cat-related Risk Perceptions and Tolerance for Outdoor Cats in Florida and Hawaii. *Conservation Biology*, 1233-1244. doi:10.1111/cobi.12671
- Walker, J., Bruce, S., & Dale, A. (2017). A Survey of Public Opinion on Cat (*Felis catus*) Predation and the Future Direction of Cat Management in New Zealand. *Animals*, 49. doi:10.3390/ani7070049
- Wikipedia. (n.d.). *Economic Equilibrium*. Retrieved from Wikipedia: [https://en.wikipedia.org/wiki/Economic\\_equilibrium](https://en.wikipedia.org/wiki/Economic_equilibrium)
- Willson, S., Okunlola, I., & Novak, J. (2015). Bird Be Safe: Can a Novel Cat Collar Reduce Avian Mortality by Domestic Cats (*Felis catus*)? *Global Ecology and Conservation*. doi:10.1016/j.gecco.2015.01.004
- Young, M. (2013, March 27). *Kamloops Daily News*. Retrieved from Kamloops Daily News: [www.kamloopsnews.ca/news/city-region/cat-control-would-be-costly-kamloops-council-told-1.1231951](http://www.kamloopsnews.ca/news/city-region/cat-control-would-be-costly-kamloops-council-told-1.1231951)
- Zhang, J. &. (2018). Air pollution and defensive expenditures: Evidence from particulate-filtering facemasks. . *Journal of Environmental Economics and Management*, 517-536.