

UNDERSTANDING STAKEHOLDER CONFLICT: AN ANALYSIS OF PUBLIC VALUES,
RISK PERCEPTIONS AND ATTITUDES TOWARD OUTDOOR CAT MANAGEMENT

By

DARA M. WALD

A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

2012

© 2012 Dara M. Wald

To Nadav, for making this possible

ACKNOWLEDGMENTS

This project would not have been possible without the support and guidance of my committee, Dr. Katie Sieving, Dr. Julie Levy, Dr. Martha Monroe, and Dr. Reed Bowman. I would also like to thank my advisor, Dr. Susan Jacobson, for her invaluable advice, her constant encouragement and her infallible mentorship. I am indebted to Dr. Douglas Levy for helping me become a better teacher and scholar and to Dr. Dan Perlman for his constructive guidance.

Financial assistance for this research was provided by the NSF Doctoral Dissertation Improvement Grant in Decision Risk and Management Sciences, the Morris Animal Foundation, the Doris and Earl and Verna Lowe Scholarship, and the University of Florida Department of Wildlife Ecology and Conservation. I would like to thank all of the research participants and organizations who supported this research. This study would not have been possible without the support of Helen Warren, Shaye Olmstead, Doug Young, Justin Freedman, Lory Chadwick, Pete Johnson, Carly Wainwright, Rick Ducharme, Diane Wiles, Cindy Diver, and Charlene Grall. A special thanks to the Human Dimensions lab for reviewing versions of this project and sitting through endless presentations and mock focus groups about outdoor cats. My gratitude goes out to my undergraduate research assistants, Andrew McConville, Deni Parsons, Natalie Elorza-Welling, Beida Chen and Melissa Archer, and graduate volunteers, Benjamin Atkinson, Nia Haynes, Tabith Morgan, Dickson Ritan, and Jame McCray who I hope have recovered from all the survey stuffing, stamping, sealing and coding. I am fortunate to have such amazing colleagues and friends and I thank Becky Mer, Stuart Carlton, and Eduardo Silva for their technical advice and thoughtful conversation.

Most importantly, I would like to thank my family. I have been blessed to be surrounded by such an incredible group of people. Thank you to the Wald, West, Skelskie, Mer, Demming and Baver families for supporting my endeavors and encouraging my dreams. Thank you to my in-laws, Barbara, and Ben, for their support and enthusiasm throughout this journey. My little sister, Jaina, has been the best cheerleader and listener imaginable. Special thanks go out to my parents, Ken and Robin, for the Friday night statistics sessions, the sage advice, the insightful suggestions and the countless hours of babysitting. Your mentorship and guidance made this arduous task possible.

My husband and partner, Nadav, has stood by me through this amazing and often difficult process and has forfeited a great deal over the last 4 years. Thank you for the countless loads of laundry, dishes and dinners. Thank you for being the best distraction and my most ardent supporter. Special thanks to Zohar for reminding me to take breaks and for making it all worthwhile.

TABLE OF CONTENTS

	<u>page</u>
ACKNOWLEDGMENTS.....	4
LIST OF TABLES.....	9
LIST OF FIGURES.....	11
ABSTRACT	12
CHAPTER	
1 INTRODUCTION	14
2 FACTORS AFFECTING STUDENT TOLERANCE FOR OUTDOOR CATS	22
Controversy over the Management of Outdoor Cats	22
Framework	23
Cat Acceptance Capacity	24
Methods.....	26
Survey Design	26
Data Analyses	28
Results.....	30
Socio-demographic Variables.....	30
Situational and Affective Variables	30
Model Results.....	31
Cat Management and CAC	32
Discussion	33
Best Predictors of CAC.....	36
CAC and Attitudes toward Management	38
Implications for Conservation Outreach	38
3 THE INFLUENCE OF PERCEPTIONS, ATTITUDES AND EXPERIENCES ON THE PERCEIVED RISKS AND BENEFITS OF OUTDOOR CATS	46
The Perceived Risks and Benefits of Outdoor Cats.....	46
A Risk Perception Framework	48
Methods.....	52
Results.....	54
Data Reduction and Scale Reliability	54
Risk Perceptions	56
Situational and Cognitive Variables and Risk	57
Mediation.....	57
Discussion	58
Low Levels of Cat-Related Risk	59
The Attenuation of Risk	60

Experience, Beliefs and Risk Perceptions	61
Generating Tolerance for Cats	62
4 IDENTIFYING DIFFERENCES BETWEEN STAKEHOLDER AND PUBLIC RISK PERCEPTIONS, BELIEFS, AND ATTITUDES ABOUT OUTDOOR CAT MANAGEMENT	69
Who Cares about Outdoor Cats?	69
Risk Perception Framework	72
Perceptions of Ecological Risk	72
Methods	75
Stakeholders and Study Site	75
Sample Design and Survey Administration	76
Survey Items	77
Ecological risks and perceived benefits	77
Impact beliefs	77
Beliefs about cats	78
Management	78
Data Analysis	78
Results	80
Respondent Characteristics and Preliminary Results	80
Group Differences Identified by PCI	80
Attitudes toward Outdoor Cats	81
Management Preference	81
Ecological Risks and Perceived Benefits	82
Impact Beliefs	82
Beliefs about Outdoor Cats	83
Cat Management	83
Discriminating Between Stakeholder Groups	84
Discussion	86
Cat-Related Risks and Benefits	86
Affection for Outdoor Cats	88
Does Origin Matter?	89
Preference for Non-Lethal Management	89
Distinguishing Between Stakeholders	92
Implications for Cat Management	93
5 A MULTIVARIATE MODEL OF STAKEHOLDER PREFERENCE FOR OUTDOOR CAT MANAGEMENT	104
Outdoor Cats and Stakeholders in Florida	104
The Cognitive Hierarchy	106
Measures in the Model	107
Attitudes	107
Beliefs	107
Worldviews	108
Methods	110

Survey Design and Distribution	110
Tests for Sample Bias	112
Data Analyses	113
Results.....	114
Characteristics of Respondents.....	114
Structural Equation Model	114
Discussion	116
Multivariate Relationships between Cognitions	117
Attitude Specificity	117
Cat-Related Risks and Impacts.....	119
6 CONCLUSION.....	125
APPENDIX	
A STUDENT IN-PERSON SURVEY	130
B SURVEY OF STAKEHOLDERS AND THE GENERAL PUBLIC	138
LIST OF REFERENCES	154
BIOGRAPHICAL SKETCH.....	168

LIST OF TABLES

<u>Table</u>	<u>page</u>
2-1 Student experiences with outdoor cats.....	41
2-2 Factor loadings and item responses based on an exploratory factor analysis with varimax rotation for 10 items from the reduced cat beliefs scale.....	42
2-3 Perceptions of the risks cats pose based on the 9-item risk scale.....	43
2-4 Respondent attitudes toward cat management based on the reduced 11-item management scale	44
2-5 Results of a stepwise logistic regression evaluating the potential predictors of tolerance for outdoor cats (CAC) with demographic variables entered as a separate step.....	44
2-6 A comparison of attitudes toward cat management predicted by individual tolerance toward outdoor cats	45
3-1 Factor analysis results of the “beliefs about cats” and “cat impacts” belief scales	64
3-2 Perceptions of risks to the environment and perceived benefits to people	65
3-3 OLS regression estimates of variables associated with perceptions of risks from outdoor cats to the ecosystem and perceptions of benefits to people	66
3-4 Mediation of the effect of beliefs about cats on tolerance for cat populations through perceptions of risks to ecosystems and benefits to people.....	67
3-5 Mediation of the effect of attitudes toward cat impact beliefs on tolerance for cat populations through risk perceptions of risks and perceived benefits.....	67
4-1 Stakeholder and public beliefs about outdoor cats	96
4-2 Stakeholder and public beliefs about cat impacts, perceptions of risks and the salience of risks	97
4-3 Stakeholder and public attitudes toward the management of outdoor cats	98
4-4 Structure matrix results for the two function solution predicting group membership.....	99
4-5 Independent predictors of group membership	99
5-1 Reliability and confirmatory factor analysis of latent variables in the final structural equation model	121

5-2 Test statistics for hypothesized multivariate model..... 122

LIST OF FIGURES

<u>Figure</u>		<u>page</u>
1-1	A model of the hypothesized predictors of tolerance and attitudes toward cat management.....	19
1-2	A model of the hypothesized predictors of the perceived cat-related risks to ecosystems and perceived benefits to people	19
1-3	A model of the potential mediation of risks and benefits between beliefs about cats and tolerance.	20
1-4	A model of the proposed predictors of stakeholder group membership.....	20
1-5	A theoretical model of the hypothesized relationships between worldviews beliefs, attitudes and intention to support management	21
3-1	Illustration of the potential mediation of risks and benefits between “Beliefs about Cats” and tolerance..	68
3-2	Illustration of the potential mediation of risks and benefits between “cat impacts” beliefs and tolerance.....	68
4-1	Potential for Conflict Index values across three stakeholder groups.	100
4-2	Discriminant function analysis results illustrating the separation between stakeholder groups and the public.....	103
5-1	A theoretical model of the hypothesized relationships between worldviews, beliefs, attitudes and intention to support management	123
5-2	Path diagram used in the final structural equation model.....	124

Abstract of Dissertation Presented to the Graduate School
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy

UNDERSTANDING STAKEHOLDER CONFLICT: AN ANALYSIS OF PUBLIC VALUES,
RISK PERCEPTIONS AND ATTITUDES TOWARD OUTDOOR CAT MANAGEMENT

By

Dara M. Wald

December 2012

Chair: Susan K. Jacobson
Major: Wildlife Ecology and Conservation

Over 25 million free-roaming cats in the U.S. represent a significant animal welfare issue, described by the American Veterinary Medical Association as a “tragedy of epidemic proportions” and by the Audubon Society as a critical threat to birds. Debate over whether current cat management methods are practical, humane, or effective, has led to intense conflict, protests, distrust between stakeholders, and deferred policy initiatives. This study examined stakeholder cognitions (e.g., values, attitudes, and beliefs) with the goal of identifying the variables driving this conflict and determining management interventions with broad support from stakeholders and the public.

Survey instruments were developed and distributed to: (a) undergraduate students at the University of Florida (N=827), (b) randomly selected stakeholders across four Florida counties (Trap-Neuter-Return supporters (n=800), Audubon Society members (n=796), and the public (n=2600)), with a response rate of 50% of undergraduates, 45% of stakeholders and 20% of the public.

Study 1 utilized the concept of Wildlife Acceptance Capacity (WAC) to measure tolerance for outdoor cats. Attitudes, beliefs, perceived risks and population perceptions predicted tolerance 81% of the time. This research expanded WAC to include a non-

native species. Study 2 employed a risk perception framework and determined that perceived benefits influenced tolerance for outdoor cats and support for cat management. The identified importance of benefit perceptions suggests that, for some individuals, motivation for management support may be driven by affection and positive experiences, rather than concern about ecological risks. Study 3 utilized Discriminant Function Analysis and the Potential Conflict Index to identify differences between groups in beliefs, perceived risks/benefits and attitudes toward management. Findings suggest fundamental differences between stakeholders that influenced their support for management. Despite differences, there were promising areas of agreement (e.g., support for mandatory rabies and identification tags) that may provide a starting point for collaboration. Study 4 utilized a latent growth curve and found that value-laden differences in beliefs and attitudes drive management support. My research results highlight the predictive role of perceived risks and benefits on management support and the importance of understanding the values, perceptions and attitudes that drive conflict between stakeholder groups.

CHAPTER 1 INTRODUCTION

Free-roaming cats are ubiquitous in both the urban, suburban and rural landscapes of Florida. These animals may be friendly, adoptable or feral and unsocialized. Some cats live in colonies -- small groups (>1) of cats residing in a fixed location -- while others live in homes; some cats have extremely large outdoor home ranges and others stay close to human settlements. In the five chapters that follow, I use the neutral term “outdoor cats” to describe socialized or feral, free-roaming, owned and unowned animals (Levy & Crawford, 2004). This expression was identified in focus groups as the most neutral and easily understood term that would engender the least amount of bias from survey participants.

In Florida, there are approximately 5 million cats that spend time outdoors (Levy, Woods, Turick, & Etheridge, 2003). Programs to manage cats include non-lethal methods, such as Trap-Neuter-Return (TNR) and removal to a long-term confinement; and lethal methods, including eradication using poison, guns, or euthanasia (Nogales et al., 2004). TNR programs typically involve trapping the animal, anesthetizing it, sterilizing it, tipping or notching the ear and then returning the cat to its original location (Slater, 2004). Debate over cat management has centered on the effectiveness and humaneness of various approaches. Wildlife advocates and professionals express concern about the effectiveness of TNR in reducing the cat population (Peterson, Hartis, Rodriguez, Green, & Lepczyk, 2012). Animal welfare advocates support the use of TNR as a management strategy and express strong concern over the use of lethal management methods (Loyd & Hernandez, 2012; Peterson et al., 2012). These differing

perspectives have contributed to conflict over the implementation of cat management and policies that reduce the outdoor cat population.

The debate over management is further influenced by questions about the potential ecological impact outdoor cats pose to wildlife and the ecosystem through predation/competition and the spread of diseases, as well as the potential health risks cats pose to people and pets. Cat predation on wildlife has been widely addressed in the fields of wildlife conservation (Baker, Molony, Stone, Cuthill, & Harris, 2008; Beckerman, Boots, & Gaston, 2007; Coleman & Temple, 1993; Coleman, Temple, & Craven, 1997) and veterinary medicine (Barrows, 2004; Clancy, Moore, & Bertone, 2003; Jessup, 2004; Levy & Crawford, 2004). Cats contribute to the significant decline of endemic and endangered prey on islands (Medina et al., 2011; Vázquez-Domínguez, Ceballos, & Cruzado, 2004). However, uncertainty remains about the population and community level impacts of cats. Little is currently known about whether cat impacts are commensal or additive, how cat predation compares to other natural and anthropogenic sources of risk to wildlife, and what the actual risk of zoonotic diseases from cats to humans, wildlife or pests is (Calver, Grayson, Lilith, & Dickman, 2011; Slater, 2004). Scientific uncertainty is strongly related to risk perceptions. Uncertainty contributes to overestimates or underestimates of risk for both experts and the general public (Granger & Carnegie, 2011). The studies in this dissertation utilize a risk perception framework and examine the hypothesis that cat-related risk perceptions and beliefs influence tolerance for outdoor cats, attitudes toward cat management, stakeholder group membership and intention to support management. Moreover, we examine the

attenuation of risk perceptions by positive experiences with cats, affection for cats, cat ownership, cat feeding and perceived cat-related benefits.

This research applied the existing and well established frameworks of risk theory and the cognitive hierarchy and utilized a quantitative social survey approach to measure the human dimensions of stakeholder conflict over cat management. The first two chapters, “Factors Affecting Student Tolerance for Outdoor Cats,” and “The Influence of Perceptions, Attitudes, and Experiences on the Perceived Risks and Benefits of Outdoor Cats,” report the results of in-person surveys with undergraduate students at the University of Florida. In Chapter 2, I explored the role that situational, affective and demographic variables, including risk and benefit perceptions, played in predicting a previously validated concept, wildlife acceptance capacity, or tolerance for outdoor cats (Figure 1-1). In addition, I used a multivariate approach to test the potential causal role that tolerance for outdoor cats played in predicting attitudes toward cat management. Tolerance was measured as preference for reducing future population levels. In Chapter 3, I used a perception of risk framework to evaluate the predictive role of situational, cognitive and demographic variables on perceptions of the perceived ecological risks that cats pose to wildlife and the environment and the benefits they provide people (Figure 1-2). Moreover, I tested whether perceived risks/benefits mediated the relationship between beliefs about outdoor cats and tolerance for the future cat population (Figure 1-3). The two final chapters, “Identifying Differences Between Stakeholder and the Public Risk Perceptions, Beliefs and Attitudes about Outdoor Cat management” and “A Multivariate Model of Stakeholder Preference For Outdoor Cat Management” report the results of a state-wide mail survey, distributed to a

randomly selected sample of members of TNR advocacy groups, members of the Audubon Society and the general public across Florida. In Chapter 4, I compare ecological risk perceptions, impact beliefs, attitudes toward and beliefs about cats, and attitudes toward and preference for management among the aforementioned groups. I applied a risk perception framework and utilized a Potential for Conflict Index to identify both areas of conflict and agreement between groups. Discriminant Function Analysis determined a 6-item model of cognitive and demographic factors predicting group membership (Figure 1-4). In the final chapter, I utilized the cognitive hierarchy to test a multivariate model (Figure 1-5) of cognitive variables that predicted stakeholder intention to support management.

The purpose of this research was to improve the theoretical understanding of the role that ecological risk perceptions play in predicting tolerance, group membership, attitudes, and support for the lethal management of a non-native species, and to evaluate the role that positive experiences, perceived benefits, and affection play in attenuating these relationships. This research also tested the utility of the cognitive hierarchy, which has been widely applied to natural resource management issues, as a framework for identifying stakeholder conflict over the management of a non-native species.

Together, these four studies can contribute important insights into public and stakeholder perceptions of outdoor cats, cat-related risk/benefit perceptions and preference for cat management. This research expanded the applicability of the concept of Wildlife Acceptance Capacity beyond what had previously been measured to test its applicability to tolerance of domestic cats. It also laid the groundwork for identifying the

similar and discrepant beliefs about cat management among stakeholder groups, in relation to tolerance for cats, cat population perceptions, perceived risks/benefits, attitudes about cats and beliefs about cats. It also analyzed specific areas of agreement over the use of TNR, mandatory rabies vaccination and mandatory spay-neuter programs with the goal of identifying approaches with wide-spread stakeholder and public support. Future communication between stakeholder groups, as well as policy discussion about these issues, will be enhanced by analyzing these important differences between stakeholder groups and the role that risk/benefit perceptions play in influencing management preference.

While this research focused on one species, the findings provide insights into the relationship between risk perceptions, tolerance, and management preference that could influence stakeholder conflict in the face of scientific uncertainty and controversy over the management of other domestic, native and non-native species.

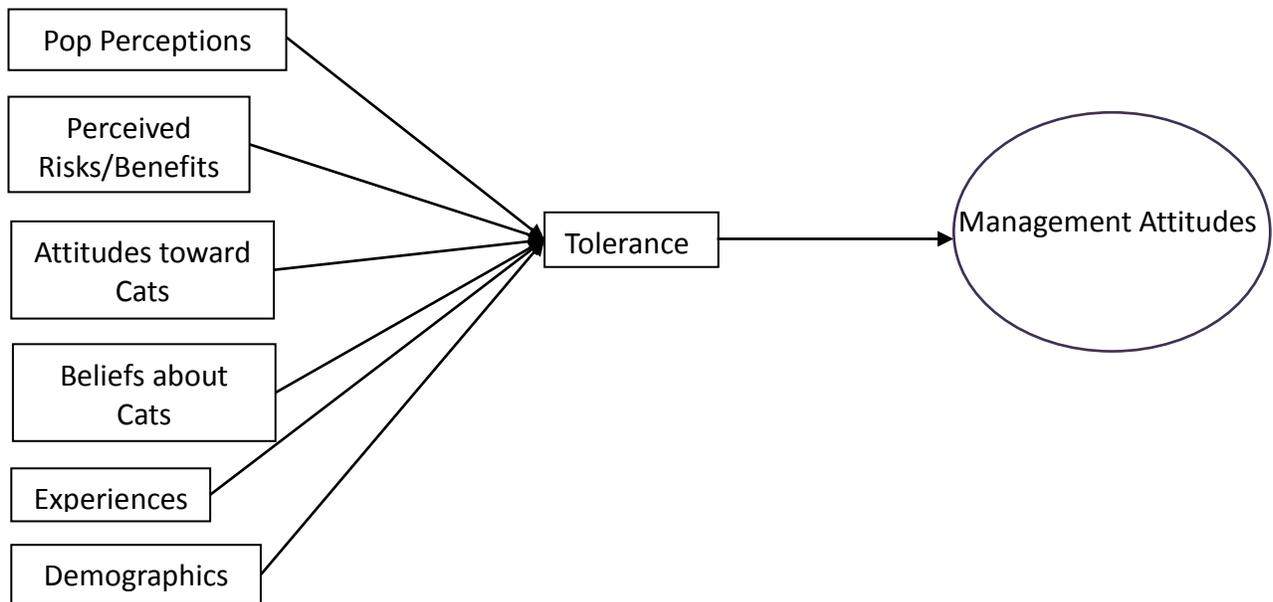


Figure 1-1. A model of the hypothesized predictors of tolerance and attitudes toward cat management

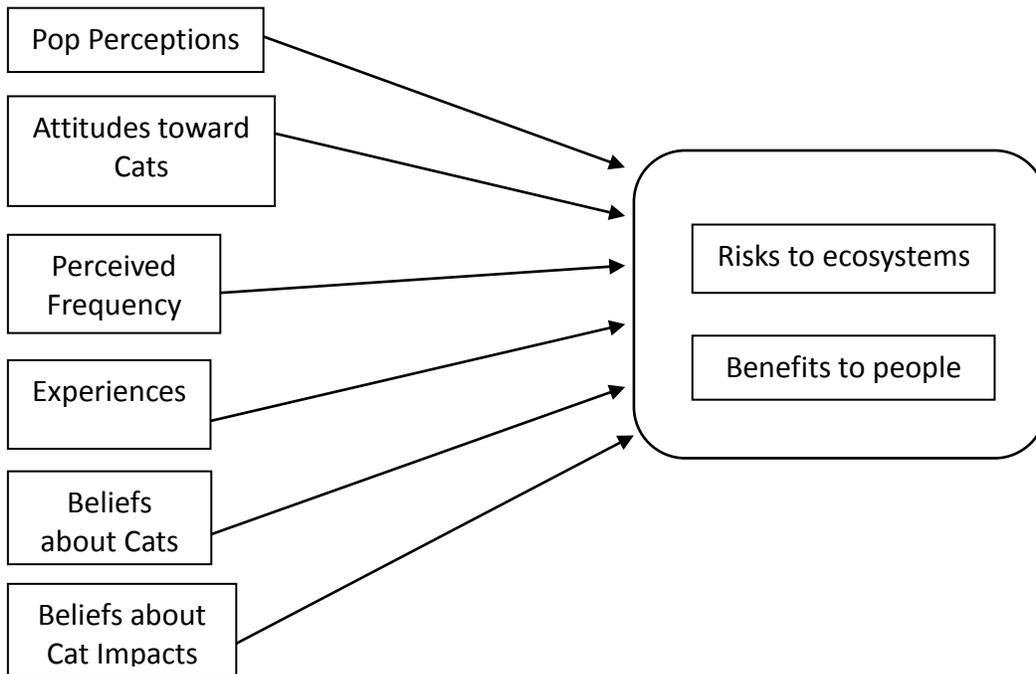


Figure 1-2. A model of the hypothesized predictors of the perceived cat-related risks to ecosystems and perceived benefits to people

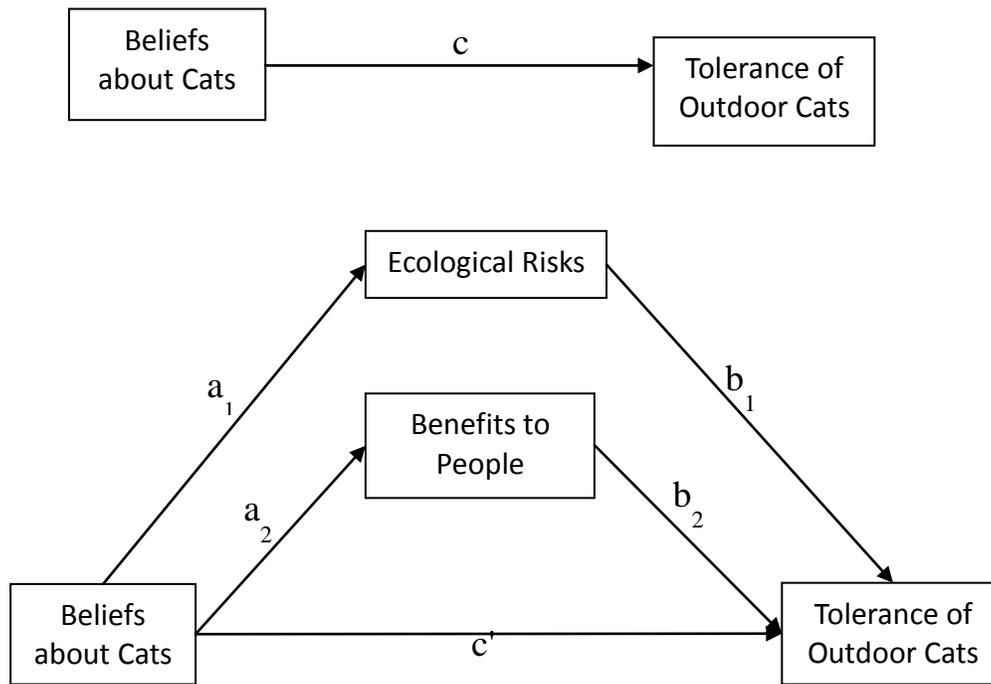


Figure 1-3. A model of the potential mediation of risks and benefits between beliefs about cats and tolerance. Beliefs about cats are hypothesized to exert an indirect effect (c') on tolerance through perceived risks and benefits

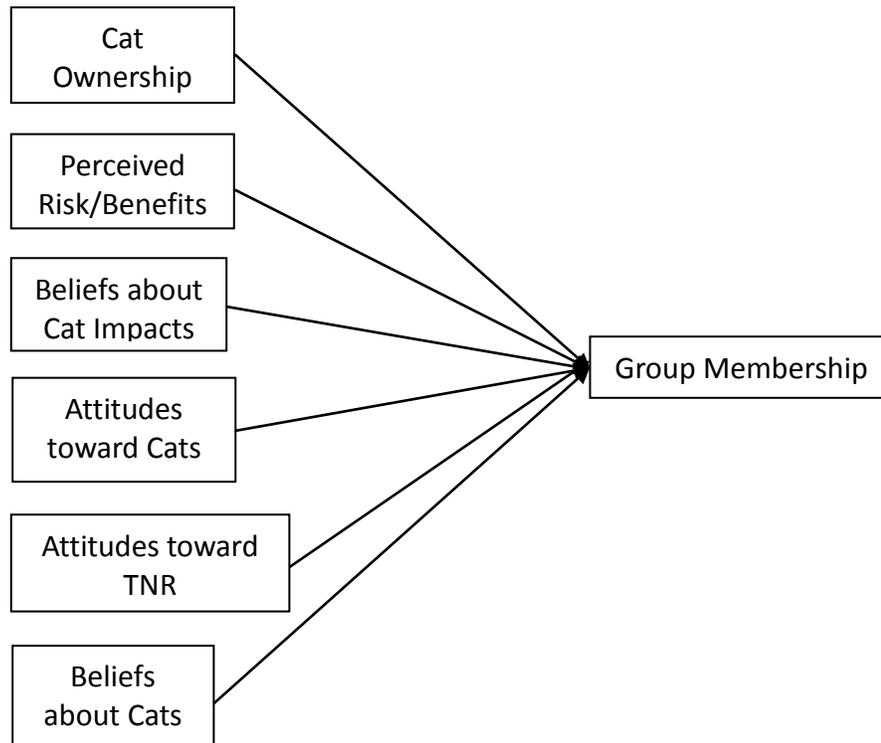


Figure 1-4. A model of the proposed predictors of stakeholder group membership

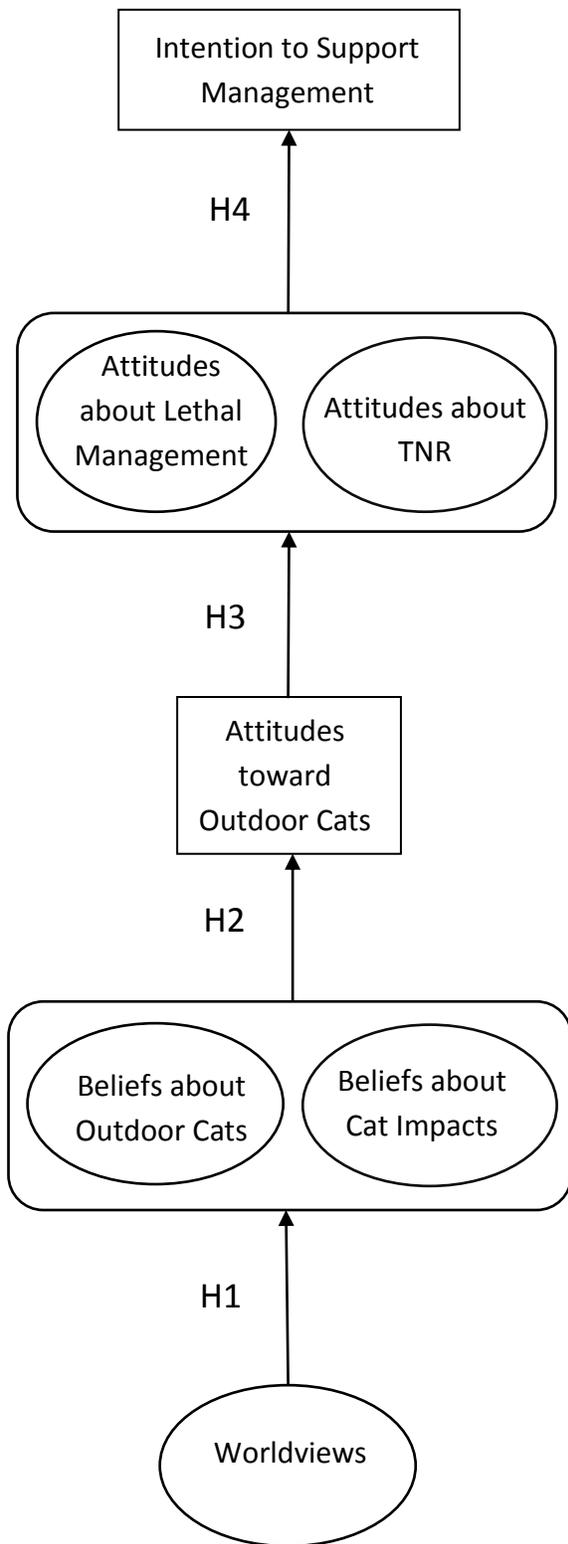


Figure 1-5. A theoretical model of the hypothesized relationships between worldviews beliefs, attitudes and intention to support management

CHAPTER 2 FACTORS AFFECTING STUDENT TOLERANCE FOR OUTDOOR CATS

Controversy over the Management of Outdoor Cats

Free-roaming domestic cats (*Felis catus*) are animals not restricted to a residence or specific area (Levy & Crawford, 2004). They can be unowned animals that spend most of their time outdoors or owned animals that spend little time outdoors. Feral cats are a subset of free-roaming cats that are untamed and generally unsocialized toward humans (Barrows, 2004; Levy & Crawford, 2004). While some outdoor cats live in colonies receiving supplemental food from people, there may be little to no interaction between the animals and their caretakers. Nonetheless, caregivers express strong feelings for these cats (Centonze & Levy, 2002). For this study, we will not attempt to distinguish between owned and unowned outdoor cats; because in the field, without a collar or a microchip it is nearly impossible for the casual observer to tell the difference (Clancy et al., 2003; Jessup, 2004). We will use the neutral term “outdoor cats” to describe all free-roaming, owned, and unowned domestic cats that may or may not be socialized (Levy & Crawford, 2004).

Citing the risks cats pose to wildlife through predation, competition and zoonotic disease, many environmental organizations advocate the confinement of cats indoors and the removal of cat colonies from public and private lands (American Bird Conservancy, 2004). Attempts to remove domestic cats from private or public lands have met with direct conflict and lawsuits between stakeholder groups (Sterba, 2002). Interest groups have prevented federal legislation aimed at eradicating an invasive species that would have also required the removal of outdoor cats (Longcore, Rich, &

Sullivan, 2009). Controversy over the management of cats has amplified cat populations by impeding management and policy initiatives.

Successful efforts to manage outdoor cats depend on understanding human perceptions, attitudes, and the variables influencing these factors. Previous surveys about outdoor cats have focused on negative associations, such as the influence of cats on water pollution and threatened species (Dabritz, Atwill, Gardner, Miller, & Conrad, 2006) or have included questions about outdoor cats as part of a larger survey about wildlife and conservation (Loyd & Miller, 2010a). Other surveys have focused on cat ownership or feeding rates (Levy, Gale, & Gale, 2003). A few studies have investigated the role of demographic factors (e.g., cat ownership, residence), experience, and value orientations on support for management initiatives and government regulation (Lord, 2008; Loyd & Miller, 2010a, 2010b). Unlike previous research, this study explores the potential perceived risks from cats to wildlife and the potential perceived benefits cats provide their owners/caregivers. This research uses the neutral term “outdoor cat” rather than feral or stray cat. It expands previous work by measuring the relationship between situational variables, affective variables, and demographic variables on individual tolerance for outdoor cats; and evaluates the relationship between tolerance and support for various management techniques. This research addresses these issues in undergraduate students enrolled in a general education science course on a college campus where the veterinary school conducts regular spay/neuter clinics for cats trapped throughout the county.

Framework

We applied a previously validated wildlife management concept, Wildlife Acceptance Capacity (WAC), to the issue of tolerance for outdoor cats and support for

cat management. WAC refers to the maximum acceptable size of a wildlife population tolerated by a community (Carpenter, Decker, & Lipscomb, 2000; Decker & Purdy, 1988; Riley & Decker, 2000a) and has been used to measure tolerance for “controversial wildlife,” including cougars (*Puma concolor*, (Riley & Decker, 2000b), white-tailed deer (*Odocoileus virginianus*; (Organ & Ellingwood, 2000), beaver (*Castor canadensis*; (Siemer, Jonker, & Brown, 2004), and Canada geese (*Brant canadensis*; (Loker, Decker, & Schwager, 1999). WAC has previously been used to examine public acceptance for different wildlife, thereby allowing managers to make management and policy decisions that consider public opinion (Decker & Purdy, 1988; Riley & Decker, 2000a). WAC is a function of individual experiences and attitudes, perceptions of risks/benefits, perceptions of current population trends, and demographic variables (Carpenter et al., 2000; Decker & Purdy, 1988; Riley & Decker, 2000b). WAC also is influenced by stakeholder characteristics – generally increasing with increased education and decreasing with age (Lischka, Riley, & Rudolph, 2009). WAC influences attitudes about wildlife management (Campbell & Mackay, 2003; Lischka et al., 2009; Riley et al., 2002). Low levels of WAC indicate support for reducing wildlife (Riley & Decker, 2000b). In measuring acceptance capacity for cats, this research applied the concept of Wildlife Acceptance Capacity (WAC) and tolerance to the non-native and controversial domestic cat.

Cat Acceptance Capacity

In this study, tolerance for outdoor cats is described as cat acceptance capacity (CAC); low CAC scores indicated support for reducing the outdoor cat population and high scores indicated support for current or higher levels of cats. The goals of this study were to (1) determine the demographic, situational, and affective factors influencing

CAC; and to (2) evaluate the predictive relationship between CAC and attitudes toward cat management strategies.

We expected most participants to prefer fewer outdoor cats. We expected lower CAC scores among respondents who reported more negative experiences with outdoor cats and who perceived greater risks from outdoor cats. We expected cat owners, feeders and respondents with positive attitudes toward cats to indicate support for current or high levels of cats (expressed by high scores on CAC). We expected CAC to be higher among individuals who expressed strong support for cat rights. We expected reported CAC scores to be lower among participants who perceived higher cat population levels.

Support for cat control typically varies by gender; men support more aggressive controls, including lethal methods while women favor non-lethal methods, including TNR (Ash & Adams, 2003; Loyd & Miller, 2010a, 2010b). Females mention love for cats as the primary reason for feeding cats (Centonze & Levy, 2002; Clancy et al., 2003). Therefore, we measured gender, cat ownership, cat feeding and attitudes toward cats as key predictors of CAC.

In this study, cats were treated as a natural or ecological risk item, rather than an anthropogenic source of risk, such as pollution or nuclear power. In this study, we measured ecological risk perceptions toward outdoor cats using a reduced set of previously measured items assessing the impacts of cats on the health of ecosystems, wildlife and people (McFarlane & Witson, 2008).

To accomplish our second goal, we explored general attitudes toward cat management and the role CAC plays in influencing those attitudes. The debate about

outdoor cats often centers on cat management, including the acceptance of cat colonies. Given previous research suggesting a predictive relationship between public tolerance for wildlife and support for management initiatives, we expected CAC to drive support for cat management. Identifying the factors that influence tolerance for outdoor cats and the relationship between tolerance and attitudes toward management, are essential steps in resolving conflicts over cat management and developing humane and effective strategies for the thousands of outdoor cats in Florida.

Methods

Survey Design

We developed survey questions after consultation with experts in the fields of wildlife ecology and animal welfare and discussions with proponents of TNR and wildlife advocates. We described free-roaming, owned and unowned, friendly and unapproachable animals, as “outdoor cats.” We did not distinguish between owned and unowned cats because few animals have outward signs of ownership (tag or microchip). Respondents included undergraduate students enrolled in a general science course at the University of Florida who received course credit for their participation. These classes were selected because students had been assigned a reading that labeled outdoor cats as a non-native species and described the potential ecological impacts on wildlife and health risks to people and wildlife. Therefore, we expected a priori knowledge about outdoor cats and cat-related risks to be similar among students. The written survey included 83 items focused on: (1) experiences with outdoor cats, (2) beliefs and attitudes about cats and cat management, (3) perceptions of current cat populations and tolerance for future cat populations, and (4) perceptions of risks. We classified experiences as positive, negative and neutral (Table 2-1). We summed the experience

items to create two scales representative of experience frequency, including positive experiences (4 items) and negative experiences (5 items). We measured beliefs about outdoor cats using 12 statements on a progressive scale (1=strongly disagree, 5=strongly agree) (Table 2-2). We measured perceived current cat population (0=too many cats 1=the right number of cats) and tolerance for future cat population trends (1=decrease, 2=stay the same, to 3=increase). Like previous wildlife studies, we used tolerance for future populations as a proxy measure for Acceptance Capacity (Lischka et al., 2009; Riley & Decker, 2000b). Established scales were used to assess ecological risk perceptions, specifically, we used a reduced 10-item scale that measured the perceived impact and acceptability of outdoor cats and feelings about this effect on the environment, wildlife, and people (Axelrod, McDaniels, & Slovic, 1999; McDaniels, Axelrod, & Slovic, 1995; McFarlane & Witson, 2008) (Table 2-3). Because of the inverse relationship between perceived risks and benefits, the positive end of this scale represented perceived benefits while the negative end represented perceived risk (1=negative, 5=positive). Respondents rated their attitudes toward cats on a scale ranging from 1=hate to 5=love. The attitudes toward management scale included 13 statements, based on scales developed by Dabritz et al. (2006) and Lord (2008) (Table 2-4). The survey concluded with questions about cat ownership, feeding, gender, age, and years in school. For all questions we asked respondents to report experiences with and perceptions of outdoor cats not owned by them. Cat owners completed additional questions about the number of owned cats, their ability to control outdoor access, and the vaccination and sterilization status of their cats. All items included a “do not know” option.

Data Analyses

For all tests, Cronbach's $\alpha > .60$ was considered acceptable reliability (Nunnally, 1978; Vaske, 2008). Factor analysis was used to evaluate construct validity for the scales we collapsed into single items. We reported factor loadings $> .30$ and Eigenvalues > 1 . For all tests SPSS 18 (Statistical Package for the Social Sciences, IBM) was used. We used Pearson's chi-square analysis to evaluate the influence of gender on cat ownership and cat feeding, as well as differences in cat ownership between feeders and non-feeders. Effect sizes for significant chi-square results are reported (Cramer's V). Partial eta squared (η^2) represents effect size ($\eta^2 = .01$ is a small effect, $\eta^2 = .09$ is a medium effect, and $\eta^2 = .25$ is a large effect) (Cohen, 1988). Respondents reported perceptions of the effectiveness of both TNR and cat impoundment. Therefore, we used a repeated measure ANOVA to evaluate perceptions of both cat management strategies. Post-hoc t-tests were used to evaluate significant results.

An exploratory factor analysis with varimax rotation resulted in two factors explaining 31% of the variance in cat beliefs. Two items did not fit into the factor solution, "this issue is important to me" and "cats should be kept indoors at all times," and were removed. From the resulting two factors, we created two composite scales representing individual beliefs about cats "beliefs about cats" (6 questions) and the impact of cats on wildlife "cat impacts" (4 items) (Table 2-2). We used paired t-tests to compare positive and negative experiences and "beliefs about cats" and "cat impacts" beliefs.

The 10-item risk perception scale addressed the perceived impact and acceptability of outdoor cats and feelings about this effect on the environment, wildlife,

and people. To ensure that we were measuring one “risk” dimension we checked the reliability of these items. We removed one item, “impacts to wildlife,” because it detracted from reliability. The final scale had 9 items and was reliable Cronbach’s $\alpha=.87$. We ran a confirmatory factor analysis to assess scale reliability. Our results indicated a one-factor solution explaining 49% of the total variance (KMO = .887) (Table 2-3). The nine items were then combined into a composite scale with a range of 1-5 (lower scores represented more negative perceptions of cat impacts).

Two items detracted from the reliability of the attitudes toward management scale, “no management is effective” and “I oppose licensing cats,” and were removed leaving an 11-item scale (Table 2-4). For all analyses we reverse coded “cats should be allowed to roam free” so that a high score represents strong agreement with the attitude items.

To identify the best model for predicting CAC, we ran a stepwise logistic regression with CAC recoded as dichotomous (1=decrease, 0=all other responses). Variables of interest were identified a priori based on the existing WAC literature and included items expected to influence CAC, such as situational variables (experiences) and affective factors (beliefs and attitudes about cats and cat management, risk perceptions and perceptions of the current cat population). Compared to affective and situational variables, demographic variables were not expected to be strong predictors of tolerance. Moreover, our interest was primarily in the influence of beliefs, attitudes and experience. Therefore, the demographic variables (cat ownership, cat feeding and gender) were entered as a separate step to see what influence, if any, they had on the initial model. Change in likelihood ratio identified the best model.

To determine whether CAC predicted attitudes toward cat management we performed a multivariate analysis of variance MANOVA. Management attitudes were the dependent variables with CAC as the sole dichotomous predictor.

Results

Socio-demographic Variables

Surveys were distributed in the spring of 2011. The survey was distributed to 663 undergraduate students and completed by 381 students (153 males, 206 females, 23 unidentified), for a response rate of 58%. The removal of missing cases reduced the sample to $n=265$ cases. Most respondents (80%) were college freshmen. A quarter (24%) of the respondents owned at least one cat. In addition, a quarter of the respondents reported feeding an outdoor cat (25%). Of the cat owners, more than half reported owning an outdoor cat (59%). Few owners indicated support for keeping their cats indoors (26%). There were no gender differences in cat ownership ($\chi^2=0.212$, $p=.65$) or cat feeding ($\chi^2=0.111$, $p=.74$). However, non-owners (19%) were less likely than owners (51%) to feed outdoor cats ($\chi^2=32.57$, $p<.001$, Cramers' $V=.30$).

Situational and Affective Variables

Most respondents had seen cats in their neighborhood or in their yard, had enjoyed watching an outdoor cat and/or heard about problems with outdoor cats; fewer had observed a cat hunting or scaring birds, had a pet attacked, or had fed, pet or adopted an outdoor cat (Table 2-1). A number of respondents (10%) indicated they had been attacked by an outdoor cat (Table 2-1). On average, respondents experienced significantly more positive experiences with outdoor cats ($M=0.39$, $SD=0.32$) than negative ones ($M=0.28$, $SD=0.24$, $t=7.08$, $p<.001$, $r=.34$). Of those respondents who indicated attitudes toward cats, most (55%) expressed affection for cats, but 21% did

not care about cats, and 24% did not like cats. On average, respondents expressed positive attitudes toward cats ($M=3.46$, $SD=1.24$).

Across the cats rights belief statements, 33-50% of the respondents indicated a “neutral” response to questions about whether cats deserve to be outdoors, live healthy lives, and whether wildlife and cats should have equal access to the outdoors (Table 2-2). Another 27-47% of respondents agreed with the aforementioned statements and less than a third disagreed. The majority of respondents believed that outdoor cats can find their way home, survive without humans, kill wildlife, and compete with wildlife for food (Table 2-2). Some respondents expressed a willingness to reduce cats to benefit wildlife, but a plurality of respondents selected a “neutral” response to this statement. Respondent “beliefs about cats” ($M=3.27$, $SD=0.60$) and “cat impacts” ($M=3.33$, $SD=0.63$) were comparable.

Respondents were neutral about the risks outdoor cats pose to wildlife and people ($M=2.87$, $SD=0.65$) (Table 2-3). Many respondents (49%) reported “the right number” of cats in their community, although 37% indicated there were “too many” cats and 14% reported “too few” cats. Most participants desired a reduction in the future population (58%) and only 5% supported an increase. CAC for all respondents fell between “decrease” and “stay the same” ($M=1.47$, $SD=0.60$).

Model Results

The first of our two models investigated the influence of experiences, beliefs, attitudes and perceptions on CAC. This model correctly classified individuals 81% of the time and explained 52% of the variance in CAC, ($\chi^2(7)=109.35$, $p<.01$). The frequency of positive or negative experiences was not a significant predictor of CAC. Strong support for cat rights, positive risk perceptions (or benefits), and favorable attitudes

toward cats increased tolerance, while perceived risks to wildlife and perceptions of an elevated cat population decreased tolerance (Table 2-5). Strong wildlife rights decreased tolerance, though this was not a significant predictor of CAC ($\beta=-0.184$, Wald $\chi^2(1) = 0.321$, $p=.571$). Adding demographic items, such as gender, cat feeding and cat ownership added little to the model ($\chi^2(3)=5.08$, $p=.166$). However, it is important to note that gender trended toward significance, with men more tolerant of outdoor cats and therefore less supportive of decreasing the future cat population than women ($\beta=-0.703$, Wald $\chi^2(1) = 3.34$, $p=.068$). While not significant, our results suggested that gender may play a role in influencing attitudes toward tolerance and cat management. Cat feeders also appeared more tolerant of outdoor cats, although these results were not significant ($\beta=-0.508$, Wald $\chi^2(1) = 1.342$, $p=.247$).

Cat Management and CAC

On average, respondents strongly supported laws requiring rabies vaccination and identification for cats (tag or microchip) (Table 2-4). Fewer respondents agreed with the use of mandatory spay-neuter laws, government control of outdoor cats, and the use of taxes for low-cost spay/neuter programs. A majority of respondents agreed that cats should be allowed to roam and disagreed with the need for a law prohibiting cats outdoors. A majority of respondents perceived TNR programs as an effective method of controlling outdoor cats. Repeated measures ANOVA results indicated significant differences in attitudes toward TNR and impoundment as management types ($F=142.17$, $p<.001$, $\eta^2=.27$); TNR was perceived as significantly more effective than impoundment, ($M=0.96$, $SD=1.43$, $t = 13.13$, $p<.001$, $r=.56$).

We conducted a MANOVA to determine whether CAC predicted attitudes toward cat management. There were no significant outliers or violations of assumptions of

normality, linearity, singularity or equal variances ($p > .001$). There was a significant effect of CAC across the 11 attitudes toward management items ($F = 5.27$, $p < .001$, $\eta^2 = .19$), suggesting a moderate association between CAC and attitudes toward management. Individuals with lower CAC values had higher scores on the majority of items measuring attitudes about management; two of the 11 items were not significant, “support for using tax dollars for low-cost spay/neuter programs” and “support for mandatory rabies vaccination” (Table 2-6). Of the individual attitude items, CAC had the strongest effect on “failure to manage cats” ($\eta^2 = .074$). Lower CAC values predicted support for active management strategies, including government control, the confinement of cats indoors, mandatory TNR, and the prohibition of outdoor cats.

Discussion

Tolerance for wildlife is a function of experiences, attitudes, perceived risks and perceptions of current population trends (Carpenter et al., 2000; Decker & Purdy, 1988; Riley & Decker, 2000b). This study indicates that tolerance for outdoor domestic cats is also a function these variables, but experiences with outdoor cats and socio-demographic variables were not significant predictors of tolerance. It is possible that this finding is unique to our sample of undergraduate students and more research is needed to answer this question. Further, this study confirmed the link between tolerance and support for active management for this domestic non-native species. While students agreed that cats pose risks to wildlife and faced increased risks compared to indoor-only cats, this knowledge failed to translate into support for mandatory spay-neuter laws or the confinement of cats indoors.

Gender did not significantly predict tolerance for cats. Our results supported previous results with the general public that found no significant gender differences in

WAC for mountain lions (Riley & Decker, 2000b), wolves (Peyton, Bull, & Holsman, 2007), and bears (Siemer, Hart, Decker, & Shanahan, 2009). In our study, men had slightly higher CAC scores than women. This difference may be due to variation in perceptions of domestic animals rather than wild animals. Women often report more concern over animal cruelty, stronger attachment to domestic pets (Kellert & Berry, 1987), and concern for species conservation than men (Czech, Devers, & Krausman, 2001). Therefore, women may be more concerned about the possible dangers to cats and wildlife from allowing cats to live outdoors and therefore expressed less tolerance.

Among respondents, cat owners fed more cats than non-owners. These results compare to previous studies of caretakers in Florida (Centonze & Levy, 2002), and residents in Ohio (Lord, 2008). Rates of cat feeding were similar to findings from Ohio (26%) (Lord, 2008). Rates of ownership and feeding were higher than previous reports of cat ownership (18%) and cat feeding in Alachua County (12%) (Levy, Gale, et al., 2003). Respondents were asked about feeding unowned outdoor cats, but without visible tags or collars, ownership status is difficult to determine. It is possible that respondents reported feeding animals owned by other people. High feeding levels may also be attributed to an increase in cat ownership; in the U.S., cat ownership has steadily increased and was estimated at 93.6 million in 2010 (American Pet Products Manufacturers, 2010). The increase could be attributed to a higher concentration of outdoor cats on college campuses compared to other areas, an increase in people feeding outdoor cats locally, or differences in the behavior of college students compared to the general public.

Previous studies of cat caretakers indicated that the primary reason for feeding outdoor cats was sympathy and love (Centonze & Levy, 2002). Therefore, we expected cat feeding and ownership to predict CAC. Neither feeding nor ownership was a significant predictor of CAC. However, negative attitudes about cats (e.g., hate) decreased tolerance for the outdoor cat population, while positive feelings increased support. These findings are consistent with previous research indicating that negative attitudes reduced hunter support for increasing cougar populations and strong and favorable attitudes toward wildlife increased tolerance (Riley & Decker, 2000b) and reduced stakeholder concern about bears (Siemer et al., 2009).

Our results indicated no significant predictive relationship between negative or positive experiences and CAC. In previous studies, WAC decreased as the frequency and severity of the experiences increased (Lischka et al., 2009; Riley & Decker, 2000b). Negative experiences with wildlife decreased WAC for beavers, white-tailed deer, geese (Loker et al., 1999), black bears (Siemer et al., 2009) and prairie dogs (Zinn, Manfredo, & Vaske, 2000). Negative experiences with cats influenced perceptions of cats as nuisance animals (Ash & Adams, 2003) and increased support for lethal management (Loyd & Miller, 2010a, 2010b). The aforementioned study did not ask respondents about positive experiences and was embedded within a larger survey sponsored by the Illinois Department of Natural Resources. It is possible that our focus on cats rather than natural resources or the addition of positive experiences contributed to this difference. It is also possible that respondents do not view negative experiences with outdoor cats with the same degree of concern as interactions with a larger non-domestic species, such as panthers, black bears, or deer.

It could be argued that results of the present study are limited by the selection of undergraduate students on a college campus. We do not believe that the significant relationships we reported and tolerance for outdoor cats (CAC) would be any different in this population than in the general public. This assertion is supported by the fact that our findings mirror previous results from studies of WAC with the general public (Carpenter et al., 2000; Decker & Purdy, 1988; Riley & Decker, 2000b). However, it is possible that the non-significant relationships between experiences, socio-demographic variables and tolerance were the result of limited student experiences with outdoor cats, including cat ownership and cat feeding due to residence in a dormitory.

Best Predictors of CAC

We assessed the influence of situational variables (i.e., experiences), affective variables (e.g., beliefs about cats, attitudes toward cats) and demographic items, such as cat ownership, feeding and gender on tolerance or CAC. Demographic variables contributed an insignificant amount to the final predictive model. Our findings are consistent with previous research citing demographic variables alone as poor predictors of resident tolerance of wolves (Peyton et al., 2007) and indicating that psychological variables are at least as important as situational specifics, species characteristics, and experience in predicting WAC. The situational and affective model predicted more than 50% of the variance in CAC. Strong and favorable “beliefs about cats” reduced respondent concern and increased tolerance for outdoor cats. In this study, people who perceived “too many cats in their community” were 13 times more likely to support decreased cat numbers. This is consistent with findings from Wisconsin where resident support for a reduction of the cat population was correlated with perceptions of “too many cats” (Coleman & Temple, 1993).

Previous researchers have suggested that it is the interaction of perceived benefits (subsistence, recreation, aesthetic, and scientific) and potential threats (damage, attack, or disease) that determine individual WAC or willingness to absorb the cost of living with animals (Riley & Decker, 2000b; Riley et al., 2002; Zinn et al., 2000). For example, perceived risk of deer-vehicle related accidents influenced respondent tolerance for wildlife population levels (WAC) (Decker & Purdy, 1988); as perceived risk increased so did support for a smaller population (Stout, Stedman, Decker, & Knuth, 1993). Respondents in Montana with a low WAC perceived greater risk of attack by cougars and worried more about attacks compared to other respondents (Riley & Decker, 2000a). Moreover, previous studies indicate that perceived benefits from a risk item can increase willingness to accept the costs of living with that risk (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978). Our model confirmed that increased risk perceptions lessened tolerance, while increased perceived benefits amplified tolerance. Although the consequences of interactions with outdoor cats are not as potentially dire as a negative interaction with a mountain lion or a deer-related vehicle accident, a number of nuisance behaviors, including the potential spread of diseases to pets (e.g., rabies, feline leukemia) and the fouling of yards, can increase the perceived cost of living with outdoor cats. Despite the fact that the transmission risk of rabies to people is low, people continue to express concern over this high consequence event (Levy & Crawford, 2004). In addition, there are a number of widely discussed potential ecological risks to wildlife from outdoor cats, including predation and disease transmission (Roelke et al., 1993). This is the first study to confirm the relationship between perceived ecological risks and tolerance and to acknowledge that the potential

benefits outdoor cats provide people (e.g. companionship, comfort) can influence tolerance and attitudes toward cat management.

CAC and Attitudes toward Management

Respondents generally supported outdoor access for cats and opposed laws prohibiting or confining cats indoors. Moreover, few respondents were concerned about the consequences of failing to manage outdoor cats. A majority of respondents perceived TNR programs as an effective method of controlling outdoor cats. It is possible that visible TNR efforts across the community and the spay/neuter clinics supported through the Veterinary School contribute to general support for outdoor cats and perceptions of TNR as more effective than impoundment.

CAC had a positive and significant effect on support for management methods for all the items except “using tax dollars for low-cost spay/neuter programs” and “laws requiring rabies vaccination.” This is likely due to strong support for rabies vaccination (low variation) and high variation in support for taxes, such that CAC did not influence these attitudes as strongly as the other items. Our results indicate that CAC plays an important predictive role in individual attitudes toward cat management. Specifically, low CAC predicted support for government control, the confinement of cats indoors, and mandatory TNR.

Implications for Conservation Outreach

Human activities, such as cat abandonment, contribute to increased numbers of outdoor cats. Therefore, effective cat control messages must target human behavior. Conservation organizations have attempted to reduce the outdoor cat population by developing education campaigns focused on the risks of cats to wildlife and the risk to outdoor cats from the outdoor lifestyle (American Bird Conservancy, 2004). The

assumption of many of these initiatives is that education about risks will convince people to keep their cats indoors. In this study, students were aware of the negative impacts of cats on wildlife and the environment and believed that cats negatively affected wildlife through the transmission of diseases, competition and direct killing. At the same time, respondents were supportive of outdoor access for cats and opposed laws confining cats. This finding suggests that knowledge of the potential impact of cats may not translate into attitudes favoring aggressive cat management. Moreover, beliefs about cats (e.g., “Cats deserve to be free outdoors like other animals”) were a significant predictor of tolerance, but “cat impacts” beliefs (e.g., “Outdoor cats kill wildlife” and “Outdoor cats transfer diseases to wildlife”) were not. Our results suggest that knowledge of ecological risks, or the risks cats pose to wildlife and the environment, may not directly influence tolerance or attitudes toward cat management.

Despite variability in attitudes about cats, cat management, and risk perceptions, the majority of participants perceived “too many cats” in their community and few (5%) individuals supported an increased cat population. Of all the predictors, perceptions about the current cat population had the strongest influence on tolerance. We suggest future studies test the effectiveness of various messages, including risks/benefits, cat welfare, and/or population reduction on tolerance and attitudes toward management.

Since its development, WAC has been used to evaluate public support for various management methods (Decker & Purdy, 1988). It is a useful tool, allowing managers to balance the competing interests of different groups and manage wildlife populations in accordance with stakeholder tolerance and the biological limits of the environment (Kellert, Black, Rush, & Bath, 1996). Previous studies focused on WAC for

native wildlife; this study expands the domain of this concept by identifying significant predictors of tolerance for a non-native, domestic animal and identifying the predictive relationship between tolerance and support for active management methods. This research provides important insights into the relationship between public perceptions, tolerance, and attitudes about outdoor cats that can inform policy decisions, support the development of creative and humane management strategies to improve cat welfare, and protect wildlife from the potential risks associated with outdoor cats. This research is the first to expand the concept of acceptance capacity to a domesticated and non-native species and suggests that many of the same variables that influence WAC apply to this model. However, additional studies are needed to explore the relationships between socio-demographic, situational and affective variables and tolerance for outdoor cats among the general public and other stakeholders.

Table 2-1. Student experiences with outdoor cats

	Total (%)*
Positive	
Fed an outdoor cat	138 (36)
Adopted an outdoor cat	83 (22)
Enjoyed watching an outdoor cat	230 (60)
Pet an outdoor cat (i.e. touched)	140 (37)
Negative	
Observed a cat scaring birds	65 (17)
Had a pet attacked by an outdoor cat	85 (22)
Heard about problems with outdoor cats	202 (53)
Personally injured by an outdoor cat	37 (10)
Observed a cat hunting	134 (35)
Neutral	
Observed a cat in my neighborhood	361 (95)
Observed a cat in my yard	283 (74)

Table 2-2. Factor loadings and item responses based on an exploratory factor analysis with varimax rotation for 10 items from the reduced cat beliefs scale

	Responses (%)			Mean (SD)	Factor Loadings	
	Agree	Neutral	Disagree		Factor 1	Factor 2
Beliefs about cats (Cronbach's $\alpha = .69$)						
Cats deserve to be free outdoors like other animals	35	47	18	3.24 (.94)	.63	--
Outdoor cats live happy healthy lives, comparable to indoor cats	27	44	29	2.99 (1.0)	.57	--
Most outdoor cats can find their way home on their own	47	38	15	3.43 (1.0)	.52	--
Outdoor cats do not pose a significant threat to wildlife	33	50	17	3.21 (.88)	.52	--
Wildlife and cats should have equal access to outdoors	41	44	15	3.37 (1.0)	.47	--
Most outdoor cats are able to survive without human help	47	33	20	3.35 (.96)	.41	--
Cat impact beliefs (Cronbach's $\alpha = .69$)						
Outdoor cats kill wildlife	48	38	14	3.40 (.92)	--	.65
Outdoor cats compete with wildlife species for food	53	32	15	3.35 (.93)	--	.64
Outdoor cats transfer diseases to wildlife	41	45	14	3.35 (.88)	--	.51
I am willing to reduce outdoor cats to benefit wildlife	33	43	24	3.12 (.98)	--	.32

Note. Factor analysis was used to evaluate construct validity for the scales we collapsed into single items. In this case "Beliefs about cats" and "Cat Impact" beliefs. Beliefs were estimated from a 5-point scale; collapsed here into 1= strongly disagree/disagree, 2=neither, 3=strongly agree/agree. KMO =0.72

Table 2-3. Perceptions of the risks cats pose based on the 9-item risk scale

	Mean (SD)	Factor 1
To what extent do you believe outdoor cats have an impact on the environment	2.78 (.70)	.654
To what extent are the effects of outdoor cats on natural ecosystems acceptable to you	3.03 (.83)	.731
What level of emotion do you feel when you think about outdoor cats and their effect on natural ecosystems	2.88 (.72)	.738
To what extent are the effects of outdoor cats on native wildlife acceptable to you	2.79 (.87)	.704
What level of emotion you feel when you think about outdoor cats and their effect on native wildlife	2.81 (.73)	.717
What threat do outdoor cats pose to wildlife	2.89 (.87)	.521
To what extent do you believe outdoor cats have an impact on you	2.94 (.84)	.698
To what extent is the presence of outdoor cats in your community acceptable to you	2.90 (.92)	.802
What level of emotion do you feel when you think about outdoor cats and their effect on your community	2.85 (.75)	.690
Total Scale ^a	2.87 (.65)	

^a Cronbach's α = .86

Note: Perceptions were measured on a 5-point scale with (1= negative and unacceptable, and 5=positive and acceptable)

Table 2-4. Respondent attitudes toward cat management based on the reduced 11-item management scale

	Responses (%)			Mean	SD
	Agree	Neutral	Disagree		
Trap-Neuter-Return programs are an effective method of controlling outdoor cat populations	66	26	8	3.90	1.0
Trapping and impounding cats is an effective method for controlling outdoor cat populations	33	28	39	2.94	1.0
Cat owners should be required to provide identification (tag or microchip) for their cats	66	22	12	3.78	1.1
Local governments should be responsible for controlling outdoor cats	34	41	25	3.09	1.0
Cats should be kept strictly indoors	21	33	46	2.66	1.0
I support mandatory spay-neuter laws for cats	39	36	25	3.21	1.1
I support using tax dollars for low-cost spay-neuter programs	33	31	36	2.92	1.2
I support laws requiring that cats be vaccinated against rabies	76	20	4	4.07	0.87
Failing to address the management of outdoor cats will have serious implications for my community	36	40	24	3.16	1.0
There should be a law prohibiting cats from roaming freely	19	28	53	2.53	1.2
Cats should be allowed to roam free ^a	42	37	21	3.29	1.1

Note. Scores estimated from a 5-point scale; collapsed here into 1= strongly disagree/disagree, 2=neither, 3=strongly agree/agree. Cronbach's α =.67

^a Reverse coded for calculations

Table 2-5. Results of a stepwise logistic regression evaluating the potential predictors of tolerance for outdoor cats (CAC) with demographic variables entered as a separate step

Independent Variable	Tolerance for outdoor cats (CAC)	
	Model 1 β	Model 2 β
Positive Experiences	-1.290	-1.341
Negative Experiences	1.162	.854
Attitudes toward cats	0.474*	.525**
Beliefs about cats	1.199**	1.042**
Cat Impacts	-.184	-.096
Perceived Benefits	.841*	.843*
CurrentPop (The right number of cats)	2.554**	2.609**
Gender (Female)		-.703
Feed (No)		-.508
Own (No)		.351
R ²	.52	.540
χ^2	109.356**	5.084

Note. CurrentPop represents a dichotomous measure of perceptions of the current cat population. All β values were reversed for ease of analysis.

* p <.05. ** p <.01.

Table 2-6. A comparison of attitudes toward cat management predicted by individual tolerance toward outdoor cats

	Tolerance toward cats (CAC)						
	Increase or stay the same		Decrease		F	p	η^2
	M	S.E	M	S.E			
Spay-neuter and release programs are an effective method of controlling outdoor cat populations	3.76	0.10	4.14	0.08	9.25	.003	.034
Trapping and impounding cats is an effective method for controlling outdoor cat populations	2.70	0.11	3.27	0.10	15.07	<.001	.054
Cat owners should be required to provide identification (tag or microchip) for their cats	3.58	0.11	4.03	0.09	10.29	.002	.038
Local governments should be responsible for controlling outdoor cats	2.96	0.10	3.32	0.08	7.68	.006	.028
Cats should be kept strictly indoors	2.39	0.10	2.90	0.09	14.53	<.001	.052
I support mandatory spay-neuter laws for cats	2.98	0.11	3.43	0.09	10.58	.001	.039
I support using tax dollars for low-cost spay-neuter programs	2.92	0.11	3.01	0.10	0.399	.528	.002
I support laws requiring that cats be vaccinated against rabies	4.05	0.09	4.13	0.07	0.453	.501	.002
Failing to address the management of outdoor cats will have serious implications for my community	2.90	0.10	3.49	0.08	21.10	<.001	.074
There should be a law prohibiting cats from roaming freely	2.28	0.12	2.81	0.10	11.96	.002	.043
Cats should be allowed to roam free ^a	2.38	0.11	2.97	0.09	17.17	<.001	.061

Note. For all tests df (1, 263) and n=265

^a Reverse coded for analysis

CHAPTER 3
THE INFLUENCE OF PERCEPTIONS, ATTITUDES AND EXPERIENCES ON THE
PERCEIVED RISKS AND BENEFITS OF OUTDOOR CATS

The Perceived Risks and Benefits of Outdoor Cats

Outdoor cats (*Felis catus*) pose a potential risk to wildlife and people. Incidences of cat predation and competition with wildlife have been widely addressed in the fields of wildlife conservation (Baker et al., 2008; Beckerman et al., 2007; Coleman et al., 1997) and veterinary medicine (Barrows, 2004; Jessup, 2004; Levy & Crawford, 2004). The spread of diseases from domesticated cats to wildlife and people is a poorly understood risk. Cats serve as incidental hosts of rabies (Dubey, Miller, & Frenkel, 1970; Nutter, Dubey, et al., 2004). Cats make up the largest percent of rabies cases in domestic animals; A total of 303 rabid cats, 71 cattle and 69 dogs were reported in 2010 (CDC, 2012b). However, the rate of rabies infection in cats is much lower than that of wildlife (Department of Health and Human Services, 2010; Slater, 2004). Despite the potential threat from rabies, there have been only 2 cases of rabies to human transmission in the last 50 years (CDC, 2012a). In 2010, the majority of reported rabies cases (92%) were associated with wildlife (CDC, 2012a). Therefore, the risk of rabies transmission from cats to people is a low probability risk (Levy & Crawford, 2004). Rabies transmission is an example of the type of high consequence low probability event that is often overestimated by the public and therefore widely discussed in the existing literature about outdoor cats (Slovic, 2000a; Zeckhauser & Viscusi, 1990).

Indirect effects of cats on wildlife and ecosystems have also been cited. These include temporal or spatial avoidance of cats, including the alteration of foraging patterns, habitat selection, and other behaviors that affect adult and juvenile survival, clutch size, or clutch number (Baker, Ansell, Dodds, Webber, & Harris, 2003;

Beckerman et al., 2007; Sims, Evans, Newson, Tratalos, & Gaston, 2008). Cats also deposit large quantities of fecal matter into the environment, a source of fecal coliform bacteria that can pollute fresh and salt water systems (Dabritz et al., 2006).

Outdoor cats are also subject to health risks including disease, starvation, collision with vehicles, and attack by dogs, coyotes, and humans (Slater, 2004; HSUS, 2010). Numerous examples of people inflicting intentional harm (e.g., shooting, poison) on outdoor cats (Jessup, 2004) exist. A study of 169 outdoor kittens found 75% of the newborns died or disappeared within 6 months of birth; the overwhelming majority of the incidents (68%) involved attacks by stray dogs or car collision (Nutter, Levine, & Stoskopf, 2004). This has led to speculation that the lifespan for indoor-only cats is significantly greater than that of outdoor cats (Jessup, 2004).

Risk/benefits perceptions (whether from technological or natural hazards) play a critical role in individual risk assessments and are therefore as important as determining the true risk of exposure to injury or disease (Gore & Knuth, 2009). Perceived risk/benefits can influence stakeholder tolerance of animals (Riley & Decker, 2000a), attitudes toward management (Agee & Miller, 2009) and support for conservation or eradication (Kellert, 1985). There was a strong and direct relationship between perceived risks of outdoor cats on wildlife and the environment and tolerance of outdoor cats, which in turn predicted attitudes toward cat management techniques, such as removal to a long-term no kill shelter, support for Trap-Neuter-Return activities, and the confinement of cats indoors (Wald & Jacobson, 2013). Therefore, efforts to manage outdoor cats require an understanding of individual perceptions and tolerance.

This study examined the influence of situational variables (e.g., experiences with outdoor cats), cognitive variables (e.g., attitudes toward cats), and demographic variables (e.g., gender, cat ownership) on perceptions of the risks that outdoor cats pose to the ecosystem and the benefits that cats provide to people. This study quantified the positive experiences or perceived benefits cats provide to people, including companionship and the control of pest species (e.g., rodents). These benefits are important to address when measuring risk, due to the inverse and potentially attenuating influence of benefits on individual risk perceptions (Fischhoff et al., 1978; McDaniels, Axelrod, Cavanagh, & Slovic, 1997), and have previously been ignored in studies of cat-related impacts on the environment and people. In addition, we analyzed the potential role that perceptions of risks and benefits play in mediating the relationship between attitudes toward outdoor cats and tolerance for the future outdoor cat population.

A Risk Perception Framework

Risk is the probability that an event will occur and the likelihood that exposure will result in a negative outcome (e.g., injury, damage, or loss) (Breakwell, 2007). Perceptions of ecological risks are defined as threats to the health and productivity of individual species, communities, environmental processes, and the ecosystem (McDaniels et al., 1997). As perceptions of ecological impact increase, perceptions of risk increase and human benefits decrease (McDaniels et al., 1997). Ecological risks have previously been studied with regard to human activities and their negative impact on ecosystem services (e.g., clearcutting in forests, air pollution) (Cavanagh, McDaniels, Axelrod, & Slovic, 2000; McDaniels et al., 1997; Williamson, Parkins, & McFarlane, 2005). Few studies have addressed the risks associated with natural

hazards (e.g., floods, earthquakes, volcanoes) (Axelrod et al., 1999; McDaniels et al., 1995). Four factors explain significant variability in lay perceptions of ecological risk ($R^2=.96$), including impact on species (humans and nonhumans), human benefits, perceived control, and knowledge of the impacts (McDaniels et al., 1997). Impact on species was the most important factor predicting ecological risk perceptions (McDaniels et al., 1997). McFarlane and Witson (2008) expanded this theory to include risks associated with a natural disturbance event in protected areas. This study further expands the concept of ecological risk by treating domestic cats as a source of natural risk and measuring risk perceptions associated with cat predation on wildlife. We focus on risk within the assumptions and limitations of the psychometric paradigm. This paradigm assumes risk is subjective, quantifiable, and predictable, and therefore can be modeled and measured using a variety of survey techniques (Slovic, 2000a; Slovic, Flynn, & Layman, 2000); it also assumes that individual evaluation of risk is influenced by psychological, social, institutional and cultural factors (Slovic, 2000a; Slovic et al., 2000).

Results of previous empirical research on wildlife-related risk have provided a basis for expectations about the explanatory relationship between risk perceptions and several cognitive, situational, and demographic variables (Sjoberg, 1998). Familiarity with a risk should increase knowledge and therefore lower risk perceptions (Slovic, 2000a; Slovic et al., 2000). Experience with a carnivore reduced perceptions of risk from carnivores (Bjurlin & Cypher, 2005; Røskaft, Bjerke, Kaltenborn, Linnell, & Andersen, 2003). Seeing the endangered San Joaquin kit fox (*Vulpes macrotis mutica*) (Bjurlin & Cypher, 2005), black bears, or a sign about black bears reduced concern (Siemer et al.,

2009). In Norway, fear of carnivores declined as experience increased (Røskaft et al., 2003).

However, it is important to note that the type of experience, the type of animal, and the frequency of the interactions matter. Perceived risk increased as the severity of the experience with cougars increased (e.g., observing the animal in the wild vs. attack or threat to pet, livestock or self) (Riley & Decker, 2000a). People were less tolerant of wolves and bears in close proximity to people than of lynx and wolverines (Kleiven, Bjerke, & Kaltenborn, 2004). Moreover, negative experiences (e.g., damage to property) with beavers, white-tailed deer and geese (Loker et al., 1999), black bears (Siemer et al., 2009), and prairie dogs (Zinn et al., 2000) amplified concerns. Risk, in the latter instance, referred to more than just the probability or perception of risk from injury or death to the individual; it also included concerns about zoonotic diseases, economic damage, and damage to property (e.g., destroying garden, fouling yard). Negative experiences with outdoor cats influenced respondent perceptions of cats as nuisance animals (Ash & Adams, 2003) and support for lethal management (Loyd & Miller, 2010a, 2010b). People in rural Wisconsin were more likely to attempt cat population control if they perceived a higher density of cats in their area (Coleman & Temple, 1993).

Affect is an involuntary, immediate emotional response to an external event (Slovic, 2000a; Slovic et al., 2000; Zajonc, 1980). Affect can be positive (like) or negative (dislike); it can influence decision-making and action (Zajonc, 1980). Affection is among the first and most important human feelings guiding cognition and behavior, including perceived risks and benefits (Finucane, Akhikami, Slovic, & Johnson, 2000;

Zajonc, 1980). Affect predicts individual attitudes and perceived benefits of a risk object (Finucane et al., 2000; Slovic, 2000b; Slovic et al., 2000). There is a strong correlation between affection, attitudes, and risk perceptions; if an activity is liked, it is valued as highly beneficial and perceived as a low-risk event (Finucane et al., 2000; Slovic, 2000a).

People are more willing to accept the costs of living with a risk if they perceive immediate benefits from the object (Fischhoff et al., 1978). There are a number of potential physical and psychological benefits of pet ownership that may reduce risk perceptions and support for the lethal management of outdoor cats (Friedmann, 1995; Friedmann, Katcher, Lynch, & Thomas, 1985; Poresky & Hendrix, 1990; Vining, 2003; Zasloff & Kidd, 1994). In California and Ohio, cat owners were more likely to oppose government initiatives to control cats than non-owners (Dabritz et al., 2006; Lord, 2008) and in Australia, cat owners were generally less supportive of cat control initiatives than non-owners (Grayson, Calver, & Styles, 2002). The human-cat bond appears to exist even in cases where cats are so “wild” that caregivers are unable to pet or even approach outdoor animals. Many caretakers report feeling a strong bond with unsocialized outdoor cats and voluntarily spend significant amounts of time, effort, and money (ranging from \$260 to \$2,400 annually) caring for them (Centonze & Levy, 2002).

Previous researchers have reported dramatic differences in attitudes and perceptions based on gender; others have suggested that “gender is among the most important demographic influences on attitudes toward animals in our society” (Kellert & Berry, 1987). Men are generally less concerned about hazards and risk than are women

(Slovic et al., 2000). Women reported higher levels of personal risk from mountain lions (Thornton & Quinn, 2010; Zinn & Pierce, 2002). However, there were also cases where gender did not result in significant difference in concern over mountain lions (Riley & Decker, 2000b), wolves (Peyton et al., 2007) and bears (Siemer et al., 2009).

Identifying the perceived risk/benefits from outdoor cats will help predict individual tolerance, attitudes toward management, and support for eradication or education programs. To explore these issues, we addressed the following questions: Which individual characteristics, such as cat ownership, cat feeding, affection for cats, and gender, will predict risk perceptions/benefits of outdoor cats? How do situational and cognitive variables influence risk/benefits perceptions? Do perceived risks/benefits mediate the relationship between attitudes toward outdoor cats and tolerance for the future cat population?

Methods

Survey research was conducted from December 2010 to May 2011. The survey used the term “outdoor cats” to describe owned and unowned friendly and unapproachable free-roaming cats. The written questionnaire contained 11 primary items focused on 1) experiences with outdoor cats, 2) beliefs about cats and cat management, 3) perceptions of current cat population and tolerance of future cat populations, and 4) perceptions of risk/benefits. *Experiences* included positive items (i.e., enjoyed watching cats, fed cats, pet cats, and adopting a cat) and negative items (i.e., observed a cat scaring birds, had a pet attacked, personally injured by a cat, heard about problems with cats, observed a cat hunting). We created two summative scales of both positive and negative experiences. We measured cat *frequency* on a 4-point progressive scale ranging from (1 = never see cats) to (4 = daily sightings). *Current*

population measured participant perceptions of current cat population levels as (1 = too many cats), or (0 = the right number or too few cats). *Attitudes toward cats* was coded on a 5-point scale (1 = hates cats, 5 = loves cats). *Beliefs about cats* were measured using a list of 12 statements about outdoor cats (Table 3-1). Respondents were asked to indicate the extent to which they agreed with the statements on a 5-point, bipolar scale that ranged from (1 = strongly disagree) to (5 = strongly agree). To measure *perceptions of risks/benefits*, we used a reduced set (10 items) of the aforementioned risk dimensions related to the impact, acceptability, and emotionality of the impact of cats on a) ecosystems, b) wildlife, and c) people on a 5-point progressive scale (Table 3-2). In discussing these measures below, we will refer to two composite scales “ecological risks” and “benefits to people.” *Tolerance* for future cat populations was treated as a dichotomous variable in which 1 = decrease the cat population and 0 = all other responses.

The survey concluded with general questions regarding cat ownership, cat feeding, gender, and years in school. Cat owners were also asked about the number of owned cats, their ability to control outdoor access, and the vaccination and sterilization status of their cats. Participants included 474 undergraduate students (191 males and 259 females) enrolled in two different general education ecology courses at the University of Florida. Course credit was given for participation. These students were selected because course assignments addressed the issue of outdoor cats and therefore we assumed respondents would have some a priori knowledge about cat-related risks and the animal welfare concerns. All scales included a “do not know” or

“neutral” response option. A subsample of these data was used to examine factors influencing tolerance for outdoor cats (Reported in Chapter 2).

Results

Data Reduction and Scale Reliability

To interpret our results, we reported factor loadings >0.30 , factors that accounted for at least 5% of the total variance, and Eigenvalues greater than 1. For all tests, Chronbach's α values >0.60 were considered acceptable (Nunnally, 1978; Vaske, 2008) and items were removed if they detracted significantly from scale reliability. The positive experiences scale had a potential range of 0 - 1; the negative experiences scale had a potential range of 0 - 0.80. An exploratory factor analysis with orthogonal rotation confirmed previous findings (Wald & Jacobson, 2013). Therefore, we removed two items, including “this issue is important to me” and “cats should be kept indoors at all times”, resulting in a 10-item measure with two factors, “beliefs about cats” and beliefs about “cat impacts.” These factors explained 32% of the total variance and had potential ranges of 1-5 (Table 3-1). The risk perceptions items comprised two separate scales, one addressing the perceived impact and acceptability of the risks cats pose to wildlife and the environment (7-items) Chronbach's $\alpha=0.84$ and a scale measuring perceived benefits to people from cats (3 items) Chronbach's $\alpha=0.79$ (Table 3-2).

To evaluate demographic differences in risk perceptions and benefits, which were measured using a single scale, we ran a series of repeated measures analysis of variance (ANOVA) with between-subject factors of cat ownership and gender. Partial eta squared, η^2 , is reported as a measure of effect size. Post-hoc independent t-tests were used to further evaluate significant results. Due to small cell sizes, differences between feeders and non-feeders on perceived risks were analyzed separately from

gender and cat ownership. In addition, we conducted a repeated measures ANOVA test comparing the influence of cat feeding on risk perceptions and benefits.

We used ordinary least squares (OLS) regression to determine the variables predicting our risk scales, “ecological risks” and “benefits to people.” The independent variables tested included perceptions of current cat populations, affection for cats, perceived frequency of outdoor cats, experiences with cats, and attitudes toward outdoor cats. Previous research suggested that strong support for cat rights and positive perceptions of cat benefits increased individual tolerance for outdoor cats, while risk perceptions decreased tolerance (Wald & Jacobson, 2013). To further explore this relationship, we examined whether perceived risks and benefits mediated the relationship between attitudes toward outdoor cats and tolerance. A mediating variable is one that influences, partially or completely, the relationship between a predictor and outcome variable (Baron & Kenny, 1986). To determine a mediating relationship, we first established a causal relationship between the independent variable “beliefs about cats” and the dependent variable tolerance (Figure 1, path c). Next, we established a causal relationship between “beliefs about cats” and both potential mediators “ecological risks” (Figure 3-1, path a1) and “benefits to people” (Figure 3-1, path a2). We then tested the predictive relationship between both of the risk scales as potential mediators of tolerance (Figure 3-1, path b1 and b2). Finally, mediation was confirmed by establishing that the difference between the total effect (c path) and the direct effect (c’), also known as the total indirect effect $f = a_1b_1 + a_2b_2$, was significantly different from zero. To test mediation we used bootstrapping, a nonparametric sampling procedure (Preacher & Hayes, 2008). Bootstrapping is an improvement over the causal-steps

model, proposed by Barron and Kenny (1996), and the Sobel test (Sobel, 1982, 1986) because it does not assume normality and can be used to estimate models where the outcome variable, in this case tolerance, is dichotomous (Hayes & Preacher, 2010; Preacher & Hayes, 2008). This approach requires responses with complete data on the variables of interest, so for this test we used a subsample of $n=333$ individuals with complete data on the variables of interest.

Risk Perceptions

A total of 827 students received a copy of the survey; 474 completed it, for a response rate of 57%. On average, participants perceived more benefits from outdoor cats to people ($M=3.01$, $SE=0.04$) than risks to the environment ($M=2.89$, $SE=0.03$) $F(1,433)=22.0$, $p<0.001$, $\eta^2=0.05$. There were no significant gender differences in risk perceptions. Significant differences were obtained across both risk scales between owners ($M=3.04$, $SE=0.06$) and non-owners ($M=2.87$, $SE=0.03$) $F(1,433)=7.00$, $p<0.01$, $\eta^2=0.02$. A significant interaction was observed between cat ownership and risk perceptions $F(1,433)=4.60$, $p<0.05$, $\eta^2=0.01$. Owners perceived fewer serious risks from cats to the environment ($M=2.95$, $SE=0.05$) than non-owners ($M=2.83$, $SE=0.03$) and this difference approached significance $t(445) = 1.91$, $p=0.057$, $r=0.09$. Owners perceived cats as more beneficial to people ($M=3.13$, $SE=0.07$) than non-owners ($M=2.90$, $SE=0.04$) $t(445) = 3.26$, $p<0.001$, $r=0.15$.

We compared the influence of feeding on participant perceptions of the “ecological risks” and “benefits to people.” Feeders’ and non-feeders differed in their overall perception of risks $F(1,445)=8.33$, $p<0.01$, $\eta^2=0.02$. Feeders scores on both risk scales were higher ($M=3.04$, $SE=0.06$) than non-feeders ($M=2.86$, $SE=0.03$). In addition, there was a significant interaction between feeding and risk perceptions

$F(1,445)=8.26, p<0.01, \eta^2=0.02$. Overall feeders viewed fewer risks to the ecosystem ($M=2.94, SE=0.05$) than non-feeders ($M=2.85, SE=0.03$), but this difference was not significant $t(445) = 1.76, p=0.08$. Feeders perceived a significantly greater benefit from outdoor cats to people ($M=3.14, SE=0.07$) than non-feeders ($M=2.88, SE=0.04$) $t(158.3) = 2.95, p<0.01, r=0.23$.

Situational and Cognitive Variables and Risk

Negative experiences with cats, perception of “too many cats,” and agreement with “cat impacts” increased ecological risk perceptions, whereas positive experiences with cats and strong beliefs about cats reduced ecological risk perceptions (Table 3-3). Positive attitudes toward cats and perceived frequency of seeing cats, while not significant predictors of perceived risks, had signs in the expected direction. Positive attitudes toward cats, positive experiences with cats, and positive beliefs about cats predicted positive benefits from cats to people. Negative experiences, perceptions of “too many cats,” and agreement with “cat impact” beliefs predicted negative perceptions of the benefits to people.

Mediation

Mediation results indicated that “beliefs about cats” was a significant predictor of tolerance $\beta=-1.167, Wald=34.51, p<0.001$ (Figure 3-1, path c) along with both of the potential mediators, “benefits to people” $\beta=.275, t=4.35, p<0.001$ and “ecological risks” $\beta=0.202, t=4.12, p<0.001$ (Figure 3-1, path a_2 and a_1). “Benefits to people” was a significant predictor of tolerance for outdoor cats $\beta=-1.16, Wald=20.00, p<0.001$ (path b_2). “Ecological risks” were not significantly related to tolerance $\beta=-0.289, Wald=0.86, p=0.35$ (path b_1). The total effect of “beliefs about cats” on tolerance was $\beta=-1.17, Wald=34.51, p<0.001$ (path c). The direct effect of “beliefs about cats” on tolerance

through both risk scales was $\beta=-1.14$, $Wald=25.82$, $p<0.001$ (path c'). The difference between the total and direct effects (path c and c') or the total indirect effects was significant (Table 3-4). "Benefits to people" mediated the relationship between "beliefs about cats" and tolerance, while "ecological risks" was not a significant mediator.

Next, we looked at the potential mediation of "ecological risks" and "benefits to people" on the relationship between "cat impact" beliefs and tolerance for outdoor cats (Figure 3-2). "Cat impact" beliefs significantly predicted tolerance $\beta=0.472$, $Wald=7.92$, $p<0.005$ (Figure 3-2, path c) and both the potential mediators "benefits to people" $\beta=-0.418$, $t=-7.09$, $p<0.001$ and "ecological risks" $\beta=-0.370$, $t=-8.21$, $p<0.001$ (Figure 3-2, path a₁ and a₂). "Benefits to people" was a significant predictor of tolerance for outdoor cats $\beta=-1.16$, $Wald=21.25$, $p<0.001$ (path b₂). "Ecological risks" was not a significant predictor of tolerance $\beta=-.363$, $Wald=1.30$, $p=.25$ (path b₂). The total effect of "cat impact" on tolerance was $\beta=0.472$, $Wald=7.92$, $p<0.005$ (path c). The direct effect of "cat impact" on tolerance through both risk scales was $\beta=0.019$, $Wald=0.008$, $p=0.927$ (path c'). Lastly, the total indirect effects had a point estimate of 0.620 and were significant (Table 3-5). These results confirm that "benefits to people", not "ecological risks", mediated the relationship between "wildlife rights" and tolerance.

Discussion

This study provides insight into the influence of situational, demographic, and cognitive variables on the perceived risks and benefits related to outdoor cats. Our results confirmed an inverse relationship between risks and benefits related to cats and provided insight into the role that experiences, beliefs and socio-demographic variables play in influence risks and benefits. However, this study also suggested that when separated into two scales, perceived benefits to people are more important than

ecological risk perceptions in predicting individual tolerance for outdoor cats.

Campaigns, such as those sponsored by the American Bird Conservancy, are aimed at reducing the outdoor cat population and encourage cat owners to “keep cats indoors.”

As motivation they provide numerous examples of the ecological risks cats pose to wildlife. Given the non-significant mediation of risk perceptions on the relationship between beliefs and tolerance, which is a known predictor of support for cat management (Wald and Jacobson, 2013), this research suggests that providing evidence of ecological risks from cats may not directly decrease tolerance or increase support for active cat management or efforts to keep cats indoors.

Low Levels of Cat-Related Risk

In general, perceived risk scores were moderate ($2.70 < M < 3.06$), suggesting that most participants found the risks of cats to wildlife and the environment acceptable and the perceived benefits to people modest. There are a number of possible explanations for this finding. It is possible that the risks associated with outdoor cats are perceived as a natural hazard rather than an anthropogenic one. Natural risk items, such as disease or wildfire, are generally perceived as less harmful to the environment, wildlife, and people than man-made events, such as pollution or urbanization (McFarlane & Witson, 2008). Secondly, the killing of birds by cats often takes place outdoors in wooded areas, not visible to most people. Perceived risks often increase as the severity of the experience with wildlife increase; therefore, individuals perceive greater risks when they have been threatened or attacked themselves than if they have passively observed the animal in the wild (Riley & Decker, 2000b). It is possible that the hunting behavior of outdoor cats, taking place away from human habitation, has contributed to reduced perceptions of risk. It is possible that students living on campus

had few experiences with outdoor cats, which contributed to the reduced perceptions of ecological risk.

The Attenuation of Risk

Americans own approximately 86.4 million cats (APPMA, 2012). The majority of pet owners view their animals as a significant member of the family (McNicholas et al., 2005). Across all “attitudinal alignments,” people favor pets above all other animals (Kellert & Berry, 1987). In a study of attitudes toward outdoor cats in Ohio, 48.7% of the participants cited positive feelings, while 14.3% expressed negative or angry feelings (Lord, 2008). Undergraduate students at the University of Florida reported similar rates of affection for cats (53%) (Wald & Jacobson, 2013). Affection generally increases positive attitudes toward a risk event and lowers risk perceptions (Slovic et al., 2000). These results confirmed an inverse relationship between positive attitudes toward cats, high rates of cat ownership, and positive experiences with outdoor cats and risk perceptions.

Consistent with other studies, we found a number of significant differences between cat owners and non-owners and cat feeders and non-feeders. Owners and feeders reported more negative experiences with outdoor cats than non-owners/non-feeders. Two of the negative experience items measured included observations of cats scaring birds or cats hunting. Cats often bring prey home and this behavior may have contributed to cat owner observation of wildlife predation and hunting (Turner & Bateson, 2000). Despite these experiences, owners and feeders perceived fewer negative risks to the environment and more positive benefits from cats to people than non-owners. Owners and feeders acknowledged risks to wildlife from cats. However, owners had higher scores on the “benefits to humans” scale than the perceived

“ecological risks” scale. This finding is similar to a study of cat owners in Perth, Australia, which found that owners were less concerned about risks to wildlife from cats than non-owners (Grayson et al., 2002) and less concerned about the environmental impact of free-ranging cats (Dabritz et al., 2006), cat owners expressed stronger opposition to governmental control of cats (Dabritz et al., 2006; Lord, 2008), and lower support for aggressive or lethal cat control initiatives than non-owners (Grayson et al., 2002). This finding corroborates an inverse relationship between perceived risks and perceived benefits, with the former decreasing as perceived immediate benefits from the object increase (Fischhoff et al., 1978). In the case of cats, the positive benefits perceived by cat owners/feeders may contribute to their acceptance of these animals and counteract the perceived risks associated with cats.

Experience, Beliefs and Risk Perceptions

The more negative experiences individuals had with outdoor cats, the more likely they were to express negative perceptions of ecological risk. Previous research has suggested a similar relationship between experience with nuisance animals and risk perceptions. Negative experiences (e.g., damage to property) with beavers, white-tailed deer and geese (Loker et al., 1999), black bears (Siemer et al., 2009), and prairie dogs (Zinn et al., 2000) amplified concerns over the presence of these animals. Negative experiences with outdoor cats increased negative perceptions of cats (Ash & Adams, 2003) and support for lethal management techniques (Loyd & Miller, 2010a, 2010b). However, the context of the experience as well as the frequency of the experience appears to be important in predicting perceived risk. Indeed, in this study the frequency of the positive experiences was associated with both increased perceived positive benefits to people and lower perceived risks from cats to the environment.

Individuals with high scores on the “cat impacts” scale were more likely to hold negative perceptions of the risk cats pose to ecosystems than participants with low scores. Strong and favorable “beliefs about cats” increased perceived positive benefits from cats to people and individual tolerance. These findings are consistent with previous research indicating that negative attitudes toward cougars (*Puma concolor*) reduced hunter support for increasing population levels (Riley, 1998) and strong and favorable wildlife benefits beliefs lessened stakeholder concern about bears (Siemer et al., 2009). Our findings, along with the results of previous research, indicate that willingness to absorb the cost of living with wildlife is dependent upon individual attitudes and perceptions (Riley, 1998; Riley et al., 2002; Zinn et al., 2000).

Generating Tolerance for Cats

The relationship between beliefs and tolerance was mediated by individual perceptions of the perceived benefits to people from outdoor cats. Perceived benefits from a risk item increased individual willingness to accept the costs of living with that risk (Fischhoff et al., 1978). Our results suggest that the perceived risks of cats to wildlife and the environment alone may not be enough to influence tolerance for outdoor cats or attitudes toward cat management. Instead, perceived benefits to people was more important than perceived risks to wildlife and the environment, and more important in predicting tolerance for cats than beliefs alone. This finding has implications for the future development of effective cat management policies and education campaigns. Current messages focused on reducing the number of cats outdoors almost always focus on the potential risks that cats pose to wildlife and ecosystems and the potential risks that the outdoor lifestyle imposes on cats. Our results suggest that risks are not the most important predictor of tolerance. Policy makers, managers, and educators may

be better off framing the issue of outdoor cats as it relates to perceived benefits from cats rather than focusing on risks to wildlife, cats, or people. Moreover, campaigns could focus on perceptions of the current cat population as “too large.” Model results indicated that this variable was a significant predictor of both risk perceptions and perceived benefits and might therefore play a more important role in influencing tolerance and attitudes about management than risk perceptions alone. In addition, students did not appear to be overly concerned about issues with outdoor cats. Education campaigns aimed at this population would likely need to raise awareness about this issue before targeting behavior.

Table 3-1. Factor analysis results of the “beliefs about cats” and “cat impacts” belief scales

	Factor Loadings				
	\bar{X}	SD	Factor 1	Factor 2	Cronbach's α
Beliefs about Cats					0.71
Cats deserve to be free outdoors like other animals	3.29	0.96	0.67	--	
Outdoor cats live happy healthy lives, comparable to indoor cats	3.05	1.0	0.60	--	
Most outdoor cats can find their way home on their own	3.51	1.0	0.57	--	
Wildlife and cats should have equal access to outdoors	3.39	1.0	0.50	--	
Outdoor cats do not pose a significant threat to wildlife	3.20	0.91	0.44	--	
Most outdoor cats are able to survive without human help	3.40	0.98	0.43	--	
Cat Impacts					0.61
Outdoor cats kill wildlife	3.44	0.92	--	0.68	
Outdoor cats compete with wildlife species for food	3.49	0.94	--	0.67	
Outdoor cats transfer diseases to wildlife	3.35	0.88	--	0.51	
I am willing to reduce outdoor cats to benefit wildlife	3.13	0.98	--	0.30	

^a Scores were estimated from a 5-point progressive scale, with 1 indicating strong disagreement, 5 strong agreement and 3 neither.

^b KMO =0.71

Table 3-2. Perceptions of risks to the environment and perceived benefits to people

	Scale Endpoints	M	SD
Risks to the environment			
To what extent do you believe outdoor cats have an impact on the environment	1=very negative impact 5=very positive impact	2.81	0.67
To what extent are the effects of outdoor cats on natural ecosystems acceptable to you	1=very unacceptable 5= very acceptable	3.06	0.80
What level of emotion do you feel when you think about outdoor cats and their effect on natural ecosystems	1=very negative emotion 5=very positive emotion	2.90	0.72
To what extent do you believe outdoor cats have an impact on native wildlife	1=very negative impact 5=very positive impact	2.70	0.72
To what extent are the effects of outdoor cats on native wildlife acceptable to you	1=very unacceptable 5= very acceptable	2.84	0.85
What level of emotion you feel when you think about outdoor cats and their effect on native wildlife	1=very negative emotion 5=very positive emotion	2.83	0.71
What threat do outdoor cats pose to wildlife	1=very serious 5=no threat	2.94	0.72
Benefits to people			
Please rate the extent to which you believe outdoor cats have an impact on you	1=very negative impact 5=very positive impact	2.97	0.84
Please rate the extent to which the presence of outdoor cats in your community is acceptable	1=very unacceptable 5= very acceptable	2.98	0.93
Please rate the level of emotion you feel when you think about outdoor cats and their effect on your community	1=very negative emotion 5=very positive emotion	2.89	0.77

Table 3-3. OLS regression estimates of variables associated with perceptions of risks from outdoor cats to the ecosystem and perceptions of benefits to people

	Risk to the Ecosystem ^b			Benefits to Humans		
	b	SEB	B	b	SEB	B
^a CurrentPOP	.272	.055	.229**	-.407	.067	-.266**
Affection	-.014	.023	-.030	.077	.028	.130*
Frequency	.032	.031	.046	.004	.038	.004
Positive Exp	-.352	.096	-.194**	.641	.118	.275**
Negative Exp	.489	.137	.172**	-.840	.168	-.230**
Beliefs about Cats	-.153	.041	-.170**	.160	.050	.138*
Cat Impacts	.301	.055	.229**	-.320	.048	-.266**

R²= .30 "Risk to Ecosystems" and R²= .36 "Benefits to Humans"

*p<.01, **p<.001

^a CurrentPOP represents a measure of participant perceptions of the current cat population

^b In this table signs for risk were reversed for ease of interpretation, so the .272 on Current Population means that perceived increases to the population are associated with higher perceptions of risk.

Table 3-4. Mediation of the effect of beliefs about cats on tolerance for cat populations through perceptions of risks to ecosystems and benefits to people

	Bootstrapping							
	Point Estimate	SE	Percentile 95% CI		BC 95% CI		Bca 95% CI	
			Lower	Upper	Lower	Upper	Lower	Upper
Benefits to People	-0.3176	0.1391	-0.6374	-0.1030	-0.6284	-0.1000	-0.6196	-0.0937
Risks to Ecosystems	-0.0586	0.0757	-0.2225	0.0865	-0.2405	0.0664	-0.2321	0.0685
TOTAL	-0.3762	0.1411	-0.6868	-0.1372	-0.6676	-0.1165	-0.6603	-0.1071

Note - BC, bias corrected, Bca, bias corrected and accelerated; 1000 bootstrap samples.

Table 3-5. Mediation of the effect of attitudes toward cat impact beliefs on tolerance for cat populations through perceptions of risks to ecosystems and benefits to people

	Bootstrapping							
	Point Estimate	SE	Percentile 95% CI		BC 95% CI		Bca 95% CI	
			Lower	Upper	Lower	Upper	Lower	Upper
Benefits to People	0.4857	0.1362	0.3783	0.9434	0.2776	0.7885	0.2768	0.7837
Risks to Ecosystems	0.1344	0.1382	-0.1284	0.4278	-0.1265	0.4417	-0.1264	0.4417
TOTAL	0.6200	0.1401	0.3783	0.9434	0.3753	0.9417	0.3744	0.9381

Note - BC, bias corrected, Bca, bias corrected and accelerated; 1000 bootstrap samples.

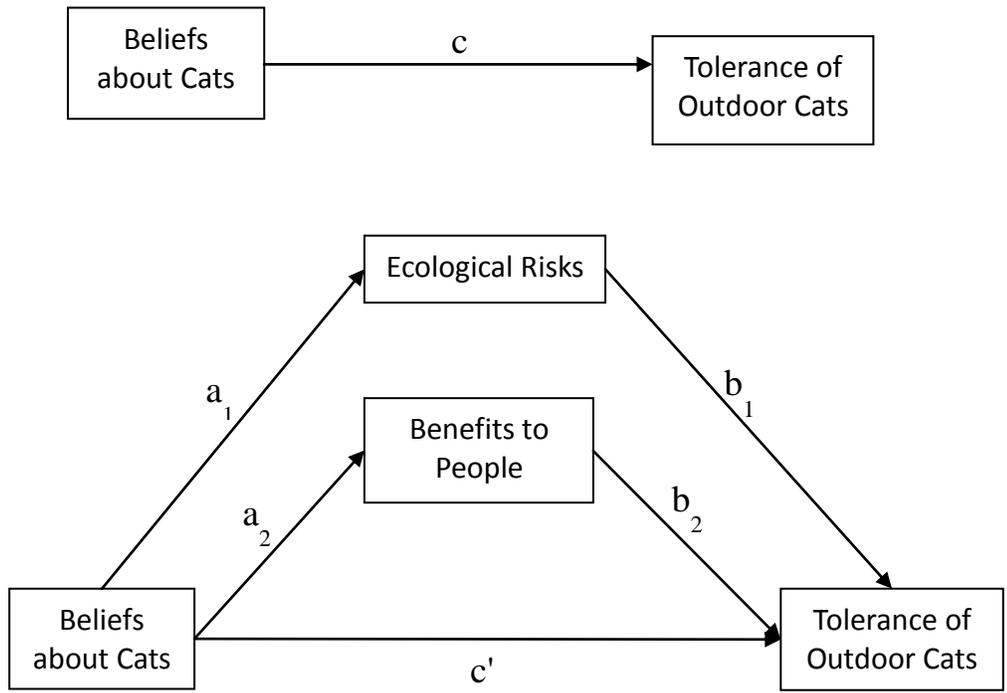


Figure 3-1. Illustration of the potential mediation of risks and benefits between “Beliefs about Cats” and tolerance. Beliefs are hypothesized to exert an indirect effect (c') on tolerance through perceived risks and benefits.

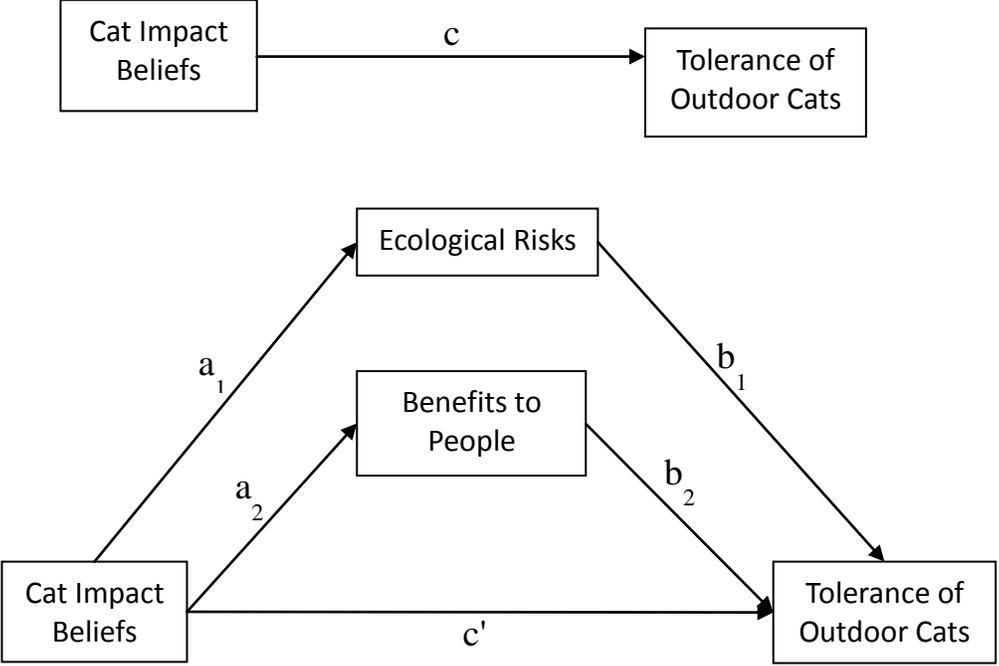


Figure 3-2. Illustration of the potential mediation of risks and benefits between “cat impacts” beliefs and tolerance. Beliefs are hypothesized to exert an indirect effect on tolerance through perceived risks and benefits.

CHAPTER 4
IDENTIFYING DIFFERENCES BETWEEN STAKEHOLDER AND PUBLIC RISK
PERCEPTIONS, BELIEFS, AND ATTITUDES ABOUT OUTDOOR CAT
MANAGEMENT

Who Cares about Outdoor Cats?

Conflict between stakeholder groups or between the public and wildlife management agencies over management interventions can result in legal action against wildlife agencies, citizen ballot initiatives dictating policy, delayed management action, and increased tension and distrust between managers and stakeholders (Chase, Schusler, & Decker, 2000; Manfredo, 2008; Perry & Perry, 2008). Stakeholders are people who affect or are affected by a wildlife species or management issue (Decker, Brown, & Siemer, 2001). Public and stakeholder support for management influences the success or failure of intervention programs. In Key Largo, FL cat management has evoked vociferous arguments between residents of the Ocean Reef Club who support the existence of managed cat colonies and the Florida Fish and Wildlife Conservation Commission, which is concerned about cat predation on the endangered Key Largo wood rat (*Neotoma floridana smalli*) and cotton mouse (*Peromyscus gossypinus allapaticola*) (Pittman, 2003). The U.S. Fish and Wildlife Service's plan to cull cats in the Florida Keys using live trapping and euthanasia was met by strong opposition from animal advocates (Clark, 2011). The debate over outdoor cats has pitted neighbors against each other, some who have filed lawsuits to remove cats and others who support petitions to protect cats (Graham, 2012).

Stakeholders involved in this issue include cat owners, cat colony feeders, animal rights organizations, veterinarians, wildlife organizations, birding associations, animal shelters, and others. The majority of "bird conservation professionals" surveyed

agreed strongly that “feral cats contribute to the decline of native birds” (Peterson et al., 2012). For these individuals, cats represent a significant source of ecological risk, (threat to the health and productivity of species and ecosystems) (McDaniels et al., 1997). For many environmental advocates, feral cats are not a natural predator and this status as an exotic and/or invasive species justifies the confinement of cats indoors and the removal from natural systems (Peterson et al., 2012; Williams, 2009). The Audubon Society has published a number of brochures, informational handouts and videos informing members about the risk cats pose to wildlife, people and the environment and actively encourages members to keep cats indoors (American Bird Conservancy, 2004; Drennan, 2012; Williams, 2009). In contrast, many animal welfare advocates perceive significant benefits from outdoor cats and consider feral cats to be “healthy wildlife” (Centonze & Levy, 2002; Levy & Crawford, 2004). Alley Cat Allies supports the rights of cats to roam outdoors, perceives cats “as a natural part of the landscape,” and advocates for the protection of existing outdoor cat colonies (Alley Cat, 2009). Some cat advocates argue that cat critics exaggerate the risks of cats; suggesting that cat predation primarily influences introduced animals rather than native species (Barratt, 1997) and may be filling a niche historically filled by predators, now depressed by human activities (Bradshaw, 1992). As a result of these differences, TNR advocates and bird or wildlife advocacy groups are often portrayed in the media as strongly polarized both in their perceptions of outdoor cats and preferences for cat management (Clark, 2011; Gorman, 2003).

In addition to differing perspectives about cat-related risks and “exotic” classification, stakeholder groups often differ in their support of cat management

initiatives and perceptions of the effectiveness of these methods (Peterson et al., 2012). One method of managing cats, called Trap-Neuter-Return (TNR), typically involves trapping the animal, anesthetizing it, spay or neutering it, marking it with a tipped or notched ear and then returning the cat to its original location (Slater, 2004). TNR advocates support the use of TNR to control the cat population (Peterson et al., 2012). Alley Cat Allies, the largest cat advocacy organization in the US, supports the use of TNR as a management strategy (approximately 115,000 supporters' in 2009) (Alley Cat Allies, 2009). Alley Cat Allies estimates that there are approximately two hundred non-profit organizations dedicated to TNR across the US (Williams, 2009). In Florida, we identified 35 cat advocacy groups involved in TNR for unowned outdoor cats (not including individual veterinary clinics that do *pro-bono* spay-neuter), many of which provide low cost spay-neuter programs and support and facilitate the management of existing outdoor cat colonies. In contrast, the National Audubon Society actively opposes the practice of TNR and cat colonies (Drennan, 2012). The Audubon society has 44 chapters in Florida and approximately 40,000 members (Audubon Florida, 2012). This research utilized a perception of risk framework to explore areas of conflict and agreement between stakeholder groups and the general public. To gain a better understanding of the underlying factors dividing stakeholder groups, we utilized the Potential for Conflict Index and a multivariate analysis to test whether factors (a) ecological risk perceptions, (b) impact beliefs, (c) beliefs about cats, (d) attitudes toward cats, (e) attitudes toward management and (f) preference for management differed significantly between Audubon members, TNR members and the general public.

Finally, we identified the combined set of predictors that best differentiated between group membership.

Risk Perception Framework

Human interactions with animals subject us to risks as well as benefits. Potential risks include injury, zoonotic disease, economic loss, property damage and death. Potential benefits include improved health, enhanced quality of life, companionship, pest control etc. Risk is defined as a construct made up of both the probability that an event will occur and a value-based judgment about the impact of the exposure (e.g., injury, damage, or loss) (Breakwell, 2007). Risk includes both individual perceptions of the risk (cognition) and emotional responses to the risk event (affect) (Slovic, 2000a; Zajonc, 1980). This research explores risk perceptions within the psychometric framework that assumes risk perceptions can be measured using survey techniques, and that risk is subjective, quantifiable, and predictable (Slovic, 2000a). The psychometric paradigm has previously been used to estimate native wildlife-related risk perceptions (Gore, Siemer, Shanahan, Schuefele, & Decker, 2005; Riley & Decker, 2000a; Thornton & Quinn, 2010). Risk perceptions (whether from technological or natural hazards) play a critical role in individual risk assessment and are therefore as important as determining the true risk of exposure to injury or disease (Gore et al., 2005). Perceived risk can influence stakeholder tolerance for animals (Riley & Decker, 2000a), attitudes toward management (Agee & Miller, 2009) and support for species conservation or eradication (Kellert, 1985).

Perceptions of Ecological Risk

Ecological risk perception is a measure of the perceived threat to the health and productivity of individual species, communities, environmental processes and the

ecosystem (McDaniels et al., 1997). Ecological risks have previously been studied with regard to human activities and their negative impact on ecosystem services (e.g., clearcutting in forests, auto emissions and air pollution, etc.) (Cavanagh et al., 2000; McDaniels et al., 1997; Williamson et al., 2005). A few studies have addressed the risks associated with natural hazards (floods, earthquakes, volcanoes) (Axelrod et al., 1999; McDaniels et al., 1995; McFarlane & Witson, 2008). McFarlane and Witson (2008) expanded this concept to include risks associated with a natural disturbance event in protected areas. To the best of our knowledge few previous studies have examined ecological risks related to exotic or invasive species. This study will address this gap by examining risk perceptions related to outdoor cats among stakeholders and the general public in Florida.

McDaniels et al. (1995) identified four factors that explained a significant amount of the variability in lay perceptions of ecological risk ($R^2=.96$), including impact on species (humans and nonhumans), human benefits, perceived control, and knowledge of the impacts (McDaniels et al., 1997). Impact on species was the most important factor predicting ecological risk perceptions (McDaniels et al., 1997). As perceptions of ecological impact increase, perceptions of risk increase and human benefits decrease (McDaniels et al., 1997).

Risk perceptions can influence stakeholder acceptance for management and public policy. Perceived risk from black bears predicted stakeholder support for lethal control (Agee & Miller, 2009). Concern over wildlife increased respondent support for lethal management methods, independent of the species (beaver, white-tailed deer, and Canada geese) (Loker et al., 1999). Support for wildfire interventions increased (e.g.,

putting out fires) as perceptions of risks to personal property increased (Kneeshaw, Vaske, Bright, & Absher, 2004). Perceived risk to aquatic environments predicted stronger support for restrictions on development and industry (McDaniels et al., 1997). Perceived risks to forest biodiversity influenced favorable attitudes toward protected area creation and stricter industry regulation (McFarlane, 2005). Ecological risk perceptions of the Mountain Pine Beetle (*Dendroctonus ponderosae*) influenced support for controlling outbreaks within the national park (McFarlane & Witson, 2008). Higher perceptions of ecological risk to aquatic environments predicted stronger support for restrictions on development and industry (McDaniels et al., 1997).

Environmental cognition (attitudes and beliefs) form the basis of environmental risk perceptions and attitudes toward management (O'Connor, Bard, & Fisher, 1999). Significant correlations have been reported between individual attitudes toward the risk item and perceived benefits of the risk (Finucane et al., 2000; Slovic et al., 2000). Moreover, negative associations with risk items were strongly and negatively associated with political support for the development of a nuclear power plant (Slovic et al., 2000). Beliefs about cats and attitudes toward cats were significant predictors of environmental risk perceptions (Wald, unpub. data).

The first objective of this research was to detect differences between stakeholder groups utilizing the potential for conflict index (PCI) and multivariate statistical techniques. The second objective was to use the risk perception framework to identify the most parsimonious set of predictors of stakeholder group membership. Based on previous research and the involvement of TNR group members in TNR or non-lethal management and Audubon member concern over ecological risks from outdoor cats

(Centonze & Levy, 2002; Peterson et al., 2012), the following hypotheses were proposed. We predict that stakeholder group members will differ significantly:

H1 Ecological perceptions and impact beliefs. TNR group members will perceive fewer ecological risks, fewer negative impacts on people and wildlife and greater perceived benefits and positive impacts to people than either the general public or Audubon group members.

H2 Attitudes toward cats. TNR group members will hold more favorable attitudes about outdoor cats than both of the other groups. Audubon members will be more likely to describe outdoor cats as “exotic” species than TNR group members or the public.

H3 Attitudes toward management and management preference. TNR group members will express more support for TNR than Audubon members and the public. Audubon group members will be more supportive of impounding cats than members of TNR groups and the public. There will be similarities between groups in support for reducing cats and requiring owners to be responsible for pets. Non-lethal management methods, such as TNR and adoption will have greater overall support than lethal methods.

H4 Group membership will be determined by ecological risk perceptions, impact beliefs, beliefs about and attitudes toward outdoor cats, attitudes toward and preference for management.

Methods

Stakeholders and Study Site

In collaboration with TNR organization employees and volunteers, 10 TNR organizations across four counties were recruited to participate in the survey. These groups were identified as the most active in Florida with large membership lists and ongoing TNR efforts throughout each county. From this list of 10 organizations, we identified which counties included both active TNR groups and existing Audubon chapters. We contacted stakeholder groups in seven counties. Four counties representing either north or south Florida were selected; Alachua, Duval, Broward and Miami-Dade, and organizations (both TNR and Audubon groups) in these counties agreed to participate in this research. According to 2010 census results, Alachua County has a population of 244,247, Duval County has a population of 854,848,

Broward County has a population of 1.7 million and Miami-Dade County has a population of 2.4 million.

Sample Design and Survey Administration

From April 2012 to September 2012 randomly selected members of the three groups (TNR groups (n=800), Audubon stakeholders (n=796) and the general public across all four counties (n=2600) received a copy of the survey in the mail. Members were selected from existing lists of people who have expressed interested in group newsletters and events or donate money or time to the identified organizations. The survey protocol followed Dillman's four-wave tailored design method (Dillman, 1999; Dillman, Smyth, & Christian, 2009). The materials were distributed in two-week intervals. Survey questions were pre-tested through focus groups with stakeholders, small meetings with experts in the fields of wildlife ecology and animal welfare and an in-person survey with undergraduate students at the University of Florida (Wald & Jacobson, 2013). The 28 question survey measured perceptions of the risks and benefits related to cats (10 items), impact beliefs (12 items), general beliefs and attitudes about outdoor cats (11 items), attitudes about management (14 items), and preference for cat management (1 item). The survey concluded with three demographic questions about gender, cat ownership and cat feeding. The survey used the term "outdoor cats" to describe owned and unowned, social and unapproachable animals. We specifically asked respondents to answer questions about outdoor cats not owned by them.

For public respondents, non-response bias checks were performed. Non-respondents with valid phone numbers (216) were telephoned in September 2012. Of those contacted 12% responded to the eleven survey questions. There were more

female respondents (68%) than non-respondents (44%) ($\chi^2=6.68$, $p<.01$).

Respondents were more likely to own cats (38%) than non-respondents (19%) ($\chi^2=4.23$, $p<.05$) and less likely to feed cats (21%) than non-respondents (41%) ($\chi^2=5.73$, $p<.05$). There were no significant differences between non-respondents and respondents in the importance of the issues related to outdoor cats, in feelings about outdoor cats, or in management preference. Despite differences in ownership and feeding rates there were no significant differences in the variables of interest and therefore the results presented here are based on unweighted data.

Survey Items

Ecological risks and perceived benefits

We measured perceived risk as a set of 9 items related to the impact, acceptability, and emotionality of the risks to the environment, native wildlife and people, similar to McDaniels et al. (1997) and McFarlane & Witson (2008).

Respondents were asked to indicate on a 7-point scale the level of risk cats pose (serious to not serious) to ecosystems and native wildlife, the level of emotion they felt about the effect (positive to negative), and the acceptability of the risk (acceptable to unacceptable). Three items measure perceived benefits to people including one item directly measuring personal benefits to people and two others measuring the acceptability (i.e., unacceptable to acceptable) and level of emotion respondents felt about these benefits (i.e., negative to positive)

Impact beliefs

Beliefs about the impacts of cats were measured using a series of 12 statements: 4 statements representing potential negative impacts to wildlife (e.g., “cats kill wildlife”), four statements representing potential negative impacts to people (e.g., “cats spread

diseases to people”), and four statements about the potential positive impacts to people (e.g., “Outdoor cats improve my quality of life;” Table 4-2). Respondents rated statements on a 7-point scale with -3=strongly disagree to 3=strongly agree.

Beliefs about cats

Nine Likert scale items addressing general beliefs about outdoor cats were measured (-3=strongly disagree to 3=strongly agree; Table 4-1). Attitudes toward outdoor cats were measured using a 7-point scale (-3=hate to 3=love). Participants were asked to classify outdoor cats as (1) native or (0) exotic. Exotic was used instead of the term invasive because the former was identified in focus groups as less polarizing and easier to understand.

Management

Attitudes toward management were assessed using 14 items. Three items specifically related to attitudes toward Trap-Neuter-Return (TNR). Respondents rated statements on a 7-point scale (Table 4-3). Preference for management was measured by asking the respondents to indicate which of the listed management methods they preferred for managing outdoor cats. Choices included TNR; placement in a long-term, no kill sanctuary; trap and euthanize; and no management. Choices were collapsed into three categories (1=non-lethal methods, 2=lethal and 3=do nothing).

Socio-demographic information included group membership, gender, cat ownership, and cat feeding. All survey items included a “do not know” option.

Data Analysis

We conducted a series of chi-square tests to evaluate group differences in gender, cat ownership, cat feeding, beliefs about cats as “exotic” and management preference. In addition, we measured differences in attitudes about outdoor cats using a

1-way ANOVA. Effect sizes for significant chi-square results are reported (Cramer's V). Partial eta squared (η^2) represents effect size ($\eta^2=.01$ is a small effect, $\eta^2=.09$ is a medium effect, and $\eta^2=.25$ is a large effect) (Cohen, 1988).

Univariate differences between stakeholder members and the public in ecological risk perceptions, impact beliefs, general beliefs and attitudes, attitudes toward and preference for management were assessed using the potential for conflict index (PCI). PCI scores range from 0 (minimal conflict) to 1 (maximum conflict) and measure the distribution of response frequency. Therefore, minimum PCI occurs when 100% of the respondents either strongly agree or strongly disagree with an item and maximum PCI represent extremes of agreement among stakeholders (e.g., 50% strongly agree and 50% strongly disagree) (Vaske, 2008). Potential Conflict Index results are presented in Figure 4-1. Scale means are represented by the center point of the bubbles. PCI values are reflected in the size of the bubble. Larger bubbles or PCI values represented greater potential for conflict among groups which generated large PCI values (e.g., ≥ 0.6), while low to moderate PCI values (e.g., ≤ 0.25) indicated greater agreement among groups.

Multivariate differences between stakeholders were assessed using a multivariate analysis of variance MANOVA. MANOVA results include a composite measure of group differences across all of the scale items as well as a follow up univariate ANOVA measuring group differences for each item. We evaluated significant differences between groups using a series of Tukey's HSD post-hoc pair-wise comparison tests. Discriminant Function Analysis was used to identify the best model (or linear combination of variables) for discerning between the three groups. Nine variables, including positive impact beliefs, negative impact beliefs, perceived risks,

perceived benefits, attitudes toward TNR, attitudes toward outdoor cats, cat ownership, general beliefs about cats and beliefs about cats as “exotic” animals were tested.

Results

Respondent Characteristics and Preliminary Results

A total of 4,396 questionnaires were mailed out. After removing invalid addresses we estimated a response rate of 51% for the Audubon group (n=384), 47% for the TNR group (n=361) and 23% among the general public (n=618). Participants included more women (n=966) than men (n=353). Respondents were generally split among cat owners (n=685) and non-owners (n =635). Approximately a quarter of the participants fed outdoor cats not owned by them (28%) and half of the respondents owned cats (52%). TNR group members were more likely to own cats (81%) compared to Audubon members (45%) and the general public (38%) ($\chi^2=165.53$, $p<.001$, Cramers' $V=.35$). TNR group members also fed more cats (52%) than Audubon members (16%) and the public (21%) ($\chi^2=139.12$, $p<.001$, Cramers' $V=.33$). The majority of the respondents in all three groups were women, but there were more women in the TNR group (83%) than in the Audubon group (71%) and the public (68%) and this difference was significant ($\chi^2=26.61$, $p<.001$, Cramers' $V=.14$).

Group Differences Identified by PCI

For all three stakeholder groups, the PCI for perceptions that cats kill pest species was low. It was moderate for the remaining impact belief items. Within the negative impact beliefs items, the highest PCI values were among the public and the Audubon groups over the nuisance of cats defecating in the yard, the transfer of diseases to people and cat-related risks to wildlife. Conflict over the perceived ecological risks and benefits to people was moderate to high. The 7 attitude toward

management items had moderate to high PCI levels. However, there was stronger agreement among the TNR group that they support TNR, that TNR was effective and that they would provide funding for TNR. There was more support for TNR than for impounding cats. Members of all three groups were supportive of taxes for animal shelters. There was strong disagreement across the three groups with the “no management” option. Both TNR and Audubon members believed that people should take more responsibility for cats ($PCI < .25$).

Attitudes toward Outdoor Cats

There were significant differences between groups in feelings toward outdoor cats ($F(2, 1287) = 78.71, p < .001$). TNR group members expressed significantly more positive feelings (mean(SD) = 5.46(1.81)) than Audubon members (mean(SD) = 3.74(2.16) or the general public (mean(SD) = 3.90(2.15) $p < .001$). Audubon members were more likely to describe outdoor cats as “exotic,” than either TNR members or the public ($\chi^2 = 51.54, p < .001$, Cramers' $V = .20$).

Management Preference

The majority of respondents (83%) preferred non-lethal management methods; fewer preferred lethal management (13%) or doing nothing (4%). There were significant differences between stakeholder groups in management preference ($\chi^2 = 55.23, p < .001$, Cramers' $V = .15$). Among TNR group members (77%) of them preferred TNR, among the public (54%) of them preferred TNR and among the Audubon respondents (49%) supported TNR. Within the groups, more Audubon group members were supportive of placement in a long-term no kill shelter (30%) than the public (25%) or TNR group members (18%). Audubon respondents were more supportive (18%) of trapping and euthanizing cats than either the TNR (4%) or public (15%) respondents. While there was

little support for “no management” among all three groups (less than 4% total), most individuals supporting “no management” were members of the general public (75%).

Ecological Risks and Perceived Benefits

There were significant multivariate effects between the groups across the ecological risk items ($F=11.24$, $p<.000$, $\eta^2=.076$). Across all of the ecological risk items the three groups differed significantly (Table 4-2). TNR members perceived significantly lower risks compared to the other two groups. Audubon members perceived higher risks than the other two groups. There were significant multivariate group effects across the benefits to people items ($F=21.91$, $p<.000$, $\eta^2=.056$). TNR group members perceived higher benefits than the other groups. Scores on the benefit items were not significantly different between the public and the Audubon members.

Impact Beliefs

There was a significant and moderate group effect across all the negative impacts to wildlife items ($F=7.85$, $p<.000$, $\eta^2=.06$) (Table 4-2). The public agreed with Audubon members that cats compete with wildlife for food and spread diseases to wildlife, but expressed less agreement that cats kill wildlife and pose a significant risk to wildlife. There was a significant group effect across the negative impacts to people items ($F=13.41$, $p<.000$, $\eta^2=.06$). TNR group members differed significantly across all four items compared to Audubon group members and the public. There were significant differences between the groups across the positive impacts to people items ($F=9.98$, $p<.000$, $\eta^2=.04$). TNR group members and the public agreed more strongly than Audubon group members that cats kill mice and pests and reduce the spread of diseases. TNR group members were more likely to agree that cats provide them with companionship and improve their quality of life when compared with the other two

groups. TNR group member scores were higher (stronger agreement) across the positive impact to people items and less supportive (stronger disagreement) of the negative impact items, both to people and to wildlife. Audubon member scores were reversed, respondents were less likely to agree with the positive impact items and more likely to agree with the negative impact items.

Beliefs about Outdoor Cats

There were significant group differences across the belief items ($F=7.23$, $p<.000$, $\eta^2=.08$) (Table 4-1). There were no significant differences between the groups in agreement with the statement “cats are able to find their way home on their own.” The public and TNR group members agreed that cats should have equal access to the outdoors, be free-roaming, and lead happy healthy lives. There were significant differences between all three groups in agreement that people should be responsible for cats; TNR group members expressed the greatest agreement, followed by Audubon group members and finally the general public. There were significant differences between all three groups about whether cats should have the right to hunt; TNR group members more strongly agreed, followed by the public and then Audubon group members. Audubon members were more supportive of cat confinement indoors and more likely to believe that cats are a problem in Florida than TNR group members. The public beliefs about cats as a problem in Florida overlapped with both stakeholder groups. The public more strongly agreed that cats are able to survive without human help than members of either stakeholder group.

Cat Management

There were significant differences between the groups across the composite TNR management items ($F=365.59$, $p<.000$, $\eta^2=.48$). There were significant differences

between TNR group respondents and Audubon respondents across all of the TNR items. TNR group members were the most supportive of TNR efforts, perceived them as more effective and were more willing to support tax dollars for low-cost spay/neuter programs. Groups varied across the management items ($F=6.33$, $p<.000$, $\eta^2=.13$). Five of the management items were not significantly different between the groups (Table 4-3). TNR supporters more strongly opposed removal to an animal shelter than members of the other groups. The public was significantly less supportive of using tax dollars to support animal control. The public was less supportive of mandatory spay-neuter laws, but not significantly so, compared to Audubon members. TNR group members and the public were more strongly opposed to local government management of cats than the Audubon group members. Public response to whether cats should be allowed to roam outdoors was not significantly different from either stakeholder group.

Discriminating Between Stakeholder Groups

To ensure that the constructs used were reliable we estimate scale measures for Cronbach's α . Based on these results, three items were removed from the "Beliefs about outdoor cats" scale, "More people should take responsibility," "Outdoor cats are able to find their way home on their own," and "Most outdoor cats are able to survive without human help." The final scale included six items and was reliable (Table 4-1). After checking reliability for the "Attitudes toward other management" scale, one item "Local governments do a good job of managing outdoor cats" was removed because it did not fit in well with the final 10 item scale (Table 4-3). To create the scales, all item scores were added and divided by the number of items to create a composite score ranging from -3 to 3. These scales were then entered into a discriminant function analysis to identify the best set of predictors of group membership. The final predictors

included ecological risk perceptions, perceived benefits to people, positive impacts to people, negative impacts beliefs, positive impact beliefs, general beliefs about outdoor cats and attitudes toward management. In addition, we included single items measuring attitudes toward cats, classification of cats as “exotic,” preference for lethal management and cat ownership.

The MANOVAs were followed by discriminant analysis, which identified two significantly different discriminant functions that distinguished between two stakeholder groups. The first function representing “Cat Rights” explained 74% of the variance, canonical $R^2=.18$; the second function representing “Wildlife Risk Perceptions” explained 26% of the variance, canonical $R^2=.06$. The combination of the two functions differed from the treatment groups, $\lambda = .76$, $\chi^2(16)=279.68$, $p<.001$. After removing the first function the second remained significantly different $\lambda = .93$, $\chi^2(7)=77.23$, $p<.001$. Cat ownership had the greatest effect on the “Cat Rights” function, followed by attitudes toward outdoor cats, attitudes toward TNR and perceived cat-related benefits. Negative and positive beliefs about outdoor cats loaded fairly evenly on both functions, but in opposite directions with high positive beliefs and low negative beliefs predicting the “Cat Rights” function and high negative beliefs and low positive beliefs predicting the “Wildlife Risk Perceptions” function (Table 4-4). Perceptions of risk had the greatest influence on the 2nd function, the classification of cats as “exotic” and beliefs about cats outdoors. The function plot showed that the “Cat Rights” function discriminated between the TNR members and non-TNR members (Figure 4-2). The “Wildlife Risk Perceptions” function discriminated between Audubon group members and the other two groups. The factor solution correctly classified 55% of the original cases. The functions were found to

distinguish between groups based on cat ownership, ecological risk perceptions, attitudes about outdoor cats, general beliefs about outdoor cats, classification of cats as “exotic,” and attitudes toward TNR (Table 4-5).

Discussion

Our findings expand the ecological risk perception framework by identifying risk perceptions and impact beliefs as significant predictors of Audubon group membership. In addition to support for TNR, TNR group membership was influenced by positive attitudes toward cats and perceived benefits from cats. Our findings suggest that TNR members and Audubon members care about significantly different issues when it comes to outdoor cats. These results confirmed previous findings of significant differences between stakeholders in attitudes about outdoor cats and perceptions of the impacts cats have on people, wildlife and the environment (Loyd & Hernandez, 2012; Peterson et al., 2012). Our results also contribute important insight into areas of agreement between stakeholder groups (e.g., support for mandatory identification, rabies vaccination; greater support for non-lethal methods than lethal methods) that may reduce conflict between stakeholder groups over cat management techniques.

Cat-Related Risks and Benefits

Concern over cat-related risks by Audubon members appears to be attenuating any recognition of cat benefits, while perceived benefits from cats to people is tempering concern over cat predation among TNR group members. TNR group members had much lower agreement with statements that “cats kill wildlife,” though they strongly agreed that cats kill “pest species.” This supports previous research indicating that most “Cat Colony Caretakers” perceived cats as natural predators and disagreed that cats contribute to the decline of native birds (Peterson et al., 2012).

Uncertainty over ecological risks is contributing to these differences and rigorous and unbiased scientific evidence about the impacts of cats on urban and suburban wildlife, the population and community level impacts of cat predation and whether these effects are compensatory and additive will serve to reduce uncertainty and allow for stakeholder collaboration based on scientific evidence and shared management objectives.

TNR group members expressed high levels of affection for outdoor cats. In other studies, cat colony caretakers indicated that love was the primary motivation for feeding cats (Centonze & Levy, 2002). An animal or risk item that is perceived as “likable” is generally viewed as beneficial (Finucane et al., 2000; Slovic, 2000a). Positive attitudes toward outdoor cats were directly and significantly correlated with perceived benefits related to outdoor cats (Wald, unpubl. data). In this study, TNR group members perceive significantly greater benefits from cats than members of the other two groups. Perceived risks and benefits have an inverse relationship; as one increases the other declines (Fischhoff et al., 1978; McDaniels et al., 1997). Therefore, it is possible that affection for cats and perceived benefits from cats are contributing to reduced risk perceptions among TNR group members.

Cat predation on wildlife has been widely documented (Baker et al., 2008; Barrows, 2004; Beckerman et al., 2007; Clancy et al., 2003; Coleman & Temple, 1993; Coleman et al., 1997; Jessup, 2004; Levy & Crawford, 2004). On islands, cat predation has contributed to drastic population declines and the extirpation of endemic and endangered prey. However, ambiguity remains about the impacts of cat predation on urban and continental wildlife (Calver et al., 2011). Cat density estimates combined with

evidence of wildlife predation have contributed to conjecture about the ecological risks cats pose and large estimates of wildlife mortality (Dauphine & Cooper, 2008; Pimentel et al., 2001). Animal advocates have disputed these estimates as inflammatory and imprecise, highlighting uncertainty about the ecological risks cats pose (Berkeley, 2004). This uncertainty may have contributed to the moderate to large PCI scores across all the perceived benefits and perceived risk items. In this study, PCI scores were larger for perceived risks and benefits than for the negative impact belief items, specifically competition with wildlife, spreading diseases to wildlife and wildlife predation. This suggests that among stakeholder groups there is more agreement that there are impacts than with the level of risk these impacts pose to wildlife and the ecosystem.

Affection for Outdoor Cats

Attitudes toward animals can predict support for management techniques, protection efforts (Fulton, Skerl, Shank, & Lime, 2004; Tarrant, Bright, & Ken Cordell, 1997; Vaske & Donnelly, 1999; Vaske & Needham, 2007) and influence behavioral intentions (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). Other research has found widespread favorable feelings for outdoor cats among college students (Tennent, Downs, Wald, & Watson, 2010; Wald & Jacobson, 2013) and the general public in Ohio (Lord, 2008). Affect has been identified as an important antecedent guiding judgment (Zajonc, 1980), decision making (Finucane et al., 2000; Zajonc, 1980), perceptions of animals (Kellert, 1983), and perceptions of risk and benefit (Alhakami & Slovic, 1994). Favorable attitudes toward outdoor cats are likely influencing TNR group member perceptions of risk and support for non-lethal management.

Does Origin Matter?

Audubon members were more likely to categorize outdoor cats as “exotic” than the public or TNR group members. The domestication of cats took place in the Near East (O’Brien et al., 2008). Cats were eventually transported by people from the near and middle east into Europe and from there to the United States (Turner & Bateson, 2000). The non-native origin of cats in combination with documented predation on native wildlife have contributed to the classification of domestic cats as “exotic” or “invasive” by wildlife advocates (Hawkins, 1998). This result corroborates findings that conservation supporters were more likely to support the management of cats as invasive species than animal welfare supporters $p < .05$ (Loyd & Hernandez, 2012). These results indicate two important differences between groups related to “exotic” status. First, TNR group members and the public are less likely to perceive cats as “exotic.” Some cat advocacy groups suggest that cats are “healthy wildlife” and “a natural part of the landscape” (Centonze & Levy, 2002; Levy & Crawford, 2004; No Kill Advocacy, 2006). Secondly, it appears that the classification of cats as exotic is less important to members of the public or TNR group as a justification for lethal management. Previous research suggests that exotic status was not identified as a sufficient reason to control outdoor cats among University staff and faculty (Ash & Adams, 2003). This result suggests that the public and TNR group members may be less likely to tolerate cat management initiatives if they are presented as an “invasive” or “exotic” species control effort.

Preference for Non-Lethal Management

Respondents generally preferred non-lethal management, including TNR, placement in a long-term shelter or no kill sanctuary. Cat sanctuaries have been

reported as the preferred management method in other studies (Loyd & Hernandez, 2012). However, the cost of these programs for materials, maintenance and staff can be extensive and impractical for large numbers of cats. A series of recent high-profile cases of inhumane treatment in cat sanctuaries and charges of cruelty and neglect have heightened concern about the sustainability of sanctuaries for cat management (Swirko, 2011). Of those individuals supporting lethal management, more than half were members of the public (53%). Previous research has found that the public generally prefers non-lethal methods of managing wildlife and perceives them as more humane than lethal management techniques (Reiter, Brunson, & Schmidt, 1999). However, the public has been found to support euthanasia as a method to manage feral cats (Loyd & Miller, 2010b). It is possible that our use of the term “outdoor cats” rather than “feral cats” contributed to reduced overall support for euthanasia compared to other studies (Lord, 2008; Loyd & Miller, 2010b). Conversely, the use of terms such as euthanasia rather than killing, culling or eradication can influence support for lethal management.

Membership in an animal welfare organization increased support for TNR among Georgia residents (Loyd & Hernandez, 2012). There was also widespread support for TNR in Ohio among urban (79%), suburban (80%) and rural (71%) residents (Lord, 2008). In this study, agreement with statements supportive of TNR was high (mean > 1 on a -3 to 3 scale) across all three groups. Audubon group members were significantly more supportive of using tax dollars for low-cost spay-neuter than the general public. There was stronger support for TNR as a management strategy (across all three groups) than support for impoundment in a shelter. These findings confirm previous

research indicating that TNR was perceived as more effective method of controlling outdoor cats than impoundment ($p < .001$) (Wald & Jacobson, 2013).

The terminology utilized in survey research is important (Dillman, 1999; Dillman et al., 2009; Vaske, 2008). Focus groups revealed that the term “outdoor” cats is perceived by stakeholders as much less negative than the term “feral cats” that has been used in previous surveys (Peterson et al., 2012). It is possible that stakeholders view “outdoor cats” as a different subset of animals than “feral” cats and are willing to support TNR for “outdoor cats,” but are more supportive of euthanasia for “feral” or unsocialized animals. It is possible that this distinction contributed to the high levels of support for TNR exhibited in this study.

Across the perceived humaneness of management and attitudes toward management items, the TNR group had smaller PCI values compared to the Audubon and public groups. This may be attributed to the broader focus of the Audubon mission to protect birds and address a variety of environmental issues compared to the narrower focus of the TNR organizations. Despite general levels of support for TNR within the Audubon and public groups, moderate PCI scores (Audubon $> .40$ and public $> .38$) suggest greater conflict among Audubon group members and the public over whether TNR is a “good method of managing outdoor cats” and their support for this management approach than among TNR group members. It is possible that previous reports of strong opposition to TNR among bird conservation professionals can be attributed to differences in the sample methods (Peterson et al., 2012). In the previous study they used purposive sampling to target bird conservation specialists and wildlife conservation employees, while in this study we randomly surveyed members of the

Audubon society who reported more tolerance for TNR efforts. It is also possible that differences were due to the use of the term “outdoor cat” in this study compared to “feral cats” in previous research. The public is less concerned about the issue of outdoor cats compared to stakeholder group members. Previous studies have also reported low levels of concern among University employees related to this issue (Ash & Adams, 2003).

Distinguishing Between Stakeholders

A previous study exploring stakeholder beliefs about feral cats, found stakeholders with polarized views on whether or not cats contributed to the decline of native birds (Peterson et al., 2012). This study corroborated these findings and indicated that not only are risk perceptions different among stakeholder groups, but that risk perceptions are the most important factor influencing membership in the Audubon stakeholder group. Perceived risks to wildlife from cats are important because they can influence support for management and public policy. Respondents who believed that healthy ecosystems and protecting wildlife were important were more likely to oppose TNR legislation in Athens, GA (Loyd & Hernandez, 2012).

The issues that individuals perceive as risky and decide to concern themselves with are shaped by social, cultural and political factors (Pidgeon, Kasperson, & Slovic, 2003). The social amplification of risk framework posits that risk perceptions are amplified and reduced by interactions within social and cultural groups and organizations (Kasperson & Kasperson, 1996; Pidgeon et al., 2003). A number of attributes of organizations can contribute to the attenuation and amplification of risk signals (Freudenburg, 1992). The Audubon website includes information about the importance of keeping cats indoors and the threat cats pose to wildlife through

predation, competition and the transmission of disease (Audubon Florida, 2012). Confining cats indoors is listed as one of the top ten ways to protect migratory bird species (Audubon Florida, 2012). It is possible that the materials and messages being transmitted by these groups and interactions among group members are increasing or attenuating individual risk and benefit perceptions and making them more salient (Kasperson et al., 1988). This might explain the important role that risk perceptions played in predicting Audubon group membership and the polarized positions of the stakeholder groups on the negative impact beliefs and perceived risk items relative to the general public.

Numerous studies have documented the perceived physical and psychological benefits of owning and/or interacting with cats (Friedmann, 1995; Poresky & Hendrix, 1990; Vining, 2003; Zasloff & Kidd, 1994). Cat ownership has been found to influence support for cat management methods (Dabritz et al., 2006; Grayson et al., 2002; Lord, 2008), perceptions of whether cats impact birds or harm wildlife (Dabritz et al., 2006; Grayson et al., 2002; Loyd & Hernandez, 2012). It is possible that these positive feelings contributed to the importance of cat ownership as a predictor of group membership.

Implications for Cat Management

To be successful, management initiatives, whether they target native or non-native species, must include significant input and involvement of all relevant stakeholder groups (Jacobson, 2009). Conflict over cat management preference has in many cases prevented and delayed the implementation of policies that could reduce the cat population, enhance animal welfare, and reduce potential risks to wildlife (Longcore et al., 2009; Sterba, 2002). Communication between stakeholder groups often breaks

down because discussions focus on areas of disagreement (Fisher & Ury, 1991). This can lead to both parties becoming so entrenched in their position that the negotiation fails. In the case of outdoor cats, this issue is often framed as a war between “cat people” and “wildlife people” and published articles and reports enhance this perception by using titles such as, “Cat Fight,” “No. 1 Enemy,” “The fur and feathers are flying,” “Bird lovers keep cats on a short leash” (Carey, 2012; Gorman, 2003; Hatley, 2003; Rosenthal, 2011). One potential solution to the current conflict and stalled debate is to shift the focus to areas of agreement or shared goals and interests (Fisher & Ury, 1991).

Our study suggests that there are some important areas of agreement between groups: Audubon and TNR group members agreed that cats should be kept indoors, that cats can find their way home, and survive without human help. There was also agreement among the Audubon members and the public that cats are a problem in Florida. Though there were significant differences between the three groups, across all three groups there were high scores, indicating agreement, over increased personal responsibility for outdoor cats. Given the general level of concern about cats in Florida and support for cats indoors there may be room for compromise between stakeholder groups on some type of regulation or educational campaign designed to encourage cats indoors. There may also be room for compromise over the use of lethal methods for “unsocialized or feral” animals and the use of TNR for socialized animals. We detected important similarities in attitudes toward management: (1) there was very little support for “no management,” (2) there was higher support for TNR than any other management method, (3) there was support for mandatory rabies vaccination and owner provided identification. These similarities suggest that members of all three groups support efforts

to take action to address cat management. If a solution to this issue and current conflict is desired, stakeholders and policy makers will need to move past the current deadlock and away from debate over whether cats kill birds; focusing instead on the areas of potential agreement identified in this study.

Table 4-1. Stakeholder and public beliefs about outdoor cats

Beliefs about outdoor cats*	TNR	Audubon Mean	Public	F	Sig	N2
Cats deserve to be outdoors and free like other animals	-0.097a	-0.896b	-0.372a	7.60	0.001	0.021
Wildlife and cats should have equal access to the outdoors	0.238a	-0.782b	-0.183a	11.15	0.000	0.030
Cats should be kept indoors as pets ^a	0.987ab	1.378a	0.874b	4.09	0.017	0.011
More people should take responsibility for outdoor cats ^b	2.286a	1.834b	1.196c	29.00	0.000	0.075
Outdoor cats are a problem in Florida ^a	0.476a	1.036b	0.532ab	4.41	0.012	0.012
Outdoor cats should have the right to hunt	0.930a	-0.513b	0.425c	23.19	0.000	0.061
Outdoor cats live happy and healthy lives	-0.004a	-0.813b	-0.196a	9.07	0.000	0.025
Most outdoor cats are able to find their way home on their own ^b	0.366a	0.399a	0.694a	2.17	0.115	0.006
Most outdoor cats are able to survive without human help ^b	-0.648a	-0.653a	0.080b	12.07	0.000	0.033

^a Reversed for multivariate analysis.

^b Removed from the final scale

*Final Cronbach's for 6 item scale $\alpha=.81$

Table 4-2. Stakeholder and public beliefs about cat impacts, perceptions of risks and the salience of risks

	TNR	Audubon Mean	Public	F	Sig	N2
Positive impacts for people (Cronbach's $\alpha=.80$)						
Outdoor cats kill mice and pests	2.106a	1.613b	1.850a	7.68	0.000	0.016
By killing pests, outdoor cats reduce the spread of diseases	1.175a	.1513b	0.537a	17.74	0.000	0.036
Outdoor cats provide me with companionship	0.026a	-1.351b	-1.233b	35.78	0.000	0.069
Outdoor cats improve my quality of life	-0.150a	-1.362b	-1.239b	27.98	0.000	0.055
Negative impacts for people(Cronbach's $\alpha=.84$)						
The use of my yard as a litter box by outdoor cats is a nuisance	-1.152a	.3765b	.2425b	35.85	0.000	0.075
Outdoor cats spread diseases to people	-1.576a	-0.447b	-0.177b	35.42	0.000	0.074
Outdoor cats make loud calls and noises	-0.655a	-0.161b	0.223b	13.78	0.000	0.030
Outdoor cats can spread diseases to owned pets	0.102a	1.098b	1.131b	25.69	0.000	0.055
Negative impacts for wildlife (Cronbach's $\alpha = .89$						
Outdoor cats compete with wildlife for food	-0.279a	1.000b	0.659b	14.71	0.000	0.056
Outdoor cats spread disease to wildlife	-0.927a	0.453b	0.031b	18.53	0.000	0.074
Outdoor cats kill wildlife	0.257a	1.577b	0.833c	15.45	0.000	0.062
Outdoor cats pose a significant risk to wildlife	-0.890a	1.015b	-0.091c	26.34	0.000	0.101
Perceived Ecological Risks (Cronbach's $\alpha= .93$)						
The effect of outdoor cats on native wildlife is (positive - negative)	-0.066a	1.282b	0.530c	36.88	0.000	0.082
The effect of outdoor cats on native wildlife is (acceptable - unacceptable)	-0.599a	1.064b	0.162c	49.48	0.000	0.108
The effect of outdoor cats on the ecosystem is (positive - negative)	-0.515a	1.052b	0.345c	48.80	0.000	0.106
The effect of outdoor cats on the ecosystem is (acceptable - unacceptable)	-0.859a	0.710b	0.041c	43.30	0.000	0.095
What level of risk does predation by outdoor cats pose to wildlife?	-0.476a	0.905b	-0.055c	39.47	0.000	0.088
What level of risk do outdoor cats pose to the ecosystem?	-1.062a	0.222b	-0.394c	32.89	0.000	0.074
Perceived benefits to people (Cronbach's $\alpha=.88$)						
The effect of outdoor cats on me is (negative - positive)	1.003a	-0.334b	-0.206b	46.33	0.000	0.077
The effect of outdoor cats on me is (unacceptable - acceptable)	1.332a	0.118b	0.000b	46.20	0.000	0.076
Outdoor cats provide me with personal benefits	0.391a	-1.150b	-1.122b	60.79	0.000	0.980

Table 4-3. Stakeholder and public attitudes toward the management of outdoor cats

	TNR	Audubon	Public	F	Sig	N2
Attitudes toward TNR (Cronbach's $\alpha = .83$)						
I support programs to Trap-Neuter-Return outdoor cats	2.470a	1.296b	1.423b	40.23	0.000	0.065
Trap-Neuter -Return programs are a good way to manage outdoor cats	2.314a	1.133b	1.383b	37.82	0.000	0.061
I support using tax dollars for low-cost spay-neuter and return programs	2.275a	1.364b	0.954c	44.52	0.000	0.071
Attitudes toward other management (Cronbach's $\alpha = .76$)						
I support programs to trap and impound outdoor cats	-1.397a	0.376b	0.314b	33.41	0.000	0.124
I oppose any program that reduces outdoor cat population	-1.815a	-2.007a	-1.886a	0.394	0.674	0.002
Owners should be prohibited from allowing cats to roam outdoors	-0.178a	0.617b	0.000ab	3.86	0.022	0.016
Owners should be required to provide identification (tag or microchip) for their cats	1.274a	1.433a	1.617a	1.34	0.264	0.006
Local governments should be responsible for controlling outdoor cats	-0.356a	0.766b	0.137a	12.30	0.000	0.050
The outdoor cat population should be left alone ^b	-1.719a	-1.936a	-1.771a	.722	0.486	0.003
Removal to an animal shelter is a good way to manage outdoor cats	-1.267a	-0.007b	-0.217b	15.16	0.000	0.061
I support mandatory spay-neuter laws for cats	2.000a	1.773ab	1.383b	4.28	0.014	0.000
I support laws requiring cats to be vaccinated against rabies	2.301a	2.340a	2.280a	0.014	0.986	0.000
I support using tax dollars to fund animal control shelters	2.048a	1.993a	1.029b	14.67	0.000	0.059
Local governments do a good job of managing outdoor cats ^a	-1.630a	-1.596a	-1.234a	3.45	0.033	0.014

*Not included in multivariate analysis

^a Removed from the final scale

^b Reverse for analysis

Table 4-4. Structure matrix results for the two function solution predicting group membership

	Function	
	1	2
Positive impact beliefs	.449	-.396
Negative impact beliefs	-.453	.451
Ecological risk perceptions	-.497	.768
Perceived Benefits	.514	-.390
Attitudes toward TNR	.633	-.133
General beliefs	.202	-.628
Attitudes toward outdoor cats	.720	-.345
Cat ownership	.758	.050
Classify cats as "exotic"	-.094	.761

Table 4-5. Independent predictors of group membership

Independent Variables	Statistic	Wilk's Λ		Sig.
		df1	df2	
Cat ownership	.890	1	2	.000
Ecological risk perceptions	.834	2	2	.000
Attitudes toward cats	.810	3	2	.000
General beliefs	.786	4	2	.000
Classify cats as "exotic"	.773	5	2	.000
Attitudes toward TNR	.764	6	2	.000

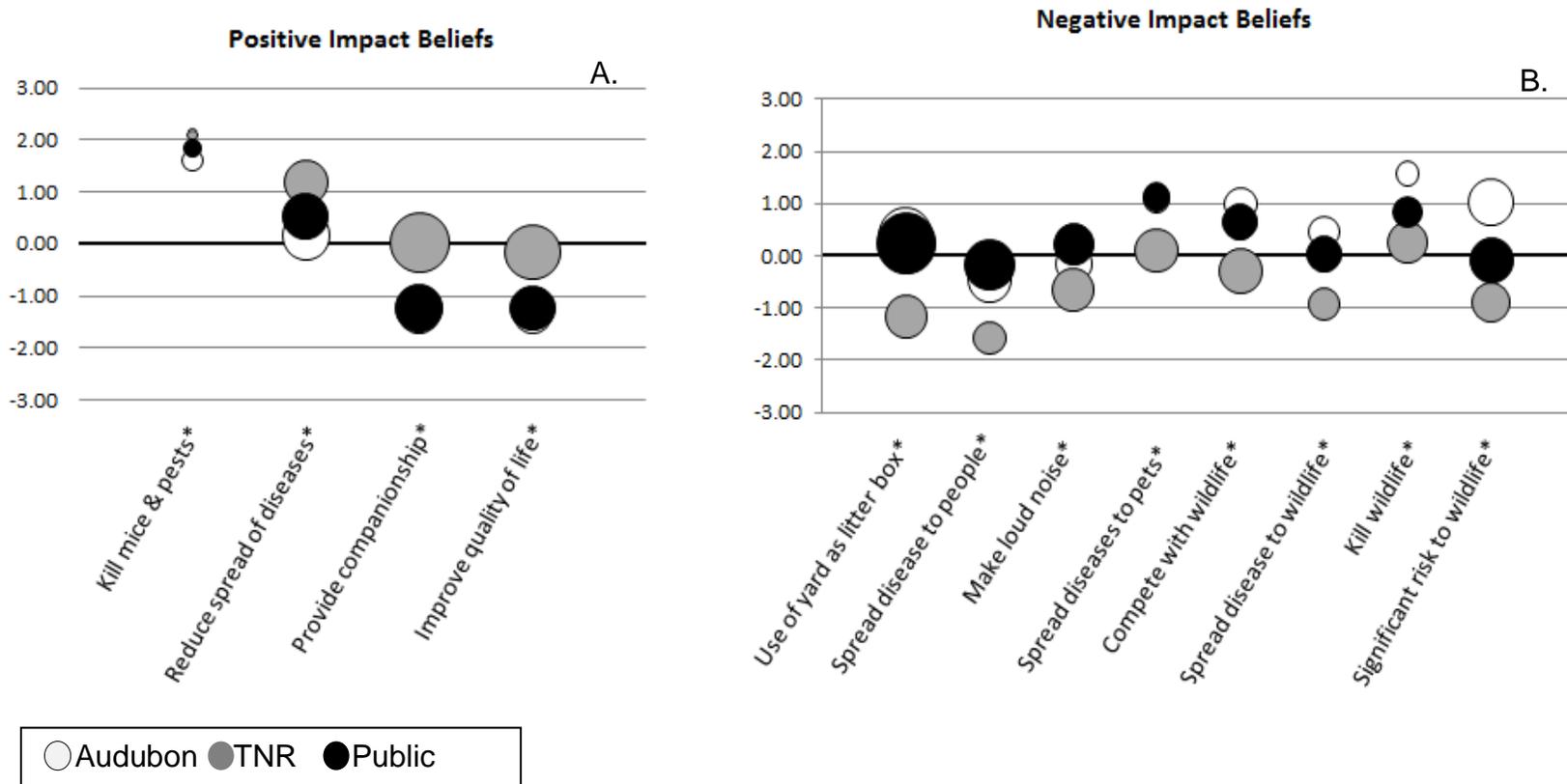


Figure 4-1. Potential for Conflict Index values across three stakeholder groups. Center point of each bubble represents the scale mean, bubble size represents PCI value. Scale used to measure level of approval ranges between -3 (strongly disagree) to 3 (strongly agree). Significant results are indicated * $p < 0.05$. Figure A reflects respondent scores for positive impact beliefs. Figure B reflects respondent scores for negative impact beliefs. Figure C reflects respondent scores for perceived benefits. Figure D reflects respondent scores for perceived risks. Figure E reflects respondent scores about cat beliefs and Figure F reflects respondent attitudes toward management.

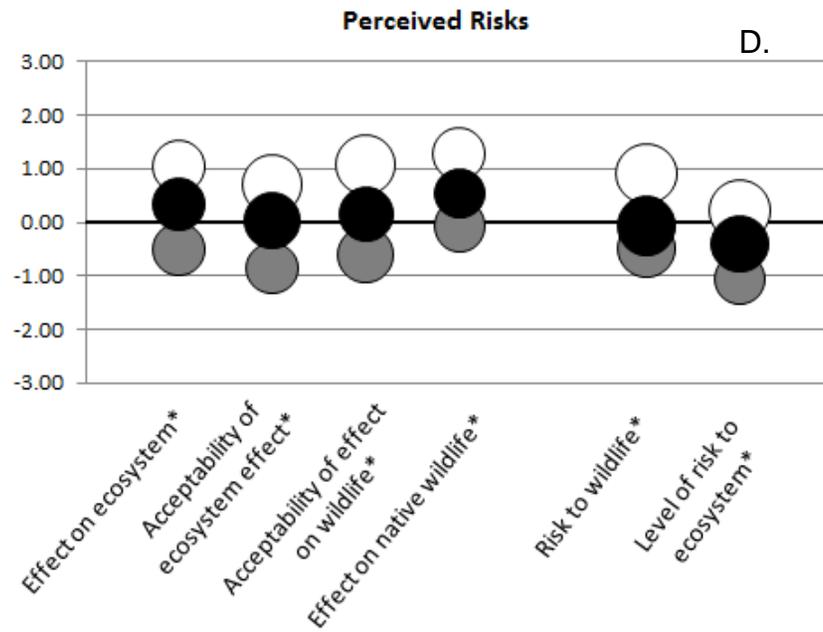
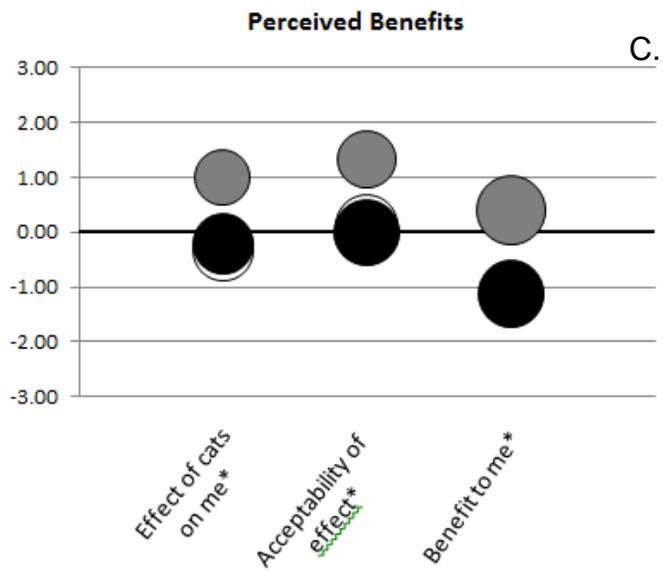


Figure 4-1 continued.

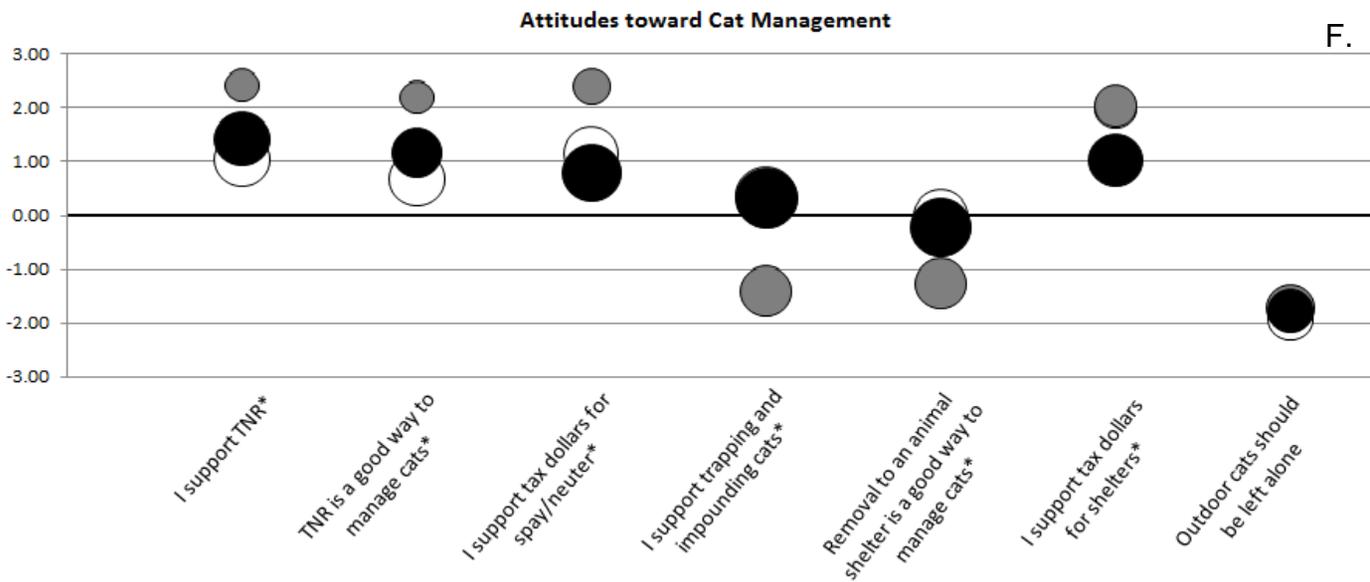
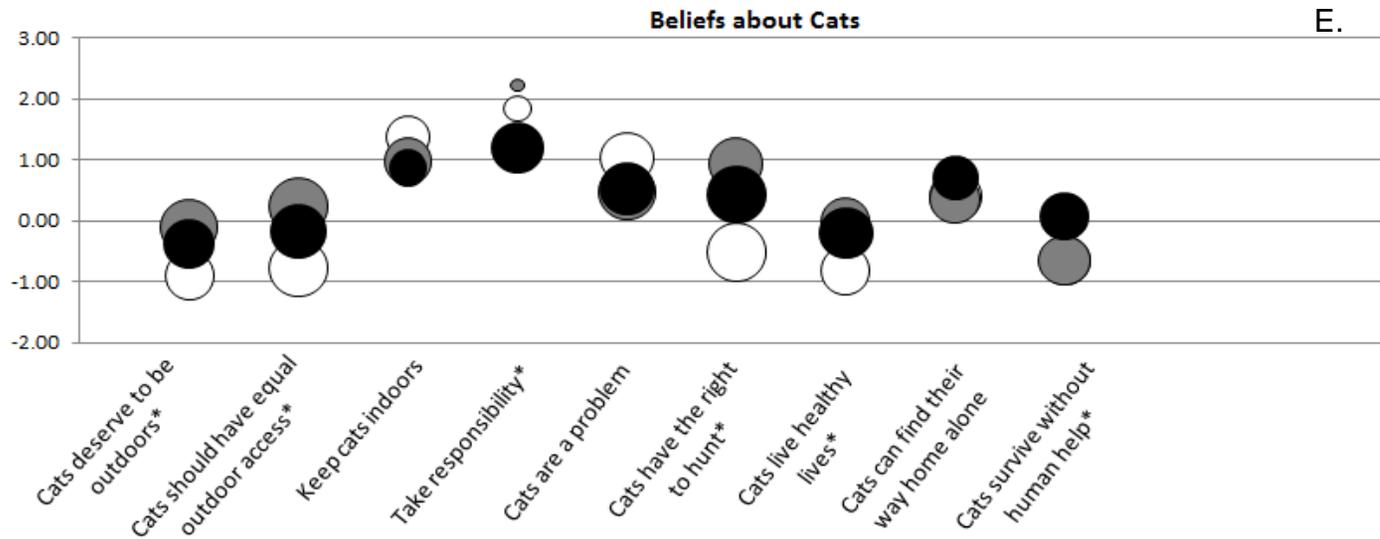


Figure 4-1 continued.

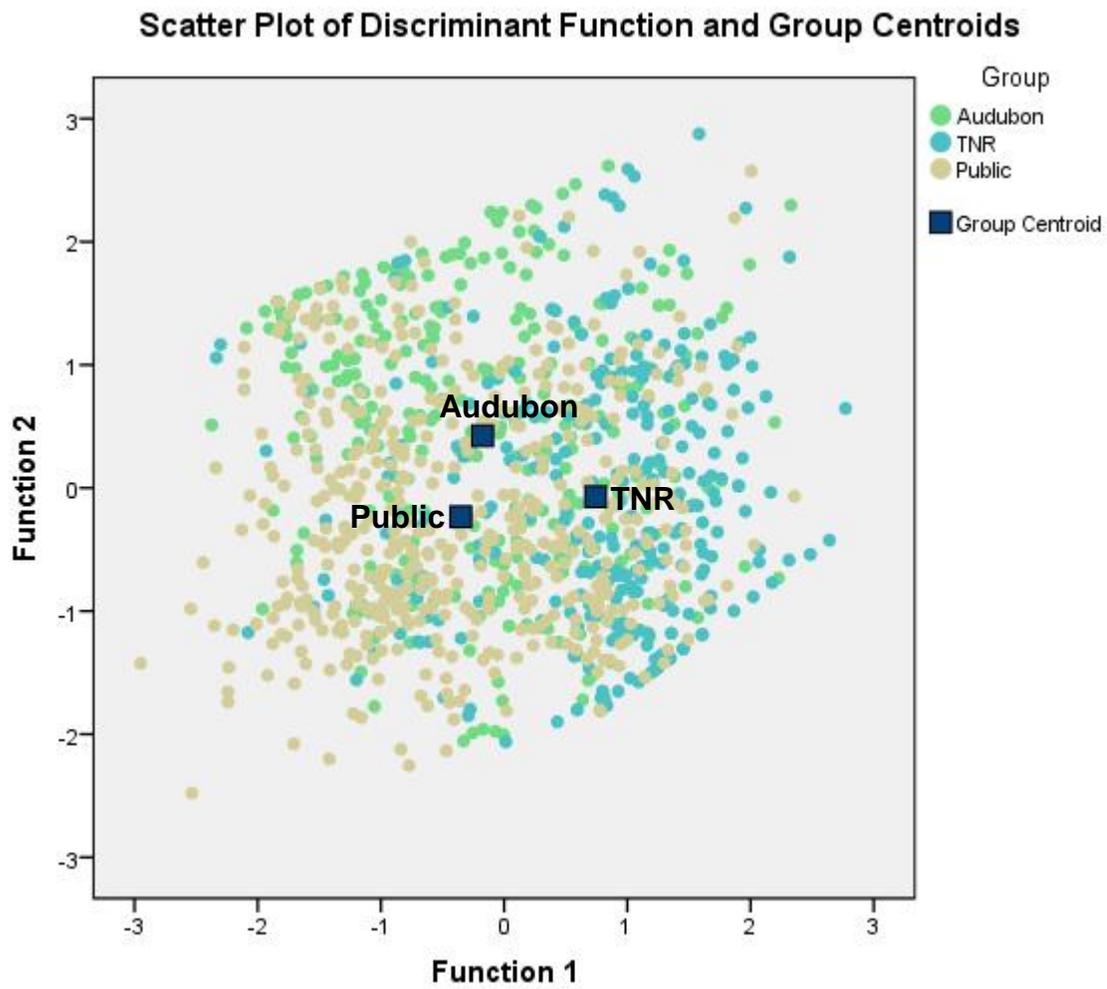


Figure 4-2. Discriminant function analysis results illustrating the separation between stakeholder groups and the public.

CHAPTER 5 A MULTIVARIATE MODEL OF STAKEHOLDER PREFERENCE FOR OUTDOOR CAT MANAGEMENT

Outdoor Cats and Stakeholders in Florida

An estimated 3.1 million unowned cats roam outdoors in Florida and another 2.3 million owned cats spend time outdoors (Levy, Woods, et al., 2003). In Florida, outdoor cats have been implicated in the predation of threatened and endangered species, including the Lower Keys marsh rabbit (*Sylvilagus palustris hefneri*) (Forys & Humphrey, 1999), the Florida scrub-jay (*Aphelocoma coerulescens*) (Woolfenden & Fitzpatrick, 1993), an endemic beach mouse (*Peromyscus polionotus*) (Frank & Humphrey, 1996) and least terns (*Sterna antillarum antillarum*) (Gore, 1996). The transmission of diseases from cats to wildlife and people has also been highlighted as a potential cat-related risk. The transmission of diseases from cats to wildlife and people, along with nuisance issues (destroying gardens, fouling yards, noise, smell, etc.) have also been highlighted as potential cat-related impacts. These concerns have contributed to calls by wildlife and birding organizations for people to keep cats indoors and to remove cat colonies using lethal and non-lethal management techniques (American Bird Conservancy, 2004; Drennan, 2012; Williams, 2009). Animal welfare advocates have also expressed concern about the welfare of outdoor cats at risk of injury from people, free-roaming dogs and wildlife (Slater, 2004; HSUS, 2010).

There is currently substantial conflict among stakeholders and managers over whether current approaches to managing outdoor cats are appropriate, effective or humane (Loyd & Hernandez, 2012). Stakeholders are people or groups that have an interest, or stake in an issue or management concern. Traditional nuisance animal management approaches include lethal control, such as trapping followed by

euthanasia, hunting, or culling using shooting and/or poison. Animal welfare advocates, opposed to the use of lethal cat control have strongly advocated for the use of non-lethal management methods, primarily the use of Trap-Neuter-Return (TNR), which involves catching the animal, sterilizing it and returning it to where it was found. Debate about the use of lethal or non-lethal control has led to a sharp ethical division between stakeholder groups that has incited rancorous debate and litigation (Carey, 2012). On one side of this divide are environmental advocates, who view cats as “exotic” animals, and for whom the risks associated with outdoor cats are severe (Longcore et al., 2009; Peterson et al., 2012). Alternatively, animal welfare advocates consider feral cats to be “healthy wildlife” (No Kill Advocacy, 2006), and advocate non-lethal methods of control and protection for existing outdoor cat colonies on public and private land (Alley Cat Allies, 2009; Centonze & Levy, 2002; Levy & Crawford, 2004; Loyd & Hernandez, 2012). Stakeholders can make or break a management initiative and influence public policies toward natural areas and wildlife management. Knowledge about the factors driving stakeholder support or opposition to lethal management is therefore critical to the success of any management approach.

In this study, we utilized the cognitive hierarchy to model stakeholder preference for non-lethal management. This model explored multivariate relationships between values that influence beliefs, which effect attitudes that, in turn guide behavioral intentions. We expected specific attitudes to be more strongly related to specific actions than general attitudes. We utilized multivariate relationships between cognitions and stakeholder preference for management actions in order to reveal the structure of the psychological variables underlying management preference. We identified the complex

causal chains linking values and beliefs to provide insight into the cognitions that influence individual preference for non-lethal management with the goal of identifying a priori support for management approaches with broad stakeholder support.

The Cognitive Hierarchy

The cognitive hierarchy is a model that suggests a hierarchical relationship between cognitions, such as beliefs, attitudes, behavioral intentions and in certain cases behaviors (Decker et al., 2001; Fulton, Manfredo, & Lipscomb, 1996; Homer & Kahle, 1988; Vaske & Donnelly, 1999). Based on this model, a person's acceptance of TNR or intention to support TNR will be influenced by beliefs about the outcome (e.g, the outdoor cat population will be reduced) and attitudes toward TNR (e.g., TNR is humane or effective). While general attitudes predict general behaviors, the specificity hypothesis posits that the relationship between beliefs, attitudes and behavior is stronger in cases where specific beliefs and attitudes predict specific behaviors (Fishbein & Ajzen, 1975; Donnelly & Vaske, 1995). General attitudes are important because they often mediate the relationship between values and specific wildlife protection attitudes (Tarrant et al., 1997).

Values have been proposed as the foundation for attitudes toward wildlife (Kellert, 1996; Purdy & Decker, 1989). Values can differ significantly between stakeholder groups involved in natural resource use and recreation (Decker & Connelly, 1989; Manfredo, Sneegas, Driver, & Bright, 1989). The cognitive hierarchy proposes that values form the base of the cognitive pyramid and influence beliefs, which in turn influence attitudes and behaviors (Decker et al., 2001). The framework suggests that each step in the cognitive hierarchy builds on the next. Values, which are at the

foundation, are few in number, slow to change, and formed early in life (Fulton et al., 1996; Rokeach, 1973).

Measures in the Model

Attitudes

Attitudes are expressed as a positive or negative evaluation of the attitude object (Vaske & Donnelly, 1999). In this model, we measured both general attitudes toward outdoor cats and specific attitudes toward Trap-Neuter-Return (TNR) and lethal management. We expect general attitudes to influence specific attitudes. Positive attitudes toward wildlife have been correlated with favorable assessments of their right to exist (Brooks, Warren, & Nelms, 1999), and tolerance for future populations (Riley & Decker, 2000b). Positive attitudes toward wolves increased support for wolf reintroduction (Bright & Manfredi, 1996). Negative attitudes toward wildlife increased support for aggressive management, including removal (Ericsson & Heberlein, 2003) or lethal techniques (Vaske & Needham, 2007). Participants with negative attitudes toward beaver were more likely to disagree with the statement “no beaver should be destroyed” (Jonker, Muth, Organ, Zwick, & Siemer, 2006). Specific attitudes toward moose hunting predicted attitudes toward hunting as acceptable (Donnelly & Vaske, 1995). Attitudes toward TNR and the humaneness of euthanasia, shooting or poisoning cats will be treated as specific attitudes and are expected to mediate the relationship between attitudes about outdoor cats and management acceptance.

Beliefs

The cognitive hierarchy provided theoretical support for the influence of impact beliefs, both positive and negative, on attitudes and management preference (Decker et al. 2001). Support for lethal control and evaluation of these methods as humane was

influenced by beliefs about human safety, animal suffering and the severity of the wildlife damage (Reiter et al., 1999). Perceived deer impacts were a strong predictor of tolerance for the future deer population (Lischka et al., 2009). Public acceptance of beaver impacts was influenced by perceived recreational benefits from beavers (Enck, Connelly, & Brown, 1996; Siemer et al., 2004). There was a strong relationship between perceived impacts from bovine tuberculosis and support for management to eradicate the disease (Dorn & Mertig, 2005). In some cases, economic and nuisance damage related to animals more strongly predicted support for lethal management than concern over health and safety (Loker et al., 1999). In the case of outdoor cats, we address both the perceived negative impacts to people (fouling yards, noise, defecation in and around gardens etc.); the perceived negative impact to wildlife and the environment through predation, competition, and the spread of diseases; and the perceived positive impacts or benefits cats provide to people through companionship and pest control. Perceptions of cats as a “problem for residents” in Illinois reduced support for TNR (Loyd & Miller, 2010a). Perceptions of outdoor cats as a “nuisance” among Texas AMU faculty and staff increased support for removal methods over TNR (Ash & Adams, 2003). Stronger control methods were advocated by respondents who perceived cats as a “nuisance” (Tennent et al., 2010). If beliefs about the negative and positive impacts associated with outdoor cats are salient and readily associated with the referent species, then they will influence attitudes (Ajzen & Fishbein, 1997; Fishbein & Ajzen, 1975).

Worldviews

The New Ecological Paradigm (NEP) is a survey instrument that measures how individuals view the natural world (Dunlap & Van Liere, 1978). Significant differences in NEP scores represent divergent environmental values among stakeholder groups

(Edgell & Nowell, 1989; Friedmann, 1995; Kaltenborn, Bjerke, & Strumse, 1998).

Respondents with a more dominant perspective (i.e., the Dominant Social Paradigm) or a more nature-centered perspective (i.e., The New Ecological Paradigm) may differ in their beliefs, attitudes and management preference. NEP is designed to measure five components of an ecological worldview: the reality of limits to growth, antianthropocentrism, the fragility of nature's balance, the rejection of exemptionalism, and the possibility of an ecocrisis. Individuals with ecocentric perspectives agree more strongly with the positive elements of the NEP scale while people with more anthropocentric beliefs (or a more dominant social paradigm) agree more strongly with the negative items in the scale.

Environmental worldviews (NEP) influenced attitudes toward the management of the non-native mountain pine beetle (*Dendroctonus ponderosae*) (McFarlane, 2005), the protection of national forests (Vaske & Donnelly, 1999), and increased concern over government management of an environmental issue (Hart, Nisbet, & Shanahan, 2011). Previous research has suggested that stakeholder groups (i.e., TNR proponents and Audubon Society members) differ significantly in their perceptions of outdoor cats' ecological impacts on wildlife and the environment (Peterson et al., 2012). It is possible that these differences are based on differing views about the fragility of nature and the importance of protecting wildlife from human sources of risk. Our model posits that conflicts over how to humanely and effectively manage the outdoor cat population are driven by differences in the value people place on nature and natural systems. Therefore, we suppose that values form the basis of beliefs and we use NEP as a measure of environmental values or worldviews (Figure 5-1).

Utilizing the framework provided by the cognitive hierarchy, the objective of this study was to determine the influence of cognitive variables on intention to support non-lethal management for outdoor cats (i.e., TNR and placement in a long-term no-kill shelter) (Figure 5-1). Based on these objectives we tested four hypotheses concerning the relationships between cognitions and behavioral intentions related to outdoor cats.

- H1 Worldviews will predict general and specific beliefs. (a) Respondents with ecocentric worldviews will be less supportive of cats outdoors. (b) Respondents with ecocentric worldviews will perceive significantly more negative impacts from cats than individuals with a dominant worldview.
- H2 Beliefs will influence attitudes toward outdoor cats. (a) Respondents who believe cats have the right to live outdoors will express more positive attitudes about outdoor cats. (b) Respondents who agreed with positive cat impact beliefs will express more positive attitudes about outdoor cats. (c) Respondents who express greater agreement with positive impact beliefs will express more positive attitudes about TNR.
- H3 General attitudes will predict specific attitudes. (a) Respondents with positive attitudes about outdoor cats will report greater support for TNR. (b) Respondents with positive attitudes about outdoor cats will perceive lethal management as less humane.
- H4 Both general and specific attitudes will influence behavioral intentions. (a) Respondents with positive attitudes about TNR will express greater support for TNR than respondents with negative attitudes. (b) Respondents who perceive lethal management as humane will express less support for TNR.

Methods

Survey Design and Distribution

We identified 10 TNR organizations across four counties in the state of Florida that represented both North and South Florida. These groups were identified as the most active in Florida with large membership/volunteer lists and ongoing TNR and efforts throughout each county. We identified active Audubon chapters across the same 10 counties with large membership lists. The final four counties included: Alachua, Duval, Broward and Miami-Dade and were selected because they included active

stakeholder groups (both TNR and Audubon), represented both North and South Florida, and agreed to participate in this research. According to census results, Alachua County had a population of 244,247, Duval County had a population of 854,848, Broward County had a population of 1.7 million and Miami-Dade County had a population of 2.4 million (United States Census, 2005).

Survey questions were developed in consultation with experts in the fields of wildlife ecology and animal welfare. We conducted 6 focus groups with stakeholders across Florida to develop survey items addressing beliefs about outdoor cats and cat impacts and test survey terminology and question wording. The term “outdoor cats” was identified as the most neutral and easy to understand term for referring to free-roaming domestic cats. For all questions we asked respondents to report answers about outdoor cats not owned by them. The survey was approved by UF-IRB.

From April 2012 to September of 2012, we sent a mail-back questionnaire to randomly selected individuals belonging to two stakeholder groups: (1) members of organizations supporting and participating in TNR efforts (n=800) and (2) members of the Audubon Society (n=796). We followed Dillman’s four-wave tailored design method (Dillman, 1999; Dillman et al., 2009). The first mailing to stakeholders included a survey, postage-paid return envelope, and cover letter. A reminder postcard was sent to non-respondents two weeks later. The final mailing, sent two to three weeks after the reminder, included another full copy of the survey, envelope and letter.

The final survey measured 28 items including (1) management acceptance, (2) attitudes toward cats, TNR, and lethal management, (3) general beliefs about cats and impact beliefs, and (4) environmental worldviews. We used self-reported management

acceptance as a proxy for behavioral intention. Respondents indicated which of the listed management methods were preferred. Choices included TNR, placement in a long-term, no kill sanctuary, trap and euthanize and no management. Items were collapsed into a binary measure so that 0=lethal methods and 1=non-lethal methods. Attitudes toward outdoor cats were measured by rating the statement “What are your feelings about outdoor cats” on a 7-point scale ranging from unfavorable feeling to favorable feeling. Three items measured attitudes toward TNR on a 7-point scale with 1=strongly disagree and 7=strongly agree (Table 5-1). Attitudes toward four lethal management approaches were measured (i.e., shelter euthanasia, veterinary euthanasia, shooting and poisoning) on a 7 point scale with 1=inhumane and 7=very humane. Seven items representing general beliefs about outdoor cats and 10 impact beliefs (6 negative and 4 positive belief items) were measured on a 7-point scale with 1=strongly disagree and 7=strongly agree (Table 5-1). Environmental worldviews were measured using the 15 item updated New Ecological Paradigm (NEP) scale (Dunlap, Van Liere, Mertig, & Jones, 2000). Items were collapsed into a 5-point Likert scale with 1=strongly disagree and 5= strongly agree. NEP statements with a negative loading were reverse coded. Scores ranged from 1 to 5, with actual scores from 1.40 to 5.00. Higher scores represent stronger agreement with NEP and more ecocentric worldviews (Table 5-1).

Tests for Sample Bias

There is a growing body of evidence suggesting that non-response rates explain only a small amount of the total non-response bias (Groves, 2006). Non-response bias is less of a concern because we are not interested in generalizing our findings and we were not interested in the marginal distributions of the variables of interest. Moreover,

surveys of specific populations have smaller average non-response differences than surveys of the general population (Groves & Peytcheva, 2008). Non-response bias is primarily a problem of reduced representation of individuals unengaged in the issue being studied. By surveying members of stakeholder groups actively involved in the issue, we reduced the chance of non-response due to lack of engagement.

Nonetheless, we tested non-response bias by evaluating the differences between early and late survey responders (those who responded after the final mailing was sent). First round respondents (n=586) and late responders (n=158) were compared on 10 questions from the survey. Demographic characteristics and responses did not differ significantly between respondent groups.

Data Analyses

A latent growth curve model was developed to explore the hypothesized relationships among management acceptance, attitudes toward cats, attitudes toward TNR, and lethal management, beliefs about outdoor cats, beliefs about cat impacts, and environmental worldviews. Multivariate models such as these allow us to simultaneously measure relationships between numerous exogenous and endogenous variables.

Unweighted data were used to perform the structural equation model. Each item was constrained so it loaded on only one latent factor. Responses with missing data were removed from the model leaving a sample size of 298 (Audubon=137, TNR=161). We used maximum likelihood estimation to calculate model parameters. The comparative fit index and standardized root mean square residual values, and the theoretical meaning of the model were used to assess model fit. The higher the CFI, the better the fit of the model to the data; the CFI has a range of zero to 1.00 and values

>0.90 are considered acceptable (Hu & Bentler, 1998). Paths with insignificant relationships were trimmed, yielding the model shown in (Figure 5-2). Reliability estimates were performed using IBM SPSS statistical software version 20. The latent growth curve model was performed using *Amos v 20*.

The first step of the analysis included confirmatory factor analyses, a fundamental component of structural equation models, for each of our latent (unobserved) variables 1) attitudes toward TNR, 2) attitudes toward lethal management, 3) beliefs about outdoor cats, 4) impact beliefs, and 5) environmental worldview. Each scale was tested for reliability with Cronbach's α >0.65 considered acceptable (Nunnally, 1978; Vaske, 2008). The second step was to fit the observed data to the proposed model. Finally, we used post hoc modification indices to identify additional parameters that enhanced model fit.

Results

Characteristics of Respondents

A total of 760 surveys were returned; Audubon stakeholders (n=384) and TNR supporters (n=361). Our response rate for the Audubon stakeholders was 51% and for the TNR supporters was 46%. Most respondents were female (78%) and cat owners (63%). Most respondents did not feed cats (67%).

Structural Equation Model

The data exhibited univariate normality allowing for the use of maximum likelihood to estimate parameters. Confirmatory factory analysis revealed that items loaded acceptably on all 5 latent variables: 1) attitudes toward TNR, 2) attitudes toward lethal management, 3) beliefs about outdoor cats, 4) impact beliefs, and 5) environmental worldviews. Consistent with Dunlap, Van Liere et al. 2000, all NEP items

loaded on one factor. The reliability of each set of items was acceptable Cronbach's $\alpha > 0.80$ (Vaske, 2008) (Table 5-1).

The initial model was not a good fit to the data (CFI=.89). We therefore adjusted the model post hoc based on modification indices and standardized factor loadings. Modification indices suggested that beliefs about outdoor cats should be split into two latent variables: positive beliefs about cats and negative beliefs about cats. In addition, our post-hoc analysis indicated that within factor correlations between error terms would improve model fit. Therefore, we allowed error terms to correlate on two items in the positive impact beliefs factor (cats reduce disease and kill pest species); the attitudes toward lethal management factor (shooting and poisoning cats) and the beliefs about cats factor (deserve to live outdoors and should have access to the outdoors equal to wildlife). In addition to improving the model, the correlated items also made theoretical sense. The revised model is nested within the original model and the difference between χ^2 values can be used to compare model fit (Table 5-3). The revised model is a significant improvement ($\Delta\chi^2=263.28, p<0.001$) and improved model fit (CFI=0.93).

The final model is presented in Figure 5-2. Estimates reported for each of the paths represent standardized coefficients. Solid lines represent significant paths; insignificant paths are indicated with dashed lines. All causal paths had signs in the expected direction. Worldviews predicted beliefs about outdoor cats and negative impact beliefs (H1). Respondents with ecocentric worldviews expressed less support for cats outdoors (H1a) and greater negative beliefs (H1b). General beliefs about outdoor cats influenced attitudes toward outdoor cats (H2). Respondents who agreed cats had the right to live outdoors expressed more positive attitudes toward outdoor cats (H2a).

Positive impact beliefs increased positive attitudes toward outdoor cats while negative impact beliefs decreased positive attitudes (H2b). Positive impact beliefs did not directly predict attitudes toward TNR (H2c). General attitudes about outdoor cats predicted both specific attitudes about TNR and attitudes about lethal management (H3).

Respondents with positive attitudes about outdoor cats expressed stronger support for TNR (H3a) and perceived lethal management as less humane (H3b). Both general and specific attitudes influenced behavioral intentions (H4). Respondents with positive attitudes about TNR expressed significantly greater support for non-lethal management (H4a). Respondents who perceived lethal management as humane expressed significantly lower support for TNR (H4b). Contrary to our expectations, worldviews did not influence positive impact beliefs.

Discussion

Successful management implementation requires an understanding of stakeholder perceptions of the humaneness of various management approaches and specific attitudes toward different management approaches prior to management implementation. Wildlife or animal control efforts will be influenced by stakeholder and public perceptions and support (Jacobson, 2009). This study confirmed that stakeholder conflict over cat management preference is driven by fundamental value-laden differences in attitudes about the effectiveness and humaneness of management, as well as beliefs about cat-related impacts. Knowledge of the values underlying attitudes and management support contributes to existing theoretical models of human behavior and can reduce conflict over environmental attitudes and natural resource management (Manfredo, Teel, & Bright, 2003). As hypothesized, results supported the relationships advanced by the cognitive hierarchy and support for the specificity principle (i.e. *specific*

attitudes will predict *specific* intentions better than *general* attitudes) (Fulton et al., 1996; Homer & Kahle, 1988; Vaske & Donnelly, 1999).

Previous research has found that preference for wildlife management is influenced by perceived management effectiveness, animal suffering, environmental impacts, the severity of the problem (Reiter et al., 1999), and beliefs about the outcomes of lethal control (Fulton et al., 2004). We found that support for the management of outdoor cats is driven primarily by attitudes toward lethal management and attitudes toward TNR (e.g., a good management strategy, general support).

Multivariate Relationships between Cognitions

Reliable information about stakeholder attitudes toward management and support for management is a crucial step in minimizing conflict over the lethal management of wildlife (Lauber, Knuth, Tantillo, & Curtis, 2007). Managing outdoor cats and communicating with stakeholder groups involved in this issue requires an understanding of the social-psychological beliefs and attitudes driving support or opposition to TNR and lethal management. Previous research has provided valuable information about public support for cat management (Loyd & Hernandez, 2012; Loyd & Miller, 2010a, 2010b; Peterson et al., 2012), but has not explored the multivariate relationships between cognitions and support for management techniques among active stakeholders. This model confirms that the reasons for individual management preference are multifaceted and influenced by multiple cognitive factors (Fulton et al., 2004). A univariate analysis may have overlooked these relationships.

Attitude Specificity

In this study, “attitudes toward lethal management” was the strongest predictor of management acceptance. “Attitudes toward cat management” was also the strongest

predictor of support for cat management among the general public in Georgia (Loyd & Hernandez, 2012). As expected, general attitudes about outdoor cats did not directly predict management acceptance. Previous research has suggested that the relationship between beliefs as a predictor of attitudes and behaviors is stronger in cases where the beliefs address specific situations or issues (Ajzen & Fishbein, 1997; Fishbein & Ajzen, 1975). General beliefs about hunting were less predictive of support for moose hunting in New Hampshire than specific beliefs about the planned hunt (Donnelly & Vaske, 1995). Attitudes toward healthy ecosystems, cat rights, beliefs about cat management and harm to wildlife were important predictors of support for TNR legislation (Loyd & Hernandez, 2012). Our results suggest that in a multivariate analysis, specific attitudes about lethal management and TNR were more important than general attitudes toward outdoor cats.

Other models and approaches have highlighted the hierarchical relationship between values, attitudes and behaviors and the importance of attitude specificity. The value–belief–norm theory is an adaptation of Stern and Dietz original hypothesis that a person's more general set of values predict attitudes of concern about environmental issues (Stern, Dietz, & Kalof, 1993). The model links environmental values (egoistic, altruistic, and biospheric), with behaviors using individual beliefs and norms as mediators (Stern, Dietz, Abel, Guagnano, & Kalof, 1999). Similar to the model proposed in this study, the foundation for the value-belief-norm theory is the NEP scale (Dunlap & Van Liere, 1978). Our findings support the applicability of a model based on the cognitive hierarchy with worldviews, measured as NEP, as a basis for beliefs about

animals and animal impacts, which predict attitudes toward the humaneness and effectiveness of management, that, in-turn influence behavioral intentions.

Cat-Related Risks and Impacts

The NEP scale is a strong predictor of ecological risk rankings (Slimak & Dietz, 2006), proenvironmental behavior (Cordano, Welcomer, & Scherer, 2003), environmental attitudes, and behavioral intentions (Stern, Kalof, Dietz, & Guagnano, 1995). In this study, NEP was a significant predictor of negative impact beliefs and beliefs about outdoor cats. This result suggests that ecocentric worldviews may contribute to both increased concern about the wildlife risks to cats from predation and competition and concern over the cat welfare and risks related to the outdoor lifestyle. More research is necessary to test this finding.

Our results underscore the important causal link between negative impact beliefs associated with an animal and attitudes toward or support for lethal management. Previous research indicates that support for lethal management for white-tailed deer (*Odocoileus virginianus*), beaver (*Castor canadensis*) and Canada geese (*Branta canadensis*) was related to beliefs about animals as a nuisance (Loker et al., 1999). The acceptability of lethal wildlife management increased as the severity of the impacts to people increased (Wittmann, Vaske, Manfredo, & Zinn, 1998). A study of Illinois residents reported that negative experiences with outdoor cats (problem with cats on property, problem killing birds or small mammals and scaring birds from the birdfeeder) significantly reduced support for TNR ($p < .001$) (Loyd & Miller, 2010a). In our study, individuals who perceived significant negative impacts from outdoor cats were more likely to perceive lethal management methods as humane; negative impacts predicted more of the variance in management support than attitudes about outdoor cats.

Previous research suggested that ecological risk perceptions (the perceived threat to wildlife and ecological systems) are an essential predictor of attitudes toward the lethal management of cats (Loyd & Hernandez, 2012; Peterson et al., 2012). Our findings confirm the importance of impact beliefs on attitudes toward management. Little is currently known about whether cat predation on wildlife influences population or community distribution, diversity and abundance and how important these impacts are compared to alternate sources of wildlife mortality (Calver et al., 2011). It is important to note that even with increased certainty about actual risks, affect for cats (i.e., positive attitudes toward outdoor cats) and positive impact beliefs may continue to minimize risk perceptions and motivate behaviors for some stakeholders (Epstein, 1994; Finucane et al., 2000).

Table 5-1. Reliability and confirmatory factor analysis of latent variables in the final structural equation model

Survey item	Factor loading ¹	Cronbach's α
The New Ecological Paradigm (NEP)		0.86
We are approaching the limit of the number of people that the earth can support	0.67	
Humans have the right to modify the natural environment to suit their needs ²	0.47	
When humans interfere with nature it often produces disastrous consequences	0.50	
Human ingenuity will insure that we do NOT make the earth unlivable ²	0.58	
Humans are severely abusing the environment	0.61	
The earth has plenty of natural resources if we just learn how to develop them ²	0.53	
Plants and animals have as much right as humans to exist	0.51	
The balance of nature is strong enough to cope with the impacts of modern industrial nations ²	0.65	
Despite our social abilities humans are still subject to the laws of nature	0.39	
The so-called "ecological crisis" facing humankind has been greatly exaggerated ²	0.73	
The earth is like a spaceship with very limited room and resources	0.71	
Humans were meant to rule over the rest of nature ²	0.59	
The balance of nature is very delicate and easily upset	0.59	
Humans will eventually learn enough about how nature works to be able to control it ²	0.45	
If things continue on their present course, we will soon experience a major ecological catastrophe	0.74	
Beliefs about outdoor cats		0.90
Cats deserve to be outdoors and free like other animals	0.80	
Wildlife and cats should have equal access to the outdoors	0.79	
I like seeing outdoor cats	0.82	
Outdoor cats should have the right to hunt	0.77	
Outdoor cats live happy and healthy lives	0.70	
Cats should be kept indoors ²	0.59	
Outdoor cats are a problem in Florida ²	0.64	
Perceived negative impacts associated with outdoor cats		0.88
The use of my yard as a litter box by outdoor cats is a nuisance	0.77	
Outdoor cats spread diseases to people	0.80	
Outdoor cats make loud calls and noises	0.70	
Outdoor cats can spread diseases to owned pets	0.74	
Outdoor cats compete with wildlife for food	0.71	
Outdoor cats pose a significant risk to wildlife	0.74	
Perceived positive impacts associated with outdoor cats		0.84
Outdoor cats improve my quality of life	0.97	
Outdoor cats provide me with companionship	0.93	
Outdoor cats kill mice and pests	0.40	

Table 5-1 continued.

Survey item	Factor loading ¹	Cronbach's α
By killing pests, outdoor cats reduce the spread of diseases	0.60	
Attitudes toward TNR		0.86
I support programs to trap-neuter and return outdoor cats	0.90	
Trap-neuter and return programs are a good way to manage outdoor cats	0.86	
I support using tax dollars for low-cost spay-neuter and return programs	0.69	
Perceived humaneness of management		0.77
Placement in a short-term shelter followed by euthanasia	0.94	
Veterinary induced euthanasia	0.86	
Shooting	0.55	
Poisoned baits	0.47	

¹ Factor loadings were standardized and were all significant at $p < 0.05$

² Items were reverse coded

Table 5-2. Test statistics for hypothesized multivariate model

Model	χ^2	<i>df</i>	CFI ¹	RMSEA ²	$\Delta\chi^2$	Δdf
1. Initial	2383	384	0.827	0.083		
2. Revised	809	379	0.926	0.062	1574	5

¹ Confirmatory Fit Index

² Root mean square error of approximation

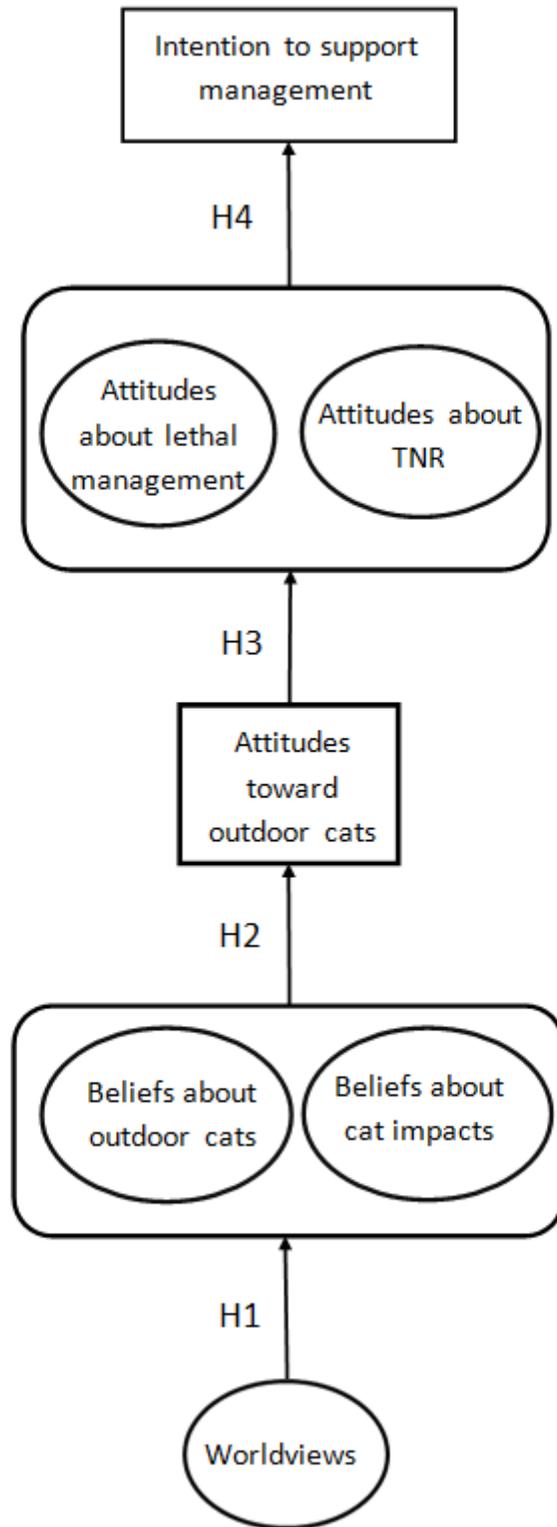


Figure 5-1. A theoretical model of the hypothesized relationships between worldviews, beliefs, attitudes and intention to support management. The four major hypotheses tested are indicated.

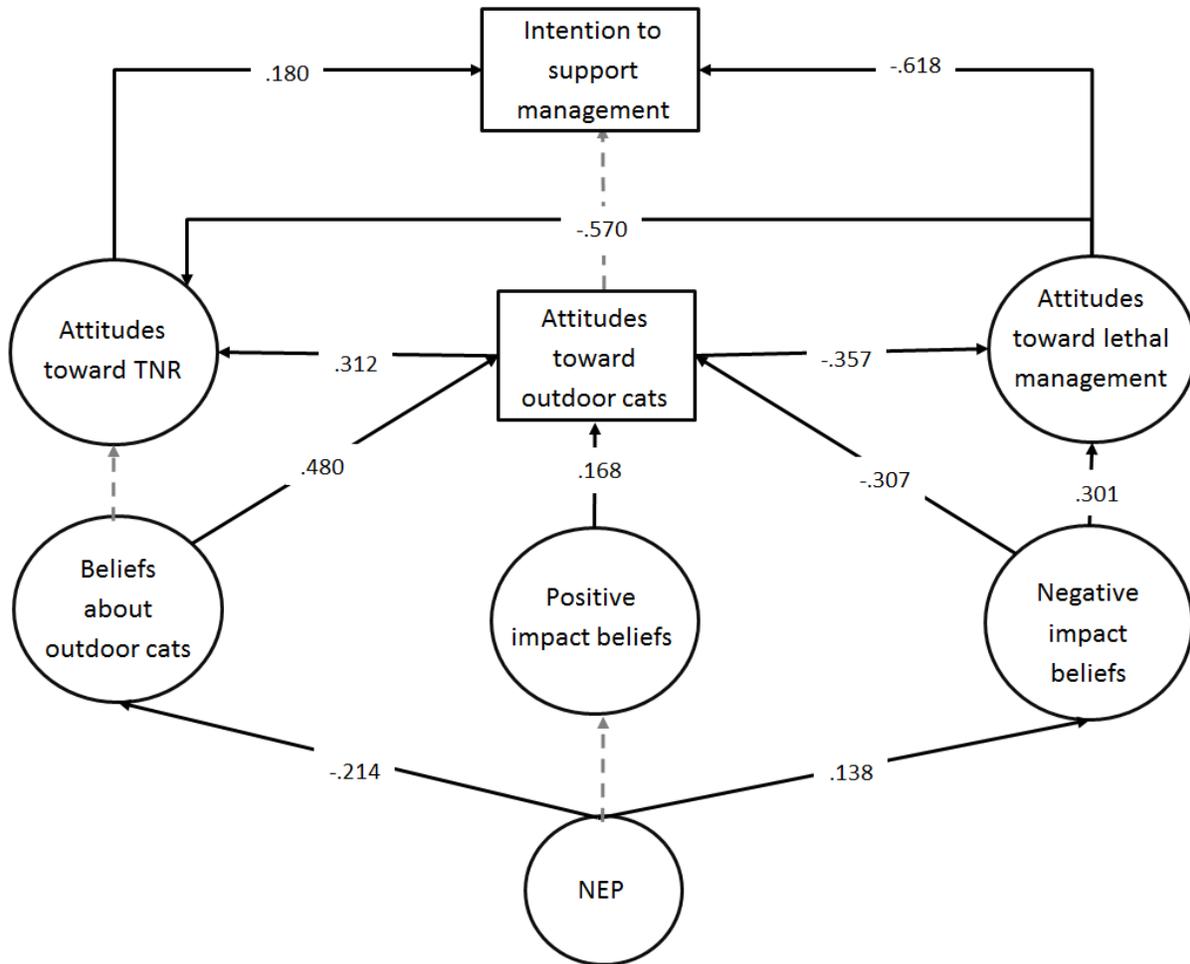


Figure 5-2. Path diagram used in the final structural equation model. Solid black lines indicate significant direct effects ($p < 0.05$) with standardized regression coefficients shown for each line. The error terms associated with the three belief items were allowed to correlate. Therefore the correlation between negative impact beliefs and beliefs about outdoor cats was 0.737. Correlation between positive impact beliefs and beliefs about outdoor cats was 0.768 and the correlation between negative and positive impact beliefs was -0.585.

CHAPTER 6 CONCLUSION

The purpose of this dissertation was to determine how cat-related risk perceptions and benefits influenced tolerance for outdoor cats, attitudes toward cat management, stakeholder group membership and preference for lethal and non-lethal cat management. Chapters 2 and 3 illustrated the importance of perceptions of the current cat population combined with risk perceptions and perceived cat-related benefits in predicting tolerance for outdoor cats. Chapters 4 and 5 confirmed that risks and benefits play a critical role in predicting support for non-lethal management, but suggested that perceptions and the importance of these variables differs significantly between stakeholder groups. The multivariate model tested in Chapter 5 confirmed the importance of specific attitudes about the effectiveness and humaneness of lethal management strategies in predicting management support. These findings contribute to the theoretical framework of risk perceptions and the cognitive hierarchy and provide concrete improvements to the design and implementation of cat management initiatives with widespread stakeholder and public support.

Chapter 2 confirmed the importance of perceptions of the cat population in predicting tolerance for outdoor cats. This finding suggests that campaigns based on concern about the future growth of the cat population may produce decreased tolerance, which could increase support for active management. Unlike previous studies with wildlife, experiences and perceptions of cat-related impacts to wildlife were not significant predictors of tolerance. It is possible these differences were the result of sample selection. Respondents were undergraduates enrolled in general education courses at the University of Florida. It is possible that these students had little direct

experience with outdoor cats, which contributed to the observed differences. It is possible that the lack of concern about this issue, as described by respondents, reduced the role of impact beliefs. These results confirm the importance of Wildlife Acceptance Capacity as a predictor of management support, but experiential differences between respondents may reduce the generalizability of this research.

In the third chapter, we addressed the hypothesis that affection for cats and positive interactions with cats will result in a reduction in the perceived risks cats pose to wildlife and the environment. The benefits perceived from outdoor cats have often been ignored by managers and environmental groups concerned about the potential risks cats pose to the environment. Our results suggest that these benefits are extremely important because they reduce risk perceptions and support for lethal management and should be recognized prior to the implementation of a cat management approach. This finding indicates that messages aimed at generating support for a specific management action may fail if they focus solely on the potential risks or impacts cats may pose to wildlife. In designing an outreach program aimed at generating support for cat management, educators and communicators should consider the important role benefits perceptions played in this study and the minimal role that risk perceptions played.

This is the first study to approach conflict between stakeholders from a neutral perspective. Avoiding reference to cats as feral or wild, use of the term “outdoor cats,” and the acknowledgement of potential benefits stakeholders perceive from outdoor cats represent a significant contribution to this literature. I believe that the high rates of stakeholder and public support for TNR are due to the use of the term “outdoor cats” rather than “feral cats.” Previous studies that have used the term “feral cats” have

reported much higher support for euthanasia (Loyd & Miller 2010b). I believe these differences are due to different perceptions of “outdoor” and “feral” cats, perceptions of the welfare of these animals and the affection people feel for them, which influences management preference. Terminology in quantitative surveys is extremely important and may be driving this result, but it may also reflect the importance of context and species-specific characteristics in public opinions of animals and management techniques (Roskaft, 2003; Riley, 2000).

The fourth chapter identified differences between three stakeholder groups (i.e., Audubon Society members, TNR group members and the general public) and defined the most parsimonious model for predicting membership in these groups. Results indicated that risk perceptions may drive support for lethal management among Audubon group members, but not among TNR group members or the general public. Moreover, affection for cats and cat ownership may drive support for TNR among TNR group members, but not among Audubon group members or the general public. Messages aimed at generating support for management methods among multiple stakeholder groups may need to target different concerns for different groups of stakeholders.

In addition to differences between groups, we also found concrete agreement among stakeholders over the importance of management, with support for mandatory rabies vaccination, owner-provided identification and TNR as a “good management strategy.” More importantly, stakeholders on both sides were unwilling to “do nothing” in terms of cat management. This desire to implement some form of cat management can be an important starting point for discussion between stakeholder groups.

In Chapter 5, the cognitive hierarchy, which posits that values form the basis for beliefs, which influence attitudes, that, in turn predict behavioral intentions, was applied to a multivariate model prediction stakeholder intentions to support non-lethal cat management. This research provided support for using the cognitive hierarchy to understand and predict stakeholder acceptance of management interventions. The results confirmed the hierarchical relationships between worldviews, beliefs, attitudes and behavioral intentions and confirmed that specific attitudes about the effectiveness and humaneness of a management method were more important predictors of management support than general attitudes. These results provide important information that can inform outreach and communication efforts related to the issue of outdoor cats.

Together these studies raise additional questions about the use of risk-based messages to encourage individuals to confine outdoor cats. In the case of undergraduate students, who had little self-reported knowledge of or concern about cat-related risks, perceived benefits mediated the relationship between beliefs and tolerance rather than risk perceptions. The reduced concern over risk perceptions observed in the public and TNR groups compared with the Audubon group members suggests that for the former groups, risk perceptions are not driving attitudes toward management or support for cats outdoors. Given the strong and significantly different opinions about cat-related risks reported by stakeholders, education focused solely on risks or messages that emphasize specific stereotypes about cats may foster additional conflict or alienate stakeholders, rather than motivate collaboration to reduce the outdoor cat population.

We believe these results have implications for wildlife managers and environmental policy makers who attempt to implement lethal or controversial management strategies to remove wildlife. Backlash from stakeholders over the implementation of specific policies may in some cases be driven by concern over the humaneness of the management method, perceived benefits from the referent species or perceived ineffectiveness of the proposed management approach. As the human population grows and comes into greater contact with the environment and wildlife it is imperative that we develop multi-disciplinary approaches to mitigating stakeholder conflicts and cutting-edge techniques for communicating with the public. Despite significant differences between groups about cat impacts and risks, there were areas of agreement about specific management approaches that could provide an important starting point for future efforts to address cat overpopulation. Focusing future efforts on areas of collaboration may help reduce conflict and enable effective efforts to control cat overpopulation. These results contribute to the theoretical framework surrounding stakeholder conflict and identified concrete areas of potential collaboration that apply to a variety of native and non-native animals.

APPENDIX A
STUDENT IN-PERSON SURVEY

Attitudes, Opinions, and Experiences with Outdoor Cats



A survey of undergraduate students
at the University of Florida

Fall 2010

Please return your completed questionnaire to:

The Department of Wildlife Ecology and Conservation

University of Florida • 110 Newins-Ziegler Hall

Please direct questions about this survey to [Dara Wald \(dwald@ufl.edu\)](mailto:dwald@ufl.edu)

OUTDOOR CATS SURVEY



Your participation in this survey is very important and will help us understand individual values, attitudes and perceptions toward the management of outdoor domestic cats. This is a short survey and will take no more than 15 minutes to complete.

Your participation in this study is completely voluntary. Your answers will remain completely confidential. Your name along with any personally identifiable information will not be associated with your answers. If you have questions regarding this study, please feel free to contact me at dwald@ufl.edu.

There are many terms to describe domestic cats, including owned free-roaming animals, friendly strays and unapproachable feral animals. In the following survey, these animals will be referred to as **outdoor cats**.

EXPERIENCE

Please indicate which, if any, of the following types of interactions you have personally experienced in the past year. Circle **All** that apply.

1. Observed an outdoor cat in my neighborhood	Applies	Does not apply
2. Observed an outdoor cat in my yard	Applies	Does not apply
3. Observed an outdoor cat hunting	Applies	Does not apply
4. Observed an outdoor cat scaring birds at my bird feeder	Applies	Does not apply
5. Enjoyed watching an outdoor cat	Applies	Does not apply
6. Had a pet threatened or attacked by an outdoor cat	Applies	Does not apply
7. Fed an outdoor cat	Applies	Does not apply
8. Have heard or read about problems with outdoor cats	Applies	Does not apply
9. Pet an outdoor cat	Applies	Does not apply
10. Have been injured by an outdoor cat	Applies	Does not apply
11. Adopted an outdoor cat	Applies	Does not apply
12. None of the experiences above	Applies	Does not apply
13. Other (please describe below)	Applies	Does not apply

14. How often do you see outdoor cats (not owned by you) in your neighborhood or campus?

Once a Day Once a week Once a month Never Do not know

15. How has the outdoor cat population in your area changed during the past five years?

Decreased Stayed the same Increased Do not know

16. In your community, there are ...

Too many outdoor cats

The right number of outdoor cats

Too few outdoor cats

17. Please indicate what you would like to happen to the outdoor cat population in your area

Decrease

Stay the same

Increase

Do not know

MANAGEMENT

We are interested in your behavior toward outdoor cats and your opinions about the management of these animals. To what extent do you agree or disagree with each of the following statements. Please circle the number that best represents your response to each statement.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree	No opinion
1. Spay, neuter and release programs are an effective method for controlling outdoor cat populations.	1	2	3	4	5	6
2. Trapping and impounding cats is an effective method for controlling outdoor cat populations.	1	2	3	4	5	6
3. The best management is no management; the outdoor cat population should be left alone.	1	2	3	4	5	6
4. There should be a law prohibiting cats from roaming freely.	1	2	3	4	5	6
5. Cats should be allowed to roam freely.	1	2	3	4	5	6
6. Owners should be required to provide identification (tag or microchip) for their cats.	1	2	3	4	5	6
7. I oppose the licensing of cats.	1	2	3	4	5	6
8. Local government should be responsible for controlling outdoor cats.	1	2	3	4	5	6
9. Cats should be kept strictly indoors.	1	2	3	4	5	6
10. I support mandatory spay-neuter laws for cats.	1	2	3	4	5	6
11. I support using tax dollars for low-cost spay-neuter programs for cats.	1	2	3	4	5	6
12. I support laws requiring cats be vaccinated against rabies.	1	2	3	4	5	6
13. Failing to address the management of outdoor cats will have serious implications for my community.	1	2	3	4	5	6

14. Have you made attempts to control outdoor adult cats? Yes No

15. Have you made attempts to control outdoor kittens? Yes No

Please indicate which, if any, of the following actions you have taken to control outdoor cats. Check **All** that apply.

16. Give a cat up for adoption	<input type="radio"/>
17. Spay or neuter a cat	<input type="radio"/>

18. Take a cat to a shelter	<input type="radio"/>
19. Contact a Trap-Neuter and Return organization	<input type="radio"/>
20. None of the above actions	<input type="radio"/>
21. None of the above actions	<input type="radio"/>
22. Other (please describe below)	<input type="radio"/>

23. If you saw an outdoor cat in your yard on a regular basis, you would. Choose **one**.

Take no action	<input type="radio"/>
Contact a cat advocacy organization, such as the Humane Society	<input type="radio"/>
Contact animal control or an animal shelter	<input type="radio"/>
Capture animal and remove to a shelter	<input type="radio"/>
None of the above actions	<input type="radio"/>
Other (please describe below)	<input type="radio"/>

24. Are you aware of any laws in your community regulating outdoor cats?

- Yes
 No
 Do not know

25. These laws are...

- Too strict
 Strict
 Exactly right
 Flexible
 Too flexible
 I don't know

26. Please rate how you perceive the following cat management techniques (1 is not humane, 5 is very humane).

Management Technique	Not Humane		Neutral		Very Humane	No opinion
NON-LETHAL						
Placement in a long-term shelter	1	2	3	4	5	6
Fertility control	1	2	3	4	5	6
Live traps	1	2	3	4	5	6
Do Nothing	1	2	3	4	5	6
LETHAL						
Veterinarian induced euthanasia	1	2	3	4	5	6
Poisoned baits	1	2	3	4	5	6
Shooting	1	2	3	4	5	6

27. Generally speaking, do you care about your friends and family members opinions?

- Yes
 No
 Do not know

The following questions address your friends and family member's opinions about cats. To what extent do you agree or disagree with each of the following statements. Please circle the number that applies best.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree	No opinion
28. People who are important to me think that cats should be kept strictly indoors	1	2	3	4	5	6
29. People who are important to me think that all cats should be spayed or neutered	1	2	3	4	5	6
30. People who are important to me think that all cats should be vaccinated against rabies	1	2	3	4	5	6

ANIMAL WELFARE

To what extent do you agree or disagree with each of the following statements. Please circle the number that represents your response to each statement.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree	No opinion
CAT WELFARE						
1. Outdoor cats live happy and health lives comparable to indoor cats.	1	2	3	4	5	6
2. Most outdoor cats are able to find their way home on their own	1	2	3	4	5	6
3. Most outdoor cats are able to survive without human help.	1	2	3	4	5	6
4. Cats deserve to be outdoors and free like other animals.	1	2	3	4	5	6
5. To protect cats, they should be kept indoors at all times.	1	2	3	4	5	6
6. It is important to me that the issue of outdoor cats be addressed	1	2	3	4	5	6
WILDLIFE						
7. Outdoor cats compete with wildlife species for food.	1	2	3	4	5	6
8. Outdoor cats kill wildlife.	1	2	3	4	5	6
9. Outdoor cats transfer diseases for wildlife.	1	2	3	4	5	6
10. Outdoor cats do not pose a significant threat to wildlife.	1	2	3	4	5	6
11. I am willing to reduce outdoor cats to benefit wildlife.	1	2	3	4	5	6
12. Wildlife and cats should have equal access to the outdoors.	1	2	3	4	5	6

ENVIRONMENTAL VALUES

People around the world are generally concerned about environmental problems because of the consequences that results from harming nature. Please **rank** each of the following items from 1 (most important) to 12 (least important) in response to the questions:

I am concerned for environmental problems because of the consequence for _____.

- | | | |
|-------------------|--------------------|--------------------------------------|
| _____ Plants | _____ Me | _____ People in my country |
| _____ Marine Life | _____ My lifestyle | _____ All people/ humanity |
| _____ Birds | _____ My health | _____ Children |
| _____ Animals | _____ My future | _____ My children/future generations |

Risk

What level of risk do you think each item poses to the environment? Please circle the number that represents your response to each statement.

	No risk		Neutral		Serious risk	No opinion
NATURAL DISTURBANCE						
Natural spread of diseases to wildlife	1	2	3	4	5	6
The killing of wildlife by natural predators	1	2	3	4	5	6
The killing of wildlife by outdoor cats	1	2	3	4	5	6
HUMAN HAZARDS						
Poaching of wildlife	1	2	3	4	5	6
Wildlife deaths caused by motor vehicles and trains	1	2	3	4	5	6
Climate changes or global warming	1	2	3	4	5	6
Habitat loss	1	2	3	4	5	6
Logging or mining	1	2	3	4	5	6
Pollutants found in rivers, lakes and streams	1	2	3	4	5	6
Introduction of nonnative plant and animal species	1	2	3	4	5	6
Emissions from automobiles	1	2	3	4	5	6
Removal of animals through the illegal pet trade	1	2	3	4	5	6

Please rate the extent to which you think outdoor cats pose a risk to ecosystems, wildlife and humans around the world. Circle the item that you think best fits into the blanks provided.

RISK TO ECOSYSTEMS					
Outdoor cats have a/an _____ effect on the environment.	Very negative	Negative	Neutral	Positive	Very positive
The effects of outdoor cats on natural ecosystems are _____ to you personally.	Very unacceptable	Unacceptable	Neutral	Acceptable	Very acceptable
When I think about outdoor cats and their effect on natural ecosystems I feel _____.	Very negative	Negative	Neutral	Positive	Very positive
RISK TO WILDLIFE					
Outdoor cats have a _____ impact on native wildlife	Very negative	Negative	Neutral	Positive	Very positive
Outdoor cats pose a _____ health threat to native wildlife	Very serious	Serious	Neutral	Not serious	None
The effects of outdoor cats on wildlife are _____ to me.	Very unacceptable	Unacceptable	Neutral	Acceptable	Very acceptable
When I think about outdoor cats and their effect on native wildlife I feel _____.	Very negative	Negative	Neutral	Positive	Very positive
RISK TO HUMANS					
Outdoor cats have a _____ impact on me	Very Negative	Negative	Neutral	Positive	Very positive
The presence of outdoor cats in my community is _____ to me.	Very unacceptable	Unacceptable	Neutral	Acceptable	Very acceptable
When I think about outdoor cats and their effect on my community I feel _____.	Very negative	Negative	Neutral	Positive	Very positive

ENVIRONMENTAL BEHAVIOR

How often do you participate in environmental behaviors? Please check the item that best represents your participation level for each activity.

Statement	Daily	Weekly	Monthly	Once a Year
Recycle cans and bottles				
Use public transportation				
Purchase environmentally friendly products				
Pick up litter that is not your own				
Compost food scraps				
Vote for a candidate who supported environmental issues				
Donate money to an environmental group				

WILDLIFE VALUE ORIENTATIONS

People have very different opinions about wildlife and wildlife rights. To what extent do you agree or disagree with each of the following statements. Please circle the number that best represents your response to each statement.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree	No opinion
Healthy populations of fish and wildlife are important to me	1	2	3	4	5	6
We should be sure future generations have an abundance of fish and wildlife	1	2	3	4	5	6
Whether or not I see fish and wildlife it is important to know they exist	1	2	3	4	5	6
Loss of habitat has more impact on wildlife populations than hunting	1	2	3	4	5	6
Wildlife should have the same rights as people	1	2	3	4	5	6
Rights of wildlife to exist are more important than human use of wildlife	1	2	3	4	5	6
Hunting is cruel and inhumane to animals	1	2	3	4	5	6
Wildlife should have the same rights as pets but not humans	1	2	3	4	5	6
Hunting for trophy animals should not be tolerated	1	2	3	4	5	6
Some species are not worth spending money to save	1	2	3	4	5	6
Endangered species should be protected even at the cost of the economy and jobs	1	2	3	4	5	6
Too much attention is given to wildlife in our society	1	2	3	4	5	6

CAT OWNERSHIP

We are interested in understanding more about cat ownership among University students and their reasons for feeding/owning or taking care of animals. Answer only the questions that apply to you and skip the ones that are not relevant to your situation.

1. Which category best describes your feelings about cats?

- Love cats Like cats Do not care about cats Do not like cats Hates cats Do not know

2. Do you feed any stray/outdoor ~~owned~~ cats? Yes No

3. Do you currently own cats? Yes No

If you answered YES to question 3, please continue to question 4.

If you answered NO to question 3, please continue to question 12.

4. How many cats do you currently own? (fill in the blank) _____

5. Are any of your cats allowed outdoors? Yes No

If you are a cat owner, please indicate to what extent you agree or disagree with each of the following statements. Please circle the number that best represents your response to each statement.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree	No opinion
CONTROL						
6. I can control whether my cat/s stay indoors.	1	2	3	4	5	6
7. I can control whether my cat/s are spayed or neutered	1	2	3	4	5	6
8. I can control whether my cats are vaccinated against rabies	1	2	3	4	5	6
ACTIONS						
9. If circumstances allowed, I would keep my cat/s indoors	1	2	3	4	5	6
10. If circumstances allowed, I would get my cat/s spayed or neutered	1	2	3	4	5	6
11. If circumstances allowed, I would have my cat/s vaccinated against rabies	1	2	3	4	5	6

12. In what year were you born 19 _____

13. Please check one: Male or Female

14. How many years have you been a student at UF _____

15. Have you selected a major? Yes No

16. What is your anticipated major _____

Thank you so much for taking the time to complete this survey. Your time is greatly appreciated. Please direct any questions about this survey to dwald@ufl.edu.

This survey was approved by the University of Florida Institutional Review Board Protocol # 2010-U-0730.

APPENDIX B
SURVEY OF STAKEHOLDERS AND THE GENERAL PUBLIC

A Survey of Florida Residents

A study of resident opinions about outdoor cats



Thank you for sharing your opinions about outdoor cats in your community. This survey should take only a few minutes to complete. Your opinions are very important to us.

Please mail your completed survey in the enclosed envelope to:

**Dara Wald
University of Florida
PO Box 110430
Gainesville, FL 32611-0430
Phone: (352) 392-8372**

YOUR EXPERIENCE

There are many terms to describe domestic cats, including owned cats that stay inside or spend some time outside, friendly strays, and unapproachable feral cats. In this survey, any cats that spend time outside will be referred to as **outdoor cats**.

The following questions refer to your experiences with outdoor cats **not owned** by you.

1. Indicate which, if any, of the following types of interactions you have personally experienced with outdoor cats. (Please check [] *all that apply*)



	Yes	No
a. Observed an outdoor cat in my neighborhood	<input type="checkbox"/>	<input type="checkbox"/>
b. Observed an outdoor cat in my yard	<input type="checkbox"/>	<input type="checkbox"/>
c. Observed an outdoor cat hunting	<input type="checkbox"/>	<input type="checkbox"/>
d. Observed an outdoor cat scaring birds at a bird feeder	<input type="checkbox"/>	<input type="checkbox"/>
e. Had a pet threatened or attacked by an outdoor cat	<input type="checkbox"/>	<input type="checkbox"/>
f. Given food to an outdoor cat	<input type="checkbox"/>	<input type="checkbox"/>
g. Have heard or read about problems with outdoor cats	<input type="checkbox"/>	<input type="checkbox"/>
h. Have heard or read about benefits from outdoor cats	<input type="checkbox"/>	<input type="checkbox"/>
i. Pet an outdoor cat	<input type="checkbox"/>	<input type="checkbox"/>
j. Have been injured by an outdoor cat	<input type="checkbox"/>	<input type="checkbox"/>
k. Adopted an outdoor cat	<input type="checkbox"/>	<input type="checkbox"/>
l. Trapped an outdoor cat	<input type="checkbox"/>	<input type="checkbox"/>
m. Seen cats killed on the road	<input type="checkbox"/>	<input type="checkbox"/>
n. Had outdoor cats disturbing my garden	<input type="checkbox"/>	<input type="checkbox"/>
p. Other types of experiences: _____		

2. How often do you see outdoor cats (not owned by you) in your neighborhood?

(Please check [] *only one of the following statements*)

- Don't know
- Never
- Rarely
- Occasionally
- Frequently
- Everyday

3. How has the outdoor cat population changed in your neighborhood in the last five years?

(Please circle the number that best represents your response to each statement)

Decrease greatly							Increase greatly	Don't know
1	2	3	4	5	6	7	DK	

YOUR OPINIONS

The following questions are designed to measure your opinions about outdoor cats.

4a. Which category best describes your feelings about outdoor cats?

(Please circle the number that best represents your response to the statement above)

Unfavorable feeling							Favorable feeling	Don't know
1	2	3	4	5	6	7	DK	

4b. Which category best describes your feelings about domestic cats in general?

(Please circle the number that best represents your response to the statement above)

Hate							Love	Don't know
1	2	3	4	5	6	7	DK	

5. People have many different feelings towards outdoor cats. To what extent do you agree or disagree with each of the following statements?

(Please circle the number that best represents your response to each statement)

Statement	Strongly disagree						Strongly agree		Don't know
a. Cats deserve to be outdoors and free like other animals	1	2	3	4	5	6	7	DK	
b. Wildlife and cats should have equal access to the outdoors	1	2	3	4	5	6	7	DK	
c. Cats should be kept indoors as pets	1	2	3	4	5	6	7	DK	
d. More people should take responsibility for outdoor cats	1	2	3	4	5	6	7	DK	
e. I want to help outdoor cats	1	2	3	4	5	6	7	DK	
f. I worry about the health of outdoor cats	1	2	3	4	5	6	7	DK	
g. I like seeing outdoor cats	1	2	3	4	5	6	7	DK	
h. Outdoor cats are a problem in Florida	1	2	3	4	5	6	7	DK	

Question 5 continued...

People have many different feelings toward outdoor cats. To what extent do you agree or disagree with each of the following statements?

(Please circle the number that best represents your response to each statement)

Statement	Strongly disagree							Strongly agree	Don't know
i. Outdoor cats should have the right to hunt	1	2	3	4	5	6	7	DK	
j. Outdoor cats should be vaccinated against rabies	1	2	3	4	5	6	7	DK	
k. Outdoor cats should have access to food	1	2	3	4	5	6	7	DK	
l. Outdoor cats should have access to shelter	1	2	3	4	5	6	7	DK	
m. Outdoor cats live happy and healthy lives	1	2	3	4	5	6	7	DK	
n. Most outdoor cats are able to find their way home on their own	1	2	3	4	5	6	7	DK	
o. Most outdoor cats are able to survive without human help	1	2	3	4	5	6	7	DK	
p. I worry about the welfare of outdoor cats	1	2	3	4	5	6	7	DK	

THE OUTDOOR CAT POPULATION

The following section asks for your opinion about the outdoor cat population in your neighborhood

6a. In your neighborhood, there are

(Please circle the number that best represents your response to each statement)

Too many outdoor cats				Too few outdoor cats		Don't know
1	2	3	4	5		DK

6b. What you would like to happen to the outdoor cat population in your neighborhood?

(Please circle the number that best represents your response to each statement)

Decrease greatly							Increase greatly	Don't know
1	2	3	4	5	6	7	DK	

NR-P

RISKS and BENEFITS

The following questions are designed to measure your perceptions of the risks and benefits associated with outdoor cats.

7a. People have many perceptions of outdoor cats. To what extent do you agree or disagree with each of the following statements?

(Please circle the number that best represents your response to each statement)

Statement	Strongly disagree						Strongly agree	Don't know
a. Outdoor cats are at risk of being killed or injured by people	1	2	3	4	5	6	7	DK
b. Outdoor cats are at risk of contracting diseases, such as rabies	1	2	3	4	5	6	7	DK
c. Outdoor cats are at risk of injury from other free-roaming pets	1	2	3	4	5	6	7	DK
d. Outdoor cats kill mice and pests	1	2	3	4	5	6	7	DK
e. By killing pests, outdoor cats reduce the spread of diseases	1	2	3	4	5	6	7	DK
f. Outdoor cats provide me with companionship	1	2	3	4	5	6	7	DK
g. Outdoor cats improve my quality of life	1	2	3	4	5	6	7	DK
h. The use of my yard as a litter box by outdoor cats is a nuisance	1	2	3	4	5	6	7	DK
i. Outdoor cats spread diseases to people	1	2	3	4	5	6	7	DK
j. Outdoor cats make loud calls and noises	1	2	3	4	5	6	7	DK
k. Outdoor cats can spread diseases to owned pets	1	2	3	4	5	6	7	DK
l. Outdoor cats compete with wildlife for food	1	2	3	4	5	6	7	DK
m. Outdoor cats spread diseases to wildlife	1	2	3	4	5	6	7	DK
n. Outdoor cats kill wildlife	1	2	3	4	5	6	7	DK
o. Outdoor cats pose a significant risk to wildlife	1	2	3	4	5	6	7	DK

7b. How important are the following issues to you?

(Please circle the number that best represents your response to each statement)

Statement	Not at all important							Extremely important	Don't know
	1	2	3	4	5	6	7		
a. Outdoor cats are killed or injured by people	1	2	3	4	5	6	7	DK	
b. Outdoor cats contract diseases, such as rabies	1	2	3	4	5	6	7	DK	
c. Outdoor cats live shorter lives than indoor only cats	1	2	3	4	5	6	7	DK	
d. Outdoor cats are injured or attacked by free-roaming pets	1	2	3	4	5	6	7	DK	
e. Outdoor cats compete with wildlife for food	1	2	3	4	5	6	7	DK	
f. Outdoor cats spread diseases to wildlife	1	2	3	4	5	6	7	DK	
g. Outdoor cats kill wildlife	1	2	3	4	5	6	7	DK	
h. Outdoor cats provide benefits to people	1	2	3	4	5	6	7	DK	
i. Outdoor cats pose risks to people	1	2	3	4	5	6	7	DK	

8. What level of risk do you think each item poses to environmental health?

(Please circle the number that best represents your opinion for each statement)

Statement	No risk							Serious risk	Don't know
	1	2	3	4	5	6	7		
a. Death of wildlife from diseases	1	2	3	4	5	6	7	DK	
b. Death of wildlife from natural predators	1	2	3	4	5	6	7	DK	
c. Death of wildlife from outdoor cats	1	2	3	4	5	6	7	DK	
d. Wildlife poaching	1	2	3	4	5	6	7	DK	
e. Wildlife deaths by car collision	1	2	3	4	5	6	7	DK	
f. Climate change or global warming	1	2	3	4	5	6	7	DK	
g. Habitat loss	1	2	3	4	5	6	7	DK	
h. Logging or mining	1	2	3	4	5	6	7	DK	
i. Pollutants in waterways	1	2	3	4	5	6	7	DK	
j. The spread of non-native plants and animals	1	2	3	4	5	6	7	DK	
k. Emissions from automobiles	1	2	3	4	5	6	7	DK	
l. The illegal pet trade	1	2	3	4	5	6	7	DK	

9a. How much risk do the following animals pose to your health and safety?
 (Please circle the number that best represents your opinion for each statement)

Statement	No risk						Serious risk	Don't know
	1	2	3	4	5	6		
a. Raccoon	1	2	3	4	5	6	7	DK
b. Opossum	1	2	3	4	5	6	7	DK
c. Outdoor cat	1	2	3	4	5	6	7	DK
d. Free-roaming dog	1	2	3	4	5	6	7	DK
e. Bat	1	2	3	4	5	6	7	DK
f. Coyote	1	2	3	4	5	6	7	DK

9b. Which of the following animals is native or exotic.
 (Please circle the number that best represents your opinion for each statement)

	Native	Exotic
a. Raccoon	1	2
b. Armadillo	1	2
c. Outdoor cat	1	2
d. White tailed deer	1	2
e. Bat	1	2
f. Coyote	1	2

YOUR PERCEPTIONS

The following questions are designed to help us understand your opinions about the interaction between outdoor cats, people, wildlife, and the environment.

10a. The effect of outdoor cats on me is
 (Please circle the number that most closely represents your perception)

Negative						Positive	Don't know
1	2	3	4	5	6	7	DK
Unacceptable						Acceptable	Don't know
1	2	3	4	5	6	7	DK

10b. The effect of outdoor cats on native wildlife is
 (Please circle the number that most closely represents your perception)

Negative						Positive	Don't know
1	2	3	4	5	6	7	DK
Unacceptable						Acceptable	Don't know
1	2	3	4	5	6	7	DK

10c. The effect of outdoor cats on the ecosystem is

(Please circle the number that most closely represents your perception)

Negative							Positive	Don't know
1	2	3	4	5	6	7	DK	
Unacceptable							Acceptable	Don't know
1	2	3	4	5	6	7	DK	

10d. What level of risk does predation by outdoor cats pose to wildlife?

(Please circle the number that most closely represents your perception)

Not serious							Extremely serious	Don't know
1	2	3	4	5	6	7	DK	

10e. What level of risk do outdoor cats pose to the ecosystem?

(Please circle the number that most closely represents your perception)

Not serious							Extremely serious	Don't know
1	2	3	4	5	6	7	DK	

10f. What level of risk do outdoor cats pose to me?

(Please circle the number that most closely represents your perception)

Not serious							Extremely serious	Don't know
1	2	3	4	5	6	7	DK	

10g. Outdoor cats provide me with personal benefits

(please circle the number that most closely represents your opinion)

Strongly disagree							Strongly agree	Don't know
1	2	3	4	5	6	7	DK	

MANAGEMENT

There are many different ways to manage and control outdoor cats. The questions below ask for your opinion about the management of these animals.

11a. Are you familiar with programs that Trap-Neuter and Return cats (Capture the animal, sterilize it and return the cat back to the area where it was found)?

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

11b. To what extent do you agree or disagree with each of the following statements?
(Please circle the number that best represents your opinion for each statement)

Statement	Strongly disagree						Strongly agree	Don't know
	1	2	3	4	5	6	7	DK
a. I support programs to trap-neuter and return outdoor cats	1	2	3	4	5	6	7	DK
b. I support programs to trap and impound outdoor cats	1	2	3	4	5	6	7	DK
c. The outdoor cat population should be left alone	1	2	3	4	5	6	7	DK
d. I oppose any program that reduces the outdoor cat population	1	2	3	4	5	6	7	DK
e. Owners should be prohibited from allowing cats to roam outdoors	1	2	3	4	5	6	7	DK
f. Owners should be required to provide identification (tag or microchip) for their cats	1	2	3	4	5	6	7	DK
g. Local governments should be responsible for controlling outdoor cats	1	2	3	4	5	6	7	DK
h. Trap-neuter and return programs are a good way to manage outdoor cats	1	2	3	4	5	6	7	DK
i. Removal to an animal shelter is a good way to manage outdoor cats	1	2	3	4	5	6	7	DK
j. I support mandatory spay-neuter laws for cats	1	2	3	4	5	6	7	DK
k. I support laws requiring cats be vaccinated against rabies	1	2	3	4	5	6	7	DK
l. I support using tax dollars to fund animal control shelters	1	2	3	4	5	6	7	DK
m. I support using tax dollars for low-cost spay-neuter and return programs	1	2	3	4	5	6	7	DK
n. Local governments do a good job of managing outdoor cats	1	2	3	4	5	6	7	DK

NR-P

12. Which of the following management actions do you prefer for managing unowned outdoor cats?
 (Please check [] only **one** of the following statements)

<input type="checkbox"/>	Trap-neuter, and return; Capture animal, sterilize and return the cat back to the outdoors
<input type="checkbox"/>	Placement in a long-term, no kill sanctuary
<input type="checkbox"/>	Trap and euthanize
<input type="checkbox"/>	No management – Animal will remain outdoors without any help or assistance from people

13. In your opinion, how humane are the following methods for managing outdoor cats?
 (Please circle the number that best represents your opinion)

Statement	Not humane							Very humane	Don't know
	1	2	3	4	5	6	7		
a. Placement in a long-term no-kill sanctuary	1	2	3	4	5	6	7	DK	
b. Fertility control (such as spay/neuter)	1	2	3	4	5	6	7	DK	
c. Trap-neuter, and return	1	2	3	4	5	6	7	DK	
d. Doing nothing	1	2	3	4	5	6	7	DK	
e. Placement in a short-term shelter followed by euthanasia	1	2	3	4	5	6	7	DK	
f. Placement in a short-term shelter followed by adoption	1	2	3	4	5	6	7	DK	
g. Veterinary induced euthanasia	1	2	3	4	5	6	7	DK	
h. Shooting	1	2	3	4	5	6	7	DK	
i. Poisoned baits	1	2	3	4	5	6	7	DK	

14. If you saw an outdoor cat in your yard on a regular basis, you would
 (Please check [] only **one** of the following statements)

<input type="checkbox"/>	Take no action
<input type="checkbox"/>	Contact a cat advocacy organization, such as the Humane Society
<input type="checkbox"/>	Contact animal control to remove it
<input type="checkbox"/>	Capture the animal and remove it to an animal shelter
<input type="checkbox"/>	Try to find the owner
<input type="checkbox"/>	Arrange for trap-neuter, and return
<input type="checkbox"/>	Adopt it
<input type="checkbox"/>	Feed it
<input type="checkbox"/>	Don't Know

15a. Have you made attempts to control outdoor cats/kittens (not owned by you)?

- Yes
 No → *If you answered NO, please skip to question number 16.*

*If you answered YES to the previous question, please continue **HERE**. If not, please continue to the next section.*

15b. Please indicate which, if any, of the following actions you have taken to control outdoor cats. (Please check all that apply)

<input type="checkbox"/>	Adopted an outdoor cat
<input type="checkbox"/>	Found a home for an outdoor cat
<input type="checkbox"/>	Paid to have a cat spayed or neutered
<input type="checkbox"/>	Taken a cat to a long-term shelter or sanctuary (no kill)
<input type="checkbox"/>	Taken a cat to a short-term shelter
<input type="checkbox"/>	Contacted a trap-neuter and return organization
<input type="checkbox"/>	Contacted animal control about nuisance cats
<input type="checkbox"/>	None of the experiences above
<input type="checkbox"/>	Other experiences _____

PEOPLE AND THE ENVIRONMENT

16. To what extent do you agree or disagree with each of the following statements?
(Please circle the number that best represents your response to each statement)

Statement	Strongly disagree							Strongly agree	Don't know
	1	2	3	4	5	6	7	DK	
a. We are approaching the limit of the number of people that the earth can support	1	2	3	4	5	6	7	DK	
b. Humans have the right to modify the natural environment to suit their needs	1	2	3	4	5	6	7	DK	
c. When humans interfere with nature it often produces disastrous consequences	1	2	3	4	5	6	7	DK	
d. Human ingenuity will insure that we do NOT make the earth unlivable	1	2	3	4	5	6	7	DK	
e. Humans are severely abusing the environment	1	2	3	4	5	6	7	DK	
f. The earth has plenty of natural resources if we just learn how to develop them	1	2	3	4	5	6	7	DK	
g. Plants and animals have as much right as humans to exist	1	2	3	4	5	6	7	DK	

Question 16 continued...

To what extent do you agree or disagree with each of the following statements?

(Please circle the number that best represents your response to each statement)

Statement	Strongly disagree							Strongly agree	Don't know
	1	2	3	4	5	6	7	DK	
h. The balance of nature is strong enough to cope with the impacts of modern industrial nations	1	2	3	4	5	6	7	DK	
i. Despite our social abilities humans are still subject to the laws of nature	1	2	3	4	5	6	7	DK	
j. The so-called "ecological crisis" facing humankind has been greatly exaggerated	1	2	3	4	5	6	7	DK	
k. The earth is like a spaceship with very limited room and resources	1	2	3	4	5	6	7	DK	
l. Humans were meant to rule over the rest of nature	1	2	3	4	5	6	7	DK	
m. The balance of nature is very delicate and easily upset	1	2	3	4	5	6	7	DK	
n. Humans will eventually learn enough about how nature works to be able to control it	1	2	3	4	5	6	7	DK	
o. If things continue on their present course, we will soon experience a major ecological catastrophe	1	2	3	4	5	6	7	DK	

BACKGROUND INFORMATION

17. How often do you participate in any of the following behaviors?

(Please check [x] the item that best represents your participation level for each activity)

	Daily	Weekly	Monthly	Once a year	Never
a. Recycle cans and bottles	[]	[]	[]	[]	[]
b. Use public transportation or a bicycle	[]	[]	[]	[]	[]
c. Purchase environmentally friendly products	[]	[]	[]	[]	[]
d. Pick up trash that is not your own	[]	[]	[]	[]	[]
e. Compost food scraps	[]	[]	[]	[]	[]
f. Vote for a candidate because he/she supports environmental issues	[]	[]	[]	[]	[]
g. Donate money to an environmental group	[]	[]	[]	[]	[]
h. Feed birds	[]	[]	[]	[]	[]
i. Donate money to an animal welfare group	[]	[]	[]	[]	[]
j. Vote for a candidate because he/she supports animal welfare issues	[]	[]	[]	[]	[]

18. Do you currently own cats?

- Yes
 No → *If you answered NO, please skip to question number 22.*

19. How many cats do you currently own?
(Please check [x] only one of the following statements)

- 1
 2
 3
 4
 More than 4

20. Are any of your cats allowed outdoors?

- Yes
 No

** Cat owners continue [HERE](#). If you do not own cats, please continue to question 22.*

21. Please indicate to what extent you agree or disagree with each of the following statements.
(Please circle the number that best represents your response to each statement)

Statement	Strongly disagree							Strongly agree	Don't know
	1	2	3	4	5	6	7	DK	
a. I can control whether my cat(s) stay indoors	1	2	3	4	5	6	7	DK	
b. I can control whether my cat(s) are spayed or neutered	1	2	3	4	5	6	7	DK	
c. I can control whether my cat(s) are vaccinated against rabies	1	2	3	4	5	6	7	DK	
d. I intend to keep my cat(s) indoors	1	2	3	4	5	6	7	DK	
e. I intend to get my cat(s) spayed or neutered	1	2	3	4	5	6	7	DK	
f. I intend to have my cat(s) vaccinated against rabies	1	2	3	4	5	6	7	DK	

22a. Please fill in the following information.

(Please check [] all that apply)

	I am a member of	I donate money to	I attend member meetings	I volunteer for
Organization that supports Trap-neuter and return	[]	[]	[]	[]
The Audubon Society	[]	[]	[]	[]
The Humane Society	[]	[]	[]	[]
Alley Cat Allies	[]	[]	[]	[]
American Bird Conservancy	[]	[]	[]	[]
Other animal welfare or conservation organization	[]	[]	[]	[]

22b. I have been a member of this organization for

(Please check [] the box that best represents your response to this statement)

	Less than one year	1-2 years	3-5 years	6-10 years	More than 10 years
Organization that supports Trap-neuter and return	[]	[]	[]	[]	[]
The Audubon Society	[]	[]	[]	[]	[]
The Humane Society	[]	[]	[]	[]	[]
Alley Cat Allies	[]	[]	[]	[]	[]
American Bird Conservancy	[]	[]	[]	[]	[]
Other animal welfare or conservation organization	[]	[]	[]	[]	[]

23. Do you currently feed outdoor only cats (not owned by you)?

Yes

No → *If you answered NO, please skip to question number 26.*

24. If yes, how many cats do you typically feed?

1-5

6-10

11-20

21-30

31-50

More than 50

25. Do you manage a cat colony?

Yes

No

26. How long have you lived at your current residence?

- Less than 1 year
- 1-5 years
- 6-10 years
- 11-15 years
- More than 15 years

27. In which year were you born?

Y Y.Y Y

28. I am

- Male
- Female

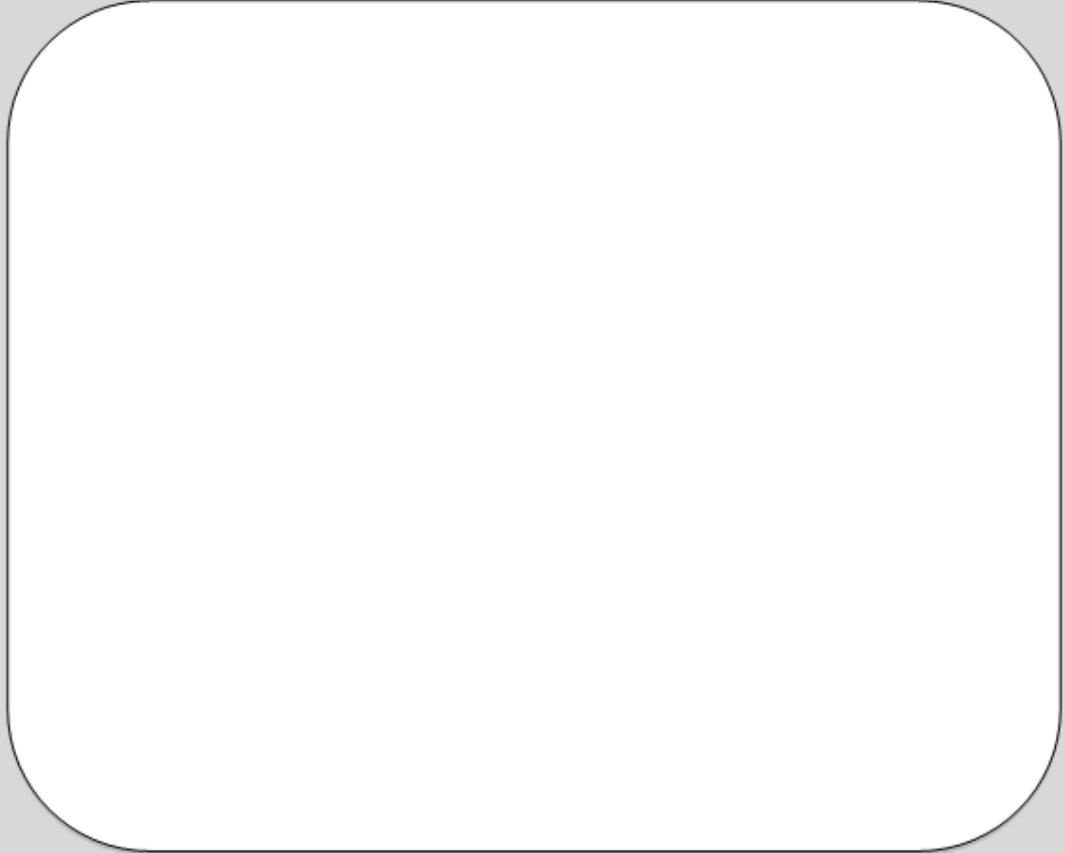
Thank you so much for taking the time to complete this survey. Your time is greatly appreciated. Please direct any questions about this survey to [Dara Wald](#) (352) 392-8372

This survey was approved by the University of Florida Institutional Review Board Protocol # 2010-U-0730.

NR-P

Thank you for your participation in this survey!

If you have any additional thoughts about any of the topics in the survey,
please share them here.



Dara Wald
University of Florida
PO Box 110430
Gainesville, FL 32611-0430
Phone: (352) 392-8372

NR-P

P

LIST OF REFERENCES

- Agee, J. D., & Miller, C. (2009). Factors contributing toward acceptance of lethal control of black bears in central Georgia, USA. *Human Dimensions of Wildlife: An International Journal*, 14(3), 198.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ.
- Ajzen, I., & Fishbein, M. (1997). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological bulletin*, 84(5), 888-918.
- Alhakami, A. S., & Slovic, P. (1994). A psychological study of the inverse relationship between perceived risk and perceived benefit. *Risk Analysis*, 14(6), 1085-1096.
- Alley Cat Allies. (2009). Fiscal Year 2009 Annual Report.
- American Bird Conservancy. (2004). Managed cat colonies: The wrong solution to a tragic problem.
- American Pet Products Manufacturers Association (APPMA). (2010). 2009-2010 National Pet Owners Survey press release. Greenwich, CT: American Pet Products Manufacturers Association Inc.
- American Pet Products Manufacturers Association (APPMA). (2012). National Pet Owners Survey 2011-2012. Greenwich, CT: American Pet Products Manufacturers Association Inc.
- Ash, S. J., & Adams, C. E. (2003). Public preferences for free-ranging domestic cat (*Felis catus*) management options. *Wildlife Society Bulletin*, 31(2), 334-339.
- Audubon Florida (2012). <http://fl.audubon.org/> (Last accessed 12/1/2012).
- Axelrod, L. J., McDaniels, T., & Slovic, P. (1999). Perceptions of ecological risk from natural hazards. *Journal of Risk Research*, 2(1), 31-53.
- Baker, P. J., Ansell, R. J., Dodds, P. A. A., Webber, C. E., & Harris, S. (2003). Factors affecting the distribution of small mammals in an urban area. *Mammal Review*, 33(1), 95-100.
- Baker, P. J., Molony, S. E., Stone, E., Cuthill, I. C., & Harris, S. (2008). Cats about town: is predation by free-ranging pet cats *Felis catus* likely to affect urban bird populations? *Ibis*, 150, 86-99.
- Baron, R. M., & Kenny, D. A. (1986). The Moderator-Mediator variable distinction in Social Psychological research: Conceptual, strategic, and statistical considerations. *Personality and Social Psychology*, 51, 1173-1182.

- Barratt, D. G. (1997). Predation by House Cats, (*Felis catus*), in Canberra, Australia: Prey Composition and Preference. *Wildlife Research*, 24(3), 263-277.
- Barrows, P. L. (2004). Professional, ethical, and legal dilemmas of trap-neuter-release. *Journal of the American Veterinary Medical Association*, 225(9), 1365-1369.
- Beckerman, A. P., Boots, M., & Gaston, K. J. (2007). Urban bird declines and the fear of cats. *Animal Conservation*, 10(3), 320-325.
- Berkeley, E. P. (2004). *TNR Past present and future: A history of the trap-neuter-return movement*. Washington, DC: Alley Cat Allies.
- Bjurlin, C. D., & Cypher, B. L. (2005). Encounter frequency with the urbanized San Joaquin kit fox correlates with public beliefs and attitudes toward the species (Vol. 22, pp. 107(109)).
- Bradshaw, J. W. S. (1992). *The behavior of the domestic cat*. Wallingford, UK: CAB International.
- Breakwell, G. M. (2007). *The Psychology of Risk* (Vol. First). University Press, Cambridge: Cambridge University Press.
- Bright, A. D., & Manfredi, M. J. (1996). A conceptual model of attitudes toward natural resource issues: a case study of wolf reintroduction. *Human Dimensions of Wildlife: An International Journal*, 1(1), 1-21.
- Brooks, J. J., Warren, R. J., & Nelms, M. G. (1999). Visitor attitudes toward and knowledge of restored bobcats on Cumberland Island National Seashore, Georgia. *Wildlife Society Bulletin*, 27(4), 1089-1097.
- Calver, M. C., Grayson, J. L., Lilith, M., & Dickman, C. R. (2011). Applying the precautionary principle to the issue of impacts by pet cats on urban wildlife. *Biological Conservation*, 144, 1895-1901.
- Campbell, J. M., & Mackay, K. (2003). Attitudinal and Normative Influences on Support for Hunting as a Wildlife Management Strategy. *Human Dimensions of Wildlife*, 8(3), 181-198.
- Carey, J. (2012, March 20, 2011). Cat Fight. *Conservation Magazine*.
- Carpenter, L. H., Decker, D. J., & Lipscomb, J. F. (2000). Stakeholder Acceptance Capacity in Wildlife management. *Human Dimensions of Wildlife: An International Journal*, 5(3), 5.
- Cavanagh, N., McDaniels, T., Axelrod, L., & Slovic, P. (2000). Perceived ecological risks to water environments from selected forest industry activities. *Forest Science*, 46(3), 344-355.

- CDC. (2012a). Rabies Surveillance Data in the United States. from <http://www.cdc.gov/rabies/location/usa/surveillance/index.html> (Last accessed 12/1/2012).
- CDC. (2012b). Recovery of a Patient from Clinical Rabies—California, 2011 *Morbidity and Mortality Weekly Report* (Vol. 4, pp. 61-64).
- Centonze, L. A., & Levy, J. K. (2002). Characteristics of free-roaming cats and their caretakers. *Journal of the American Veterinary Medical Association*, 220(11), 1627-1633.
- Chase, L. C., Schusler, T. M., & Decker, D. J. (2000). Innovations in Stakeholder Involvement: What's the Next Step? *Wildlife Society Bulletin*, 28(1), 208-217.
- Clancy, E. A., Moore, A. S., & Bertone, E. R. (2003). Evaluation of cat and owner characteristics and their relationships to outdoor access of owned cats. *Journal of the American Veterinary Medical Association*, 222(11), 1541-1545.
- Clark, C. (2011). A plan to rid Keys of predator species, *The Miami Herald*.
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (Vol. 2nd). Mahwah, NJ: Lawrence Erlbaum Associates.
- Coleman, J. S., & Temple, S. A. (1993). Rural Residents' Free-Ranging Domestic Cats: A Survey. *Wildlife Society Bulletin*, 21(4), 381-390.
- Coleman, J. S., Temple, S. A., & Craven, S. R. (1997). Cats and Wildlife a Conservation Dilemma (Vol. Extension article). University of Wisconsin-Extension, Cooperative Extension.
- Cordano, M., Welcomer, S. A., & Scherer, R. F. (2003). An Analysis of the Predictive Validity of the New Ecological Paradigm Scale. *The Journal of Environmental Education*, 34(3), 22-28.
- Czech, B., Devers, P. K., & Krausman, P. R. (2001). The Relationship of Gender to Species Conservation Attitudes. *Wildlife Society Bulletin*, 29(1), 187-194.
- Dabritz, H. A., Atwill, E. R., Gardner, I. A., Miller, M. A., & Conrad, P. A. (2006). Outdoor fecal deposition by free-roaming cats and attitudes of cat owners and nonowners toward stray pets, wildlife, and water pollution. *Journal of the American Veterinary Medical Association*, 229(1), 74-81.
- Dauphine, N., & Cooper, R. J. (2008). *Impacts of Free-Ranging Domestic Cats (Felis catus) on Birds in the United States: A Review of Recent Research with Conservation and Management Recommendations*. Paper presented at the Proceedings of the Fourth International Partners in Flight Conference: Tundra to Tropics.

- Decker, D. J., Brown, T. L., & Siemer, W. F. (2001). *Human dimensions of wildlife management in North America*. Bethesda, Md.: Wildlife Society.
- Decker, D. J., & Connelly, N. A. (1989). Motivations for deer hunting: Implications for antlerless deer harvest as a management tool. *Wildlife Society Bulletin*, 17(4), 455-463.
- Decker, D. J., & Purdy, K. G. (1988). Toward A Concept of Wildlife Acceptance Capacity in Wildlife Management. *Wildlife Society Bulletin*, 16(1), 53-57.
- Department of Health and Human Services. (2010). Center for Disease Control and Prevention: About Rabies. <http://www.cdc.gov/RABIES/> (Last accessed 12/1/2012).
- Dillman, D. A. (1999). *Mail and Internet Surveys: The tailored design method* (Vol. 2nd). New York, NY: John Wiley & Sons.
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2009). *Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method* (Vol. Third). Hoboken, New Jersey: John Wiley & Sons, Inc.
- Donnelly, M. P., & Vaske, J. J. (1995). Predicting attitudes toward a proposed moose hunt. *Society and Natural Resources*, 8(4), 307-319.
- Dorn, M. L., & Mertig, A. G. (2005). Bovine tuberculosis in Michigan: stakeholder attitudes and implications for eradication efforts. *Wildlife Society Bulletin*, 33(2), 539-552.
- Drennan, S. R. (2012). Cats. <http://web4.audubon.org/local/cn/98march/cats.html> (Last accessed 12/1/2012)
- Dubey, J. P., Miller, N. L., & Frenkel, J. K. (1970). Characterization of the New Fecal Form of *Toxoplasma gondii*. *The Journal of parasitology*, 56(3), pp. 447-456.
- Dunlap, R. E., & Van Liere, K. D. (1978). The "new ecological paradigm": A proposed measuring instrument and preliminary results. *Journal of Environmental Education.*, 9, 10-19.
- Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New Trends in Measuring Environmental Attitudes: Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. *Journal of Social Issues*, 56(3), 425-442. doi: 10.1111/0022-4537.00176
- Edgell, M. C. R., & Nowell, D. E. (1989). The new environmental paradigm scale: Wildlife and environmental beliefs in British Columbia. *Society & Natural Resources*, 2(1), 285-296.

- Enck, J. W., Connelly, N. A., & Brown, T. L. (1996). Management Response to Beaver Complaints: Defining Problems and Acceptable Solutions (Vol. 96-3). Ithaca, NY: Human Dimensions Resource Unit, Department of Natural Resources Unit, Cornell University.
- Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *American Psychologist*, 49(8), 709-724.
- Ericsson, G., & Heberlein, T. A. (2003). Attitudes of hunters, locals, and the general public in Sweden now that the wolves are back. *Biological Conservation*, 111(2), 149-159.
- Finucane, M. L., Akhikami, A., Slovic, P., & Johnson, S. M. (2000). The affect heuristic in judgements of risks and benefits *The Perception of Risk* (Vol. first, pp. 413-429). London, UK: Earthscan Publications Ltd.
- Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., & Combs, B. (1978). How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. *Policy Sciences*, 9(2), 127-152.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior*. Reading, MA: Addison-Wesley.
- Fisher, R., & Ury, W. (1991). *Getting To Yes: Negotiating Agreement Without Giving In* (Vol. 2nd). New York, USA: Penguin Books.
- Forys, E. A., & Humphrey, S. R. (1999). Use of Population Viability Analysis to Evaluate Management Options for the Endangered Lower Keys Marsh Rabbit. *The Journal of Wildlife Management*, 63(1), pp. 251-260.
- Frank, P. A., & Humphrey, S. R. (1996). Populations, habitat requirements, and management of the endemic Anastasia Island beach mouse (*Peromyscus polionotus phasma*), emphasizing the potential threat of exotic house mice (*Mus musculus*) (Vol. vi., pp. 46). Tallahassee, FL: Florida Game and Fresh Water Fish Comm.
- Freudenburg, W. R. (1992). Nothing recedes like success? Risk analysis and the organizational amplification of risks. *Risk: Issues in Health and Safety*, 3(1), 1-35.
- Friedmann, E. (1995). The role of pets in enhancing human well being: Physiological effects. In I. Robinson (Ed.), *The Waltham book of human-animal interaction* (Vol. first, pp. 33-54). Tarrytown, NY: Elsevier.
- Friedmann, E., Katcher, A. H., Lynch, J. J., & Thomas, S. A. (1985). Animal companions and one-year survival of patients after discharge from a coronary care unit. *Public Health Reports*, 95(4), 307-312.

- Fulton, D. C., Manfredo, M. J., & Lipscomb, J. (1996). Wildlife value orientations: A conceptual and measurement approach. *Human Dimensions of Wildlife: An International Journal*, 1(2), 24.
- Fulton, D. C., Skerl, K., Shank, E. M., & Lime, D. W. (2004). Beliefs and Attitudes toward Lethal Management of Deer in Cuyahoga Valley National Park. *Wildlife Society Bulletin*, 32(4), 1166-1176.
- Gore, J. A. (1996). Least Tern, *Sterna antillarum antillarum*. In J. Rodgers, H. Kale & H. Smith (Eds.), *Rare and Endangered Biota of Florida* (Vol. 5). Gainesville, FL: University Press of Florida.
- Gore, M. L., & Knuth, B. A. (2009). Mass Media Effect on the Operating Environment of a Wildlife-Related Risk-Communication Campaign. *Journal of Wildlife Management*, 73(8), 1407-1413.
- Gore, M. L., Siemer, W. F., Shanahan, J. E., Schuefele, D., & Decker, D. J. (2005). Effects on Risk Perception of Media Coverage of a Black Bear-Related Human Fatality. *Wildlife Society Bulletin*, 33(2), pp. 507-516.
- Gorman, J. (2003). Bird Lovers Hope to Keep Cats on a Very Short Leash, *The New York Times*.
- Graham, G. (2012). Feral cats run wild in Saco, but not for long, *The Portland Press Herald*. Retrieved from <http://www.pressherald.com/news/Feral-cats-run-wild-in-Saco-but-not-for-long.html?pageType=mobile&id=1> (Last accessed 12/1/2012).
- Granger, M., & Carnegie, M. (2011). Certainty, uncertainty, and climate change. *Climate Change*, 108(4), 707-721.
- Grayson, J., Calver, M., & Styles, I. (2002). Attitudes of suburban Western Australians to proposed cat control legislation. *Australian Veterinary Journal*, 80(9), 536-543.
- Groves, R. M. (2006). Nonresponse Rates and Nonresponse Bias in Household Surveys. *Public opinion quarterly*, 70(5), 646-675.
- Groves, R. M., & Peytcheva, E. (2008). The Impact of Nonresponse Rates on Nonresponse Bias. *Public opinion quarterly*, 72(2), 167-189.
- Hart, P. S., Nisbet, E. C., & Shanahan, J. E. (2011). Environmental Values and the Social Amplification of Risk: An Examination of How Environmental Values and Media Use Influence Predispositions for Public Engagement in Wildlife Management Decision Making. *Society & Natural Resources*, 24(3), 276-291.
- Hatley, P. J. (2003). Feral Cat Colonies in Florida: The Fur and Feathers are Flying. *Journal of Land Use and Environmental Law*, 18(Spring), 441-466.

- Hawkins, C. C. (1998). *Impact of a subsidized exotic predator on native biota: Effect of house cats (Felis catus) on California birds and rodents*. (Ph.D.), Texas A&M University, United States -- Texas. Retrieved from <http://search.proquest.com/docview/304479999?accountid=10920> (Last accessed 12/1/2012).
- Hayes, A. F., & Preacher, K. J. (2010). Quantifying and Testing Indirect Effects in Simple Mediation Models When the Constituent Paths are Nonlinear. *Multivariate Behavioral Research*, 45, 627-660.
- Homer, P. M., & Kahle, L. R. (1988). A structural equation test of the value-attitude-behavior hierarchy. *Journal of personality and social psychology*, 54(4), 638-646.
- Hu, L.-t., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: sensitivity to underparameterization model misspecification. *Psychological Methods*, 3, 424-453.
- Humane Society of the United States (HSUS). (2010). Home, sweet home: Bringing an outside cat in. Web Page. http://www.humanesociety.org/animals/cats/tips/bringing_outside_cat_indoors.html (Last accessed 12/1/2012).
- Jacobson, S. K. (2009). *Communication Skills for Conservation Professionals* (Vol. 2nd). Washington, DC: Island Press.
- Jessup, D. A. (2004). The welfare of feral cats and wildlife. *Journal of the American Veterinary Medical Association*, 225(9), 1377-1383.
- Jonker, S. A., Muth, R. M., Organ, J. F., Zwick, R. R., & Siemer, W. F. (2006). Experiences with Beaver Damage and Attitudes of Massachusetts Residents toward Beaver. *Wildlife Society Bulletin*, 34(4), 1009-1021.
- Kaltenborn, B. P., Bjerke, T., & Strumse, E. (1998). Diverging Attitudes Towards Predators: Do Environmental Beliefs Play a Part? *Human Ecology Review*, 5(2), 1-9.
- Kasperson, R. E., & Kasperson, J. X. (1996). The Social Amplification and Attenuation of Risk. *Annals of the American Academy of Political and Social Science*, 545, 95-105.
- Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., Ratick, S. (1988). The Social Amplification of Risk: A Conceptual Framework. *Risk Analysis*, 8(2), 177-187.
- Kellert, S. R. (1983). Affective, cognitive, and evaluative perceptions of animals. *Human Behavior & Environment: Advances in Theory & Research*, 6, 241-267.

- Kellert, S. R. (1985). Social and Perceptual Factors in Endangered Species Management. *The Journal of Wildlife Management*, 49(2), 528-536.
- Kellert, S. R. (1996). *The Value of Life: Biological Diversity and Human Society*. Washington, DC: Island Press.
- Kellert, S. R., & Berry, J. K. (1987). Attitudes, Knowledge, and Behaviors toward Wildlife as Affected by Gender. *Wildlife Society Bulletin*, 15(3), 363-371.
- Kellert, S. R., Black, M., Rush, C. R., & Bath, A. J. (1996). Human Culture and Large Carnivore Conservation in North America. *Conservation Biology*, 10(4), 977-990.
- Kleiven, J., Bjerke, T., & Kaltenborn, B. (2004). Factors influencing the social acceptability of large carnivore behaviours. *Biodiversity and Conservation*, 13(9), 1647-1658.
- Kneeshaw, K., Vaske, J. J., Bright, A. D., & Absher, J. D. (2004). Situational influences of acceptable wildland fire management actions. *Society and Natural Resources*, 17, 477-489.
- Lauber, T. B., Knuth, B. A., Tantillo, J. A., & Curtis, P. D. (2007). The Role of Ethical Judgments Related to Wildlife Fertility Control. *Society and Natural Resources*, 20(2), 119-133.
- Levy, J. K., & Crawford, P. C. (2004). Humane strategies for controlling feral cat populations. *Javma-Journal of the American Veterinary Medical Association*, 225(9), 1354-1360.
- Levy, J. K., Gale, D. W., & Gale, L. A. (2003). Evaluation of the effect of a long-term trap-neuter-return and adoption program on a free-roaming cat population. *Journal of the American Veterinary Medical Association*, 222(1), 42-46.
- Levy, J. K., Woods, J. E., Turick, S. L., & Etheridge, D. L. (2003). Number of unowned free-roaming cats in a college community in the southern United States and characteristics of community residents who feed them. *Journal of the American Veterinary Medical Association*, 223(2), 202-205.
- Lischka, S. A., Riley, S. J., & Rudolph, B. A. (2009). Effects of Impact Perception on Acceptance Capacity for White-Tailed Deer. *Journal of Wildlife Management*, 72(2), 502-509.
- Loker, C. A., Decker, D. J., & Schwager, S. J. (1999). Social Acceptability of Wildlife Management Actions in Suburban Areas: 3 Cases from New York. *Wildlife Society Bulletin*, 27(1), 152-159.
- Longcore, T., Rich, C., & Sullivan, L. M. (2009). Critical Assessment of Claims Regarding Management of Feral Cats by Trap-Neuter-Return. *Conservation Biology*, 23(4), 887-894.

- Lord, L. K. (2008). Attitudes toward and perceptions of free-roaming cats among individuals living in Ohio. *Journal of the American Veterinary Medical Association*, 232(8), 1159-1167.
- Loyd, K. A., & Hernandez, S. M. (2012). Public Perceptions of Domestic Cats and Preferences for Feral Cat Management in the Southeastern United States. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, 25(3), 337-351.
- Loyd, K. A., & Miller, C. A. (2010a). Factors Related to Preferences for Trap–Neuter–Release Management of Feral Cats Among Illinois Homeowners. *Journal of Wildlife Management*, 74(1), 160-165.
- Loyd, K. A., & Miller, C. A. (2010b). Influence of Demographics, Experience and Value Orientations on Preferences for Lethal Management of Feral Cats. *Human Dimensions of Wildlife*, 15(4), 262-273.
- Manfredo, M., Teel, T., & Bright, A. (2003). Why Are Public Values Toward Wildlife Changing? *Human Dimensions of Wildlife: An International Journal*, 8(4), 287-306.
- Manfredo, M. J. (2008). *Who Cares About Wildlife* (Vol. 1st). New York, NY: Springer Science and Business Media LLC.
- Manfredo, M. J., Sneegas, J. J., Driver, B., & Bright, A. (1989). Hunters with disabilities: A survey of wildlife agencies and a case study of Illinois deer hunters. *Wildlife Society Bulletin*, 17(4), 487-493.
- McDaniels, T. L., Axelrod, L. J., Cavanagh, N. S., & Slovic, P. (1997). Perception of Ecological Risk to Water Environments. *Risk Analysis*, 17(3), 341-352.
- McDaniels, T. L., Axelrod, L. J., & Slovic, P. (1995). Characterizing Perception of Ecological Risk. *Risk Analysis*, 15(5), 575-588.
- McFarlane, B. L. (2005). Public Perceptions of Risk to Forest Biodiversity? *Risk Analysis*, 25(3), 543-553.
- McFarlane, B. L., & Witson, D. O. T. (2008). Perceptions of Ecological Risk Associated with Mountain Pine Beetle (*Dendroctonus ponderosae*) Infestations in Banff and Kootenay National Parks of Canada. *Risk Analysis*, 28(1), 203-212.
- McNicholas, J., Gilbey, A., Rennie, A., Ahmedzai, S., Dono, J., & Ormerod, E. (2005). Pet ownership and human health: a brief review of evidence and issues. *BMJ*, 331, 1252-1254.
- Medina, F. M., Bonnaud, E., Vidal, E., Tershy, B. R., Zavaleta, E. S., Josh Donlan, C., . . . Nogales, M. (2011). A global review of the impacts of invasive cats on island endangered vertebrates. *Global Change Biology*, 17(11), 3503-3510.

- No Kill Advocacy, C. (2006). A model feral cat policy. <http://www.nokilladvocacycenter.org> (Last accessed 12/1/2012).
- Nogales, M., Martin, A., Tershy, B., Donlan, J. C., Veitch, D., Puerta, N., . . . Alonso, J. (2004). A Review of Feral Cat Eradication on Islands. *Conservation Biology*, 18(2), 310-319.
- Nunnally, J. C. (1978). *Psychometric theory* (Vol. 2nd). New York: McGraw-Hill.
- Nutter, F. B., Dubey, J. P., Levine, J. F., Breitschwerdt, E. B., Ford, R. B., & Stoskopf, M. K. (2004). Seroprevalences of antibodies against Bartonella henselae and Toxoplasma gondii and fecal shedding of Cryptosporidium spp, Giardia spp, and Toxocara cati in feral and pet domestic cats. *Journal of American Veterinary Medical Association*, 225(9), 1394-1398.
- Nutter, F. B., Levine, J. F., & Stoskopf, M. K. (2004). Reproductive capacity of free-roaming domestic cats and kitten survival rate. *Journal of the American Veterinary Medical Association*, 225(9), 1399-1402.
- O'Connor, R. E., Bard, R. J., & Fisher, A. (1999). Risk Perceptions, General Environmental Beliefs, and Willingness to Address Climate Change. *Risk Analysis*, 19(3), 461-471.
- Organ, J. F., & Ellingwood, M. R. (2000). Wildlife Stakeholder Acceptance Capacity for black bears, beavers, and other beasts in the east. *Human Dimensions of Wildlife: An International Journal*, 5(3), 63.
- O'Brien, S. J., Johnson, W., Driscoll, C., Pontius, J., Pecon-Slattery, J., & Menotti-Raymond, M. (2008). State of cat genomics. *Trends in Genetics*, 24(6), 268-279.
- Perry, D., & Perry, G. (2008). Improving Interactions between Animal Rights Groups and Conservation Biologists. *Conservation Biology*, 22(1), 27-35.
- Peterson, M. N., Hartis, B., Rodriguez, S., Green, M., & Lepczyk, C. A. (2012). Opinions from the Front Lines of Cat Colony Management Conflict. *PLoS ONE*, 7(9).
- Peyton, R. B., Bull, P. A., & Holsman, R. H. (2007). Measuring the social carrying capacity for gray wolves in Michigan. Michigan: Michigan Department of Natural Resources and Environment.
- Pidgeon, N. F., Kasperson, R. E., & Slovic, P. (2003). *The social amplification of risk*. Cambridge ; New York: Cambridge University Press.
- Pimentel, D., McNair, S., Janecka, J., Wightman, J., Simmonds, C., O'Connell, C., . . . Tsomondo, T. (2001). Economic and environmental threats of alien plant, animal, and microbe invasions. *Agriculture, Ecosystems & Environment*, 84(1), 1-20.

- Pittman, C. (2003). Cat fight in the lap of luxury, *St Petersburg Times*. Retrieved from http://www.sptimes.com/2003/06/15/State/Cat_fight_in_the_lap_.shtml (Last accessed 12/1/2012).
- Poresky, R. H., & Hendrix, C. (1990). Differential effects of pet presence and pet-bonding on young children. *Psychological Reports*, 67, 51-54.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40(3), 879-891.
- Purdy, K. G., & Decker, D. J. (1989). Applying Wildlife Values Information in Management: The Wildlife Attitudes and Values Scale. *Wildlife Society Bulletin*, 17(4), 494-500.
- Reiter, D. K., Brunson, M. W., & Schmidt, R. H. (1999). Public Attitudes toward Wildlife Damage Management and Policy. *Wildlife Society Bulletin*, 27(3), 746-758.
- Riley, S. J. (1998). *Integration of Environmental, Biological, and Human Dimensions for Management of Mountain Lions (Puma concolor) in Montana*. (Dissertation), Cornell University. Retrieved from <http://www.fw.msu.edu/~rileysh2/publications.htm> (Last accessed 12/1/2012).
- Riley, S. J., & Decker, D. J. (2000a). Risk perception as a factor in Wildlife Stakeholder Acceptance Capacity for cougars in montana. *Human Dimensions of Wildlife: An International Journal*, 5(3), 50.
- Riley, S. J., & Decker, D. J. (2000b). Wildlife Stakeholder Acceptance Capacity for Cougars in Montana. *Wildlife Society Bulletin*, 28(4), 931-939.
- Riley, S. J., Decker, D. J., Carpenter, L. H., Organ, J. F., Siemer, W. F., Mattfeld, G. F., & Parsons, G. (2002). The Essence of Wildlife Management. *Wildlife Society Bulletin*, 30(2), 585-593.
- Roelke, M. E., Forrester, D. J., Jacobson, E. R., Kollias, G. V., Scott, F. W., Barr, M. C., . . . Pirtle, E. C. (1993). Seroprevalence of infectious disease agents in free-ranging Florida panthers (*Felis concolor coryi*). *Journal of wildlife diseases*, 29(1), 36-49.
- Rokeach, M. (1973). *The nature of human values*. New York: Free Press.
- Rosenthal, E. (2011, March 20, 2011). Tweety Was Right: Cats Are Birds Number 1. *Enemy*, *New York Times*.
- Røskaft, E., Bjerke, T., Kaltenborn, B., Linnell, J. D. C., & Andersen, R. (2003). Patterns of self-reported fear towards large carnivores among the Norwegian public. *Evolution and Human Behavior*, 24(3), 184-198.

- Siemer, W. F., Hart, P. S., Decker, D. J., & Shanahan, J. E. (2009). Factors that Influence Concern About Human-Black Bear Interactions in Residential Settings. *Human Dimensions of Wildlife*, 14(3), 185-197.
- Siemer, W. F., Jonker, S. A., & Brown, T. L. (2004). Attitudes toward beaver and norms about beaver management: Insights from baseline research in New York (Vol. HDRU Series No. 04-5). Ithaca, NY: Department of Natural Resources, Cornell University.
- Sims, V., Evans, K. L., Newson, S. E., Tratalos, J. A., & Gaston, K. J. (2008). Avian assemblage structure and domestic cat densities in urban environments. *Diversity and Distributions*, 14(2), 387-399.
- Sjoberg, L. (1998). World views, political attitudes and risk perception. *Risk: Health, Safety & Environment*, 9(2), 137-152.
- Slater, M. R. (2004). Understanding issues and solutions for unowned, free-roaming cat populations. *Journal of the American Veterinary Medical Association*, 225(9), 1350-1354.
- Slimak, M. W., & Dietz, T. (2006). Personal Values, Beliefs, and Ecological Risk Perception. *Risk Analysis*, 26(6), 1689-1705.
- Slovic, P. (2000a). *The Perception of Risk* (Vol. First). London, UK: Earthscan Publications Ltd.
- Slovic, P. (2000b). Trust, Emotion, Sex, Politics and Science: Surveying the Risk-assessment Battlefield *The Perception of Risk* (Vol. First, pp. 390-412). London, UK: Earthscan Publications Ltd.
- Slovic, P., Flynn, J., & Layman, M. (2000). Perceived Risk, Trust and the Politics of Nuclear Waste *The Perception of Risk* (Vol. First, pp. 275-284). London, UK: Earthscan Publications Ltd.
- Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equations models. In S. Leinhardt (Ed.), *Sociological methodology* (pp. 290-312). San Francisco: Josey-Bass.
- Sobel, M. E. (1986). Some new results on indirect effects and their standard errors in covariance structure models. In N. Tuma (Ed.), *Sociological Methodology* (pp. 159-186). Washington, DC: American Sociological Association.
- Sterba, J. P. (2002). Kill kitty? Question has the fur flying in critter crowd. Oct 1, 2012. *Wall Street Journal*, p. 1. Retrieved from http://www.nwcoa.com/pr/wall_street_journal_Oct11-2002.pdf (Last accessed 12/1/2012).

- Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human ecology review*, 6(2), 81-97.
- Stern, P. C., Dietz, T., & Kalof, L. (1993). Value Orientations, Gender, and Environmental Concern. *Environment and Behavior*, 25(5), 322-348.
- Stern, P. C., Kalof, L., Dietz, T., & Guagnano, G. A. (1995). Values, Beliefs, and Proenvironmental Action: Attitude Formation Toward Emergent Attitude Objects. *Journal of Applied Social Psychology*, 25(18), 1611-1636.
- Stout, R. J., Stedman, R. C., Decker, D. J., & Knuth, B. A. (1993). Perceptions of Risk from Deer-Related Vehicle Accidents: Implications for Public Preferences for Deer Herd Size. *Wildlife Society Bulletin*, 21(3), 237-249.
- Swirko, C. (2011, June 8, 2011). 679 cats seized from sanctuary, making it nation's largest case, *Gainesville Sun*. Retrieved from <http://www.gainesville.com/article/20110608/ARTICLES/110609538> (Last accessed 12/1/2012).
- Tarrant, M. A., Bright, A. D., & Ken Cordell, H. (1997). Attitudes toward wildlife species protection: Assessing moderating and mediating effects in the value-attitude relationship. *Human Dimensions of Wildlife*, 2(2), 1-20.
- Tennent, J., Downs, C. T., Wald, D. M., & Watson, H. (2010). Public perceptions of feral cats within an urban conservancy on a campus of the University of KwaZulu-Natal. *South African Journal of Wildlife Research*.
- Thornton, C., & Quinn, M. S. (2010). Risk Perceptions and Attitudes Toward Cougars in the Southern Foothills of Alberta. *Human Dimensions of Wildlife*, 15(5), 359-372.
- Turner, D. C., & Bateson, P. P. G. (2000). *The domestic cat: the biology of its behaviour* (Vol. 2nd). Cambridge, UK: Cambridge University Press.
- United States Census Bureau. (2005). US census bureau population projections.
- Vaske, J. J. (2008). *Survey research and analysis: Applications in parks, recreation and human dimensions*. State College, Pennsylvania: Venture Publishing, Inc.
- Vaske, J. J., & Donnelly, M. P. (1999). A value-attitude-behavior model predicting wildland preservations voting intentions. *Society & Natural Resources*, 12(6), 523.
- Vaske, J. J., & Needham, M. D. (2007). Segmenting Public Beliefs about Conflict with Coyotes in an Urban Recreation Setting. *Journal of Park and Recreation Administration*, 25(4), 79-98.

- Vining, J. (2003). The connection to other animals and caring for nature. *Research in Human Ecology*, 10(2), 87-99.
- Vázquez-Domínguez, E., Ceballos, G., & Cruzado, J. (2004). Extirpation of an insular subspecies by a single introduced cat: the case of the endemic deer mouse *Peromyscus guardia* on Estanque Island, Mexico. *Oryx*, 38(3), 347-350.
- Wald, D., & Jacobson, S. (2013). Factors Affecting Student Tolerance for Free-Roaming Cats. *The Human Dimensions of Wildlife*, 18(3).
- Williams, T. (2009). Feline Fatales. *Audubon Magazine*, September - October.
- Williamson, T. B., Parkins, J. R., & McFarlane, B. L. (2005). Perceptions of climate change risk to ecosystems and forest-based communities. *Forestry Chronicle*, 81(5), 710-716.
- Wittmann, K., Vaske, J., Manfredo, M. J., & Zinn, H. C. (1998). Standards for lethal response to problem urban wildlife. *Human Dimensions of Wildlife: An International Journal*, 3(4), 29-48.
- Woolfenden, G. E., & Fitzpatrick, J. W. (1993). Florida scrub jay. In J. A. Rodgers, H. W. Kale & H. T. Smith (Eds.), *Rare and endangered biota of Florida* (Vol. V, pp. 267-280). Gainesville, FL: University Presses of Florida.
- Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, 35(2), 151-175.
- Zasloff, R. L., & Kidd, A. H. (1994). Loneliness and pet ownership among single women. *Psychological Reports*, 75, 747-752.
- Zeckhauser, R. J., & Viscusi, W. K. (1990). Risk Within Reason. *Science*, 248(4955), 559-564.
- Zinn, H. C., Manfredo, M. J., & Vaske, J. J. (2000). Social psychological bases for Stakeholder acceptance Capacity. *Human Dimensions of Wildlife: An International Journal*, 5(3), 20.
- Zinn, H. C., & Pierce, C. L. (2002). Values, Gender, and Concern about Potentially Dangerous Wildlife. *Environment and Behavior*, 34(2), 239-256.

BIOGRAPHICAL SKETCH

Dara was born in Memphis, Tennessee, in 1979. Four years later, her family moved to Gainesville, Florida. Dara spent two years in Israel, at the age of 10, and again at 13, the first time in Jerusalem with her family and the second time as part of a Hebrew High School program on a kibbutz in the Amec valley. She finished her high school degree at Gainesville High School.

Upon graduation, Dara moved to Israel and earned dual citizenship. At the age of 18, she was drafted into the Israeli military, where she spent 2 years as a tank mechanic. After completing her service, Dara returned to the U.S. to pursue an undergraduate degree at Brandeis University in Waltham, Massachusetts. While there, she spent a semester in Kenya studying environmental politics and wildlife ecology and management. In 2004, Dara graduated from Brandeis University and received a Bachelor of Arts degree with a major in biology, a minor in theater, and a certificate in Environmental Studies.

After graduation, Dara stayed in Boston to continue her work in the field of environmental studies. She worked at the New England Aquarium as a senior Program Educator and grant coordinator. She also worked as an event coordinator with Alternatives for Community and Environment, an environmental justice organization in Roxbury, Massachusetts.

In 2006, Dara returned to Gainesville, FL to begin her master's degree in the Department of Wildlife Ecology and Conservation at the University of Florida. Dara began her Ph.D. program in 2008. Once she finishes her Ph.D., she will pursue an academic position. Dara currently lives in Gainesville, FL with her husband and young daughter.