HUMAN-COYOTE INTERACTIONS:

RISK PERCEPTION AND EDUCATION EVALUATION IN A NATIONAL PARK

by

A Dissertation submitted to the

School of Graduate Studies

in partial fulfillment of the requirements for the degree of

Doctorate of Philosophy

Department of Geography, Faculty of Arts

Memorial University of Newfoundland

August 2014

St. John's Newfoundland

Abstract

Human dimensions uses theoretical frameworks (e.g., cognitive hierarchy) and applied methods to understand human-wildlife conflicts. In this dissertation, the cognitive hierarchy is used to understand the relationships among cognitions measured at different levels of specificity. Cognitions can range from general (e.g., values/value orientations) to specific (e.g., attitudes/norms), which in turn influence individual and/or agency behaviour (e.g., management actions). This study examined different levels of cognition in relation to human-coyote interactions in Cape Breton Highlands National Park in Nova Scotia, Canada. Since a coyote caused death the of a park visitor in 2009, safety has become a primary concern for the park. Understanding human-coyote interactions supports informed management decisions and planning, and extends theoretical insights to human-wildlife conflicts.

Carnivores can ignite the imagination and polarize people's beliefs, attitudes, and preferences about acceptable management practices. Aspects of risk perception such as the fear or likelihood of, and control over, an interaction with a potentially dangerous species play a role in a person's attitudes and management preferences. These risk perceptions are examined and compared among residents, park visitors, and park staff (Chapter 2). People's beliefs, attitudes, and preferences of acceptable management

practices are also influenced by emotions. Human dimensions of wildlife research has traditionally focused on cognitions, which commonly explain 50% of the variance of responses. Emotions may account for another portion of the variation, as wildlife issues are often contentious. To assess the potential influence of emotions on behavioural intention, emotional dispositions are examined relative to different types of human-coyote interactions (Chapter 3). Understanding the cognitive and emotional influences on management action acceptability is important for guiding management decisions and helping to develop human dimensions of wildlife theory. Understanding which management action is more or less acceptable in relation to different types of human-coyote interactions is also important for guiding management actions (Chapter 4).

In this dissertation, risk perception, emotional disposition, and the acceptability of management strategies are examined to better understand the nature of ongoing human-wildlife conflicts. Based on this research, a practical management intervention was developed. The effectiveness of an experiential coyote education program was evaluated to see whether the program influenced change in attitudes and risk perceptions in participants (Chapter 5). This study examined human dimensions of wildlife theory within the context of the research questions and contributed a management intervention for human-coyote interactions.

Dedication

To my gram, Phyllis Allan, the woman with the secret to happiness.

Acknowledgements

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Acronyms

ANOVA   Analysis of Variance

CBHNPC   Cape Breton Highlands National Park of Canada

CSU   Colorado State University

CVM   Cognitive Vulnerability Model

CFI   Comparative Fit Index

DNR   Department of Natural Resources

HCI   Human-coyote interactions

HDW   Human dimensions of wildlife

HWC   Human-wildlife conflict

MUN   Memorial University of Newfoundland

NFI   Normed Fit Index

PCI$_2$ Potential for Conflict Index$_2$

RMSEA   Root Mean Square Error of Approximation

SEM   Structural Equation Model

Research Project Framework

This research is situated within a larger Parks Canada project called *Cape Breton Highlands National Park's Project to Reduce Human-Coyote Conflict*. The purpose of the larger project is to examine the social and biological aspects of human-coyote interactions in Cape Breton Highlands National Park of Canada (CBHNPC). After a coyote killed a park visitor and regular reports of aggressive coyote behaviour toward humans in the park were received (1-2 on average per year), CBHNPC decided that a multi-disciplinary research project was needed to examine both the social and biological aspects of the human-coyote interface with the objective of minimizing conflicts. With a better understanding of human-coyote interactions (HCI), CBHNPC hopes to minimize serious incidents and gain support for the development of an effective coyote management plan for the park.

CBHNPC is the lead agency of the *Coyote Project Management Team* (composed of park employees), and is in charge of project management, facilitation of communication among the different project teams, and project budgeting. The *Coyote Project Management Team* facilitates two research teams: the *Human Behaviour Task Team* and the *Coyote Behaviour Task Team*. The scope of this doctoral research falls within the initiative of the *Human Behaviour Task Team* that is charged with understanding the human aspect of the human-coyote interface / conflict. Since one of the

main goals of this project is to develop a coyote management plan for the park, it is

imperative that we understand how users of the park (i.e., residents, visitors, and park

staff) view coyotes and coyote management. Information from both task teams (social

and biological scientists) will inform and support the park in their decisions when

developing a coyote plan.

Co-authorship Statement

The author of this dissertation has been the primary researcher behind this study, including the literature review and the design of the research proposal, the practical aspects of the research, the data collection and analysis, and the manuscript preparation. The co-authors and committee members have contributed to the research project by critically reading and providing feedback on all stages of the study.

For all manuscripts included in this dissertation, the author is the primary and corresponding author. The co-authors provided significant intellectual contributions to each of the articles by critiquing methods (i.e., data collection and analysis), by interpreting data, and by reviewing the manuscripts. The following paragraphs state the journal each manuscript has been submitted to, and the order of the co-authors proceeding the author of this dissertation.

The first manuscript "Attitudinal differences among residents, park staff, and visitors toward coyotes in Cape Breton Highlands National Park of Canada," was a collaborative effort with Dr. Jerry J. Vaske (CSU) and Dr. Alistair Bath (MUN). This paper has been submitted to *Society and Natural Resources*.

The second manuscript, "The role of emotions in human-coyote interactions," was a collaborative effort with Dr. Jerry J. Vaske (CSU) and Dr. Alistair Bath (MUN). This paper has been submitted to *Human Dimensions of Wildlife: An International Journal*.

The third manuscript, "Differences in management action acceptability for coyotes in a national park," was a collaborative effort with Dr. Jerry J. Vaske (CSU) and Dr. Alistair Bath (MUN). This paper has been submitted to the *Wildlife Society Bulletin*.

The fourth manuscript, "Changing attitudes and emotions toward coyotes with experiential education", was a collaborative effort with Dr. TA Loeffler (MUN), Dr. Jerry J. Vaske (CSU), and Dr. Alistair Bath (MUN). This paper has been submitted to *Journal of Environmental Education*.

Chapter 1: Introduction

1.1 Introduction

A human-wildlife conflict (HWC) is "any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, on the conservation of wildlife populations, or on the environment" (WWF, 2005). These conflicts or interactions have been examined in the context of contemporary social change and used as an example of human struggle over how to use and understand our natural surroundings (Skogen & Thrane, 2008), a struggle shaped by differences in peoples' wildlife value orientations (Vaske & Needham, 2007; Zinn, Manfredo, & Barro, 2002). In order to understand and describe human-wildlife interaction human dimensions of wildlife typically uses the cognitive hierarchy to frame relationships between different cognitions which shape and influence attitudes and behaviour (Vaske & Manfredo, 2012). This theoretical framework was first developed by Homer and Kahle (1988) and Rokeach (1973) and was introduced into the study of human dimensions of wildlife by Fulton, Manfredo, and Lipscomb (1996). The cognitive hierarchy (Figure 1.1) explores the relationships between general values, value orientations, and specific attitudes, and examines norms to understand how these cognitions influence individual and / or agency behaviour (e.g., management actions). The relationships between the different types of cognitions are best understood as part of a hierarchy from general to specific. In this dissertation the cognitive hierarchy is used to frame and understand HWC. It is described in more detail and how it is situated within the current literature in later chapters (e.g., Chapter 3).

The image shows an inverted triangle with the following labels from top to bottom: "Behaviours", "Behavioural Intentions", "Attitudes and Norms", "Value Orientations (Basic Belief Patterns)", "Values". To the right of the triangle at the top: "Numerous / Fast to Change / Peripheral / Specific to situation" and at the bottom: "Few in number / Slow to change / Central to beliefs / Transcend situations", with an upward arrow.

Figure 1.1. The theoretical framework of the cognitive hierarchy (source: Vaske & Donnelly, 1999).

The cognitive hierarchy has been used as a framework to describe HWC from carnivores to herbivores (Glikman, Bath, & Vaske, 2010; Sponarski, Vaske, Bath, & Musiani, 2014; Vaske & Needham, 2007). Research examining human-coyote interactions (HCI) has explored attitudes toward coyotes in suburban and urban areas in California (Baker, 2007; Baker & Timm, 1998), New York (Gallerani Lawson, 1995; Weckel et al., 2010; Wieczorek Hudenko, Decker, & Siemer, 2008; Wiezorek Hudenko, 2009), Denver, Colorado (Vaske & Needham, 2007), Chicago, Illinois (Spacapan, 2013), Vancouver, British Columbia (Webber, 1993), and parts of Eastern Canada (Martínez-Espiñeira, 2006; Sutherland, 2010). Human-coyote conflict (e.g., coyote depredation on domestic pets, coyote attacks on people) is an issue for wildlife managers, especially in urban areas (White & Gehrt, 2009). HCI research indicates that people with a longer history of living with coyotes tend to be less concerned about the presence of coyotes and believe

them to be more of a nuisance than a threat (Wiezorek Hudenko, 2009). Residents have also been found to prefer non-lethal coyote management strategies but are willing to accept lethal management when human safety is jeopardized or depredation increases (Arthur, 1981; Martínez-Espiñeira, 2006; Vaske & Needham, 2007).

Unlike most of the HCI literature to date, this study took place in a national park in a remote and rural area in Cape Breton Island, Nova Scotia. Cape Breton Highlands National Park of Canada (CBHNPC) has undertaken a four-year study to reduce human-coyote conflicts in the park. The research project framework (pg. xv) described the multi-disciplinary approach the park is taking to examine HCI. Park management is aware that park visitors (i.e., residents living near the park and visitors) have had, and will continue to have, contact with coyotes in the park. In order to mitigate and reduce human-coyote conflicts, outreach interpretation programs have been developed to increase public awareness and to suggest appropriate behaviour when coming into contact with coyotes (Baker, 2007; Gore, Knuth, Curtis, & Shanahan, 2006b; Manning, 2003). Communication is an integral component in management strategies designed to influence park visitors' behaviour and minimize social and ecological impacts (Ham, 2007). To be effective, interpretation messages must clearly identify the environmental threat (e.g., coyotes) as well as the human behaviour associated with, or contributing to, that threat (e.g., feeding coyotes) (Ham & Krumpe, 1996). To design appropriate interpretation messages, one should first understand park visitor knowledge of, attitudes toward, and beliefs about (Ham, 2006; Hughes, Ham, & Brown, 2009) coyotes. As in the attitudinal component of this research project, little research has

been done on the effectiveness of interpretation messages on changing people's behaviour in regards to HCI.

Experiential education was the theoretical framework used to design a coyote education program aimed at changing attitudes and perceptions of risk toward coyotes. This framework uses the understanding of the link between values, attitudes, and behaviour and has been applied in parks and recreation to influence change in people's attitudes and behaviour when interacting with the environment (i.e., trail use, feeding animals, bear safety) (Ballantyne & Hughes, 2006; Bright, 1994; Dunn, Elwell, & Tunberg, 2008; Kim, Airey, & Szivas, 2010). The experimental education theoretical framework is described in more detail in Chapter 5.

1.2 Study Area

CBHNPC was established in 1936 (MacEachern, 2001) and is situated on the north-eastern peninsula of Cape Breton Island in Nova Scotia, Canada (Figure 1.2). The park covers roughly 950km^2 of rugged plateaus and canyons in northern Cape Breton. The cool climate and rugged topography provide conditions for Acadian, Boreal, and Taiga landscapes, vegetation, and wildlife (Bridgland, 1990).
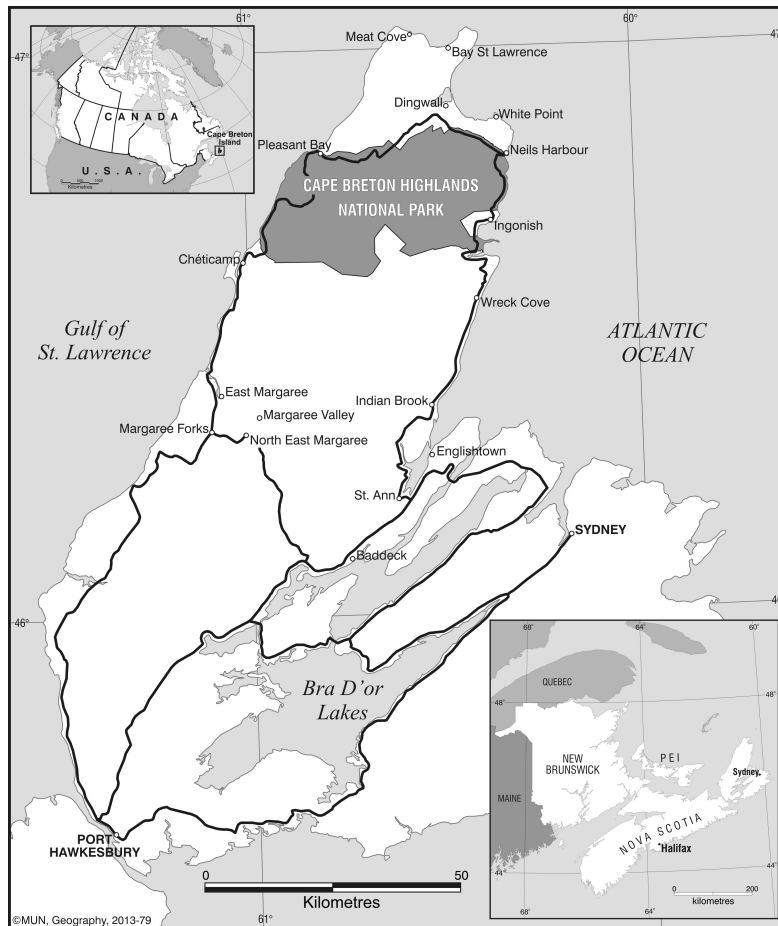
Figure 1.2. A map of Cape Breton Highlands National Park of Canada (CBHNPC) and its location on Cape Breton Island, Nova Scotia, Canada.

In 2010, the park developed a 10- to 15-year management plan. In this plan, Parks Canada set three management plan elements: (a) protecting heritage resources, (b) facilitating opportunities for visitor experience, and (c) providing public outreach (Parks Canada, 2010). Research on human-coyote interactions fall within the 2010 management plan elements.

Towns and communities surround the border of CBHNPC. The two largest towns are found at the park entrances. At the western entrance is the Acadian village of Chéticamp on the Gulf of Saint Lawrence. At the eastern side entrance is Ingonish, located on the Atlantic Ocean.

The residents of the communities surrounding the park possess diverse heritage and cultural backgrounds, including Acadian, Basque, French, Irish, Mi'kmaq, Newfoundland, Portuguese, and Scottish, reflecting the waves of settlement from the 1500s (MacEachern, 2001). The economy of the region is based on natural resources such as tourism, forestry, hydroelectric generation, and commercial fishing (Parks Canada, 2010). Residents of these towns depend on the tourism revenue generated from park visitors and are also park visitors themselves. Therefore, residents of Cape Breton may be personally affected (e.g., encounters with an aggressive coyote) and/or economically affected (e.g., reduced tourism revenue) by human-coyote interactions.

The Cabot Trail, considered the main tourist attraction in the north-western portion of Cape Breton, passes through the park. The park landscape is composed of mountains, valleys, forests, waterfalls, rocky coastlines, and tundra-like plateaus known as the Cape Breton Highlands. Trails for hiking and biking are found mostly around the periphery of the park; the majority are accessed from the Cabot Trail. The park is home to a diversity of wildlife species, including moose (*Alces alces*), black bear (*Ursus americanus*), coyote (*Canis latrans*), and bald eagle (*Haliaeetus leucocephalus*).

The coyote (*Canis latrans*) has expanded its range in the last 200 years from areas in the south and Midwest of the United States of America (USA) north and eastward (Moore & Parker, 1992). The coyote arrived in northeastern North America in the early 1900s, first in NE USA in 1925, southwest Québec, Maine, New Hampshire and Vermont by the 1930-1940s (Gompper, 2002a), southwest Québec in the early 1970s, Nova Scotia in the 1970s (Moore & Millar, 1986) and finally to the island of Newfoundland in the 1990s (Parker, 1995). There are three hypotheses

that may have supported coyote population expansion: (a) the eradication of the gray wolf in the USA removed a competitor for the coyote; (b) in the past hunters have translocated coyote pups to new areas of North America mistaking them for fox kits; and (c) the expansion of the human population and associated changes to the terrestrial habitat (e.g., urbanization) has opened up habitats previously not available to a behaviourally flexible species (Gompper, 2002b).

The size (weight) of the eastern coyote ranges from 11-15kg for females and 12-18kg for males. On average, eastern coyotes are larger than coyotes from other areas of North America but due to the wide range of average weights found in all coyote populations, the differences are only a few kilograms (Gompper, 2002a). Coyotes, in general, are opportunistic omnivores, their diet can consist of large to small vertebrates, invertebrates and fruit. There can be changes in diet depending on the seasonal availability of resources. Generally, the eastern coyote tends to depend upon white tailed deer and snowshoe hare, and fruit when it's available in late-summer (Parker, 1986).

The Nova Scotian coyote established around the 1970s (Moore & Millar, 1986) and on Cape Breton Island in the 1980s (Parks Canada Agency, 2009). Since 2004, 25 incidences of human-coyote conflicts have been reported in CBHNPC, most of which occurred in the summer and early fall months. Of those 25 cases, six involved a coyote, showing little to no fear, approaching or walking past people; 14 cases involved a coyote exhibiting aggressive behaviour toward humans; and five cases involved a coyote attack on a person (including one fatal attack) (based on incident report data from CBHNPC, 2010).

CBHNPC recognizes the need to understand the human-coyote interface. With consistent yearly human-coyote interactions (i.e., coyotes approaching people and chasing bikers) within the park boundaries, park visitors must be knowledgeable about safety precautions and the appropriate behaviour when encountering a coyote. In order to manage HCI, a better understanding of the factors that contribute to the risk of serious interactions is required. CBHNPC management explained that HCI required immediate and longer-term responses, so that two of the park's objectives could be met:

1. Visitation must remain safe and visitors must have positive experiences;

2. Coyotes must be maintained as part of the landscape and hence must be able to co-exist with visitors.

Coyotes are considered a critical component of the diversity and overall ecosystem health of CBHNPC (Parks Canada, 2010). Unlike the provincial coyote management mandate, which includes a pelt incentive for coyote pelts and management focused on dealing with problem coyotes, CBHNPC would like to move to a model of coexistence with coyotes. Doing so would include a better understanding of human tolerance and a focus on affecting human behaviour. Coexistence management plans have been implemented in some cities in Canada and the United States after trying expensive culling programs to reduce and mitigate conflicts with coyotes (Worcester & Boelens, 2007). In order to support the development of a coexistence management model and the park's overall objectives (above), data describing public knowledge, attitudes, beliefs, and behaviour regarding coyotes is required.

1.3 Research Objectives

Within the context of HDW, the overarching research goal consistent with Parks Canada's objectives is to minimize human-coyote conflict. Specficially, this project has four objectives: (a) assessing the public's perception of risk; (b) investigating the role of emotional dispositions within the cognitive hierarchy; (c) examining the public's attitudes toward coyote management in and around CBHNPC; and (d) the design, implementation, and testing of the effectiveness of interpretation messages. Each of these research objectives are assessed in one or more of the manuscripts in this dissertation. These four areas of research will provide theoretical insight and information that can be directly integrated into the decision-making process.

1.4 Significance of Research

This dissertation on human dimensions of wildlife has relevance in the realms of academia, policy, and applied practice. First, the research responds directly to the request by Parks Canada for a sociological understanding of the human-coyote conflict. Secondly, the research directly responds to Jacobs (2012) call to examine the role of emotional dispositions in the context of the theoretical framework of the cognitive hierarchy. Thirdly, the applied education program tests the effectiveness of experiential education, a project outcome desired by Parks Canada and an area needing further examination in the literature (Gore, Knuth, Curtis, & Shanahan, 2006a). This study adds to and extends academic knowledge on human dimensions of wildlife theory, aspects of wildlife management, human-coyote conflicts, the application of different statistical methods, and the role of education in HWC. Discussion about the implications of this research for academia and for practical purposes is outlined in Chapter 6.

1.5 Organization of Dissertation

This dissertation is organized into six sections: the introduction, four manuscripts, and a conclusion chapter. The following are the abstracts for each of the manuscripts:

Chapter 2 explored differences and similarities among local residents, park staff, and visitors in their (a) attitudes toward, (b) fear of, (c) perception of control over, and (d) perception of likelihood of coming into contact with, coyotes. Data were collected near CBHNPC, where a coyote caused a human fatality in 2009. Local residents were mailed a questionnaire ($n = 578$; 72% return rate) in 2011. Park staff completed the questionnaire ($n = 124$; 85% return rate) in 2011 and visitors were interviewed on trails and given a mail-in questionnaire in 2011 and 2012 ($n = 375$; 51% return rate). The Potential for Conflict Index$_2$ (PCI$_2$) was used to examine differences among the three groups. Residents held more negative attitudes, reported more fear, felt less in control when coming into contact with coyotes, and reported a higher likelihood of seeing a coyote while in CBHNPC than park staff and visitors. The three groups examined in this study exhibited different attitudes toward, fear of, perceived control over, and perceived likelihood of coming into contact with, coyotes. Understanding the attitudes held by different interest groups toward coyotes facilitates the design of specialized messages to ensure each user group is receiving the appropriate information.

In *Chapter 3*, emotional and cognitive variables were used to predict reactions to human-coyote interactions. Anticipated emotional dispositions were hypothesized to mediate the influence of general attitude and symbolic existence beliefs toward coyotes on support/opposition for killing a coyote. Residents around Cape Breton Highlands National Park of Canada were

mailed a questionnaire ($n = 578$; 72% return rate) in 2011. The acceptability of killing a coyote

was evaluated for three situations: (a) a coyote crossed the trail, (b) a coyote approached you and

(c) a snarling coyote approached you. In all three scenarios, symbolic existence beliefs and

anticipated emotional dispositions directly influenced support/opposition of lethal management.

Emotional dispositions mediated the relationship between attitudes and symbolic existence

beliefs, and lethal management in all scenarios except for scenario 3. The best predictor of the

acceptability of the management option was symbolic beliefs followed by anticipated emotional

disposition. The three predictors accounted for 39%, 34% and 22% of the variation in

management option.

Chapter 4 explores the level of acceptability and consensus among local residents, park

staff, and visitors for coyote management in CBHNPC. Successful wildlife management often

depends on public acceptance of wildlife control methods. We explored the acceptability and

amount of consensus among local residents, park staff, and visitors for coyote management in

Cape Breton Highlands National Park of Canada (CBHNPC). We collected data near CBHNPC,

where there has been an increase in human-coyote conflict. Local residents were mailed a

questionnaire ($n = 578$; 72% return rate) in 2011. Park staff completed the questionnaire ($n = $

124; 85% return rate) during 2011 and visitors were interviewed on trails and given a mail-back

questionnaire during 2011 and 2012 ($n = 375$; 51% return rate). The Potential for Conflict Index

(PCI_2) was used to examine differences in acceptability among the three groups. Acceptability of

different management options was evaluated for three situations: 1) a coyote crossed the trail, 2)

a coyote approached and 3) a snarling coyote approached a person. All three groups tended to

prefer non-lethal management options but as the scenarios increased in threat level, lethal and more invasive options became more acceptable. Understanding which management options were more acceptable in different contexts facilitates informed decision making when humans and coyotes come into conflict. Contrasting public(s) views against those of managers highlighted situations whereby problems might occur.

Chapter 5 examined the effectiveness of an experiential coyote education program at changing attitudes and perceptions of risk. Traditional wildlife programs typically use presentation-style communication tools, which have proven to be only slightly effective, to relay information. Experiential education, on the other hand, provides opportunities for individuals to internalize and retain knowledge via direct interaction. An experiential education program was designed to target risk perceptions and preventative measures that would enable people to feel more comfortable in situations where coyotes are present. Based on previous research, the effects of an experience-based coyote education program on people's (a) attitudes toward coyotes, (b) fear of coyotes, (c) perceived likelihood of encountering coyotes, and (d) perceived control over a contact situation with a coyote were explored. The reliabilities for the latent constructs (listed above) were acceptable as Cronbach's alphas were greater than .84. A pre- and post-test comparison ($n = 150$; 96% completion rate) was conducted during 20 public education sessions in local communities. The experiential education approach to wildlife safety and coexistence communication had a significant positive effect on people's attitudes and significantly decreased their sense of fear toward coyotes. The program also significantly decreased participants' sense of likelihood of incident and significantly increased their sense of control over coming into

contact with coyotes in their yard and in the park. Effective education programming helps ensure that appropriate messages are getting through to the target audiences.

In *Chapter 6* the relevance of this research initiative is discussed within the context of a wider audience. This chapter discusses the implications of the research findings to the field of human dimensions in wildlife theory, management decisions, and application. Future research areas are also discussed. These questions of research direction are beyond the scope of this dissertation's research but provide suggestions to advance human dimensions of wildlife research.

1.6 Data Collection Tool

Questionnaires utilizing a mixture of quantitative and qualitative questions were used to examine the research questions in this study. The questionnaires used in Chapter 2, 3 and 4 to collect information from residents, park staff and visitors were the same. For residents and park staff, one questionnaire (Appendix C and D) was used and included a cover letter and 155 questions. The visitor's questionnaire used the same 155 questions but these items were divided into two questionnaires. Visitors were initially interviewed on trails using an onsite questionnaire composed of 49 questions (Appendix A); the remaining 106 questions were answered through a mail back questionnaire or the offsite questionnaire (Appendix B), given to participants at the end of the onsite interview. The questions in these three questionnaires asked participants about their wildlife value orientations, normative beliefs, attitudes and emotions toward coyotes, and knowledge about coyotes. Further details of the questionnaire sampling are given in each chapter. The research questions answered in Chapter 2, 3 and 4 used a sample of the questions answered by participants.

The questionnaire in Chapter 5 was different from the preceding data collection tool. In the education program participants were given a questionnaire before (pre-test) and after (post-test) the program. The pre-test questionnaire (Appendix F) had 29 questions asking participants about their experiences with coyotes, general attitudes, perceived likelihood, perceived control over a human-coyote interaction and basic demographic information. The post-test questionnaire (Appendix G) had 33 questions asking participants about their experience in the program, general attitudes, perceived likelihood, and perceived control over a human-coyote interaction.

In all questionnaires basic demographic information were obtained. Participants were asked to report their age in the following categories: (a) 18-24, (b) 25-34, (c) 35-44, (d) 45-54, (e) 55-64 and (f) over 65 years. Sex was categorical: (a) Female, or (b) Male. Age and sex in the manuscripts were reported as percentages of the sample.

Chapter 2:

Attitudinal differences among residents, park staff, and visitors toward coyotes in Cape Breton Highlands National Park of Canada

2.1 Introduction

Natural resource planning is enhanced when the attitudes and management preferences of the constituents are understood (Chase, Decker, & Lauber, 2004; Decker & Bath, 2010). Knowledge of the similarities and differences between the agency and the different sectors of the public can be used to facilitate policy changes, to develop and adopt new outreach programs, to emphasize the need for a public participatory processes, and to increase the effectiveness of communication by the agency (Beierle & Konisky, 2000; Koontz & Johnson, 2004). At Cape Breton Highlands National Park of Canada (CBHNPC), managers are concerned with minimizing human-coyote interactions (HCI). Such interactions include coyote sightings, feeding coyotes, coyotes approaching people and coyotes attacking people (very rare). In the fall of 2009, CBHNPC experienced the only known coyote-caused adult human fatality in North America (CBC News, 2009). Since the death, visitors and residents have expressed awareness of, and fear toward, coyotes. This article examines residents, visitors, and park staff with respect to their: (a) attitudes toward, (b) fear of, (c) perceived control over, and (d) perceived likelihood of coming into contact with, coyotes.

Attitudes are positive or negative evaluations of some object (Vaske & Manfredo, 2012). The object can be either general or specific. For example, if the object is a "coyote," the

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evaluation reflects the mixture of cognitions that form a general attitude. If the object is "coyote attacks in CBHNPC during 2009," the evaluation reflects a narrower context and time frame, and thus represents a more specific attitude. Studies of attitudes toward coyotes have primarily concentrated on urban contexts and evaluations of coyote management (Martínez-Espiñeira, 2006) or evaluations of coyotes in general (Stevens, More, & Glass, 1994; Vaske & Needham, 2007; Wieczorek Hudenko, Decker, & Siemer, 2008). In this research, we examined general attitudes toward coyotes.

Attitudes toward wildlife can be influenced by context and individual experiences. Wildlife viewing in a natural area, for example, might be a positive experience (Manfredo & Larson, 1993; Schänzel & McIntosh, 2000). Seeing coyotes in one's backyard, however, may be judged less favourably. For the three populations examined in this study, each may have different general attitudes toward coyotes due to varying experiences. Residents may have more negative attitudes toward coyotes because of their awareness of the 2009 death, whereas visitors may or may not be aware of the incident and thus may not perceive coyotes as negatively. Park staff could hold a mixture of both positive and negative attitudes. Most of the staff were employed by the park during the incident and were exposed to intra-park narratives about the injuries the young woman sustained, as well as information about the rarity of fatal coyote attacks on humans.

Fear is an adaptive reaction to danger (Taylor, 1998). The level of fear is unique to an individual but can be explained by two factors: (a) idiosyncratic experiences (i.e., personal traumatic experiences, vicarious experiences of an acquaintance, receiving threat-relevant information) (Rachman, 1984, 1990), and (b) factor(s) that determine the tendency to become

fearful (fear-proneness) (Johansson, Karlsson, Pedersen, & Flykt, 2012; Taylor, 1998). Fear of animals is a very common emotion (Davey, Cavanagh, & Lamb, 2003), and most research has examined fear of small animals such as spiders, snakes, and mice (Lerner & Keltner, 2001). Even though large carnivores invoke fear, limited psychological research has been conducted to understand factors influencing a person's fear of large carnivores (Johansson, Karlsson, et al., 2012; Røskaft, Bjerke, Kaltenborn, Linnell, & Andersen, 2003). This research examines three groups with three potentially differing levels of fear toward one species in the same geographical area. Previous fear research in regards to large carnivores (e.g., bear, wolves, and cougar) suggests that, with increased experience and longevity of living with large carnivores, fear levels do decrease (Ericsson & Heberlein, 2003; Johansson, Karlsson, et al., 2012).

In the context of this research, risk perceptions are critical for understanding the perceptions of coyotes held by residents, park staff, and visitors. Risk perception is a risk judgment made by citizens as opposed to an assessment by experts (Slovic, 1987). There are two types of risk perception: (a) affective risk – feelings of trepidation or concern about potential hazards (Johansson, Karlsson, et al., 2012; Sjöberg, 1998, 2000), and (b) cognitive risk – the perceived probability of suffering injury or loss (Renn, 1992; Weber, Scholz, Buhlmann, & Grasmuck, 2001). In this article, two risk constructs were used. First, affective risk was assessed as fear toward coyotes (Sjöberg, 1998, 2000). Affective risk is often related to fear or phobia of a wildlife species (Johansson, Karlsson, et al., 2012). In the context of the fatal coyote attack on a human in CBHNPC, fear levels toward coyotes may be more severe for local residents than those from other areas where no attacks have occurred. Second, cognitive risk was measured by the: (a)

perceived likelihood of interacting with a coyote (Flynn, Burns, Mertz, & Slovic, 1992; Siegrist, 1999) and (b) perceived control over minimizing the risks from coyotes (Grobe, Douthitt, & Zepeda, 1999; Slovic, 1987; Weber et al., 2001). Similar to predictions about attitudes and the level of fear, residents may believe the likelihood of a coyote interaction is high and feel a decreased sense of control in comparison to visitors and park staff.

2.1.1 Potential for Conflict Index$_2$

Differences and similarities among groups are typically examined using means and abstract statistics such as standard deviations or standard errors. Unfortunately, abstract statistics often fail to effectively communicate the findings due to a lack of knowledge, understanding or experience with statistics by the public. A major goal in Human Dimensions of Wildlife (HDW) research is to conceptualize, measure, and interpret variables and their relationships in a way that brings meaning to problems of managerial or scientific interest (Manfredo, Vaske, & Teel, 2003). The level of consensus on a certain subject such as the appropriateness of lethal control to manage wildlife issues is important to understand and incorporate into management planning. The Potential for Conflict Index$_2$ (PCI$_2$) was developed to help address these issues (Vaske, Beaman, Barreto, & Shelby, 2010). The strength of PCI$_2$ is it is a visual representation of the level of conflict or consensus the sampled population has on a given topic. Although specifics of the PCI$_2$ are beyond the scope of this article, a detailed description of this statistic and programs for calculating, graphing, and comparing PCI$_2$ values can be found at http://warnercnr.colostate.edu/~jerryv/PCI2/index.htm.

In general, the PCI_2 ranges from 0 to 1. The least amount of consensus and greatest potential for conflict ($PCI_2 = 1$) occurs when responses are equally divided between two extreme values on a response scale (e.g., 50% extremely unacceptable, 50% extremely acceptable). A distribution with 100% at any one point on the response scale yields a PCI_2 of 0 and suggests complete consensus and no potential for conflict.

PCI_2 results can be displayed using graphs. Degree of consensus is illustrated as a bubble; the size of the bubble depicts the magnitude of the PCI_2 value and indicates the extent of potential conflict (or consensus) regarding acceptance of a particular issue. A small bubble represents little potential for conflict (i.e., high consensus) and a larger bubble represents greater potential for conflict (i.e., low consensus). The centre of the bubble represents the mean evaluative response as plotted on the vertical axis. The bubble's location relative to the neutral point illustrates whether or not the distribution of acceptance of an action is skewed (Vaske et al., 2010).

2.1.2 Hypotheses

We evaluate differences and similarities among local residents, park staff, and visitors in their attitudes toward, fear of, perceived control over, and perceived likelihood of coming into contact with coyotes using PCI_2. The following hypotheses are examined:

H_1:   Residents and park staff will hold more negative attitudes toward coyotes than

visitors.

H_2:   Fear of coyotes will be higher in residents and park staff than in visitors.

H[3]: The perceived likelihood of coming into contact with coyotes while visiting the park will be higher in residents and park staff than in visitors.

H[4]: Perceived control over coming into contact with coyotes while visiting the park will be lower in residents and park staff than in visitors.

2.2 Methods

2.2.1 Sampling Protocol

Data were collected from (a) local residents, (b) park staff, and (c) visitors (age $\geq$ 18). Local residents were defined as people living around CBHNPC in the Inverness and Victoria Counties on Cape Breton Island; 800 residents were randomly sampled from these counties in the fall of 2011 using telephone directories (899 residents called; response rate = 89%). Due to poor cellular phone reception, most area residents have a land-line number that is listed in the telephone book, which makes this sampling frame a suitable choice. A telephone call was used to (a) select the individual in the household whose birthday was coming up next and who was older than 18 years of age, (b) confirm willingness to participate in the survey, and (c) verify the resident's mailing address.

Residents were first mailed the questionnaire package (i.e., copy of the survey with a return postmarked envelope). Two weeks after the initial mailing, all individuals in the sample were mailed a reminder postcard thanking participants for returning the questionnaire and encouraging response if it had not yet been completed. Individuals who had not responded two weeks after the reminder postcard were mailed a second questionnaire package. Using this three-mailing method (Dillman, 2007), the response rate was 70% (n = 556 usable questionnaires).

Budget constraints did not allow for any additional contacts. Participant ages ranged from 18 to over 65 years with 52% of the sample falling within the 45-64 age range; 58% were female and 42% were male.

Park staff members were defined as people working for CBHPNC in any department. The department manager gave the survey to the staff ($n = 146$) in the summer of 2011. Questionnaire return boxes were placed in offices around the park to provide anonymity to respondents. Two weeks later, reminder bulletins were placed in staff lunchrooms and reminder emails were sent to department managers. The staff was given four weeks to complete the questionnaire. The response rate was 85% ($n = 124$). Participant ages ranged from 18 to over 65 years with 37% of the sample falling within the 45-54 age range; 53% were female and 47% were male.

Visitors were defined as people visiting CBHNPC. Intercept surveys on park trails were used to sample visitors in the summers of 2011 and 2012 (Davis, Thompson, & Schweizer, 2012). Sampling occurred at the end of the two most popular trails in the park. Visitors were asked if they would be willing to answer a questionnaire about coyotes. Only 4% of people who were asked to participate declined. Those who agreed ($n = 1,333$) were verbally asked questions on a short onsite questionnaire. At the end of the interview, participants were asked if they would be willing to complete an offsite questionnaire that asked further questions about coyotes and coyote management. Individuals who agreed to participate in the offsite questionnaire ($n = 734$) were given a questionnaire with a return postmarked envelope and were asked to give their email address. Two weeks later, all participants were sent a reminder email and a link to an online version of the offsite questionnaire. Participants who had not responded two weeks after the

reminder email was sent were emailed a second reminder. After the second reminder email we did not solicit responses further. The response rate was 60% (*n* = 443). Participants who completed the offsite questionnaire ranged from 18 to over 65 years of age with 54% of the sample falling within the 45-64 age range; 54% were female and 46% were male.

2.2.2 Variables

Type of public (i.e., local resident, park staff, park visitor) served as the independent variable. Attitudes toward coyotes (3 items), the fear of coyotes (4 items), the perceived likelihood of coming into contact with a coyote, (3 items) and the perceived control over a coyote encounter (3 items) were the dependent variables.

The three attitudinal questions were: "In general do you think of coyotes as … (a) good/bad; (b) beneficial/harmful; and (c) positive/negative." Each attitude was measured on a 7-point scale. For example, for "In general do you think of coyotes as good/bad," the scale ranged from "extremely bad" (-3), "moderately bad" (-2), "slightly bad" (-1), "neither" (0), "slightly good" (1), "moderately good" (2), and "extremely good" (3). The same scale, replacing the adjective, was used for the "beneficial/harmful" and "positive/negative" questions.

The fear questions asked whether respondents agreed or disagreed with statements concerning fear and were measured on a 7-point scale ranging from "strongly disagree" (-3) to "strongly agree" (3). The four questions were: "I fear for … (a) my own personal health or safety; (b) my children's health or safety; (c) my pet's health or safety; and (d) the spread of disease by coyotes." A "not applicable" option was provided for the fear questions dealing with children and pets, as these questions were not relevant to all participants.

The likelihood questions asked: "What is the likelihood of the following events occurring to you while in the park?" Three scenarios were presented: (a) "seeing a coyote"; (b) "being approached by a coyote"; and (c) "being approached by a coyote, snarling." All three scenarios were measured on a 7-point scale: "extremely unlikely" (-3), "moderately unlikely" (-2), "slightly unlikely" (-1), "neither" (0), "slightly likely" (1), "moderately likely" (2), and "extremely likely" (3).

The perceived control questions asked: "How much control do you feel you have at preventing the following from occurring to you while visiting the park?" The same three scenarios used in the likelihood questions were used for the control questions. All three scenarios were measured on a 7-point scale: "no control" (-3), "almost no control" (-2), "nearly no control" (-1), "neither" (0), "some control" (1), "almost in control" (2), and "complete control" (3).

2.2.3 Analysis

One-way analysis of variance (ANOVA) compared residents, park staff, and visitors across each of the 13 items. Effect size measures (i.e., η) compared the three groups' responses for each attitude, fear, perceived control, and perceived likelihood question. Differences among residents, park staff, and visitors were examined using PCI_2 (Vaske et al., 2010). The PCI_2 and statistical differences (d) tests for comparing two PCI_2 values were computed using software available at http://warnercnr.colostate.edu/~jerryv/PCI2/index.htm.

2.3 Results

2.3.1 Differences in Attitude

On average, park visitors held positive attitudes toward coyotes (i.e., means above the neutral line, Figure 2.1), while park staff and residents had negative attitudes toward coyotes across all three attitudinal variables (i.e., means below the neutral line). The mean responses for each of the three attitudinal variables among residents, park staff, and visitors were all significantly different ($p < .001$) (Table 2.1). The visitors generally had the highest consensus and were significantly different from residents ($p < .05$) for two out of three items (i.e., good-bad, beneficial-harmful). The PCI_2 values for positive/negative did not differ between groups. PCI_2 for the park staff ranged from .23 to .36; PCI_2 for the residents ranged from .21 to .34. These results support the first hypothesis: residents and park staff hold more negative attitudes toward coyotes than visitors.
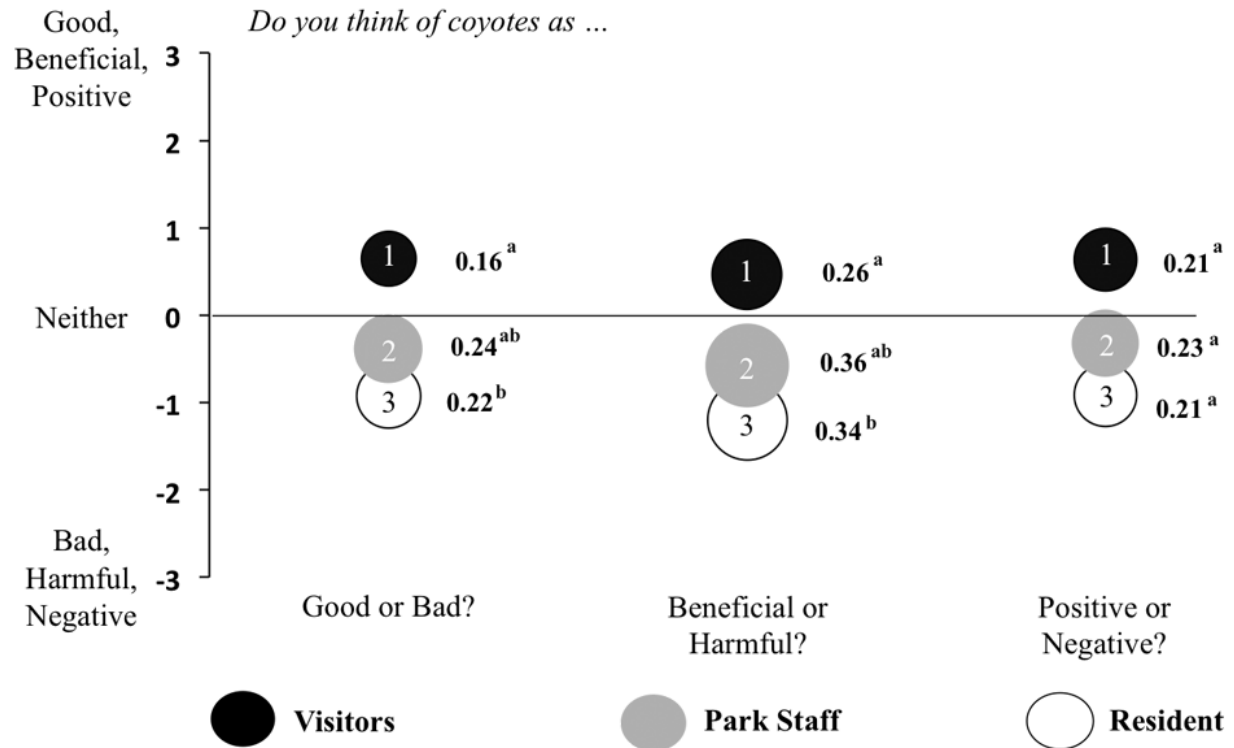
Figure 2.1. The mean response for residents, park staff, and visitors and PCI$_2$ values for the three attitudinal variables.

* The numbers in the bubbles (1, 2, 3) represent whether there was a significant difference between the means. The superscript letters ([a], [b], [c]) on the PCI$_2$ represent whether there was a significant difference in the PCI$_2$ for the three groups.

Table 2.1 The results of the one-way ANOVA for the dependent variables (attitudes, fear, likelihood, and control), as a function of the independent variable (respondent type).

Survey Item	Visitor (M)	Park Staff (M)	Resident (M)	F value	p value	Eta (η)
In general do you think of coyotes as …[1]						
… good/bad	0.65^c	-0.38^b	-0.93^a	122.37	<0.001	0.44
… beneficial/harmful	0.47^c	-.057^b	-1.20^a	118.15	<0.001	0.43
… positive / negative	0.64^c	-0.32^b	-0.91^a	107.46	<0.001	0.42
I fear for …[2]						
… my own personal health or safety.	-2.12^c	-0.99^b	1.12^a	371.61	<0.001	0.63
… my children's health or safety.	-1.20^b	-0.92^b	1.40^a	108.77	<0.001	0.49
… my pet's health or safety.	-0.38^b	-1.10^b	1.59^a	93.40	<0.001	0.49
… the spread of disease by coyotes.	-2.40^c	-1.47^b	0.68^a	379.71	<0.001	0.64
What is the likelihood of the following events occurring to you while in the park?[3]						
… seeing a coyote?	-0.65^b	-0.23^b	1.01^a	108.34	<0.001	0.41
… being approached by a coyote?	-1.78^c	-0.62^b	0.05^a	131.64	<0.001	0.44
… being approached by a coyote, snarling?	-2.33^c	-1.41^b	-0.38^a	148.82	<0.001	0.46
How much control do you feel you have at preventing the following from occurring to you while visiting the park?[4]						
… seeing a coyote?	-0.92^b	-1.09^b	-1.83^a	33.34	<0.001	0.24
… being approached by a coyote?	0.10^c	-0.44^b	-1.18^a	61.51	<0.001	0.32
… being approached by a coyote, snarling?	0.07^c	-0.64^b	-1.30^a	70.59	<0.001	0.34

[a,b,c] The letter superscripts denote significant differences between means based on the Tamhane post-hoc test.

[1] The questions were on a 7-point semantic differential scale. For example -3 = bad to +3 = good

[2] The questions were on a 7 point scale from: strongly disagree (-3) to strongly agree (+3).

[3] The questions were on a 7 point scale from: extremely likely (+3) to extremely unlikely (-3)

[4] The questions were on a 7 point scale from: complete control (+3) to no control (-3).

2.3.2 Differences in Fear

Visitors and park staff were less fearful of coyotes in the four scenarios (i.e., means below the neutral line) than residents who generally feared coyotes across all four items (i.e., means above the neutral line, Figure 2.2). The mean responses for each of the four fear items for residents, park staff, and visitors were generally significantly different ($p < .001$). The exception was that park staff and visitors did not differ in their fear for the safety of children or pets safety (Table 2.1). Residents consistently were fearful of coyotes with PCI_2 values ranging from .31 to .47. Park staff and visitors were consistently not fearful of coyotes. The degree of consensus in visitors shifted depending on the question. Visitor consensus on fear for their own safety and for the spread of diseases was high ($PCI_2 = .32$ and .19, respectively), but consensus decreased dramatically in regards to their fear for their children and pet safety ($PCI_2 = .62$ and .72, respectively, Figure 2.2). The PCI_2 values for visitors were significantly different from residents and park staff ($p < .05$). These results support the second hypothesis: fear of coyotes is higher in residents and park staff than in visitors.
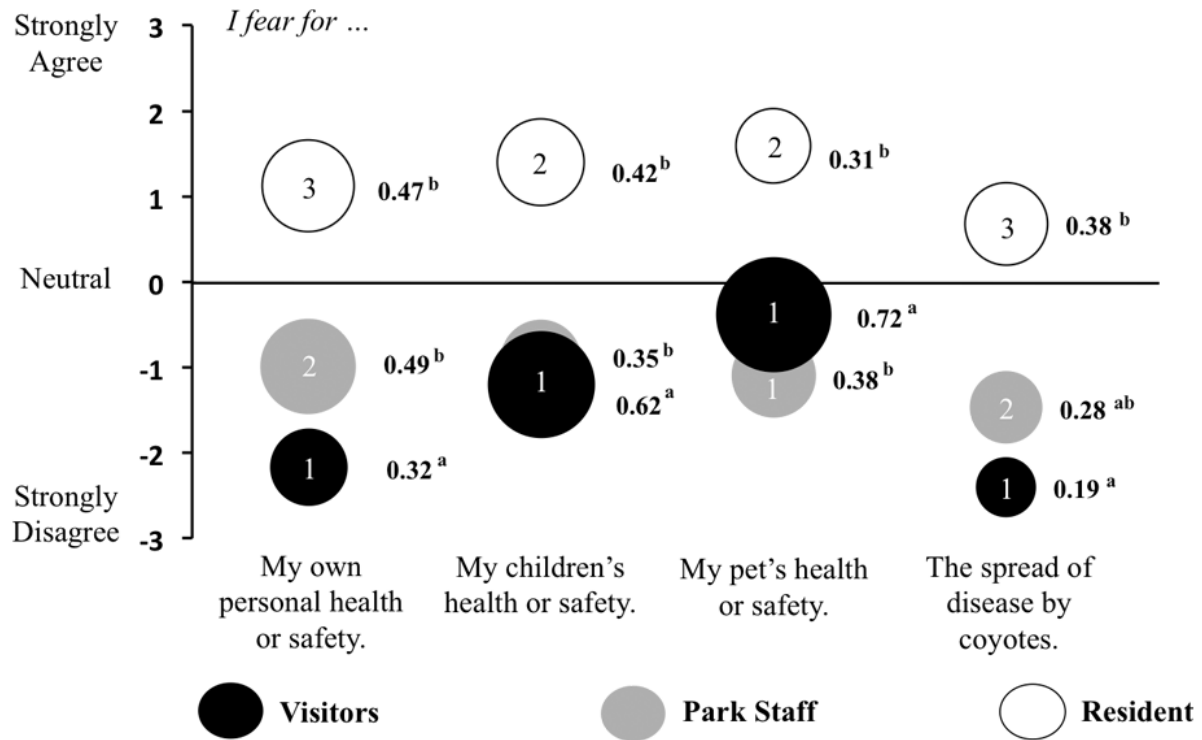
Figure 2.2. The mean response for residents, park staff, and visitors and PCI_2 values for the four fear variables.

* The numbers in the bubbles (1, 2, 3) represent whether there was a significant difference between the means. The superscript letters ([a], [b], [c]) on the PCI_2 represent whether there was a significant difference (d) in the PCI_2 for the three groups.

2.3.3 Differences in Likelihood of HCI

Each group was asked to respond to HCI likelihood scenarios of seeing a coyote, being approached by a coyote, and being approached by a snarling coyote. The mean perceived likelihood for each group decreased (i.e., the scenario was less likely) as the severity of the HCI increased and generally the means were significantly different ($p <.001$). Residents believed that seeing a coyote was quite likely while in the park, but slightly unlikely for being approached by a snarling coyote. Both park staff and visitors thought that all three scenarios were unlikely (Table 2.1). Residents and park staff tended to have moderate consensus across all items (PCI_2 values ranging from .36 to .57), whereas visitors had a range of PCI_2 values (Figure 2.3). For example, the least amount of visitor consensus involved seeing a coyote in the park ($PCI_2 = .52$); consensus increased as the scenarios escalated (PCI_2 value .18 in the snarling coyote scenario). The PCI_2 values for residents, on average, differed statistically from visitors but not park staff ($p <.05$) except for the snarling coyote scenario. These results support the third hypothesis: the perceived likelihood of coming into contact with coyotes while visiting the park is higher in residents and park staff than in visitors.
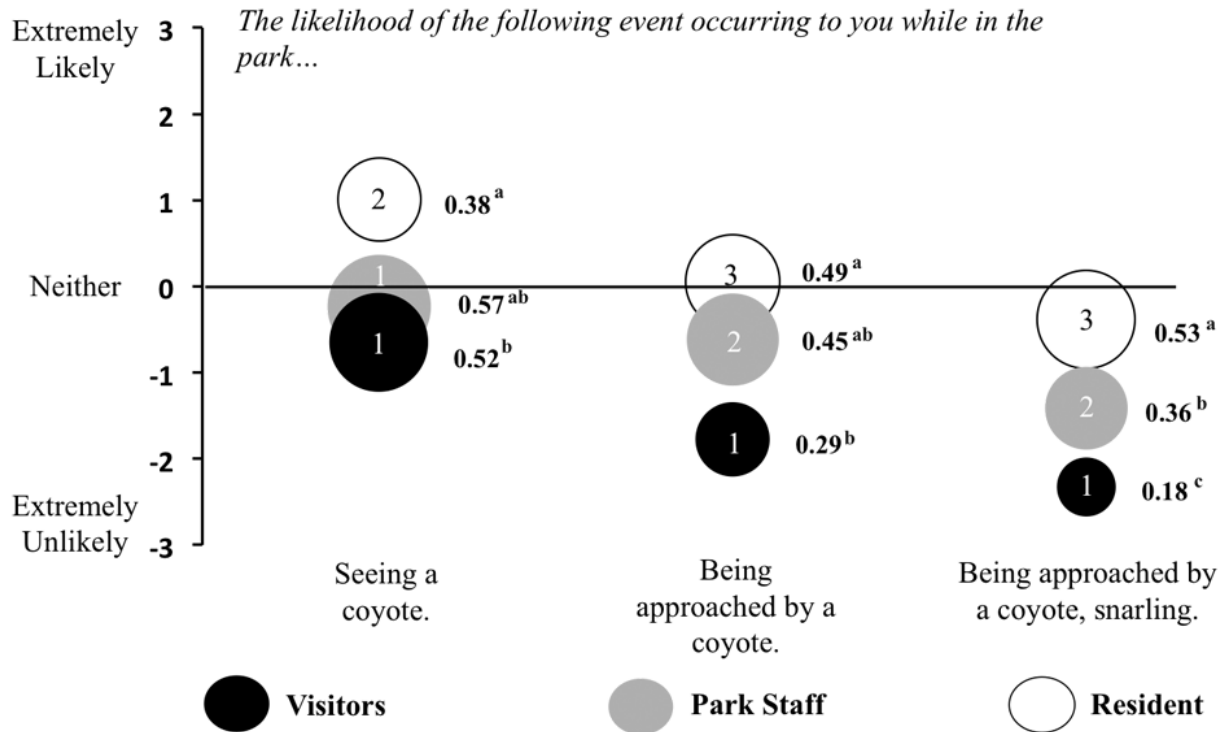
Figure 2.3. The mean response for residents, park staff, and visitors and PCI_2 values for the three likelihood scenarios.

* The numbers in the bubbles (1, 2, 3) represent whether there was a significant difference between the means. The superscript letters ([a], [b], [c]) on the PCI_2 represent whether there was a significant difference (*d*) in the PCI_2 for the three groups.

2.3.4 Differences in Control over a HCI

Each group was given the same HCI scenarios as those used in the likelihood questions, but in regards to control over the situation. Generally, the means for each group increased as the severity of the HCI increased (Table 2.1). Visitors generally felt they had more control as the severity of the scenario increased. Residents felt that they had little control over any of the scenarios. Park staff, on average, were in between the residents and visitors, and felt they had more control over HCI than residents. All means were significantly different ($p < .001$) except

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between park staff and visitors for the first scenario. Residents, visitors, and park staff had moderate consensus (PCI_2 ranged from .33 to .52). Consensus for visitors increased as the severity of the scenario increased; for park staff and residents consensus decreased with increased scenario severity (Figure 2.4). These results support the fourth hypothesis: perceived control over coming into contact with coyotes while visiting the park is lower in residents and park staff than in visitors.
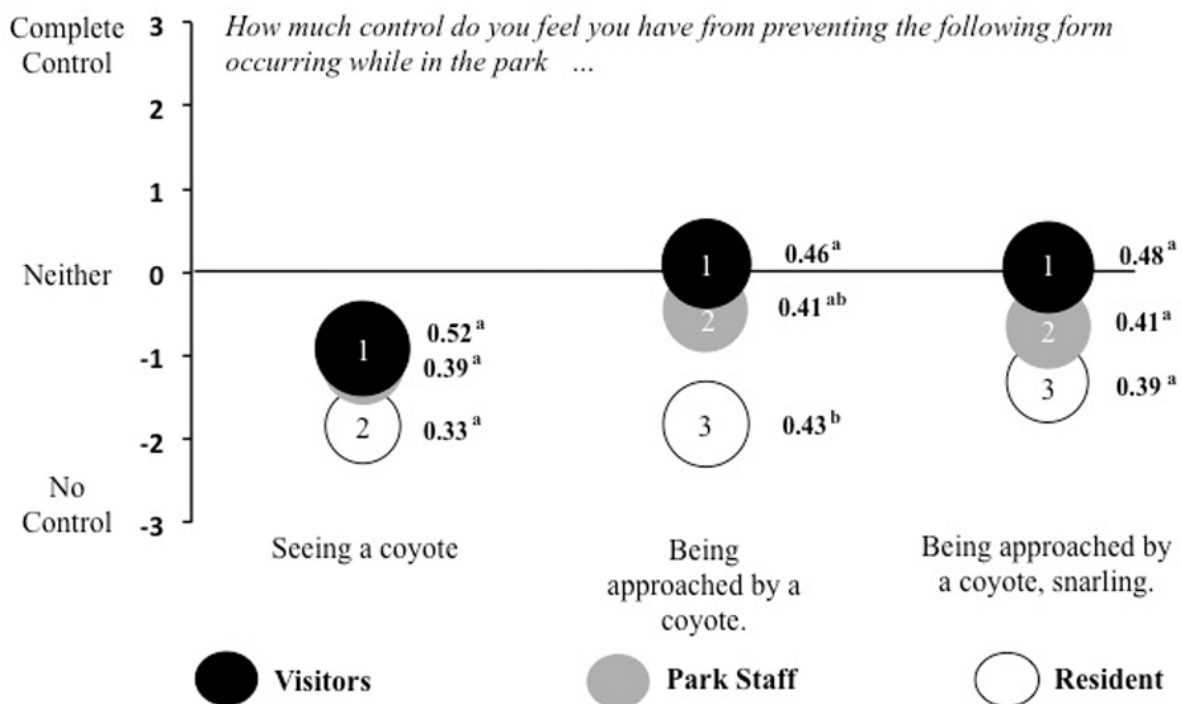
Figure 2.4. The mean response for residents, park staff, and visitors and PCI_2 values for the three control scenarios.

* The numbers in the bubbles (1, 2, 3) represent whether there was a significant difference between the means. The superscript letters ([a], [b], [c]) on the PCI_2 represent whether there was a significant difference (d) in the PCI_2 for the three groups.

2.4 Discussion

Visitors generally held positive attitudes, reported less fear, described a low likelihood of interacting with a coyote, and felt in control of coming into contact with a coyote while visiting CBHNPC. Residents generally held negative attitudes, reported fear, indicated a higher likelihood of interacting with a coyote, and felt little in control over coming into contact with a coyote while visiting CBHNPC. Park staff tended to fall in between these two user groups. The findings generally supported the hypothesized differences between the three groups. The distribution of park staff responses may be due to the variety of backgrounds within this group. Park staff consisted of people born and raised in the towns bordering the park (i.e., resident in characteristic) as well as people who have moved into the area to work at the park. Residents are typically people who have lived in the area their entire lives for generations.

Cape Breton has historically been an isolated island and was not connected to the mainland of Canada until 1955 with the completion of the Canso Causeway (Beaton & Muise, 2008). The majority of CBHNPC staff who are not locals moved into the area to work for the national park and typically possess a higher degree of education (e.g., biology degrees for park resource officers). The locally born staff members are abreast with both local knowledge and gossip about coyotes as well as information and education material from CBHNPC. Since the coyote-caused human death, residents seem to have less tolerance for coyotes and have an increase in fear level. We believe the mosaic of backgrounds of the park staff could be an explanation for the observed results of staff responses falling in between residents and visitors.

A study of human-coyote interactions in New York state showed resident fear levels decreased and attitudes became more positive the longer the communities had co-existed with coyotes (Wiezorek Hudenko, 2009). Residents in our study who lived with coyotes were more fearful and held more negative attitudes toward coyotes than visitors. A critical difference between the New York study and this study is the death of a woman by coyotes. While we do not know what attitudes were held before the tragic incident, we believe the death triggered a change in how residents view coyotes and how they subsequently behave today (e.g., less walking alone in the community) (E. Muntz, personal communication, January 2011). Previously, coyote presence was inconsequential to whether a person liked or disliked them. Since the death, the coyote is seen as a potential threat, as shown by the higher fear levels held by residents than park staff and visitors. This historical context between the people and the species is critical for understanding attitudes and fear perceptions. Coyotes are abundant across North America, but the type and strength of interaction with humans (e.g., frequency) does vary across different scenarios and geographic regions.

HDW research typically discusses attitudes and fear, but has focused less attention on alternative components of risk perception. Likelihood and control are components of risk perception that can influence one's fear of a species (Armfield, 2006). Residents felt that the likelihood of coming into contact with coyotes in all three scenarios was more probable than park staff and visitors. The perceived likelihood of coming into contact with coyotes may be related to one's perception of the unpredictability and uncertainty of the animal's behaviour (Armfield, 2006). The belief that an interaction is more likely tends to increase fear level. A human's

behavioural response with higher degrees of fear would be aversive in nature (e.g., not hiking because of fear of coming across a coyote) (Armfield & Mattiske, 1996). Based on the results of the likelihood data, residents would be far more likely not to participate in activities in the park than park staff and visitors.

Control is "the belief that one has at one's disposal a response that can influence the [aversive nature] of the event" (Thompson, 1981, p. 89). A perception of control over a scenario (e.g., coming across a coyote while hiking) appears to reduce perception of risk and fear (Armfield, 2006). Our results support this logic; people who possessed high levels of fear in all three coyote scenarios also felt in less control in each scenario. Visitors and park staff felt a higher degree of control than residents, most likely due to their experience. Park staff work in CBHNPC, while visitors seek out an experience in the park. Both groups have had experience with wildlife whether it is in CBHNPC or elsewhere. Visitors may have more hiking or outdoor experience than residents, leading to greater confidence in their own abilities to address HCIs while in the park. This could lead to a sense of more control when compared to residents who might not use the park for recreation. Visitors are potentially more exposed to coyote-related safety messages, which explain how to act and how to prevent coyotes from approaching; such messages did exist on the trail where the data were collected.

Understanding the range of attitudes and the different components of risk perception provides managers with information that can enhance education and outreach programs. Managers can target certain groups with specific messages. For example, the park might want to reach out to residents to increase their visitation. Residents were different from both park staff

and visitors in that they live around the park and could potentially use the park and its facilities all year. CBHNPC may want to explore different avenues to engage residents to bring more people into the park as well as to build relationships with local communities. These activities could include guided hikes and snowshoe treks, movies about coyotes, art shows, wildlife storytelling, etc. Based on this research, CBHNPC, in collaboration with Memorial University, has developed a pilot experiential education program which targets the attitudes and risk perception of residents. The objectives of this program are to increase understanding of coyote ecology, and to educate residents about how to deter coyotes from coming into their backyards and how to defend themselves from coyotes while recreating. In contrast, messages targeted toward visitors may already be working, thus this research supports the continued delivery of these messages to visitors through signage and pamphlets outlining how to behave if a coyote does approach. Our research suggests the need to address fear among residents and their perceived risk regarding HCI.

Chapter 3:
The role of cognitions and emotions in human-coyote interactions

3.1 Introduction

Social-psychological theories differentiate basic, general values (Schwartz, 2006) from specific cognitions (Eagly & Chaiken, 1993). "Cognitions refer to the mental processes (e.g., values, beliefs, attitudes) used in perceiving, remembering, thinking, and understanding, as well as the act of using these processes" (Vaske & Manfredo, 2012, p. 43). Such cognitions have been arranged in a "hierarchy" from general to specific (Fulton et al., 1996). Specific beliefs and attitudes are more likely to predict behaviour than more general cognitions like values (Rokeach, 1973). Human dimensions research has applied this "cognitive hierarchy" to wildlife (Bright, Manfredo, & Fulton, 2000; Manfredo, 2008; Vaske, Jacobs, Sijtsma, & Beaman, 2011), wildfire (Absher, Vaske, & Shelby, 2009) and forest planning issues (Vaske & Donnelly, 1999).

The specificity principle lies at the heart of this line of research (Whittaker, Vaske, & Manfredo, 2006). Specificity refers to the level of measurement correspondence among the variables. When variables are measured at the same or similar levels in terms of target, action, context, and time, the correlations among the items have been shown to be larger (Fishbein & Ajzen, 1975). General "wildlife value orientations," for example, predict the general acceptability of hunting better than the acceptability of a specific conflict situation (e.g., killing [the action] a nuisance bear [the target] in a suburb [the context] during the fall of 2014 [time]).

The influence of general cognitions on more specific cognitions is well studied in the human dimensions literature (Jeremy T. Bruskotter, Vaske, & Schmidt, 2009a; Fulton et al., 1996; M. J. Manfredo, Teel, & Henry, 2009). These cognitive models typically explain about

50% of the variability in people's approval or disapproval of a management action like lethal control (Johansson, Karlsson, et al., 2012). Jacobs, Vaske, and Roemer (2012) have suggested that emotions might account for at least some of the remaining variability. The integration of emotions into predictive models, however, has received limited attention in human-wildlife interactions research.

3.1.1 Emotion & Human Dimensions of Wildlife

The lack of attention given to emotional responses in human dimensions research can be attributed to at least three reasons. First, the wildlife professional has traditionally emphasized *science* and excluded emotional considerations from the decision-making process (M. J. Manfredo et al., 2009). Second, many human dimensions researchers have their disciplinary roots in flavors of psychology that has ignored emotions and emphasize behavioural responses (Forgas, 2000). Third, emotions research has focused on physiological measures that necessitate laboratory-based, experiments (M. J. Manfredo, 2008). Such studies often have limited implications for an applied field such as human dimensions of wildlife.

Exploration of emotional reactions to wildlife, however, holds considerable promise for future investigations (M. J. Manfredo, 2008). Emotions reflect a primal reaction to animals. The rudiments of emotion are inherited and interact with cognitions to influence human behaviour (Izard, 2007). Emotions can produce uncontrolled reactions (e.g., fear, rage, anger), but are essential to sound decision-making (Cacioppo & Gardner, 1999). Enhancing our understanding of human behaviour will ultimately occur by exploring the interrelationship of cognitive concepts such as value orientations, attitudes, and norms with affective concepts such as emotion.

Human dimensions research has explored some aspects of emotions. Self-reported fear toward a species and perceived risk, for example, have been examined for carnivore species (Arrindell, 2000; Davey et al., 1998; Kaltenborn, Bjerke, & Nyahongo, 2006; Tucker & Bond, 1997). Fear of carnivores has been shown to be higher than for physically non-threatening species such as birds (Davey et al., 1998). Fear also tends to be higher when asking people about specific species or scenarios versus more general statements (Kaltenborn et al., 2006). Different species and different contexts result in different levels of fear toward carnivores around the world (Jacobs, Vaske, Dubois, & Fehres, 2014).

Johansson and Karlsson (2011) examined the fear of brown bear and wolves in Sweden. Fear was linked to the perceived danger the animal posed to the person and the perceived uncontrollability of the animal. Perceived unpredictability of the animal's movements and feelings of disgust played less of a role in fear responses. The appraisal dimensions (i.e., potential harm, uncontrollability) in the fear of bears and wolves could be due to the animal's physical attributes (e.g., sharp teeth, size) and to the known attacks on people (Flykt, Johansson, Karlsson, Lindeberg, & Lipp, 2013).

Recent research has explored the relationships between emotions and management policy (Jacobs et al., 2014). As fear of carnivores increased, willingness to pay for management decreased (Johansson, Sjöström, Karlsson, & Brännlund, 2012). Anger about the presence of wolves, sympathy for wolves, and sympathy for ranchers influenced the acceptability of using lethal control in wolf management (Vaske, Roemer, & Taylor, 2013). Both positive and negative emotions influence beliefs about wolf recovery (K. M. Slagle, Bruskotter, & Wilson, 2012).

3.1.2 *Emotional Dispositions*

Although the definition of emotion is debated (Izard, 2007), there is agreement that emotions consist of four components: (a) physiological response such as an increase in heart rate; (b) physical expressions such as a frown; (c) behavioural response such as running; and (d) cognitively experiencing the emotion such as worry or fear (Bradley & Lang, 2000; Jacobs et al., 2014). Emotions initiate and drive our attraction or aversion toward wildlife (M. J. Manfredo, 2008). For example, our emotional disposition toward human-wildlife interactions (e.g., attacks on humans, depredation of livestock) often elicit strong memories (Vaske et al., 2013), influence attitudes towards wildlife (Ajzen, 2005) and inform decisions regarding behaviour toward wildlife (Slagle et al., 2012).

Emotions articulated through experience denote mental dispositions. Emotional dispositions have been used to study emotions toward wildlife (Jacobs et al., 2012). When emotions are measured as traits, the disposition reflects who a person is (Barrett, 2007; Barrett & Russell, 1999). Traits are always present, even if they are not active. Like all mental dispositions, emotional disposition can be examined through reflection. For example, personality characteristics are properties of an individual, even if they do not always guide current behaviour, thought, or experience. Emotional dispositions are mental traits that act as criteria against which the emotional relevance of stimuli is judged. In this article, the specificity principle is used to understand how specific anticipated emotional dispositions in specific scenarios influence the acceptability of coyote lethal control in the same scenarios.

3.1.3 Emotional Dispositions in Relation to Cognitions

The relationships between beliefs and attitudes have been explored in the human

dimensions literature (Manfredo, 2008). Psychologists define attitudes as a mental state reflected

by cognitive (beliefs) and affective (e.g., emotions) components (Eagly & Chaiken, 1993;

Manfredo & Fulton, 1997). Attitudes represent negative or positive evaluations of a general or

specific object (Vaske & Manfredo, 2012). For example, a general attitude might refer to a

person's overall evaluation of coyotes across different contexts, whereas a specific attitude might

focus on the individual's evaluation of coyotes in Cape Breton National Park of Canada

(CBHNPC) while hiking in the summer of 2014. This article examined the influence of general

attitudes toward coyotes on specific anticipated emotional dispositions and acceptability of lethal

management. Research has shown that people with positive attitudes are towards a species are

less likely to support the use of lethal control (Bremner & Park, 2007; Bruskotter et al., 2009a;

Infield, 2003; Kellert, 1985; Zinn, Manfredo, Vaske, & Wittmann, 1998). The influence of

general attitude on a specific emotional disposition is a novel area of research.

Beliefs are what people think are true, but are not necessarily true in fact (Vaske &

Manfredo, 2012). Like attitudes, beliefs are not static but can change depending on the scenario

(Vaske & Whittaker, 2004). For the purposes of this research, symbolic existence beliefs focused

on general beliefs about coyotes in the park (e.g., whether the species has the right to exist).

General symbolic existence beliefs were predicted to influence a specific anticipated emotional

disposition and the acceptability of lethal control. Beliefs have been shown to influence the

acceptability of the management of feral cats (Loyd & Miller, 2010). The influence existence beliefs have on more specific anticipated emotional dispositions is a novel area of research.

3.1.4 Study Context

Coyotes naturally dispersed into the province of Nova Scotia around 1977 (Moore & Millar, 1986) and onto the island of Cape Breton in the 1980s (E. Muntz, personal communication, January 2011). While negative human-coyote interactions (e.g., attacks on domestic pets, following people) have occurred on the island, a coyote killed a human in Cape Breton Highlands National Park in 2009. This fatality and the associated mass media coverage likely heightened the levels of fear in the residents. Researchers have shown that negative media attention influences fear of a species (Røskaft et al., 2003).

3.1.4 Hypotheses

Based on the specificity principle (i.e., general to specific), general attitude toward coyotes and symbolic existence beliefs were predicted to influence specific anticipated emotional dispositions linked to different scenarios The emotional disposition was hypothesized to mediate the influence of general attitude and existence beliefs on the acceptability of a specific lethal management action (i.e., killing a coyote – an agency behaviour). The emotional dispositions were specific to a scenario and were hypothesized to directly influence the acceptability of lethal management options. The hypothesized relationships are shown in Figure 3.1:

H[1]   Individuals with a positive general attitude toward coyotes will less likely to support lethal control.

H₂   For individuals with a positive general attitude toward coyotes, the emotional

disposition will be less extreme (e.g., less nervous, tense, upset, scared, worried) for

each scenario.

H₃   Individuals with positive symbolic existence beliefs toward coyotes will be less likely

to support lethal management for each scenario.

H₄   For individuals with positive symbolic existence beliefs toward coyotes, the

emotional disposition will be less extreme (e.g., less nervous, tense, upset, scared,

worried) for each scenario.

H₅   As the emotional disposition becomes more extreme (e.g., more nervous, tense, upset,

scared, worried), the willingness to support lethal management will increase for each

scenario.
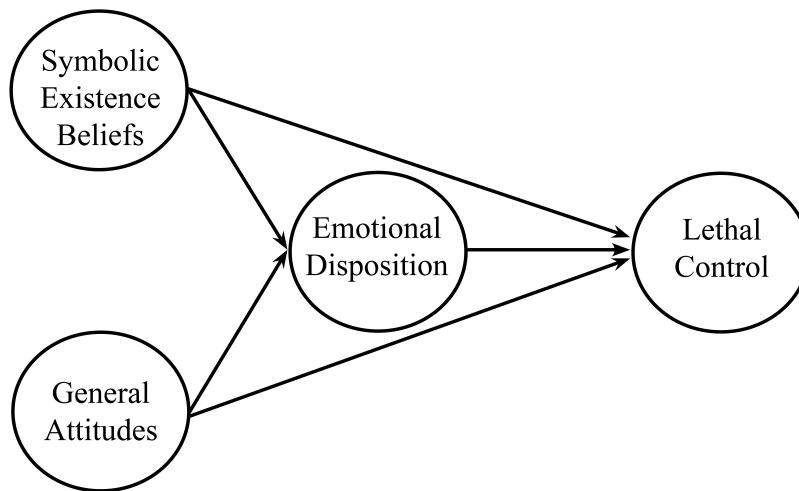
Figure 3.1. Hypothesized relationships between general attitudes, basic beliefs, emotional

disposition, and lethal control.

3.2 Methods

3.2.1 Sampling Protocol

Data were obtained from randomly selected residents (age ≥ 18) living around CBHNPC

in the Inverness and Victoria Counties on Cape Breton Island in the fall of 2011. Because people

in this area still have a landline number (due to poor cellular phone reception) and are listed in

the telephone book, telephone directories were used as the sampling frame. Telephone calls were

used to contact 800 accepting participants (response rate = 76%) and (a) select the individual in

the household whose birthday was coming up next and who was older than 18 years of age, (b)

confirm willingness to participate in the survey, and (c) verify the participant's mailing address.

Residents were mailed the questionnaire package (i.e., a cover letter, a copy of the survey

and a return post marked envelope). Two weeks after the initial mailing all participants were

mailed a reminder postcard. Individuals who had not responded two weeks after the reminder

postcard were mailed a second questionnaire package. Budget constraints did not allow any

additional contacts. The response rate was 70% (n = 556 usable questionnaires). Participant ages

ranged from 18 to over 65 years with 52% of the sample falling within the 45-64 age range; 58%

were female and 42% were male.

3.2.2 Variables in Model

This article focused on 12 observed items, organized in four latent constructs: general

attitude toward coyotes (3 items), general symbolic existence beliefs toward coyotes (3 items),

specific anticipated emotional disposition (4 items per scenario), and the acceptability of lethal

coyote management (1 item per scenario).

The three attitudinal questions were: "In general do you think of coyotes as … (a)

good/bad; (b) beneficial/harmful; and (c) positive/negative." Each attitude was measured on a 7-

point rating scale. For example, for the question, "In general do you think of coyotes as beneficial/harmful?" the scaled was "extremely harmful" (-3), "moderately harmful" (-2), "slightly harmful" (-1), "neither" (0), "slightly beneficial" (1), "moderately beneficial" (2), and "extremely beneficial" (3). The same scale, replacing the adjective, was used to record answers to the "good/bad" and "positive/negative" questions.

The general symbolic existence belief items were: (a) "coyotes have a right to exist in Cape Breton Highlands National Park"; (b) "the presence of coyotes in Cape Breton Highlands National Park is a sign of a healthy environment"; and (c) "I may never see a coyote but it is important to know they exist in the park." Items were measured on 7-point rating scales ranging from "strongly disagree" (-3) to "strongly agree" (3).

The four specific anticipated emotional disposition questions were scenario-based. The scenarios were: (a) "seeing a coyote"; (b) "being approached by a coyote"; and (c) "being approached by a coyote, snarling." Each anticipated emotional disposition was measured on 7-point semantic differential scales. For example, in scenario 1 the question was asked, "If you were walking on a trail in the park and saw a coyote cross the trail ahead of you, to what extent would you feel … (a) relaxed/nervous; (b) calm/tense; (c) pleased/upset; and (d) not scared/scared." The scales ranged from relaxed (3) to nervous (-3). The four anticipated emotional dispositions were asked in each of the scenarios.

The one management option was "how unacceptable or acceptable would it be for Parks Canada to kill the coyote." This question was also based on the three scenarios stated above. Items were measured on 7-point rating scales ranging from "extremely unacceptable" (-3) to "extremely acceptable" (3).

3.2.3 Analysis

Confirmatory factor analysis was used to empirically verify the legitimacy of the conceptual distinctions among the observed variables. Internal consistency of the general coyote existence value, general attitude towards coyote, and specific emotional disposition latent indices were investigated using Cronbach's alpha (Cronbach, 1951; Vaske, 2008). A structural equation model was used to assess the relationships among the latent variables. For each scenario, Lisrel 8.8 was used to fit two separate models (full vs. partial mediation) using the covariance matrix. The overall model fit was examined using a variety of goodness-of-fit indices: Chi-square ($\Delta \chi^2$, χ^2/df), Comparative Fit Index (CFI; an acceptable CFI value > .90), root mean square error of approximation (RMSEA; an acceptable RMSEA value .05 > .08), and Normed Fit Index (NFI; an acceptable NFI value > .95) (Hu & Bentler, 1999).

3.3 Results

3.3.1 Confirmatory Factor Analysis & Scale Reliabilities

Confirmatory factor analysis empirically verified the legitimacy of the conceptual distinctions among the observed variables and latent constructs. All of the items loaded on their associated constructs with all factor loadings ≥ .71 on the latent variable (Figure 3.2) except for the third belief observed variable (BEL3) that had a loading factor of .40, .40 and .41. The three items measuring general attitude toward coyotes had a reliability of .92 (Table 3.1). The Cronbach's alpha for the three items in the general symbolic existence beliefs toward coyotes scale was .69. The reliabilities for the three anticipated emotional dispositions were: (a) scenario 1: .90; (b) scenario 2: .91; and (c) scenario 3: .86.

Table 3.1 The indicators for general attitudes and basic beliefs toward coyotes, scenario-based emotional disposition, and behavioural intention (lethal control).

		Mean[a]	Standard Deviation	Cronbach's Alpha If Item Deleted	Cronbach's Alpha
	Attitudes Toward Coyotes [a]				.92
	In general do you think of a coyotes as …				
ATT1	Good/bad	-.89	1.64	.87	
ATT2	Beneficial/harmful	-1.17	1.72	.88	
ATT3	Positive/negative	-.91	1.65	.90	
	Symbolic Existence Beliefs [b]				0.69
BEL1	Coyotes have a right to exist in Cape Breton Highlands National Park	.56	2.08	.48	
BEL2	The presence of coyotes in Cape Breton Highlands National Park is a sign of a healthy environment	.06	1.97	.50	
BEL3	I may never see a coyote but it is important to know they exist in the park.	.97	2.26	.76	
	Emotional Disposition [b]				
	Scenario 1: coyote crosses the trail				.90
ED1	Would you feel relaxed or nervous?	1.89	1.60	.87	
ED2	Would you feel calm or tense?	1.63	1.85	.86	
ED3	Would you feel pleased or upset?	1.34	1.90	.90	
ED4	Would you feel not scared or scared?	1.62	1.73	.90	
	Scenario 2: being approached by a coyote.				.91
ED1	Would you feel relaxed or nervous?	2.18	1.37	.87	
ED2	Would you feel calm or tense?	1.98	1.57	.87	

		Mean[a]	Standard Deviation	Cronbach's Alpha If Item Deleted	Cronbach's Alpha
ED3	Would you feel pleased or upset?	1.76	1.67	.91	
ED4	Would you feel not scared or scared?	1.84	1.60	.88	
	Scenario 3: being approached by a coyote, snarling.				.86
ED1	Would you feel relaxed or nervous?	2.74	.88	.82	
ED2	Would you feel calm or tense?	2.64	1.11	.79	
ED3	Would you feel pleased or upset?	2.55	1.21	.85	
ED4	Would you feel not scared or scared?	2.50	1.18	.84	
	Management Option[c]				
MO1	Scenario 1: How acceptable is it to kill a coyote	-.04	2.42		
MO1	Scenario 2: How acceptable is it to kill a coyote	.09	2.40		
MO1	Scenario 3: How acceptable is it to kill a coyote	1.00	2.31		

[a] The question were on a 7-point semantic differential scale. For example -3 = bad to +3 = good
[b] The questions were on a 7 point scale where -3 = Strongly Disagree; -2 = Moderately Disagree; -1 = Slight Disagree; 0 = Neutral; 1 = Slight Agree; 2 = Moderately Agree; and 3 = Strongly Agree.
[c] There was one management option question per scenario therefore there no reliability analysis was run on this latent variable.
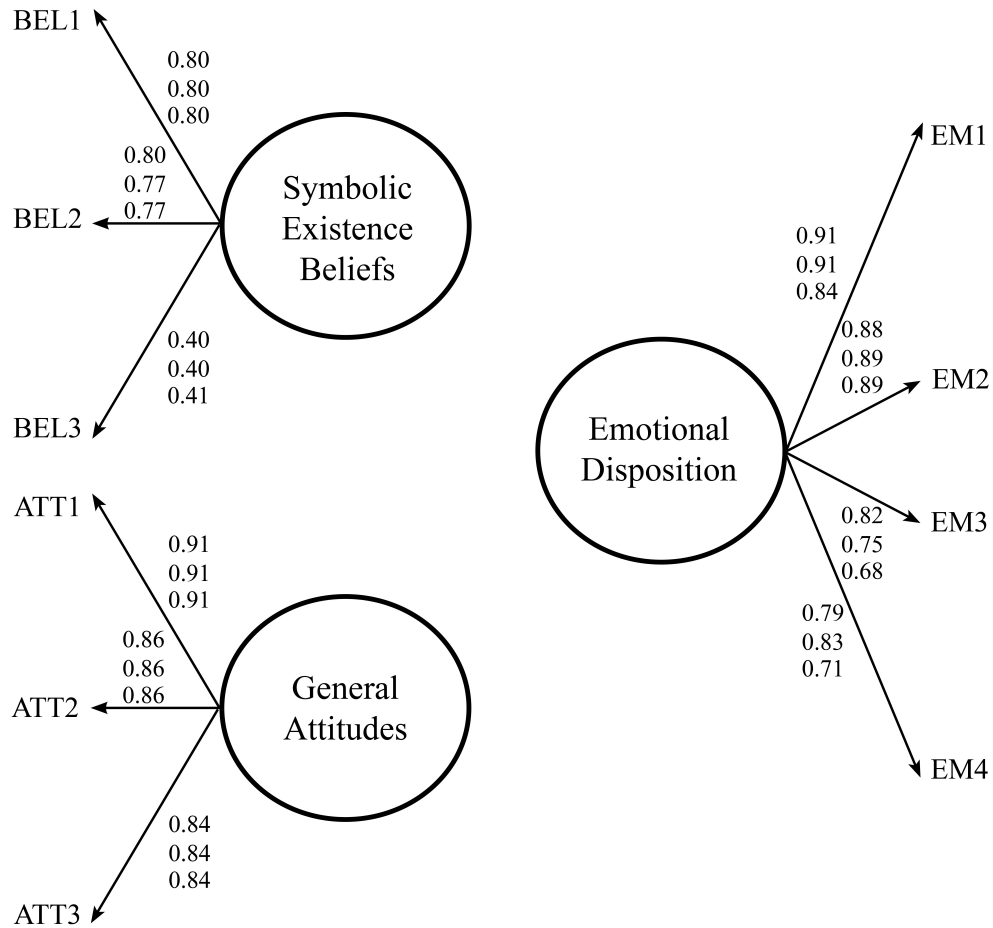
Figure 3.2. The factor loadings for the confirmatory factory analysis of the three latent variables: Symbolic Existence Beliefs, General Attitudes, and Emotional Dispositions. The factor loadings are presented for the three scenarios therefore the top loading is for scenario 1, followed by scenario 2, and then 3.

On average, residents were slightly below the neutral on each of the three attitude items (i.e., M = -0.89, -1.17, -0.91, Table 3.1) and held slightly positive symbolic existence beliefs (i.e., M = 0.59, 0.06, 0.97). As the severity of the scenario increased from scenario 1 to 3, the anticipated emotional dispositions were progressively more negative (i.e., more nervous, tense, upset, scared, worried).

Scenario 1

The fit indices for the model were acceptable ($\chi^2 = 93.75$ $df = 38$, $\chi^2/df = 2.60$, NFI (0.98), CFI (0.99), and RMSEA (0.054)) (Hu & Bentler, 1999) (Table 3.2). The data supported 4 out of 5 of the relationships hypothesized in Figure 3.3a. Hypothesis one was not supported in scenario 1 as general attitude did not significantly influence the management option. Attitude indirectly influenced the acceptability of lethal control through the emotional disposition. Symbolic existence beliefs directly influenced the management option and indirectly through emotional disposition.

Table 3.2 Goodness-of-fit Indices for the Structural Equation Models for scenarios 1, 2, and 3.

Mediation models	χ^2	df	*p*-value	χ^2/df	NFI	CFI	RMSEA
Scenario 1	98.98	38	< 0.05	2.60	0.98	0.99	0.054
Scenario 2	72.36	38	< 0.05	2.00	0.96	0.99	0.040
Scenario 3	88.55	38	< 0.05	2.33	0.98	0.99	0.050

In scenario 1, for individuals with a positive general attitude toward coyotes, the specific emotional disposition was less extreme (ß = -.35, $p \leq .05$, hypothesis 2). For individuals with a positive symbolic existence belief towards coyotes, the emotional disposition was less extreme (ß = -.14; $p \leq .05$, hypothesis 4), and support for lethal management decreased (ß = -.50; $p \leq .05$, hypothesis 3). As the emotional disposition became more extreme (i.e., more nervous, tense, upset, scared, worried), support for lethal management increased (ß = .17; $p \leq .05$, hypothesis 5). General attitude did not influence lethal control (significant at $p > .05$, hypothesis 1). Symbolic existence beliefs about coyotes were the strongest predictor of the acceptability of lethal control

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(Figure 3.3a). The model explained 20% of the variance for emotional disposition and 39% of the variance in the acceptability of lethal control.

Scenario 2

For scenario 2, the fit indices for the model were acceptable (χ^2 = 72.36 *df* = 38, NFI (.96) CFI (.99) and RMSEA (.40) (Table 3.2). The data supported 4 of 5 relationships hypothesized in 3.1. Hypothesis one was not supported in scenario 2 as general attitude did not significantly influence the management option. For scenario 2, general attitude had a significant relationship with the emotional disposition (Figure 3.3b). As attitude toward coyotes became more positive, the emotional disposition was less extreme (ß = -.22, $p \leq$ .05, hypothesis 2). As symbolic existence belief toward coyotes became more positive, the emotional disposition was less extreme (ß = -.20; $p \leq$ .05, hypothesis 4), and support for lethal management decreased (ß = -.50; $p \leq$ .05, hypothesis 3). As the emotional disposition became more extreme (i.e., more nervous, tense, upset, scared, worried), support for lethal management increased (ß = .13; $p \leq$ .05, hypothesis 5). Symbolic existence belief was the strongest predictor of the acceptability of lethal control, and attitude was the stronger predictor of anticipated emotional disposition. The amount of explained variance (i.e., R^2) was 14% for anticipated emotional disposition and 34% for the acceptability of lethal control. The amount of explained variance decreased in scenario 2 in comparison to scenario 1.
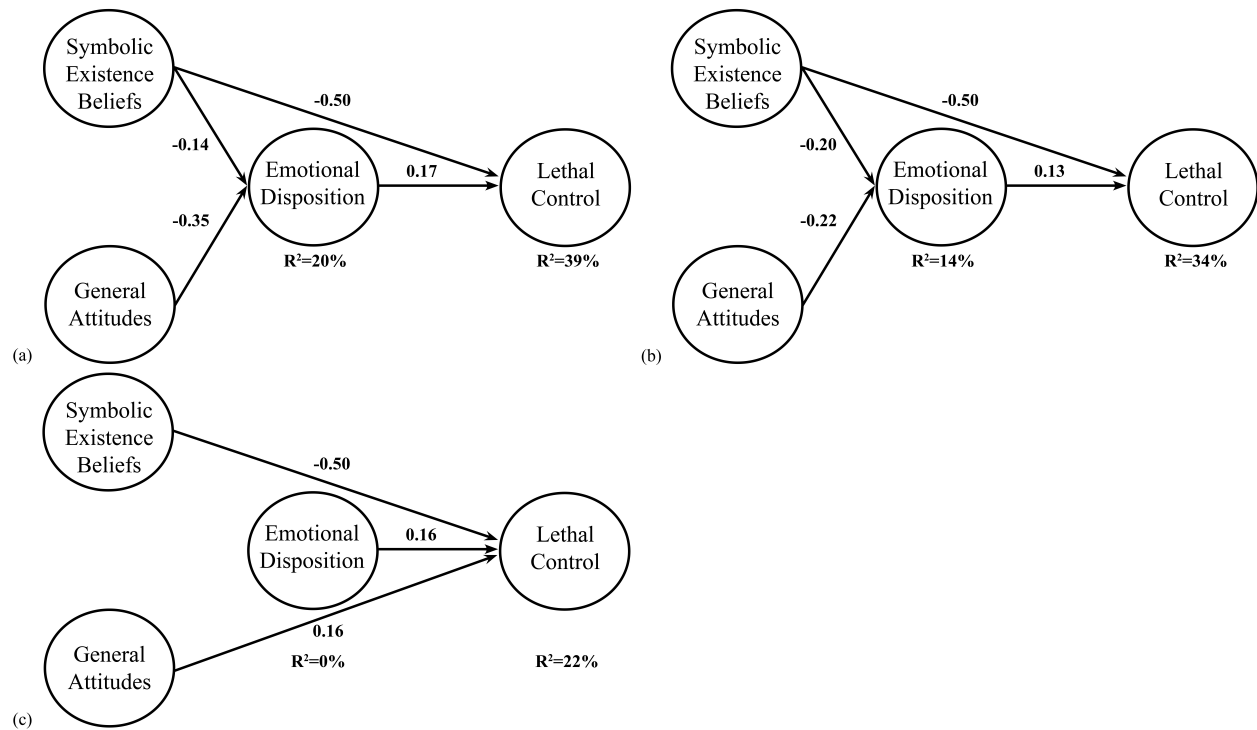
Figure 3.3. The Structural Equation Model for (a) scenario 1: a coyote crosses the trail (b) scenario 2: a coyote approaches you and (c) scenario 3: a coyote approaches you, snarling: Path coefficients are standardized regression coefficients. All coefficients are statistically significant at *p*<.05.

Scenario 3

For scenario 3, the fit indices for the model were acceptable ($\chi^2 = 88.55$ *df* = 38, NFI (.98) CFI (.99) and RMSEA (.050)) (Table3.2). The data supported 3 of the 5 relationships hypothesized in Figure 3.1. General attitude statistically influenced the acceptability of lethal control (Figure 3.3c). As attitude toward coyotes became more positive, support for lethal management decreased (ß = -.16; *p* $\leq$ .05, hypothesis 1). As symbolic existence beliefs toward coyotes became more positive, support for lethal management decreased (ß = -.50; *p* $\leq$ .05,

hypothesis 3). As anticipated emotional dispositions became more extreme (i.e., more nervous, tense, upset, scared, worried), support for lethal management increased ($\beta = .16$; $p \leq .05$, hypothesis 5). The relationship between general attitude and anticipated emotional disposition was not significant ($\beta = -.04$, $p \leq .01$, hypothesis 2), nor was the relationship between symbolic beliefs and emotional disposition ($\beta = -0.04$, $p \leq .01$, hypothesis 4). Symbolic existence beliefs were a stronger predictor of the acceptability of lethal control than anticipated emotional disposition and general attitudes. The amount of explained variance (i.e., R^2) was 0% for emotional disposition and 22% for the acceptability of lethal control. The amount of explained variance decreased in scenario 3 in comparison to scenarios 1 and 2.

3.4. Discussion

Overall, 3 of the 5 hypotheses were typically supported by the findings across the scenarios. First, general attitude predicted anticipated emotional disposition (H_2). Attitude only significantly influenced the acceptability of lethal control in scenario 3 (H_1). Second, symbolic existence belief was a strong predictor of the acceptability of lethal control (H_3) and a weak predictor of the emotional disposition (H_4). Third, emotional disposition was a weak predictor of lethal management (H_5). In the three scenario models, attitude and symbolic existence belief toward coyotes explained 20%, 14%, and 0% of the variance in the emotional disposition. General attitude, symbolic existence belief, and anticipated emotional disposition explained 39%, 34% and 22% respectively of the variance in lethal management. Explained variance decreased as the severity of the scenario increased from seeing a coyote cross a trail to a coyote approaching, snarling.

3.4.1 Theoretical Implications

Emotional dispositions offer a starting point for examining emotional reactions in human-wildlife relationships. The results here indicate that: (a) emotions do play a role in human-wildlife reactions, and (b) emotional dispositions can be incorporated into a model including cognitive concepts. It is important to note, however, that participants reported their anticipated emotional dispositions based on hypothetical situations, not actual interactions. The self-reporting could be influenced by personal experience (or lack there of), and their own imagination of the hypothesized scenario. Our findings do demonstrate that emotions play a role and suggest that further research is warranted to generalize our findings to other contexts. Future studies might explore emotions using videos to communicate different scenarios of human-wildlife interactions. Collecting data on physiological responses may also prove useful (Armfield, 2007) in understanding emotional reactions in human-wildlife interactions.

The influence of anticipated emotions decreased as the severity of the human-coyote interaction increased. As the scenarios became more dangerous, most respondents reported strong negative emotional dispositions. By scenario 3, nearly all respondents reported extremely negative and elevated levels of emotional dispositions. The lack of variability in anticipated emotional disposition responses decreased the amount of explained variance (Johansson & Karlsson, 2011). The role of emotional dispositions may be difficult to decipher due to natural reactions to dangerous situations. If a bear charged a hiker, for example, the person's value orientations (i.e., whether the hiker support conservation or not) and attitudes (whether the hiker likes bears or not) would become irrelevant. The hiker's attention, energy and cognition would concentrate on living and the emotions would be heightened to support survival.

The amount of explained variance measured by emotional disposition has not been extensively explored in human-wildlife relationships (Johansson, et al., 2012). Vaske et al. (2013)

examined the role of emotional dispositions in relation to the acceptability of non-lethal and lethal wolf management actions. The emotional reaction by respondents to the use of non-lethal management was minimal (1% and 8% explained variance) whereas in the case of using lethal management the explained variance increased (41% and 49%). Emotions came into play when a severe management action was taken (i.e., lethal). Explained variance may have increased in the lethal management scenario because the wolf's life and right to live may have been influenced by a person's wildlife value orientations. In the models in this article, explained variance of emotion was tied to a person's fear of personal injury (i.e., coyote attack) and not to the animal's overall health (i.e., lethal management of a wolf). The type of emotional disposition may be tied to the primal instinct of survival, a different type of emotional response than whether or not to use lethal management. The context of the emotional disposition and for whom it is being projected onto (i.e., saving the animal or saving self) may shift the amount of explained variance. In examples where the person's safety or life was jeopardized, there is little variance that could be explained. This argument is speculative as instinctive survive was not measured. The role and placement of emotional dispositions in relation to other cognitions requires further inquiry.

The specificity principle reinforces the observations in previous research using other species (Fulton et al., 1996; Loyd & Miller, 2010; Manfredo & Fulton, 1997). General attitude influenced the specific emotional disposition, which in turn influenced the acceptability of lethal control. The survey items composing the latent variable, symbolic existence belief, asked for the respondent's position on the existence of coyotes within the park (i.e., coyotes have a right to exist in Cape Breton Highlands National Park). The context of the question may influenced the acceptability of lethal control. Symbolic existence belief had a stronger influence on the acceptability of lethal control than general attitudes toward coyotes.

3.4.2 Applied Implications

Coyotes are one of the only species to expand their home range post-European settlement (Gehrt, Riley, & Cypher, 2010). Humans and coyotes come into conflict over a variety of interaction types (i.e., livestock depredation, eating pet food, approaching people) and on different landscapes (e.g., rural vs. urban). This research is set within the context of a national park surrounded by rural communities. The residents living around the park generally fear coyotes and potential interactions but still value the species' existence on the landscape. The residents' positive beliefs are interesting considering the human fatality and other less severe attacks that have occurred in their backyards. Research has shown that the level of fear decreases and attitudes become more positive given the extent of time people have lived with coyotes (Wieczorek Hudenko et al., 2008). Coyotes naturally dispersed into the province of Nova Scotia, Canada in the 1980s (Moore & Millar, 1986) and the people on this island have had roughly 30 years to adapt to coyote presence. Human-coyote interactions have increased media attention in the last decade (Alexander & Quinn, 2011); it is roughly within the last decade that people have become aware of the possible negative interactions with coyotes. Currently, residents value the coyote's presence in the area and possess slightly positive attitudes toward coyotes. It is important for wildlife managers to understand that these two cognitive concepts influence the type of management protocol residents would support. Emotional dispositions also influence the acceptability of lethal control and support for or opposition to management options. For example, the anticipated emotional disposition increased (e.g., more nervous, more tense, upset) as the severity of the scenario increased. The residents' response to severe human-coyote interactions heightened the emotional response and influenced acceptance of lethal management.

3.4.3 Future Research

The mean response to the most severe scenario, a coyote approaches snarling, ranged between 2.50-2.74 (maximum = 3). In this scenario, the majority of people reported a strong emotional response of fear. Other appraisal dimensions such as danger, disgust, unpredictability and uncontrollability were not examined in terms of human-coyote interactions. It would be interesting to see whether the same two appraisal dimensions, that contributed to fear of bears and wolves (i.e., danger and unpredictability) would be found in relation to coyotes (Johansson, Karlsson, et al., 2012). Johansson et al. (2012) also suggested that other social factors such as the degree of social trust in the managing authorities might also influence fear. Social trust in the managing agency has been shown to influence wolf management preferences (Sponarski et al., 2014) and could potentially influence perceptions of risk (Johansson, Karlsson, et al., 2012). Further research is required to understand the relationships and degrees of influences both the appraisal dimension and social trust may have on emotions.

The coyote is a generalist and meso-carnivore (Gehrt et al., 2010). Human and coyote interactions include livestock depredation, interactions with domestic pets, coyote presence in people's backyards or schoolyards, and direct contact with people (i.e., coyote attacks on people). The different types and severity of interactions can influence people's cognitive and emotional responses to this species. Understanding the different components that contribute to fear towards a species can provide further understanding of perceptions and relationships between humans and wildlife. A deeper understanding of the human-coyote relationship could help managers develop education programs targeting specific aspects of fear which might improve human-coyote relationships and decrease fear in people.

3.4.4 Conclusion

Emotions research in human dimensions of wildlife is limited. The role, influence, and relationship emotions have with other cognitions require further study. Human-wildlife conflicts can be rooted in a variety of social systems; understanding and assessing for conflict management strategies requires examination of the context in terms of cultural, social, and political factors (Røskaft et al., 2003). It is important to consider both the cognition and affective components of people's relationship with the wildlife species and other interest groups (i.e., government agency and non-government agency). Understanding the context and the different components of the relationships people have with wildlife will support the development of stronger policies around wildlife management policies. Emotions are a new frontier in human dimensions of wildlife research (Jacobs et al., 2012; Manfredo, 2008) and require further study in order to understand the role they play in the formation of attitudes and opinions regarding management options.

Chapter 4:

Differences in Management Action Acceptability for Coyotes in a National Park

4.1 Introduction

Wildlife are managed for a variety of reasons such as population size, genetic viability, disease control, and ecological system maintenance (Decker et al. 2009). Conflicts regarding how specific species should be managed can arise when different interest groups have diverse attitudes toward acceptable management protocols (Decker and Bath 2010, Koichi et al. 2013). Managers have historically used lethal control as a cost-effective method for reducing human-wildlife conflict (Sanborn and Schmidt 1995). In contemporary society, the public often demands consideration of a wider range of both lethal and non-lethal options (e.g., capture and relocate, education). Which management option the public deems as acceptable varies by context (Loyd and Miller 2010, Miller 2009). We defined acceptability as a "judgment or decision regarding the 'appropriateness' of a particular action or policy" (Bruskotter et al. 2009, p. 121). In this article, we examined the acceptability of different management options in the context of different human-coyote interaction (HCI) scenarios.

Coyotes have been involved in a diversity of conflicts with humans (e.g., nuisance, killing pets, injuring humans) across a range of rural and urban landscapes (White and Gehrt 2009). Given this diversity, it is important to understand the perceived acceptability of different management strategies within the context the conflict is occurring. Lethal management, for example, may not be acceptable in some situations and as a "population control measure" tends

to be costly (Treves and Karanth 2003). Human-coyote conflict tends to be situation specific and can involve a single coyote or family group. In this context, general population control may not be as effective as other management actions. Consequently, some communities have started coyote co-existence programs to teach residents how to safely and proactively coexist with coyotes (e.g., Coyote Watch in Colorado, see Adams 2014).

4.1.1 Study Context

Coyotes naturally dispersed into Nova Scotia around 1977 (Moore and Millar 1986) and onto the island of Cape Breton in the 1980s (E. Muntz, Parks Canada, personal communication). The Nova Scotia Department of Natural Resources (NSDNR), classified coyote as a "non-protected species" in Nova Scotia since their verified establishment in 1989. Coyotes became a harvestable wildlife species under provincial policy in 1994 (M. Boudreau, NSDNR, personal communication). During 2009-2010 hunting seasons, NSDNR launched the Trapping Incentive Program, whereby licensed trappers were paid a $20 pelt incentive for trapping coyotes. This program was initiated to offset declining pelt prices and to increase trapping participation; the program was not an attempt to eradicate coyotes from Nova Scotia (M. Boudreau, NSDNR, personal communication). In Nova Scotia, coyotes can be harvested all year; however, there are restrictions related to type of weapon and when traps can be used.

Coyotes were established in the Cape Breton Highlands National Park of Canada (CBHNPC) ecosystem during the 1980s. Since 2000, human-coyote conflict has increased in the province and in the park. Park reports have ranged from sightings, people feeding coyotes, coyotes approaching people and coyotes attacking people. A coyote-caused human fatality in

CBHNPC occurred in 2009 (CBC News 2009). The woman was hiking alone on a popular trail in October when multiple coyotes attacked her. The details surrounding the fatal encounter are not clear, as there were no eyewitnesses. Park managers are concerned with minimizing HCI; however, because CBHNPC is a federally protected area lethal management is used as a last resort to deal with wildlife conflict. Given this species has only existed in the park for roughly 30 years, and conflict with coyotes is a relatively recent management issue, CBHNPC in collaboration with Memorial University initiated a study to understand what the public deems acceptable coyote management within park boundaries.

4.1.2 Potential for Conflict Index$_2$

Human dimensions research seeks to conceptualize, measure, and interpret variables and their relationships in a way that bears meaning on problems of managerial or scientific interest (Manfredo et al. 2003). The Potential for Conflict Index$_2$ (PCI$_2$) was developed to help address these issues (Vaske et al. 2010). Although specifics of PCI$_2$ are beyond the scope of this article, a detailed description of the program for calculating, graphing, and comparing PCI$_2$ values can be found at http://warnercnr.colostate.edu/~jerryv/PCI2/index.htm. In general, the PCI$_2$ ranges from 0.0 to 1.0. The least amount of consensus and greatest potential for conflict (PCI$_2$ = 1) occurs when responses are equally divided between two extreme values on a response scale (e.g., 50% highly unacceptable, 50% highly acceptable). A distribution with 100% at any one point on the response scale yields a PCI$_2$ of 0.0 and suggests complete consensus and no potential for conflict.

PCI$_2$ results can be displayed using graphs. Degree of consensus is illustrated as bubbles where the size of the bubble depicts the magnitude of PCI$_2$ and indicates the extent of potential

conflict (or consensus) regarding acceptance of a particular issue. A small bubble represents little

potential for conflict (i.e., high consensus) and a larger bubble represents greater potential for

conflict (i.e., low consensus). The center of a bubble represents mean evaluative response as

plotted on the vertical axis. For example, a bubble's location near the middle of the scale

illustrates that the acceptability of the management action is neutral (Vaske et al. 2010).

4.1.3 Hypotheses

We describe similarities / differences among local residents, park staff, and visitors

regarding the acceptability of five management options for three HCI scenarios: 1) a coyote

crosses the trail; scenario 2) a coyote approaches you on a trail; and scenario 3) a coyote

approaches you on a trial, snarling. The following hypotheses were examined:

H_1:　Mean acceptance of different management actions will vary by respondent type (i.e.,

visitor, park staff, resident).

H_2:　Mean acceptance of different management actions will vary by the severity of

human-coyote interaction (e.g., coyote crossing the trail, coyote approaching, coyote

approaching snarling).

H_3:　Consensus regarding acceptance of different management actions will vary by

respondent type (i.e., visitor, park staff, resident).

H_4:　Consensus regarding acceptance of different management actions will vary by the

severity of human-coyote interaction (e.g., coyote crossing the trail, coyote

approaching, coyote approaching snarling).

4.2 Methods

4.2.1 Sampling Protocol

We collected data from 1) residents, 2) park staff, and 3) visitors. Local residents were defined as people living in the two counties on Cape Breton Island in which CBHNPC resides (i.e., Inverness, Victoria); 800 residents were randomly sampled from these counties during fall 2011. A telephone call was used to 1) randomly select the individual in the household with the next birthday and who was older than 18, 2) confirm willingness to participate in the survey, and 3) verify the mailing address.

Residents were mailed the questionnaire package (i.e., the survey with a return post marked envelope). Two weeks after the initial mailing all individuals were mailed a reminder postcard thanking individuals for returning the questionnaire and encouraging response if not yet completed. Individuals who had not responded after the reminder postcard were mailed a second questionnaire package after two weeks. Budget constraints did not allow for any additional contacts. The response rate was 70% ($n = 556$ usable questionnaires).

Park staff was defined as people working for any department in CBHPNC. The department manager gave the survey to the staff ($n = 146$) during summer 2011. Questionnaire return boxes were placed in offices around the park to ensure respondent anonymity. Two weeks later reminder bulletins were placed in staff lunchrooms and reminder emails were sent to department managers. The staff was given four weeks to complete the questionnaire; the response rate was 85% ($n = 124$).

Visitors were defined as people visiting CBHNPC. Intercept surveys on park trails were used to sample visitors in the summers of 2011 and 2012. Visitors were approached at a trail viewpoint, midway through a one of two trails (the trails were straight out and straight back to a scenic view) in the park. Potential participants were asked if they would be willing to complete a questionnaire about coyotes. Those who agreed (n = 1,333; response rate = 96%) were verbally asked questions on a short onsite questionnaire. The questions asked onsite included personal experiences with, knowledge about, and attitudes toward coyotes. The responses to these questions were important to park managers and helped build rapport with participants. At the end of the interview, participants were asked if they would be willing to complete a take home questionnaire that asked further questions about coyotes and coyote management. Individuals who agreed to participate in the offsite questionnaire (n = 734; offsite participation: 55%) were given a questionnaire with a return postmarked envelope and were asked to give their email address. Two weeks later, all participants were sent a reminder email and a link to an online version of the offsite questionnaire. Two weeks afterwards, non-respondents were sent a reminder email. After the second reminder email, we did not solicit responses further. The response rate was 60% (n = 443; n=85 online and n=358 mail back questionnaire)[1].

4.2.2 Variables Measured

Two demographics are described for each of the three sample populations: age and sex. Participants were asked to report their age in the following categories: (a) 18-24, (b) 25-34, (c) 35-44, (d) 45-54, (e) 55-64 and (f) over 65 years. Sex was categorical: (a) female, or (b) male.

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[1] There is no statistical different (P > 0.05) between the online and paper respondents to the visitor questionnaire.

Type of public (i.e., local resident, park staff, park visitor) served as the independent variable. Respondents evaluated three different HCI scenarios: 1) coyote crosses the trail, 2) coyote approaches you on the trail, and 3) coyote approaches you on the trail, snarling. In each of these scenarios, respondents were asked: "how acceptable or unacceptable would it be to: 1) do nothing; 2) monitor the situation; 3) educate the public; 4) frighten the coyote; 5) capture and relocate the coyote; and 6) use lethal control". Each management option was measured on a 7-point scale: "strongly unacceptable" (-3), "moderately unacceptable" (-2), "slightly unacceptable" (-1), "neither" (0), "slightly acceptable" (1), "moderately acceptable" (2), and "strongly acceptable" (3). The six management options were based on the literature (i.e., what could potentially be done) and discussions with park managers. Doing nothing, monitoring the situation, and lethal control are currently used by the park on a case-by-case basis. The park does "nothing" when sightings are random. Education is a proactive strategy to help reduce the chances of human-coyote conflicts. Lethal management is used when coyotes become food conditioned and approach people. In cases where coyotes are habituated to human presence, the park will haze coyotes to prevent food conditioning and lethal removal.

4.2.3 Analysis

One-way analysis of variance (ANOVA) compared residents, park staff, and visitors mean responses to each of the six management options in the three scenarios. Effect size measures (i.e., η) compared the three groups' responses for each of the management options in a given scenario (i.e., minimal relationship = 0.10, typical relationship = 0.243, substantial relationship = 0.371, Vaske 2008). Differences in consensus among residents, park staff, and

visitors were examined using PCI$_2$ (Vaske et al. 2010). Statistical differences test were used to compare two PCI$_2$ using software available on the website referred to in the introduction. Repeated measures analysis of variance (ANOVA) was used to compare means within each management option (e.g., do nothing) across the three scenarios for each respondent type. Paired *t*-tests were used to compare respondent type means between scenarios for each management option. The Bonferroni correction was used to adjust the *P* value.

4.3 Results

4.3.1 Descriptive results

Participant age was asked using six categories: 18-24 years, 25-34 years, 35-44 years, 45-54 years, 55-64 years and over 65 years. Twenty-four percent of the residents were 45-54 and 28% were 55-64 years old (Table 4.1). Of the resident sample, 58% were female and 42% were male. The two highest age categories for park staff were 45-54 years old (24%) and over 65 (34%). Fifty-three percent of park staff respondents were female. Twenty-eight percent of the visitors were 45-54 years old and 25% were 55-64. Fifty-four percent of the visitor sample was female.

Table 4.1. Age and sex frequencies for residents, park staff and visitors sample populations.

.	Age (years)						Sex	
	18-24	25-34	35-44	45-54	55-64	Over 64	Female	Male
Residents	7	39	73	131	156	145	315	232
Park Staff	28	14	9	41	19	56	53	60
Visitors	14	62	82	126	112	47	204	239

4.3.2 Between respondent types – Within scenarios

Scenario One: Coyote crosses the trail.

On average, park visitors, park staff and residents slightly to moderately agreed that appropriate management responses to *a coyote crossing the trail* were to 1) monitor the situation (residents: $M = 2.04$; staff: $M = 2.23$; and visitor: $M = 2.13$) and 2) educate the public (residents: $M = 2.46$; staff: $M = 2.63$; and visitor: $M = 2.67$). Mean response from residents differed significantly from park staff and visitors across all management options (Table 4.2). Level of consensus (Figure 4.1), on average, for the three groups, was higher (i.e., smaller PCI_2 values; range: 0.03 to 0.44) for two management options (monitor the situation and educate the public) than for the other three options (range: 0.23 to 0.69). Residents' thought the more invasive management options (i.e., frighten coyote away, capture and relocate, lethal control) were slightly acceptable whereas park staff and visitors did not. For all invasive management options level of consensus was generally low (i.e., higher PCI_2 values) in comparison to non-invasive options.
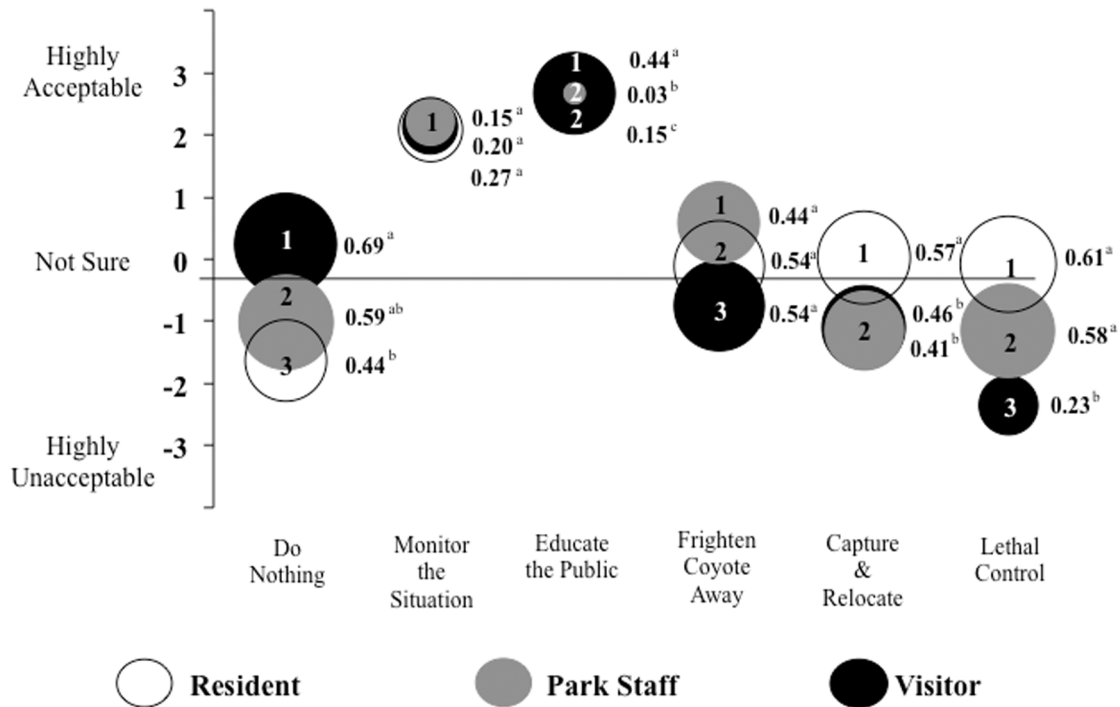
Figure 4.1. Mean response for residents, park staff, and visitors with PCI_2 values for six

management options provided in scenario 1: coyote crosses the trail.

* Numbers within bubbles (1, 2, 3) represent significance between means. Superscript letters ([a], [b], [c]) on PCI_2 values represent significance (d) in PCI_2 between three groups.

Table 4.2. One-way ANOVA comparisons between residents, park staff and visitors for three scenarios and six management options per scenario.

Survey Item	Resident (M)	Park Staff (M)	Visitor (M)	F value	p value	Eta (η)
Scenario 1: ***Coyote crosses the trail***						
Do nothing	-1.62[a]	-1.02[b]	.23[c]	82.14	<0.001	0.37
Monitor the situation	2.04[a]	2.23[a]	2.13[a]	1.00	0.37	0.09
Educate the public	2.46[a]	2.63[ab]	2.67[b]	4.65	0.01	0.19
Frighten coyote away	-0.14[a]	0.56[b]	-0.77[c]	20.06	<0.001	0.19
Capture and relocate	0.03[a]	-0.64[b]	-1.12[b]	32.70	<0.001	0.24
Lethal control	-0.04[a]	-1.12[b]	-2.33[c]	142.51	<0.001	0.46
Scenario 2: ***Coyote approaches you on the trail***						
Do nothing	-2.21[a]	-1.99[a]	-1.17[b]	40.05	<0.001	0.27
Monitor the situation	2.08[a]	2.40[a]	2.28[a]	3.22	0.05	0.08
Educate the public	2.57[a]	2.66[ab]	2.78[b]	6.19	0.002	0.12
Frighten coyote away	0.58[a]	1.50[b]	0.71[a]	8.02	<0.001	0.12
Capture and relocate	0.62[a]	0.57[a]	0.39[a]	1.24	0.29	0.05
Lethal control	0.09[a]	-0.47[a]	-2.04[b]	116.43	<.001	0.43
Scenario 3: ***Coyote approaches you on the trail, snarling***						
Do nothing	-2.50[a]	-2.63[a]	-1.97[b]	16.07	<0.001	0.17
Monitor the situation	1.89[a]	2.46[b]	2.10[ab]	4.99	0.007	0.10
Educate the public	2.49[a]	2.78[b]	2.76[b]	8.15	<0.001	0.12
Frighten coyote away	0.22[a]	1.43[b]	0.92[b]	17.85	<0.001	0.18
Capture and relocate	0.54[a]	0.72[ab]	1.05[b]	5.40	0.005	0.10
Lethal control	1.00[a]	0.85[a]	-.84[b]	80.57	<0.001	0.36

[a,b,c] The letter superscripts denote significant differences between means based on the Tamhane post-hoc test.

Scenario Two: Coyote approaches you on a trail.

On average, park visitors, park staff and visitors agreed that the appropriate management responses to *a coyote approaching you on a trail* were to 1) monitor the situation (residents: $M =$ 2.08; staff: $M =$2.40; visitors: $M =$2.28) and 2) educate the public (residents: $M =$ 2.57; staff: $M =$2.66; visitors: $M =$2.78) (Figure 4.2). Frighten the coyote away was a more acceptable management option in the scenario 2 (residents: $M =$ 0.58; staff: $M =$1.50; visitors: $M =$-0.71) than scenario 1. Capture and relocate was a slightly acceptable management option for all three groups (Table 4.2), however, consensus for all three groups had PCI_2 values ranging from 0.52 to 0.60. All three groups thought that doing nothing in this scenario was unacceptable ($PCI_2 =$ 0.23 to 0.57). Visitors agreed that lethal control was unacceptable ($M =$ -2.04) given the scenario, whereas residents and park staff (residents: $M =$ -0.09; park staff $M =$ -0.47) were neutral. Consensus for all three groups was lower for lethal actions compared non-invasive options.
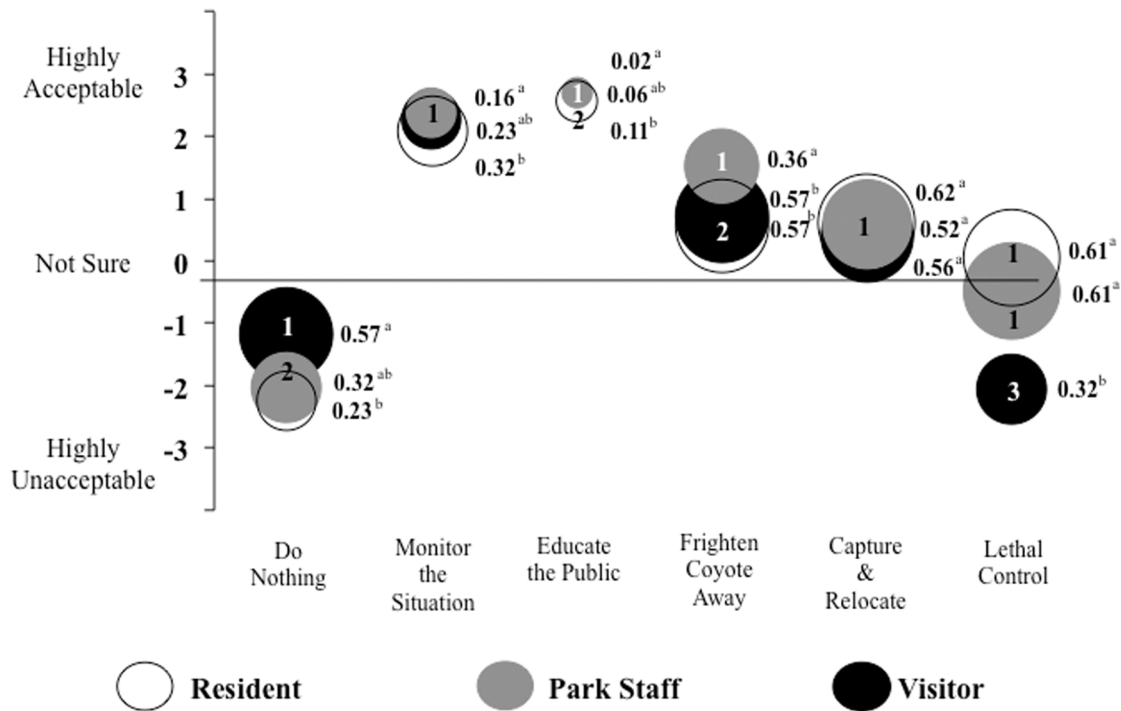
Figure 4.2. Mean response for residents, park staff, and visitors with PCI$_2$ values for six management options provided in scenario 2: coyotes approaches you on the trail.

* Numbers within bubbles (1, 2, 3) represent significance between means. Superscript letters (^{a}, ^{b}, ^{c}) on PCI$_2$ values represent significance (*d*) in PCI$_2$ between three groups.

Scenario Three: Coyote approaches you on a trail, snarling.

Park visitors, park staff and visitors agreed that the appropriate management responses to

a coyote approaching you on a trail, snarling were to 1) monitor the situation (residents: $M =$

1.89; staff: $M =$2.46; visitors: $M =$2.10) and 2) educate the public (residents: $M =$ 2.49; staff: M

=2.78; visitors: $M =$2.76) (Figure 4.3). Educate the public had the highest degree of consensus

(PCI$_2$ range 0.05 to 0.19) compared to monitor the situation (PCI$_2$ range 0.21 - 0.42). As with

scenario 2, do nothing was moderately to highly unacceptable with varying levels of consensus

(PCI$_2$ range: 0.19 to 0.37) within all three groups (residents: $M =$ -2.50; staff: $M =$-2.63; and

visitors: $M =$-1.97). Frighten the coyote away was a more acceptable management option for park

staff $M =$ 1.43) and visitors ($M =$ 0.92) than residents ($M =$ 0.22). Capture and relocate was an

acceptable management option (residents: $M =$ 0.54; staff: $M =$0.72; and visitors: $M =$1.05) given

the scenario but consensus was lower (PCI$_2$ range: 0.54 to 0.67) compared to non-invasive

options such as educating the public. Lethal control was more acceptable for residents ($M=$1.00)

and park staff $M =$0.85) but not as acceptable for visitors ($M =$-0.84). Consensus regarding use of

lethal control ranged from 0.55 to 0.62. A similar range of consensus for lethal management was

found in the third scenario as in the second scenario.
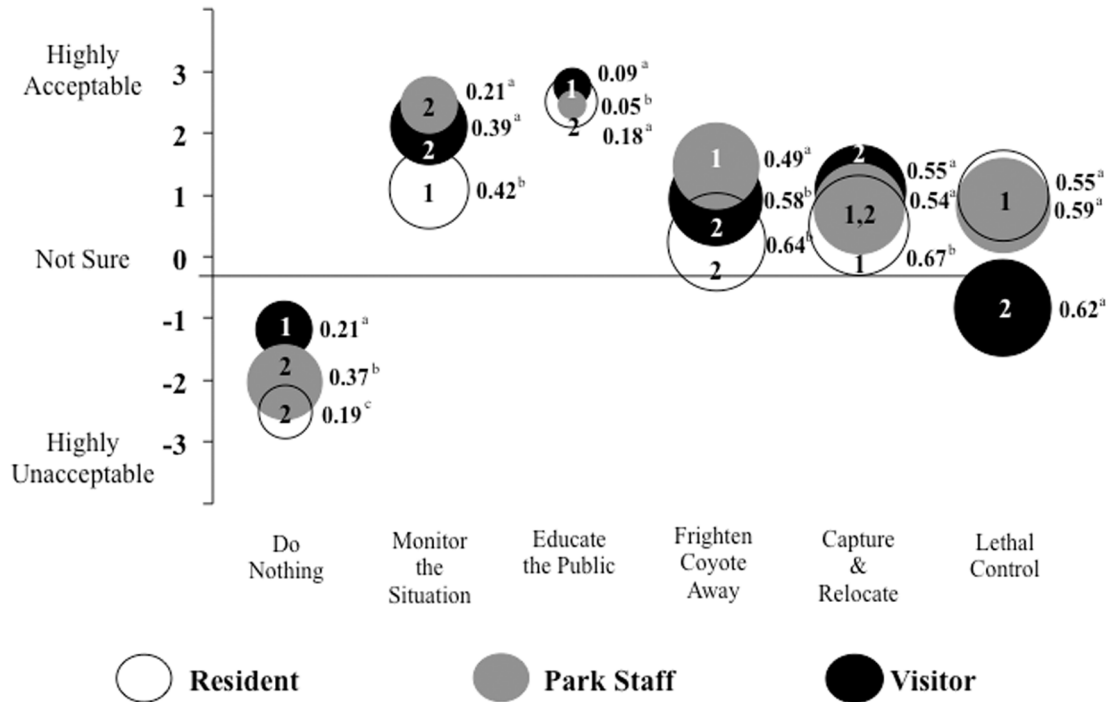
Figure 4.3. Mean response for residents, park staff, and visitors with PCI_2 values for six

management options provided in scenario 3: coyote approaches you on a trail, snarling.

* Numbers within bubbles (1, 2, 3) represent significance between means. Superscript letters ([a], [b], [c]) on PCI_2 values

represent significance (*d*) in PCI_2 between three groups.

Effect size was measured using Eta. The effect sizes for 1) doing nothing was substantial for scenario 1, typical for scenario 2 and minimal for scenario 3; for 2) monitoring the situation, 3) educate the public and 4) frighten coyote away the effect size was minimal for all three scenarios. The effect size for capture and relocate were typical for scenario 1 and minimal for scenario 2 and 3. For lethal control the effect size for all three scenarios was substantial.

On average, visitors, park staff and residents differed in their mean response and consensus level regarding the acceptance of the six management options. These results support hypothesis one and three.

4.3.3 Within respondent types – Across scenarios

Residents

The 'do nothing' option became increasingly less acceptable as the severity of the scenarios increased ($p < 0.001$). 'Monitor the situation' and 'education the public' were acceptable in all scenarios for residents but the mean response did not differ significantly across scenarios (Table 4.3). 'Frighten the coyote away' and 'capture and relocate' were slightly acceptable across scenarios and mean responses were all significantly different ($p < 0.001$). For residents these two options were more appropriate in scenario 2 than the other two scenarios. Acceptability of lethal control increased as the severity of the scenario increased. There was no mean difference among residents between scenarios 1 and 2, but there was a significant difference between these scenarios and scenario 3 ($p < 0.001$).

Park Staff

As with the residents, the 'do nothing' option became significantly less acceptable as the severity of the scenarios increased ($p < 0.001$). 'Monitor the situation' and 'education the public' were acceptable in all scenarios for park staff but mean response did not differ significantly across scenarios (Table 4.3). 'Frighten the coyote away' was acceptable across scenarios and mean responses to scenarios 2 and 3 were significantly different from scenario 1. Mean response for 'capture and relocate' differed significantly between scenario 1 and scenarios 2 and 3 ($p < 0.001$). Acceptability of lethal control increased as the severity of the scenario increased. There was a significant mean difference for park staff between all scenarios ($p < 0.001$).

Visitors

The same pattern of significance for 'do nothing' (i.e., significant difference across all scenarios $p < 0.001$), 'monitor the situation' and 'educate the public' was found for visitors as in residents and park staff (Table 4.3). 'Frighten the coyote away' was more acceptable in scenarios 2 and 3 than 1. Mean responses to scenarios 2 and 3 were significantly different from scenario 1. Mean response for 'capture and relocate' and 'lethal control' differed significantly between scenarios 1, 2 and 3 ($p < 0.001$).

On average, as the severity of the scenario increased there were differences in mean response and consensus level regarding the acceptance of the six management options among residents, park staff and visitors. These results support hypothesis two and four. Educate the public and monitor the situation were the only two management options that did not vary for the three groups across scenarios.

Overall, the most acceptable management options in all three scenarios were monitor the situation and educate the public. These two management options were the most acceptable in scenario 2; they were less acceptable in scenario 3. More invasive management options such as capture and relocate and lethal control became more acceptable as the severity of the scenario increased. Consensus was the lowest for these more invasive management options; the less invasive options (i.e., educate the public) had higher levels of consensus. Doing nothing in all three scenarios was unacceptable but as the severity of the scenario increased, consensus increased and doing nothing became less acceptable to all three groups.

Table 4.3 Repeated Measure ANOVA comparisons within three scenarios for each management action and between respondent types.

Management Action[1]		Resident (M)[2]	Park Staff (M)	Visitor (M)	Multivariate F Wilks Lambda	Within-Subject Greenhouse-Geisser	Partial Eta Square
Do nothing	Scenario 1	-1.62[a]	-1.05[a]	.23[a]	149.56*	202.25*	.165
	Scenario 2	-2.24[b]	-2.02[b]	-1.17[b]			
	Scenario 3	-2.51[c]	-2.02[c]	-1.17[c]			
Monitor the situation	Scenario 1	2.09	2.22	2.14	2.39	1.64	.005
	Scenario 2	2.08	2.39	2.28			
	Scenario 3	1.90	2.45	2.12			
Educate the public	Scenario 1	2.48	2.67	2.68	2.14	2.32	.004
	Scenario 2	2.57	2.69	2.67			
	Scenario 3	2.51	2.79	2.76			
Frighten coyote away	Scenario 1	-.11[a]	.59[a]	-.76[a]	85.96*	96.47*	.145
	Scenario 2	.57[b]	1.52[b]	.72[b]			
	Scenario 3	.24[c]	1.48[b]	.93[b]			
Capture and relocate	Scenario 1	.03[a]	-.59[a]	-1.10[a]	126.78*	350.91*	.198
	Scenario 2	.61[b]	.60[b]	.40[b]			
	Scenario 3	.52[b]	.78[b]	1.06[c]			
Lethal Control	Scenario 1	-0.7[a]	-1.16[a]	-2.34[a]	159.17*	236.51*	.235
	Scenario 2	.06[a]	-.48[b]	-2.05[b]			
	Scenario 3	.98[b]	.82[c]	-.84[c]			

[1] There are three scenarios: (1) coyote crosses the trail; (2) coyote approaches you on the trail; and (3) coyote approaches you on the trail, snarling.
[2] Superscripts ([a,b,c]) should be read down the columns for each respondent types mean response to each scenario for a specific management action.
[3] With Bonerroni correction, values are significant at $p < .0167$.
* $p < .001$

4.4 Discussion

Management of human-wildlife conflict can be enhanced by an understanding of the similarities and differences among all interest groups (including park staff) (Decker et al. 2001). PCI$_2$ facilitates such understanding by communicating abstract statistics (e.g., central tendency, dispersion, shape of a distribution) in a visual display that is easy to comprehend. Ambiguity is further reduced by placing the findings within a managerial context (Vaske et al. 2010).

4.4.1 Research Implications

There were varying levels of agreement in doing nothing as a management option over the three scenarios. The lack of acceptance for doing nothing in scenario 1 is interesting because wildlife viewing is often a reason for visiting a national park. Residents and park staff believed that seeing a coyote crossing a trail warranted some type of management intervention. The acceptability of doing nothing may change depending on the location of the wildlife sighting. For example, it may be acceptable to do nothing when wildlife are seen in a national park, but not acceptable in an urban trail system. Visitors, on the other hand, did not agree that seeing a coyote warranted a management action. A motivation for visiting a national park is to explore the landscape (i.e., hiking, biking, camping) and to see the wildlife (Lindsey et al. 2007; Nvight 1996). Seeing a coyote maybe an experience a visitor would want whereas the residents and park staff may not.

Differences in acceptable management strategies depend on both the species and the context (Agee and Miller 2009, Wittmann et al. 1998). Given that viewing coyotes is likely to continue in the park, acceptability might be related to the frequency of occurrence. Seeing one coyote might be a novel and exciting experience. As the number of sightings increases

acceptability may decrease. Future research should examine tolerances for seeing coyotes relative to: 1) number seen, and 2) location of the encounter. At CBHNPC, location might refer to backcountry versus front country. More generally, location might reflect the distinction between a national park and an urban setting (Adams 2014, Spacapan 2013). Location of sighting or interaction may also influence general acceptability of different management options due to different tolerance levels of human-wildlife interactions. For example, seeing a coyote in the wild (i.e., national park) may be more acceptable than seeing a coyote in one's backyard. Differences in location and risk associated with interaction with wildlife would mostly likely influence the type of acceptable management options (Agee & Miller, 2009).

Monitoring the situation across all three scenarios was an acceptable management option for all three groups. Given that no definition or explanation of each of the management options were provided to residents, park staff or visitors, we do not know how respondents interpreted monitoring the situation. The success of this option is difficult to measure as well as relay to the public that managers are doing something to track potential areas for HCI. Monitoring also requires user participation such as hikers reporting coyote sightings and interactions to managers.

A citizen science program could be organized to support managers in monitoring and tracking coyote movement and HCI in the park (Cooper et al. 2009). Citizen science programs can initiate and maintain communication between both users and managers (Adams 2014, Cooper et al. 2007), so that both parties are informed about HCI in the park. Such projects are participatory and empowering for users to get involved in coyote management. A coyote-specific program called Coyote Watch has been started in the greater Denver metropolitan area (Adams 2014). Coyote Watch trains citizens to report coyote sightings and interactions into an online database. The program teaches people how to avoid contact with coyotes, how to keep safe, and

how to haze a coyote to reduce the chance that a coyote would approach a human. CBHNPC and other parks could use this program to address human-wildlife conflicts.

A coyote education program, another non-invasive management strategy, was supported by residents, park staff and visitors in all three scenarios. Interpretation programs in parks tend to communicate information in a single direction using posters, pamphlets and interpreters (teacher) to educate the visitor (student). Education programs inform the visitors about wildlife biology and appropriate behaviour concerning the species of interest (e.g., appropriate garbage disposal to reduce human-black bear conflicts). CBHNPC employs these methods to communicate coyote awareness and safety. Outreach intervention is typically designed to enhance the publics' ability to understand and mitigate potential hazards. These programs require extensive agency resources, yet their effects on the public in changing attitudes or behaviour are minimal to moderate (Cole et al. 1997, Heberlein 2012, Ormsby and Forys 2010).

Another approach to interpretation programming involves experiential education theory, which communicates to the public about how to deal with HCIs (Adams, 2014). Well designed education messages can target risk perceptions and provide biological understanding of a species (Loyd and Miller 2010). Based on the research presented in this article, CBHNPC, in collaboration with Memorial University has developed a pilot experiential education program called "Sharing Space: Living with Coyotes." The objectives of this program are to increase understanding of coyote ecology, and how to deter coyotes from coming into your backyard and defend yourself from coyotes. This program along with current signage and pamphlets is helping communicate appropriate human and coyote behaviour via direct hands on experiences.

Relocation is often supported by the public as a non-lethal but invasive form of management when dealing with human-wildlife conflict. Relocation, however, tends not to be successful for coyotes or other carnivores due to the species life histories, species behaviour and

costs (Fischer and Lindenmayer 2000). The "capture and relocate" option was a viable

management strategy for residents, park staff and visitors for scenarios 2 and 3. This was an

unacceptable option for park staff and visitors but acceptable for residents in scenario 1.

Acceptance of this management options indicates a lack of biological knowledge of coyotes in all

three groups as coyotes live in family groups and maintain home ranges (Bowen 1982, Grinder

and Krausman 2001). Relocation of a problem coyote is not viable as they would return to their

home range. Acceptance of this non-viable option indicates that researchers need to describe the

pros and cons of alternative management options in the survey and whether or not this method is

legal. Providing descriptions of the potential management options provides respondents with a

better description to judge their management preferences.

Lethal management was slightly acceptable for residents in all three scenarios. The option

was acceptable for park staff in scenario 3 but was not acceptable for visitors in all three

scenarios. Differences in tolerance and perception of HCI may be due to the exposure to the

fatality. Residents and park staff have lived with this tragic incident and the death has created fear

within the local populations (Sponarski et al. 2013). Visitors may or may not be aware of the

fatality, may have different experiences with coyotes around their home than residents and park

staff, and may seek wildlife viewing opportunities when they visit a national park. Differences in

exposure to HCI between residents and park staff, and visitors could lead to differing levels of

acceptability for lethal control. This difference suggests that experience and risk perception could

influence acceptability of lethal control when dealing with conflicts with wildlife. Comparable

results have been found in other studies dealing with potentially dangerous wildlife (Agee and

Miller 2009, Bruskotter et al. 2009, Wittmann et al. 1998). Monitoring the situation, a highly

acceptable management option, supports informed use of lethal control when dealing with HCI in the park. Monitoring and assessing HCI on a case-by-case basis are supported by the public. Acceptance of lethal control tends to be context specific whether it is dealing with location of conflict or severity of threat to human safety (Agee and Miller 2009).

4.4.2 Management Implications

On average, residents, park staff and visitors agreed on appropriate management options given different scenarios. Mean responses for residents and park staff were generally more closely aligned in comparison with visitor responses. Comparisons of means, however, only communicate one component of a variable's distribution. PCI_2 values allowed for the examination of consensus. Overall, there were varying levels of consensus given specific management options for each scenario. Lethal management, for example, acceptable for residents and park staff in scenario 3, but the large PCI_2 values suggested the potential for disagreement if park managers used this option. PCI_2 provided a more thorough understanding of both mean response and level of consensus in each sample. The graphic representation of this statistic enhances interpretation and understanding of the results.

Our results provide a first step in supporting coyote management and decision-making within the policies that govern their current management protocols. There were differences between and within populations as to the best course of action when it comes to HCI. Our findings highlight which management options were more acceptable given different HCI severity levels. For example, when the coyote displayed no aggressive behaviour (scenarios 1 and 2), lethal management was less acceptable. In these cases, managers should use non-lethal options.

Coyote populations are generally increasing and ranges are expanding across North America (Gehrt et al. 2009, Martínez-Espiñeira 2006). To appropriately manage conflicts between humans and coyotes agencies need to understand public attitudes toward coyotes and acceptability of different management strategies (Agee and Miller 2009). Public opinion is typically not integrated into policy (Longcore et al. 2009). Studies such as the one presented here provide an understanding of public preferences for acceptable management strategies.

Chapter 5:

Changing Attitudes and Emotions toward Coyotes with Experiential Education

5.1 Introduction

Wildlife education programming is used to teach the public about wildlife and wildlife habitats, ecology, conservation, and management strategies. Education can assist in (a) facilitating the understanding of public issues; (b) promoting discourse on public issues among and between interest groups; and (c) contributing to informed decision making (at the community and individual levels) (Boggs, 1991; Stave, 2003). Wildlife education programming is designed to communicate, to the public, the proper way to behave when encountering wildlife, especially those species that potentially pose a threat to human safety (e.g., black bears, coyotes, elk) (Ham, 2006). Programs advocating for human-wildlife coexistence or reduced conflict have been designed by agencies to empower people and to maintain wildlife populations (Ham, 2007; Manning, 2003). These programs typically use the transmission method of education in which the public is the student who is fed information (Itin, 2008; Knapp, 2010). Wildlife education programs have traditionally provided factual information such as safety protocols (e.g., what to do in case of a confrontation with a black bear). Fact dissemination of knowledge, however, seldom changes people's attitudes and behaviours toward wildlife (e.g., do not feed wildlife) (Espinosa & Jacobson, 2012; Orams, 1996) because it superficially educates the public with no incentive for knowledge retention. Lacking an educational philosophy, as well as an understanding of knowledge acquisition, formation, and retention, these programs have not been effective (Novak, 2002).

5.1.1 Experiential Education

Experiential education is both a philosophy and methodology that supports the development and implementation of effective educational programs. Experiential education provides a foundational understanding of knowledge acquisition, formation, and retention. The approach is potentially more effective in changing attitudes and behaviour than traditional outreach (Ormsby & Forys, 2010) because students are encouraged to internalize the information. Research suggests that wildlife education programs can be strengthened by using experiential education (Baldwin, Persing, & Magnuson, 2004; Gore et al., 2006a).

Experiential education is often thought of as outdoor education (e.g., rope courses, adventure trips), but the framework is more than learning by doing or taking students into the outdoors (Chapman, McPhee, & Proudman, 2008). This approach to education merges direct experience that is meaningful to the learner with guided reflection and analysis of the experience (Luckner & Nadler, 1997). Such reflection and internal analysis facilitates the learning experience. This educational method challenges and activates both the mind and body. Individuals are encouraged to take initiative, responsibility, and make decisions based on their experiences and knowledge (Chapman et al., 2008).

Joplin (2008) and Kolb (1984) have modelled the experiential learning cycle. Within the experiential education framework, the teacher needs to (a) provide an experience to the learner and (b) facilitate reflection on that experience. Joplin (2008) and Kolb's (1984) experiential learning cycles (Figure 5.1) have four basic stages. First, the *action stage* (experience) presents the learner with a stressful or novel situation that cannot be ignored (situations are often unfamiliar and require new skills and knowledge). This stage often requires learners to tap into their physical, mental, emotional, or spiritual intelligence. Second, in the *debrief stage*

(reflection), the learning is recognized, articulated, and evaluated either individually or in a group. In this stage, the teacher ensures the experiences of stage one are questioned, realized, and integrated. Third, in the *generalizing stage*, abstract (analysis) concepts and generalizations (conclusion) are made. Fourth, in the *applying stage*, generalized conclusions and abstract concepts are used in novel situations.
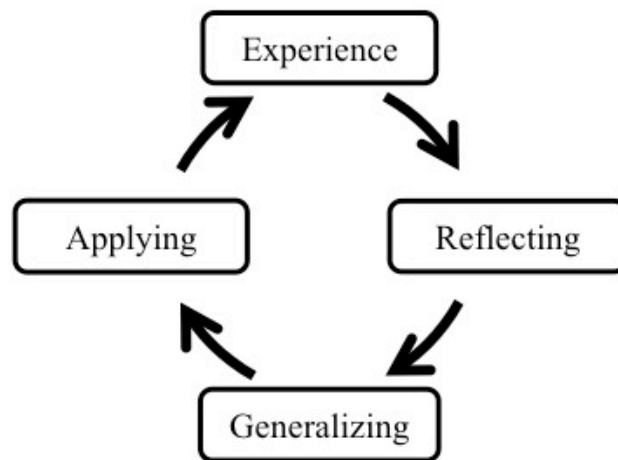
Figure 5.1. The experiential learning cycle as portrayed by Joplin (2008) and Kolb (1984).

Experiential education is an iterative, continuous process that builds upon previous learning experiences (Vince, 1998). The process integrates thinking, feeling, perceiving, and behaving. The process involves having an experience and then extrapolating the learning into future situations (Vince, 1998). This approach connects the learner to the task and the current activity and location. When memory is key to public safety (e.g., human-wildlife interactions), the experiential learning cycle provides a framework for designing effective education messaging.

5.1.2 Background

Using the experiential educational framework, a coyote education program was designed for Cape Breton Highlands National Park of Canada (CBHNPC). The program was called *Sharing Space: Living with Coyotes*. The information provided in the program targeted people's (a) attitudes toward, (b) fear of, (c) perceived likelihood of, and (d) perceived control over, coming into contact with coyotes. These cognitive concepts were based on previous human dimensions research in the same study area in 2011-2012 (see Chapter 2). This earlier article indicated that local residents held more negative attitudes toward coyotes, reported more fear of the species, felt less control in coming into contact with coyotes, and reported a higher likelihood of seeing a coyote while in CBHNPC than visitors to the area.

5.1.3 Cognitive & Emotional Constructs

Four different cognitive/emotional constructs were used in the education program: attitudes, and three perceived risk constructs (fear, control, and likelihood). Attitudes refer to an evaluation of a person, object, or action (Vaske & Manfredo, 2012). Because attitudes are sometimes malleable, knowledge, experience, and other factors can influence a person's perception of different species (Bright & Manfredo, 1996). Attitudes possess three major components: (a) an affective component that is the feeling of like or dislike toward something; (b) a cognitive component that is the belief a person has about something which may or may not be based on fact (Fishbein & Ajzen, 2010); and (c) an effective component (or behavioural component) that is the manner in which a person acts toward something. This research examined thee affective and cognitive components of attitudes toward coyotes held by participants.

Risk perception refers to the innate risk judgments made by citizens as opposed to risk experts (Slovic, 1987). Understanding risk perception helps to support proactive and strategic planning (Gore, Knuth, Curtis, & Shanahan, 2006a). There are two types of risk perception: (a) cognitive risk, perceived probabilities of suffering injury or loss (Renn, 1992), and (b) affective risk perception, feelings of trepidation or concern about potential hazards (Sjöberg, 1998). Three perceived risk constructs were used: (a) *fear/dread:* feelings of anxiety, worry, or fear (see Sjöberg, 2000; Sjoberg, 1998); (b) *likelihood/frequency*: how chronic an individual feels exposure may be (see Flynn et al., 1992; Siegrist, 1999); and (c) *control*: how much individuals feel they can prevent exposure to the risks from a wildlife species (see Grobe et al., 1999; Slovic, 1987; Weber et al., 2001). These risk perceptions are linked to a person's behaviour concerning risky situations and one's fear of a wildlife species (Johansson, Karlsson, et al., 2012). This research examines how people's perceived risk perception toward coyotes may change depending on participation in an experiential education program.

5.1.4 Hypotheses

This article examined the impact of an experiential education program on participants' attitudes toward, fear of, perceived control over, and perceived likelihood of coming into contact with, coyotes. Following participation in the program, we hypothesized that participants will:

H$_1$:   possess more positive attitudes toward coyotes.

H$_2$:   feel less fear toward coyotes.

H$_3$:   have a decreased sense of the likelihood of coming into contact with coyotes.

H₄: feel more in control about coming into contact with coyotes

5.2 Methods

5.2.1 Education Program

The *Sharing Space: Living with Coyotes* education program was based on previous research that indicated residents around CBHNPC feared coyotes (see Chapter 2). Questionnaires were given to participants before and after attending the education program to test immediate effectiveness. The program used six modules to target the four cognitive/emotional concepts.

The first module involved a discussion about coyotes called *understanding personal attitudes*. This module allowed participants to feel comfortable with one another by sharing their experiences with coyotes. The second *assessed perceived and actual risk of human-coyote interaction*. This module helped participants understand the differences between their personal perceived risk of coming into contact with a coyote and the actual risk. The third module, called *being a coyote,* used GPS data of collared coyotes in the park to get people to think about how a coyote moves across the landscape. Participants were given maps with non-connected GPS points and asked to connect the dots and to tell the story of their coyote's movement. The participants' maps were then compared to the GPS information on actual coyote behaviour. From *being a coyote*, participants moved into module four called *stop being a coyote yard sale*. This module taught participants about attractants (e.g., garbage, pet food, birdseed) that might be present in their yards and how to properly store these items. This information was relayed through a poster depicting a typical yard with a variety of attractants scattered throughout. Participants were asked to use sticky coyotes to pin the coyote on the attractant — much like a game of pin the tail on the

donkey. Once all attractants were discovered, the facilitator led a discussion about why an object

like birdseed may attract coyotes and what could be done to prevent that from happening. The

fifth module, *being a coyote ninja*, taught participants about personal safety while in coyote

country. Participants were shown a variety of defense tools and defensive actions such as

noisemakers (e.g., whistle), mace, walking/hiking in a group and walking sticks. Participants

were then given walking sticks and asked to physically enact how they should respond given

different scenarios with coyotes. The Nova Scotia provincial coyote safety acronym, BAM (Back

away, Act big, and Make noise) was used to teach people how to respond given different types of

interactions with coyotes.

The final module was a *reflection* on all the information provided. Participants were asked

to describe their favourite parts of the session, what they learned, what BAM meant, and other

reflections. Questions during this time specifically targeted each of the five previous modules in

order to support information retention.

5.2.2 Sampling protocol and independent variables

Public sessions of the education program were organized and advertised in local

communities situated around the Cabot Trail, the main highway and the only entrance to

CBHNPC. A total of 20 different sessions were completed over five weeks. These sessions were

open to the public and to all ages. Participants were informed about the background of the

program and general information about the program. Participants who were 18 years and older

were asked at the beginning of each session to participate in an anonymous questionnaire prior

(pre-test) to the program start and again at the end (post-test) of the program. Anonymity was

maintained by assigning a code on the pre-questionnaire and a sticky note with the same code was attached to the pre-test questionnaire. Participants were asked to keep the sticky note with the code during the program and place it on their post-test questionnaire.

The response rate for the pre- and post-test was 96% ($n = 150$ completed both pre- and post-questionnaire). Participants who did not complete the pre- and/or post-test ($n = 6$) were individuals who came late (missing the pre-test), individuals who left early (missing the post-test) ($n = 4$), or people who participated in the program but declined to participate in the questionnaire ($n = 2$). The pre-test questionnaire had 29 questions asking participants about their experiences with coyotes, general attitudes, perceived likelihood, perceived control over a human-coyote interaction and basic demographic information. The post-test questionnaire had 33 questions asking participants about their experience in the program, general attitudes, perceived likelihood, and perceived control over a human-coyote interaction. Participant ages ranged from 18 to over 65 years with 25% of the sample falling within the 45-54 age range and 35% of the sample falling within the 55-64 age range; 66% were female and 34% were male.

5.2.3 Questionnaire Variables

Each question was asked on the pre- and post-test for comparison. Twenty questionnaire items were organized into four concepts: attitudes toward coyotes (3 items), the fear of coyotes (3 items), the likelihood of encountering a coyote (7 items) and the control of coming into contact with a coyote (7 items).

The three attitudinal questions were: "In general do you think of coyotes as … (a) good/bad; (b) beneficial/harmful; and (c) positive/negative." Each attitude was measured on a 7-point rating scale. For example, for "In general do you think of coyotes as good/bad," the scale

was: "extremely bad" (-3), "moderately bad" (-2), "slightly bad" (-1), "neither" (0), "slightly good" (1), "moderately good" (2), and "extremely good" (3). The same scale, replacing the adjective, was used for the "beneficial/harmful" and "positive/negative" questions.

The fear questions asked participants whether or not they agreed or disagreed with statements concerning fear and were measured on a 7-point rating scale ranging from "strongly disagree" (-3) to "strongly agree" (3). The three questions were: (a) "I fear for my own personal health or safety"; (b) "I fear for my children's health or safety"; and (c) "I fear for my pet's health or safety." A "not applicable" option was provided for the fear questions dealing with children and pets, as these questions were not relevant to all participants. "Not applicable" responses were coded as missing data.

The seven likelihood questions asked: "What is the likelihood of the following events occurring to you?" The scenarios were: (a) "seeing a coyote in my yard"; (b) "being approached by a coyote in my yard"; (c) "being approached by a coyote, snarling in my yard"; (d) "seeing a coyote in the park"; (e) "being approached by a coyote in the park"; (f) "being approached by a coyote, snarling in the park"; and (g) "being attacked by a coyote in the park." All seven scenarios were measured on a 7-point scale: "extremely unlikely" (-3), "moderately unlikely" (-2), "slightly unlikely" (-1), "neither" (0), "slightly likely" (1), "moderately likely" (2), and "extremely likely" (3).

The seven control questions asked: "How much control do you feel you have at preventing the following from occurring to you?" The same seven scenarios used in the likelihood questions were used for the control questions. All seven scenarios were measured on a 7-point scale: "no control" (-3), "almost no control" (-2), "nearly no control" (-1), "neither" (0), "some control" (1), "almost in control" (2), and "complete control" (3).

Three questionnaire items were used to describe a participant's prior experience with coyotes and with coyote education: (a) "Have you ever seen a coyote before?"; (b) Have coyotes ever caused a problem for you?"; and (c) Have you ever participated in a coyote education program?" All three questions were dichotomous with the possible responses of no or yes.

To test for knowledge retention of coyote safety information, participants were asked in both the pre- and post-test to state what each of the letters in 'BAM' meant. For each letter the participant either was correct (1) or incorrect (0). The totals were summed to see how many letters each participant got correct.

Four questions in the post-questionnaire described a participant's satisfaction with the education program. One question was coded no or yes and asked participants: "Would you recommend this coyote awareness program to a friend or family member?" The three other questions asked about satisfaction with the program and asked: "How did you feel about the coyote awareness program … (a) satisfied/unsatisfied; (b) fun/boring; (c) engaging/not engaging; and (d) informative/not informative." Each satisfaction question was measured on a 7-point rating scale. For example, for "How did you feel about the coyote awareness program: satisfied/unsatisfied," the scale was: "extremely unsatisfied" (-3), "moderately unsatisfied" (-2), "slightly unsatisfied" (-1), "neither" (0), "slightly satisfied" (1), "moderately satisfied" (2), and "extremely satisfied" (3). The same scale, replaced with the other three adjective pairs, was used.

5.2.4 Analysis

Internal consistency of the four latent constructs: attitudes, fear, perceived likelihood, and perceived control, were investigated using Cronbach's alpha (Vaske, 2008) for both pre- and

post-test variables. All eight constructs had a Cronbach's alpha of >.89, therefore these survey items could be used to calculate an overall latent construct scale. Latent construct scales for attitudes, fear, perceived likelihood, and perceived control were computed separately by taking the mean of the pre- and post-test survey items respectively; to be included in each scale, participants had to complete all but one of the items making up the respective scale. The four scales from the pre- and post-test responses were compared using a paired *t*-test. Effect size measures (e.g., correlation) compared mean responses for each constructed scale.

5.3 Results

The experiential coyote education program had positive effects on people's attitudes toward coyotes (Table 5.1). On average, the responses to pre-test questionnaire items about general attitudes were more negative (ranging from -0.27 to -0.57) than after completing the program (mean range: 0.12 to -0.15). For each of the three attitudinal items, the mean difference between pre- and post-test ranged from -0.40 to -0.54. The Cronbach's alpha for the three general attitudinal items was .90 for the pre-test and .94 for the post-test. The computed general attitudes index toward coyotes followed the same mean difference pattern as observed in the questionnaire items (Table 5.2). There was a significant difference ($t = 4.44$; $df = 118$; $p < .001$) between the pre- and post-test general attitudes toward coyotes. The results support hypothesis one: participants will possess more positive attitudes toward coyotes after taking part in the education program.

On average, participants' fear of coyotes before the program, as shown in the three fear questionnaire items, was higher than after completing the program (mean difference range: 0.51 to 0.82). The largest change between pre- and post-test fear items was the decreased sense of participants' fear for their own personal health or safety, followed by a decreased sense of fear for their children's health or safety. The Cronbach's alpha for the three fear items was .90 for the pre-test and .84 for the post-test. The computed fear of coyotes scale followed the same mean difference pattern as observed in the questionnaire items. There was a significant difference ($t =$ 4.47; $df = 106$; $p < .001$) between the pre- and post-test (Table 5.2). The results support hypothesis two: fear of coyotes will decrease after participating in the education program.

Table 5.1 The mean and mean difference between the pre- and post-test for each of the survey items representing attitudes, fear, perceived likelihood, and perceived control. The reliability of the scale for each of the four concepts was measured using Cronbach's alpha.

Survey Item	Pre-Test (*M*)	Post-Test (*M*)	Mean Difference	Cronbach's Alpha Pre-Test	Cronbach's Alpha Post-Test
In general do you think of coyotes as ...[1]				.90[a]	.94[a]
… good/bad	-0.27	0.12	-0.40	.85	.90
… beneficial/harmful	-0.57	-0.04	-0.54	.87	.92
… positive/negative	-0.27	-0.15	-0.42	.83	.90
I fear for ...[2]				.90[a]	.84[a]
… my own personal health or safety.	0.86	0.04	0.82	.87	.79
… my children's health or safety.	1.41	0.78	0.63	.80	.67
… my pet's health or safety.	1.67	1.16	0.51	.89	.86
What is the likelihood of the following events occurring to you? [3]				.90[a]	.89[a]
… seeing a coyote in my yard.	0.94	0.51	0.42	.90	.90
… being approached by a coyote in my yard.	-0.29	-0.77	0.49	.87	.87
… being approached by a coyote, snarling in my yard.	-0.92	-1.40	0.48	.87	.87
… seeing a coyote in the park.	1.31	0.96	0.36	.89	.90
… being approached by a coyote in the park.	0.15	-0.31	0.46	.87	.87

Survey Item	Pre-Test (M)	Post-Test (M)	Mean Difference	Cronbach's Alpha Pre-Test	Cronbach's Alpha Post-Test
… being approached by a coyote, snarling in the park.	-0.48	-1.07	0.59	.83	.86
… being attacked by a coyote in the park.	-1.06	-1.61	0.55	.66	.88
How much control do you feel you have at preventing the following from occurring to you? [4]				*.91*[a]	*.91*[a]
… seeing a coyote in my yard.	-1.47	-1.05	-0.42	.91	.91
… being approached by a coyote in my yard.	-0.19	0.67	-0.86	.90	.90
… being approached by a coyote, snarling in my yard.	-0.15	0.62	-0.77	.89	.90
… seeing a coyote in the park.	-1.31	-0.91	-0.40	.90	.90
… being approached by a coyote in the park.	-0.67	0.09	-0.76	.88	.89
… being approached by a coyote, snarling in the park.	-0.63	0.16	-0.79	.88	.89
… being attacked by a coyote in the park.	-0.26	0.45	-0.71	.89	.90

[1] The questions were on a 7-point semantic differential scale. For example -3 = bad to +3 = good

[2] The questions were on a 7 point scale from: strongly disagree (-3) to strongly agree (+3).

[3] The questions were on a 7 point scale from: extremely likely (+3) to extremely unlikely (-3)

[4] The questions were on a 7 point scale from: complete control (+3) to no control (-3).

[a] The Cronbach's alpha in italics is the overall reliability while the reliability estimates below are the Cronbach's alpha if the item was deleted.

Table 5.2 The results of the paired t-test between the pre- and post-test scale variables (attitudes, fear, likelihood, and control).

Scale Item[1]	Pre-Test M	Post-Test M	t-test	df	p-value	Effect Size (r)
General attitudes toward coyotes	-0.35	-0.08	-4.44	118	<.001	.68
Fear of coyotes	1.26	0.57	4.47	106	<.001	.60
Perception of likelihood of interaction with coyotes	-0.05	-0.53	5.82	138	<.001	.76
Sense of control over an interaction with coyotes	-0.67	-0.1	-5.81	133	<.001	.57

[1] Scale items are computed mean scales from the survey items listed in Table 5.1 representing each of the four latent constructs (e.g., attitudes, fear, likelihood and control).

The perceived likelihood of each of the seven scenarios decreased after completing the program (mean difference range: 0.36 to 0.59). The largest change in the sense of likelihood was within the scenarios where a coyote approached or showed aggressive behaviour. This result indicates that the program was able to shift people's perception of the likelihood of coming into an aggressive interaction with a coyote. The Cronbach's alpha for the seven likelihood items was .90 for the pre-test and .89 for the post-test. The likelihood of interacting with coyotes scale followed the same mean difference pattern as observed in the questionnaire items. There was a significant difference ($t = 5.82$; $df = 138$; $p < .001$) between the pre- and post-test (Table 5.2). The results support hypothesis three: the perceived likelihood of interacting with a coyote will decrease after participation in the education program.

The participant's sense of control over the seven human-coyote interaction scenarios also increased between the pre- and post-test (mean difference range: 0.40 to 0.86). As observed in the likelihood variables, the largest change occurred in the sense of control over the different scenarios in which the coyote approached or showed aggressive behaviour. The Cronbach's alpha for the seven control items was .91 for the pre-test and .91 for the post-test. The perceived control over interacting with coyotes scale followed the same mean difference pattern as observed in the questionnaire items. There was a significant difference ($t = 5.81$; $df = 133$; $p < .001$) between the pre- and post-test (Table 5.2). The results support hypothesis four: the feeling of control over coming into contact with coyotes will increase after the respondents have participated in the education program.

All four hypotheses were supported by the analyses. The experiential education approach to wildlife safety and coexistence communication (a) had a positive effect on people's attitudes toward coyotes, (b) decreased their sense of fear of coyotes, (c) decreased their sense of likelihood of encountering coyotes, and (d) increased their sense of control over coming into contact with coyotes in their yards and in the park.

Prior to participating in the *Sharing Space* program, 84% of the participants had seen a coyote, but only 31% of participants had had problems with a coyote. When asked if they had participated in a coyote education program before, 85% of participants said they had not. CBHNPC does offer a coyote presentation offering general biological information to visitors to the park during summer programming in July and August. At the end of the program, 99% of participants said they would recommend *Sharing Spaces: Living with Coyotes* to family and friends. Before the program began, 72% of participants did not know what any of the letters in the acronym BAM meant. After the program 94% knew what BAM meant. For the four

satisfaction items measured on a 7-point scale, participants, on average, stated that they felt moderately to extremely satisfied. Participants felt moderately to extremely satisfied ($M = 2.55$), had enjoyed themselves ($M = 2.48$), found the program moderately engaging ($M = 2.48$), and found it quite informative ($M = 2.53$).

5.4 Discussion

Wildlife safety and coexistence programming tend to provide information on the assumption that learners will retain the information provided and change their behaviour. Signage communicating safety information is typically used in advocating appropriate behaviour in dangerous wildlife country (Cole et al., 1997; Manning, 2003; Ormsby & Forys, 2010). The effectiveness of signage has been shown to have varying levels of success in communicating appropriate behaviour around wildlife encounters (e.g., what do to in a bear attack and not to feed wildlife) (Bridson, 2000). If the intent of an education program is to change attitudes or behaviour, it is useful to understand how people decide what behaviour to perform in a given circumstance.

From a theoretical perspective, people's behaviour choices and attitudes do not develop independently on a case-by-case scenario, but are influenced by underlying cognitions such as values, beliefs, and attitudes. One such framework, the cognitive hierarchy (Vaske & Manfredo, 2012), states that behaviours (what a person does) are influenced by behavioural intentions (what a person thinks they would do in a given scenario). Behavioural intentions, in turn, are influenced by attitudes (a person's feeling toward an object), which are influenced by one's value orientations (a person's pattern and direction of basic beliefs) (Vaske & Donnelly, 1999). This program has shown the capacity of experiential education to support education goals in wildlife

educational programs. Strategically designed education programs, which provide educative

experiences and reflection such as *Sharing Spaces: Living with Coyotes* were shown to influence

attitudes and risk perception in the study. These two concepts have the potential to influence a

person's behaviour based on the logic of the cognitive hierarchy. It should be noted that actual

behavioural change was not measured in this study, but future evaluations of *Sharing Space*

should incorporate such measures.

5.4.1 An effective educational framework

Experiential education is a philosophy, a methodology, and a process that provides a

framework to develop education material suited to the aim(s) and the goal(s) of the wildlife

program. As a philosophical approach to learning, it values and encourages relationships between

concrete educational activities and abstract lessons learned through those activities (Luckner &

Nadler, 1997). Experiential education has been shown to be effective in changing environmental

responsibility attitudes in youth and young adults and to a certain extent their behaviour

(Littledyke, 2008; Mittelstaedt, Sanker, & VanderVeer, 1999). *Sharing Spaces: Living with*

Coyotes provided guided activities that targeted abstract lessons (i.e., risk perception) not directly

taught in the program. For example, *being a coyote* provided participants with information about

coyote ecology and behaviour through their own exploration of GPS collar data and their own

questioning.

As a methodology, experiential education has a set of principles that supports the process

of knowledge retention. These principles provide teachers or program developers with key

concepts to consider when designing and implementing effective experiential educational

programs. In the program presented here, for example, the model dispensed information

interactively. As educators, we were able to design modules targeting key learning concepts that were discovered and reflected upon by the participants. As a process, experiential education requires learners to integrate their thoughts, feelings, perceptions, and behaviours. Therefore, as a learning process, it requires adapting experiences as well as extrapolating the understanding gained to contexts outside of the experience (Vince, 1998). This approach may take learners more deeply into the world of their own experiences. Each program module required participants to use their own experiences and knowledge to guide themselves through the lessons.

To be effective, wildlife educational programs focused on human-wildlife conflicts must address coexistence (Espinosa & Jacobson, 2012). The result of any education program should be positive changes in knowledge, attitudes, awareness, and behaviour toward wildlife (Morgan, 1992). Reviews of traditionally designed wildlife education programs show mixed results (Espinosa & Jacobson, 2012; Ormsby & Forys, 2010). Gore et al. (2006a) examined the six bear awareness and safety programs in the United States of America (USA). All the programs focused on knowledge (e.g., appropriate human behaviour when encountering a bear and how to store bear attractants such as garbage) to reduce human-bear conflicts. Five out of six programs used the number of calls from the public to indicate program success and only one program had a questionnaire to examine knowledge retention. Many wildlife programs do evaluate the effectiveness of what is being administrated. Sometimes these programs can have detrimental effects. For example the New York NeighBEARhood Watch program found that tolerance of black bear conflict actually decreased after a media campaign to target risk communication to the public (Gore & Knuth, 2009). In contrast, in Ohio a target media campaign with study participants showed that combining both perceived control and black bear benefits messages actually increased tolerance (Slagle, Zajac, Bruskotter, Wilson, & Prange, 2013). These programs

did not use experimental education but show the variation in potential education program evaluations.

The post-test for this dissertation research was completed at the end of the program. There could be some response bias. First, participating in a "fun" program could lead to more positive responses in the questionnaire in general. Second, the immediacy of the post-test may lead to stronger retention of the information presented. And third, respondents could provide feedback which they think is socially acceptable based on a group program. In order to examine retention, a second post-test should be administered to test for the amount of knowledge, changes in attitudes and risk perception over a longer term.

The flexible nature of the experiential models is one of its strengths. It can be applied to many educational mediums in wildlife programming such as signage, brochures, interpretation programs (e.g., presentations), and courses. For example, The Parks Canada Xplorers program at Cape Breton Highlands National Park provides an educative experience. Young park visitors who participate in the program learn about the flora and the fauna of the park through their own exploration of the park's landscape. The booklet provides the participants with fun facts and a map to find unique aspects of the park (e.g., moose habitat and moose). By exploring the park, the participants experience the different habitats, observe what species reside in each, and have to find answers to questions posed in the booklet. Once the participant has completed a section, he or she will get an award (e.g., a stamp). By the end, the participant has actively engaged in the park and learned about a variety of species and associated habitats. When the participant approaches a member of the park staff to get a booklet stamp, the park official will reflect with the participants about what has been learned. This program provides an opportunity for young people to go on a self-guided version of the learning cycle. The flexibility in mediums used to

educate can access a wide variety of users. Experiential education has the capacity to target a variety of users while being grounded in education theory.

Sharing Space: Living with Coyotes was an experiential education program built and designed based on a target audience, the objectives of CBHNPC, and wildlife safety programs focused on human-coyote programs. This article has shown the strength in designing an education program that provides critical coyote safety and biological information, and requires critical thought and reflection upon what has been learned. Participants in this program not only gained important information but, upon completion, felt less fear toward coyotes, had a decreased sense of the likelihood of a coyote encounter, and felt more in control over an interaction with coyotes. Information alone does not guarantee safety. Practice, and the confidence in knowing one has the ability to protect oneself if a situation was to arise are also critical aspects of appropriate human response. Experiential education provides a strong foundation upon which to design wildlife programming because it requires participants to listen, practice, and reflect upon the experience/information being communicated which, in turn, increases the chance of retention.

Conflicts between humans and wildlife will continue to be a conservation and management issue as human populations expand and human-wildlife space continues to overlap (Deguise & Kerr, 2006). Educational programming is one method to support a decrease in conflict and advocate for coexistence. Experiential education is a framework that has been shown to affect change in attitude and risk perception. The general effectiveness of this framework on other human-wildlife conflict scenarios needs to be further tested.

Chapter 6: Conclusion

Highlights of the dissertation and an analysis of how it fits into existing literature and provides direction for future research will be discussed in this chapter.

6.1 Discussion

Despite expanding human populations and increased urbanization of the terrestrial landscape, medium- to large-sized carnivores (i.e., coyotes, wolves, bears) are finding ways to live amongst people (Bruskotter & Shelby, 2010; Zajac, Bruskotter, Wilson, & Prange, 2012). As human populations increasingly overlap with wildlife habitat, the frequency of human-carnivore interactions will likely rise, resulting in more conflicts (Enserink & Vogel, 2006). Human-wildlife conflicts (HWC) will require response from wildlife managers, either through management planning or policy creation. Traditional wildlife management uses biological and ecological information such as abundance, distribution, and recruitment to make sound biology-based management and policy decisions. Successful conservation and maintenance of carnivore species requires an understanding of both the biology and ecology of the animals, and the sociology behind the HWC (Bruskotter & Shelby, 2010). In order to reduce conflict, wildlife managers will have to advocate for coexistence strategies (Decker & Purdy, 1988); doing so will require an understanding of the sociological factors influencing human acceptance of the target species and of the types of management, as well as an understanding of the cognitions influencing HWC (Zajac et al., 2012).

This research occurred within the context of a larger Cape Breton Highlands National Park of Canada (CBHNPC) project aimed at reducing human-coyote conflict through an examination of coyote biology and ecology and human dimensions of human-coyote interactions (HCI) in the park. After many years of tackling such issues solely from a biological perspective, CBHNPC recognized the need to take a two-pronged approach when assessing human-coyote conflict. This approach supports the long-term viability of the coyote population, as well as the creation of well-rounded and informed management planning and policy (Bruskotter, Toman, Enzler, & Schmidt, 2009; Don Carlos, Bright, Teel, & Vaske, 2009). In many ways, the innovative integration of human dimensions into the human-coyote conflict in CBHNPC provides a template for how such conflicts or interactions could be addressed throughout protected area systems in Canada and the rest of the world.

The four research manuscripts fulfilled the four research objectives. The significance of each manuscript to the discipline of human dimensions of wildlife and to the research project is discussed below.

6.1.1 Assessing the public's attitudes and perception of risk toward coyotes

Carnivores can ignite the imagination and polarize people's beliefs and attitudes about preferences for management practices. For example, Treves and Bruskotter (2011) discuss the social and political realms of dealing with wolf recovery and management in the United States of America. They discuss how attitudes toward wolves and wolf management fall along a spectrum where the most polarized segments of the population, whether pro-wolf conservation or pro-use of lethal management, tend to be the most vocal. Their human dimensions-based research

examining human-wolf conflict in mutliple states (see Bruskotter, Schmidt, & Teel, 2007; Bruskotter, Toman, Enzler, & Schmidt, 2010; Treves, Naughton-Treves, & Shelley, 2013; Treves, 2008) shows the majority of people want wolves to persist (i.e., do not want wolves eradicated) and do support sustainable lethal management which includes hunting and trapping. Understanding sociological factors in HWC is imperative providing a voice to the general population and gaining a better understanding of the overall opinions and beliefs of interest groups (Treves & Bruskotter, 2011).

In this disertation, attitudes toward coyotes and aspects of risk perception such as fear toward, perceived likelihood of, and percieved control over an interaction with a potentially dangerous species were examined. Residents had more negative attitudes and felt more fear toward coyotes than park staff and visitors. Residents also perceived the likelihood of an interaction with coyotes to be greater and perceived their control of an interaction with a coyote to be less than visitors and park staff. The reasons for these differences were outlined in detail in Chapter 2. One major reason residents could possess heightened degrees of risk perception when comparred to visitors and park staff could be personal experience. Residents were present when the coyote caused a human dealth in 2009. Previous HCI research showed that experience and the amount of time living with coyotes influenced attitdues toward the species (Wiezorek Hudenko, 2009). Coyotes are a relatively novel species to Cape Breton Island, having been established in the 1980s. The perceived potential for conflict by the human populace is an even more recent occurrence; media reports about conflicts have increased since around 2000 (E. Muntz, Parks Canada, personal communication, January 2011). These factors may influence the differences

identified between residents, visitors, and park staff. The findings presented are unique as this study examined these sociological factors in a rural and national park context whereas the majority of research concerning HCI has focused on conflicts in urban contexts (Martínez-Espiñeira, 2006; Spacapan, 2013; White & Gehrt, 2009; Wiezorek Hudenko, 2009).

6.1.2 *The role of emotional dispositions within the cogintive hierarchy*

People's beliefs, attitudes, and preferences of acceptable management practices are also influenced by emotions. Human dimensions of wildlife (HDW) research has traditionally focused on cognitions which commonly explain 50% of the variance. The amount of explained variance measured by emotional disposition has not been extensively explored in human-wildlife relationships (Johansson, Karlsson, et al., 2012). Vaske, Roemer, and Taylor (2013) examined the role of emotional dispositions in relation to the acceptability rating of non-lethal and lethal wolf management actions. The emotional reaction by respondents to the use of non-lethal management was minimal (1% and 8% explained variance), whereas in the case of using lethal management, the explained variance increased (41% and 49%). Emotions came into play when a severe management action was under consideration (i.e., lethal). Explained variance may have increased in the lethal management scenario because the respondents' opinions regarding the wolf's right to live may have been influenced by each person's wildlife value orientations. Research by Vaske et al. (2013) indicated that emotions may account for a substantial portion of the unexplained variation, especially with contentious wildlife issues.

In this dissertation the potential influence of emotional dispositions on the acceptability of lethal control were examined relative to different types of HCI. Emotional dispositions were

found to play a role in the acceptability of using lethal management, but the percentage of explained variance did not increase as the severity of scenario increased, as had been observed in previous research (Vaske et al., 2013). In our study, explained variance of emotion appeared to be tied to a person's fear of personal injury, not to the animal's health. Therefore, when a person's life is threatened, no matter if the person possesses positive or negative attitudes toward the animal, fear is commonly present, which decreases the response variation and thus decreases the explained variation. HWC such as those in the study area can be rooted in a variety of social systems; understanding and assessing for conflict management strategies requires examination of the conflict in terms of the culture, social, and political factors that are present (Røskaft et al., 2003). It is important to consider both the cognition and affective components of people's relationship with the wildlife species and other interest groups (i.e., government agency and non-government agency). Understanding the context, including societal, political, and personal aspects of the relationship people have with wildlife, will support the development of stronger policies around wildlife management.

6.1.3 *The public's attitudes toward coyote management in and around CBHNPC*

Research in HDW offers both theoretical and applied insights into assessing and understanding HWC. Traditionally HDW has had an applied research history in which the purpose of examining HWC was to inform managers about the general public's or interested groups' value orientations, beliefs, attitudes, and behavioural intentions in regards to the management of specific species (e.g., wolves, elk, and bears) (Decker, Jacobson, & Brown, 2006; Manfredo, Vaske, Brown, Decker, & Duke, 2009; Manfredo, 2008). This dissertation research is

no different: Parks Canada wanted to understand the public's opinion on appropriate management actions if human-coyote conflicts were to occur in the park.

This research used the Potential for Conflict Index$_2$ (PCI$_2$) to describe and communicate results in a manner that is easy for all audiences to understand. This statistic is unique to human dimensions research as it was developed by researchers working within the context of this discipline (Manfredo, Vaske, & Teel, 2003; Vaske, Beaman, Barreto, & Shelby, 2010). The applicability of this statistical tool is not limited, however, to HDW. PCI$_2$ provided information on the level of consensus between groups in reference to different management strategies. Examining consensus along with mean response provides more detail about the acceptability of a given management strategy. Significant differences between residents, visitors, and park staff in their acceptance of seven management responses in three different human-coyote interactions were presented using PCI$_2$. This research not only adds to the knowledge gaps regarding human-coyote conflicts but also provides a platform which can be used to communicate the results to managers and interest groups. Understanding which management action is more or less acceptable in relation to different types of human-coyote interactions is important in guiding management actions (Vaske, Needham, Newman, Manfredo, & Petchenik, 2006).

6.1.4 The effectiveness of an education program

The examination of attitudes, risk perceptions, emotional disposition, and the acceptability of management strategies examined in this research supported the current understanding of ongoing HWC. In Chapter 4, education was consistently found to be a strongly supported management action, no matter the conflict scenario. The findings in Chapter 2 and 3

indicated that different types of cognition (e.g., attitudes) and emotion (e.g., risk perception), particularly in residents but not excluding visitors and park staff, were areas of human-coyote conflict that needed to be addressed. Based on this research, a practical management intervention in the form of an experiential education program was developed: *Sharing Space: Living with Coyotes*. This program successfully changed attitudes and risk perceptions of the participants regarding HCI. The experiential education framework provided the foundation and theory of learning retention (Joplin, 2008), which influenced change in the participants. The education theory encouraged the designers of the program to think outside the box, as the framework required creating interactive lessons. Previous human dimensions research conducted on park visitors, residents and staff in the study area provided the necessary research and understanding to frame and target the appropriate lessons for success. Building an effective education program supported by HDW research ensures that appropriate messages are included to target the key issues CBHNPC is facing with HCI.

The process by which this education program was developed and implemented is applicable to many other contexts involving human-wildlife conflicts. The generalizability of the framework requires further testing in other contexts (e.g., mountain lion and grizzly bear), but shows promise based on these results. A follow up questionnaire to test for retention of *Sharing Space: Living with Coyotes*, would be helpful to show the long term effects of this program on people's knowledge, attitudes and risk perceptions. Government and non-government organizations examining HWC need to start thinking creatively about the tools available to them

to help mitigate these types of conflicts. Experiential education is just one method, and potentially an effective method, if education is the desired tool to approach these conflicts.

6.2 Conclusion

As the interface between human and wildlife space becomes more clouded, it will be increasingly necessary to fully integrate, and often lead, projects on human-carnivore interactions with a multi-faceted human dimensions approach. Results from such research help to better support the formulation and implementation of robust policies that incorporate human opinion (Clark, Curlee, & Reading, 1996; Decker, Jacobson, & Brown, 2006; Fritts et al., 1997; Nie, 2003; Treves & Bruskotter, 2011). Examination and incorporation of sociological factors support successful conservation and management of carnivores such as the coyote. Coyotes have expanded their North American distribution range since European settlement. This medium-sized carnivore has adapted to a variety of human-influenced habitats from rural to urban environments (White & Gehrt, 2009). As human-carnivore conflicts with other species, such as the wolf, bear, and cougar have shown, expanding species populations tend to lead to increased conflict with humans. Within the context of HDW research, the research presented in this dissertation describes and discusses HCI within the parameters of the larger Parks Canada research project and how it relates to existing research. This research also discusses the potential implementation of a wildlife management option in the form of an education program which was designed to support human-coyote coexistence.

At the beginning of this dissertation, the significance of this research, both theoretical and applied, was stated. The examination and discourse concerning each of the four research objectives supports the stated significance; this dissertation on HDW has relevance in the realms of academia, policy, and applied practice. The research (a) examined the role of emotional dispositions within the cognitive hierarchy, thus contributing to HDW theory, (b) responded directly to the research goals of Parks Canada, (c) described the attitudes and risk perceptions toward coyotes, and the acceptability of different management strategies by residents, visitors, and park staff, and (d) designed and tested the effectiveness of an education program. This study adds to and extends academic knowledge on human dimensions of wildlife theory, aspects of wildlife management, human-coyote conflicts, the application of different statistical methods, and the role of education in HWC. As academics are more frequently asked to integrate public engagement activities into their research programs, this research provides a useful direction on how to do this effectively.

6.3 Recommendations

This section discusses both theoretical and applied recommendations based on the research presented in this dissertation and inferred from the combined results of Chapter 2 through Chapter 5.

1. *Risk perception is composed of multiple constructs. Understanding these key constructs supports a comprehensive understanding of perceptions of risk involved in human-wildlife interactions.*

Fear is one of the main constructs of risk perception used in the literature to describe human-wildlife interactions. Using specific constructs of risk, such as likelihood and control, to examine HCI supported further understanding of different aspects of risk and provided managers with information that can enhance education and outreach programs. Three constructs and attitudes were used to understand different parts of HCI in this dissertation. These concepts helped to build a successful experiential education program, test the program's effectiveness, and empower participants.

2. *The study of emotions is a growing area of research in the field of human dimensions of wildlife. Additional variance in responses can be explained through the exploration of emotional dispositions in human-wildlife interactions. Further research is required to understand the role of emotional disposition in the cognitive hierarchy and the relationship and the influence of emotions on human-wildlife interactions.*

The empirical study of emotions and their role in human-wildlife relationships is relatively rare in HDW research. As discussed in Chapter 3, this could be for two reasons: (a) wildlife science traditionally has relied on cognitive variables, and (b) traditionally the examination of emotional reactions has been conducted in the laboratory to understand physiological and reported psychological responses. The amount of explained variance measured by emotional disposition has not been extensively explored in human-wildlife relationships. As observed in Chapter 3, explained variance decreased as the personal threat level within the scenarios increased. In contrast, emotional dispositions have been shown to have an effect on explained variation in other contexts such as lethal control in wolf management (see Bruskotter,

Vaske, & Schmidt, 2009). The scenario-based examination of emotional dispositions examined in this dissertation, using graduated levels of personal threat, made it difficult to understand the effect emotional dispositions may have on explained variations. I have suggested the decrease in response variation observed in the more severe scenarios affected the explained variance. Given these results, further research is required to understand the role of emotional dispositions in HCI. Since this area is still a relatively novel research area, we encourage researchers to further examine similarities and differences in order to see whether these results can be generalized across populations and different contexts.

Currently, visitors, park staff, and residents value the coyote's presence in the area and possess slightly positive attitudes toward coyotes. It is important for wildlife managers to understand that these two cognitive concepts, existence beliefs and attitudes toward coyotes, influence the type of management protocol people would support. Additionally, given the relationship between emotional disposition and management action, emotions do influence people's behavioural intention and their support of or opposition to management options. For example, in residents, the emotional disposition increased toward a heightened emotional state as the severity of the scenario increased. The residents' response to severe human-coyote interactions produced a heightened emotional response, which influenced their acceptance of lethal management.

3. *The experiential education framework is a useful tool in understanding and addressing human-wildlife conflicts. This framework should be tested for participant retention in*

CBHNPC and in other contexts to examine if it is also applicable in other communities for

other wildlife species.

Experiential education is more than simply learning by doing or taking students into the outdoors. It is an education framework useful in developing wildlife programming. This approach to education merges direct experience that is meaningful to the learner with guided reflection and analysis of the experience. Such reflection and internal analysis by the learner facilitates the learning experience. This educational method challenges and activates both the mind and body. Students are encouraged to take initiative, responsibility, and make decisions based on their experiences and knowledge. Experiential education integrates well into wildlife programming because wildlife education typically centres around activities such as safety while walking or hiking. Understanding the learning objectives and using a little creativity within the framework of the learning cycle (Chapter 5) can produce memorable and effective educational programming.

Sharing Spaces: Living with Coyotes is a unique program and, during the pilot, the effectiveness of the program was tested. In HDW research, outreach material and education programs are often recommended to help quell conflict with wildlife but are rarely tested. Further testing of the effectiveness of experiential education as an educational design framework is warranted in: (a) the retention of knowledge, and changes in attitudes and risk perception by the people participating in *Sharing Spaces*, and (b) different contexts and for different species. If wildlife safety or awareness programs are evaluated, the evaluation is typically completed once (Gore et al., 2006a). The positive influences of this program warrant a second post-test questionnaire to test whether the changes observed in participants are maintained over the long-

term. This program is particularly suitable for other communities faced with HCI, especially in areas where this carnivore has recently arrived or has had negative interactions with humans which may increase fear levels and catalyze crisis management approaches such as lethal management.

4. *Despite the differences in attitudes and perceptions of risk toward coyotes, non-lethal management options were the preferred strategy by residents, park visitors, and park staff.*

As the severity of the HCI scenarios increased, different types of management options became more or less acceptable to residents, visitors, and park staff. Education and monitoring was the management option with the highest level of consensus among all three populations and was highly acceptable. This result indicates that an education program is wanted and supported by populations interacting with the park. Building an effective education program, though, requires HDW research first to ensure the best messages and mechanisms are used.

5. *Building relationships with communities is a long-term process accomplished through continued dialogue (i.e., continuing the education program: Sharing Space: Living with Coyotes).*

The program *Sharing Space: Living with Coyotes* was an effective education program that increased positive attitudes toward coyotes, decreased the fear of coyotes, decreased the perception of the likelihood of a coyote encounter, and increased the sense of control over coming into contact with coyotes. This program was memorable, well-received, and empowered participants to be safe in coyote country. This program should be continued in the park and

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surrounding communities in order to educate more people and help change people's attitudes and

risk perceptions of coyotes. Having the government agencies that manage protected areas reach

out to community residents can only ensure a better relationship between those who live nearest

to the protected areas and those responsible for its management.

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Appendix A:

Visitor Onsite Questionnaire

The following is the onsite/intercept questionnaire used to interview park visitors on the

trails.

Visitor Attitudes Toward Coyotes Study
Cape Breton Highlands National Park of Canada

Memorial University is conducting this study to learn more about park visitor's opinions toward coyotes in Cape Breton Highlands National Park. Your opinion is important and all responses will be confidential.

1. Where are you from? (e.g., town, prov/state, country)   _____

2. Including yourself, how many people are in your group? _____ # of people

3. How many children under 11 years of age are in your group? _____ # of children

4. Before today, were you aware that coyotes exist in Cape Breton Highlands National Park?   ❏ Yes   ❏ No

5. In general how do you *feel* about coyotes? *(Please **check one** that best represents your response)*

❏ Extremely Negative	❏ Moderately Negative	❏ Slightly Negative	❏ Neither	❏ Slightly Positive	❏ Moderately Positive	❏ Extremely Positive

6. Do you think the coyote population is *increasing or decreasing* in Cape Breton Highlands National Park? *(Please check one that best represents your response)*

❏ Significantly Decreasing	❏ Moderately Decreasing	❏ Slightly Decreasing	❏ Neither	❏ Slightly Increasing	❏ Moderately Increasing	❏ Significantly Increasing	❏ Don't Know

7. About how many coyotes do you think live in Cape Breton Highlands National Park?

    _____ # of coyotes   ❏ Don't Know

8. Have you ever seen a coyote in Cape Breton Highlands National Park?   ❏ Yes   ❏ No   ❏ Don't Know

9. Have you ever seen a coyote before?   ❏ Yes *(Go to Question #10)*   ❏ No *(Go to Question #13)*   ❏ Don't Know

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10. Where were you the first time you saw a coyote?
    (Please provide a specific location, e.g., in my campsite in a National Park or walking my dog in a city park)

    _____

11. The first time you saw a coyote, what was your initial reaction?

    _____

    _____

12. Have you ever reported a coyote sighting or problem to an authority?   ❏ Yes   ❏ No

13. Have coyotes ever caused a problem for you?   ❏ Yes *(Go to Question #14)*   ❏ No *(Go to Question #15)*

14. What problem(s) have coyotes caused for you?

    _____

    _____

15. Given that coyotes are present in Cape Breton Highlands National Park, how do you *feel* about *each* of the following? *(For **each statement**, circle the number that best represents your response.)*

I fear for …	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	
... my own personal health or safety.	1	2	3	4	5	6	7	
... my children's health or safety.	1	2	3	4	5	6	7	n/a
... my pet's health or safety.	1	2	3	4	5	6	7	n/a
... the spread of diseases by coyotes.	1	2	3	4	5	6	7	

16. To what extent do you *disagree or agree* with *each* of the following in regards to Cape Breton Highlands National Park? *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Parks Canada is doing a good job of managing the coyotes in the park.	1	2	3	4	5	6	7
Problems arising from coyotes in the park are everyone's responsibility.	1	2	3	4	5	6	7
I believe feeding …							
.. helps coyotes to survive.	1	2	3	4	5	6	7
.. reduces coyotes fear of humans.	1	2	3	4	5	6	7
.. makes coyotes dependent on people for food.	1	2	3	4	5	6	7
.. makes coyotes aggressive toward people.	1	2	3	4	5	6	7
.. coyote results in a dead coyote.	1	2	3	4	5	6	7

17. For *each* of the following statements, indicate whether you believe it is "**True**", "**False**", or are "**Not Sure**". *(Please **circle** your response)*

In areas where coyotes exist near residential neighbourhoods, their primary food is domestic pets.	T	F	Not Sure
In general, only one pair of coyotes in a family group breeds in any one year.	T	F	Not Sure
Coyotes consume human food sources only if there are not enough wild food sources.	T	F	Not Sure
In areas where coyotes live in close proximity to humans, coyote attacks on humans are rare.	T	F	Not Sure
The eastern coyote is bigger on average than other coyotes.	T	F	Not Sure
Coyotes have killed moose in Cape Breton Highlands National Park.	T	F	Not Sure
Coyotes have never killed a person in Cape Breton Highlands National Park.	T	F	Not Sure
If a coyote crossed a trail, you should feed the coyote.	T	F	Not Sure
If a coyote were to bare its teeth, you should run away.	T	F	Not Sure
If a coyote crossed a trail, you should back away slowly.	T	F	Not Sure
If a coyote were to approach you, you should make yourself big and stand your ground.	T	F	Not Sure

18. In your opinion, how *unacceptable or acceptable* are the following actions?
    *(For **each statement**, circle the number that best represents your response.)*

How unacceptable or acceptable is it …	Unacceptable Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Acceptable Extremely
To throw your food waste into the forest while hiking	1	2	3	4	5	6	7
To approach deer to get a photo	1	2	3	4	5	6	7
To make noises to attract moose	1	2	3	4	5	6	7
To make noises to attract coyotes	1	2	3	4	5	6	7
To feed …							
… birds	1	2	3	4	5	6	7
… squirrels	1	2	3	4	5	6	7
… deer	1	2	3	4	5	6	7
… coyotes	1	2	3	4	5	6	7

19. While visiting Cape Breton Highlands National Park, did you participate in: *(Please check all that apply)*

❏ Hiking   ❏ *Coyotes Among Us* Interpretation Program   ❏ Biking
❏ Camping   ❏ Picnicking   ❏ Feeding Wildlife

20. What is your age?

❏ 18-24 years   ❏ 25-34 years   ❏ 35-44 years   ❏ 45-54 years   ❏ 55-64 years   ❏ Over 65 years

21. Are you: ❏ Female   ❏ Male

Thank you for participating.

Appendix B:

Visitor Offsite Questionnaire

The following is the extended questionnaire park visitors would take away with them and then mail back to the park.

Visitor Attitudes Toward Coyotes Study
Cape Breton Highlands National Park of Canada

Dear Park Visitor,

It was nice meeting you in Cape Breton Highlands National Park. Thank you for agreeing to complete the second portion of the coyote questionnaire. Your responses, will provide valuable insight into the way park visitors feel about coyotes and how they should be managed. All responses, whether opposed to, in favour, or neutral, are valuable to our study and I encourage you to answer all questions. As your responses are completely anonymous, please answer the questions as openly as possible and do not include your name. Thank you in advance for your help with this important study. If you have any questions, please do not hesitate to contact me (email: carly.sponarski@mun.ca).

Sincerely,

Carly Sponarski
Project Coordinator
Memorial University PhD Candidate
carly.sponarski@mun.ca

A Study Conducted Cooperatively by:

MEMORIAL UNIVERSITY

Parks Canada   Parcs Canada

Social Sciences and Humanities Research Council of Canada

Conseil de recherches en sciences humaines du Canada

Canada

SECTION 1: In the following section you will be asked two similar sets of questions. The first set of questions is about *wildlife* in *general* and the second set of questions is about *coyotes* in *general*.

1.   To what extent do you *disagree or agree* with *each* of the following? *(For each statement, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Humans should manage wildlife populations so that humans benefit.	1	2	3	4	5	6	7
Animals should have rights similar to the rights of humans.	1	2	3	4	5	6	7
We should strive for a world where there's an abundance of wildlife for hunting and fishing.	1	2	3	4	5	6	7
I view all living things as part of one big family.	1	2	3	4	5	6	7
Hunting does not respect the lives of animals.	1	2	3	4	5	6	7
I feel a strong emotional bond with animals.	1	2	3	4	5	6	7
The needs of humans should take priority over wildlife protection.	1	2	3	4	5	6	7
I care about animals as much as I do about people.	1	2	3	4	5	6	7
Wildlife are on earth primarily for people to use.	1	2	3	4	5	6	7
Hunting wildlife is cruel and inhumane.	1	2	3	4	5	6	7
We should strive for a world where humans and wildlife can live side by side without fear.	1	2	3	4	5	6	7
I value the sense of companionship I receive from animals.	1	2	3	4	5	6	7
Wildlife are like my family and I want to protect them.	1	2	3	4	5	6	7
People who want to hunt should have the opportunity to do so.	1	2	3	4	5	6	7

2. To what extent do you *disagree or agree* with *each* of the following? *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Humans should manage coyote populations so that humans benefit.	1	2	3	4	5	6	7
Coyotes should have rights similar to the rights of humans.	1	2	3	4	5	6	7
We should strive for a world where there's an abundance of coyotes for hunting.	1	2	3	4	5	6	7
I feel a strong emotional bond with coyotes.	1	2	3	4	5	6	7
The needs of humans should take priority over coyote protection.	1	2	3	4	5	6	7
I care about coyotes as much as I do about people.	1	2	3	4	5	6	7
Coyotes are on earth primarily for people to use.	1	2	3	4	5	6	7
Hunting coyotes is cruel and inhumane.	1	2	3	4	5	6	7
We should strive for a world where humans and coyotes can live side by side without fear.	1	2	3	4	5	6	7
I value the sense of companionship I receive from coyotes.	1	2	3	4	5	6	7
Coyotes are like my family and I want to protect them.	1	2	3	4	5	6	7
People who want to hunt coyotes should have the opportunity to do so.	1	2	3	4	5	6	7

SECTION 2: These questions ask you for your opinion on *coyotes*.

1. Imagine your are in Cape Breton Highlands National Park:

a. What is the *likelihood* of the following events occurring to you while in the park? *(For each statement, circle the number that best represents your response.)*

	Extremely Unlikely	Moderately Unlikely	Slightly Unlikely	Neither	Slightly Likely	Moderately Likely	Extremely Likely
Seeing a coyote.	1	2	3	4	5	6	7
Being approached by a coyote.	1	2	3	4	5	6	7
Being approached by a coyote, snarling.	1	2	3	4	5	6	7

b. How much **control** do you feel you have at preventing the following from occurring to you while visiting the park? *(For each statement, circle the number that best represents your response.)*

	No Control	Almost No Control	Nearly No Control	Neither	Some Control	Almost In Control	Complete Control
Seeing a coyote.	1	2	3	4	5	6	7
Being approached by a coyote.	1	2	3	4	5	6	7
Being approached by a coyote, snarling.	1	2	3	4	5	6	7

2. In general, do you *think* of coyotes as: *(For each statement, circle the number that best represents your response.)*

	Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Extremely	
Bad	1	2	3	4	5	6	7	Good
Harmful	1	2	3	4	5	6	7	Beneficial
Negative	1	2	3	4	5	6	7	Positive

3. To what extent do you *disagree or agree* with *each* of the following? *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Coyotes are nuisance animals in Cape Breton Highlands National Park.	1	2	3	4	5	6	7
Coyotes have a right to exist in Cape Breton Highlands National Park.	1	2	3	4	5	6	7
There are too many coyotes in Cape Breton Highlands National Park.	1	2	3	4	5	6	7
The presence of coyotes in Cape Breton Highlands National Park is a sign of a healthy environment.	1	2	3	4	5	6	7
I may never see a coyote but it is important to me to know they exist in the park.	1	2	3	4	5	6	7
Overall, coyote populations should be completely protected in Cape Breton Highlands National Park.	1	2	3	4	5	6	7
Coyotes pose a threat to people in the park.	1	2	3	4	5	6	7
If a coyote attacks a human in the park, the park should be allowed to selectively kill the animal.	1	2	3	4	5	6	7

SECTION 3 Situations Involving Coyotes: We will describe 3 different situations involving coyotes. Think about what each situation would be like for you. Then respond to the questions about the situation.

SCENARIO #1: Imagine yourself walking along a trail in Cape Breton Highlands National Park and **a coyote crosses the trail ahead of you.** *(For each item, circle the answer closest to your own response.)*

1. Would you say that walking on the trail in the park and seeing a coyote cross the trail ahead of you would be a positive, negative or neutral experience? *(Circle the response that best represents your opinion.)*

Extremely Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Extremely Positive

2. If you were walking on a trail in the park and saw a coyote cross the trail a-head of you, to what extent would you *feel* … *(For **each row**, circle the number that best represents your response.)*

Relaxed	1	2	3	4	5	6	7	Nervous
Calm	1	2	3	4	5	6	7	Tense
Pleased	1	2	3	4	5	6	7	Upset
Not Excited	1	2	3	4	5	6	7	Excited
Not Surprised	1	2	3	4	5	6	7	Surprised
Not Scared	1	2	3	4	5	6	7	Scared
Not Worried	1	2	3	4	5	6	7	Worried
Not Alert	1	2	3	4	5	6	7	Alert

3. If you were walking on a trail in the park and saw a coyote cross the trail ahead of you, would you … *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Crouch down and try to hide from the coyote	1	2	3	4	5	6	7
Stand tall, talk loudly, and try to back away slowly	1	2	3	4	5	6	7
Run away	1	2	3	4	5	6	7
Throw stones or use pepper spray	1	2	3	4	5	6	7
Stand still and do nothing	1	2	3	4	5	6	7
Throw food to distract the coyote and leave	1	2	3	4	5	6	7
Notify the authorities as soon as possible	1	2	3	4	5	6	7

4. Given Scenario 1: how *unacceptable or acceptable* would it be for Parks Canada to take *each* of the following actions? *(For **each statement**, circle the number that best represents your response.)*

Management Action	Unacceptable Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Acceptable Extremely
.. do nothing	1	2	3	4	5	6	7
.. monitor the situation	1	2	3	4	5	6	7
.. educate the public	1	2	3	4	5	6	7
.. frighten the coyote away	1	2	3	4	5	6	7
.. capture then relocate the coyote	1	2	3	4	5	6	7
.. kill the coyote	1	2	3	4	5	6	7

SCENARIO #2: Imagine yourself camping in Cape Breton Highlands National Park and **you see a coyote in your campsite**. *(For each item, circle the answer closest to your own response.)*

1. Would you say that seeing a coyote in your campsite while camping in the park would be a positive, negative or neutral experience? *(Circle the response that best represents your opinion.)*

Extremely Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Extremely Positive

2. If you were camping in the park and saw a coyote in your campsite, to what extent would you *feel* … *(For **each row**, circle the number that best represents your response.)*

Relaxed	1	2	3	4	5	6	7	Nervous
Calm	1	2	3	4	5	6	7	Tense
Pleased	1	2	3	4	5	6	7	Upset
Not Excited	1	2	3	4	5	6	7	Excited
Not Surprised	1	2	3	4	5	6	7	Surprised
Not Scared	1	2	3	4	5	6	7	Scared
Not Worried	1	2	3	4	5	6	7	Worried
Not Alert	1	2	3	4	5	6	7	Alert

3. If you were camping in the park and saw a coyote in your campsite, would you … *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Crouch down and try to hide from the coyote	1	2	3	4	5	6	7
Stand tall, talk loudly, and try to back away slowly	1	2	3	4	5	6	7
Run away	1	2	3	4	5	6	7
Throw stones or use pepper spray	1	2	3	4	5	6	7
Stand still and do nothing	1	2	3	4	5	6	7
Throw food to distract the coyote and leave	1	2	3	4	5	6	7
Notify the authorities as soon as possible	1	2	3	4	5	6	7

4. Given Scenario 2, how *unacceptable or acceptable* would it be for Parks Canada to take *each* of the following actions? *(For **each statement**, circle the number that best represents your response.)*

Management Action	Unacceptable Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Acceptable Extremely
.. do nothing	1	2	3	4	5	6	7
.. monitor the situation	1	2	3	4	5	6	7
.. educate the public	1	2	3	4	5	6	7
.. frighten the coyote away	1	2	3	4	5	6	7
.. capture then relocate the coyote	1	2	3	4	5	6	7
.. kill the coyote	1	2	3	4	5	6	7

SCENARIO #3: Imagine yourself walking along a trail in Cape Breton Highlands National Park **and a coyote starts to approach you, snarling**. *(For each item, circle the answer closest to your own response.)*

1. Would you say that a coyote approaching you, snarling, while you are walking on a park trail would be a positive, negative or neutral experience? *(Circle the response that best represents your opinion.)*

Extremely Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Extremely Positive

2. If you were walking on a trail in the park and a coyote starts to approach you, snarling, to what extent would you *feel* … *(For **each row**, circle the number that best represents your response.)*

Relaxed	1	2	3	4	5	6	7	Nervous
Calm	1	2	3	4	5	6	7	Tense
Pleased	1	2	3	4	5	6	7	Upset
Not Excited	1	2	3	4	5	6	7	Excited
Not Surprised	1	2	3	4	5	6	7	Surprised
Not Scared	1	2	3	4	5	6	7	Scared
Not Worried	1	2	3	4	5	6	7	Worried
Not Alert	1	2	3	4	5	6	7	Alert

3. If you were walking on a trail in the park and a coyote starts to approach you, snarling, would you … *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Crouch down and try to hide from the coyote	1	2	3	4	5	6	7
Stand tall, talk loudly, and try to back away slowly	1	2	3	4	5	6	7
Run away	1	2	3	4	5	6	7
Throw stones or use pepper spray	1	2	3	4	5	6	7
Stand still and do nothing	1	2	3	4	5	6	7
Throw food to distract the coyote and leave	1	2	3	4	5	6	7
Notify the authorities as soon as possible	1	2	3	4	5	6	7

4. Given Scenario 3, how *unacceptable or acceptable* would it be for Parks Canada to take *each* of the following actions? *(For **each statement**, circle the number that best represents your response.)*

Management Action	Unacceptable Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Acceptable Extremely
.. do nothing	1	2	3	4	5	6	7
.. monitor the situation	1	2	3	4	5	6	7
.. educate the public	1	2	3	4	5	6	7
.. frighten the coyote away	1	2	3	4	5	6	7
.. capture then relocate the coyote	1	2	3	4	5	6	7
.. kill the coyote	1	2	3	4	5	6	7

SECTION 4: Please provide the following information about yourself just so we can compare how representative our respondents are to the park's visitor population. Thank you.

1. Have you ever participated in the following activities? *(Please check your response)*

    Have you ever hunted?   ❏ Yes   ❏ No

    Have you ever trapped game?   ❏ Yes   ❏ No

2. How large is the community where you live? *(Please check your response)*

    ❏ Large city with 250,000 or more people
    ❏ City with 100,000 to 249,000 people
    ❏ City with 50,000 to 99,999 people
    ❏ Small city with 25,000 to 49,999 people
    ❏ Town with 10,000 to 24,999 people
    ❏ Town with 5,000 to 9,999 people
    ❏ Small town / village with less than 5,000 people
    ❏ A farm or rural area

3. What is the highest level of education that you have achieved? *(Please check your response)*

❏ Grade 8 or less	❏ College / Trade / Technical School
❏ Some High School	❏ Some University
❏ High School Diploma	❏ Undergraduate Degree (Bachelor's)
❏ Some College / Trade / Technical School	❏ Graduate Degree (Master's, Doctorate)

If you have any other comments, please feel free to share them with us:

_____

_____

_____

_____

On behalf of Memorial University and Parks Canada, thank you again for your participation.

Appendix C:

Park Staff Questionnaire

The following is the park staff questionnaire distributed internally.

Park Staff Attitudes Toward Coyotes Study
Cape Breton Highlands National Park of Canada

Dear Park Staff,

As you probably are aware there is a human-coyote interactions project being carried out in Cape Breton Highlands National Park. The project involves minimizing human-coyote interactions and the human dimensions aspect of this project focuses on understanding public attitudes and behaviour toward coyotes, knowledge about coyotes and coyote management. This is a four-year project involving park visitors, park staff and local community residents. We would like all park staff regardless of length of employment and position to complete the questionnaire so that we can ensure a representative understanding of your feelings toward this issue and your concerns.

We encourage everyone to complete the questionnaire. Your responses are completely anonymous. The questionnaire is available in French or in English.

Thank you for expressing your opinion.

Sincerely,

Carly Sponarski
Project Coordinator
Memorial University PhD Candidate
carly.sponarski@mun.ca

A Study Conducted Cooperatively by:

MEMORIAL UNIVERSITY

Parks Canada   Parcs Canada

Social Sciences and Humanities Research Council of Canada

Conseil de recherches en sciences humaines du Canada

Canada

SECTION 1: In the following section you will be asked two similar sets of questions. The first set of questions is about *wildlife* in *general* and the second set of questions is about *coyotes* in *general*.

1. To what extent do you disagree or agree with *each* of the following? *(For each statement, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Humans should manage wildlife populations so that humans benefit.	1	2	3	4	5	6	7
Animals should have rights similar to the rights of humans.	1	2	3	4	5	6	7
We should strive for a world where there's an abundance of wildlife for hunting and fishing.	1	2	3	4	5	6	7
I view all living things as part of one big family.	1	2	3	4	5	6	7
Hunting does not respect the lives of animals.	1	2	3	4	5	6	7
I feel a strong emotional bond with animals.	1	2	3	4	5	6	7
The needs of humans should take priority over wildlife protection.	1	2	3	4	5	6	7
I care about animals as much as I do about people.	1	2	3	4	5	6	7
Wildlife are on earth primarily for people to use.	1	2	3	4	5	6	7
Hunting wildlife is cruel and inhumane.	1	2	3	4	5	6	7
We should strive for a world where humans and wildlife can live side by side without fear.	1	2	3	4	5	6	7
I value the sense of companionship I receive from animals.	1	2	3	4	5	6	7
Wildlife are like my family and I want to protect them.	1	2	3	4	5	6	7
People who want to hunt should have the opportunity to do so.	1	2	3	4	5	6	7

2. To what extent do you *disagree or agree* with *each* of the following? *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Humans should manage coyote populations so that humans benefit.	1	2	3	4	5	6	7
Coyotes should have rights similar to the rights of humans.	1	2	3	4	5	6	7
We should strive for a world where there's an abundance of coyotes for hunting.	1	2	3	4	5	6	7
I feel a strong emotional bond with coyotes.	1	2	3	4	5	6	7
The needs of humans should take priority over coyote protection.	1	2	3	4	5	6	7
I care about coyotes as much as I do about people.	1	2	3	4	5	6	7
Coyotes are on earth primarily for people to use.	1	2	3	4	5	6	7
Hunting coyotes is cruel and inhumane.	1	2	3	4	5	6	7
We should strive for a world where humans and coyotes can live side by side without fear.	1	2	3	4	5	6	7
I value the sense of companionship I receive from coyotes.	1	2	3	4	5	6	7
Coyotes are like my family and I want to protect them.	1	2	3	4	5	6	7
People who want to hunt coyotes should have the opportunity to do so.	1	2	3	4	5	6	7

SECTION 2: These questions ask you for your opinion on *coyotes*.

1. In general, do you *think* of coyotes as: *(For **each statement**, circle the number that best represents your response.)*

	Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Extremely	
Bad	1	2	3	4	5	6	7	Good
Harmful	1	2	3	4	5	6	7	Beneficial
Negative	1	2	3	4	5	6	7	Positive

2. To what extent do you *disagree or agree* with *each* of the following? *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Coyotes are nuisance animals in Cape Breton Highlands National Park.	1	2	3	4	5	6	7
Coyotes have a right to exist in Cape Breton Highlands National Park.	1	2	3	4	5	6	7
There are too many coyotes in Cape Breton Highlands National Park.	1	2	3	4	5	6	7
The presence of coyotes in Cape Breton Highlands National Park is a sign of a healthy environment.	1	2	3	4	5	6	7
I may never see a coyote but it is important to me to know they exist in the park.	1	2	3	4	5	6	7
Overall, coyote populations should be completely protected in Cape Breton Highlands National Park.	1	2	3	4	5	6	7
Coyotes pose a threat to people in the park.	1	2	3	4	5	6	7
If a coyote attacks a human in the park, the park should be allowed to selectively kill the animal.	1	2	3	4	5	6	7

3. Given that coyotes are present in Cape Breton Highlands National Park, how do you *feel* about *each* of the following? *(For **each statement**, circle the number that best represents your response.)*

I fear for …	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	
... my own personal health or safety.	1	2	3	4	5	6	7	
... my children's health or safety.	1	2	3	4	5	6	7	n / a
... my pet's health or safety.	1	2	3	4	5	6	7	n / a
... the spread of diseases by coyotes.	1	2	3	4	5	6	7	

4. Imagine your are in Cape Breton Highlands National Park:

a. What is the *likelihood* of the following events occurring to you while in the park? *(For **each statement**, circle the number that best represents your response.)*

	Extremely Unlikely	Moderately Unlikely	Slightly Unlikely	Neither	Slightly Likely	Moderately Likely	Extremely Likely
Seeing a coyote.	1	2	3	4	5	6	7
Being approached by a coyote.	1	2	3	4	5	6	7
Being approached by a coyote, snarling.	1	2	3	4	5	6	7

b. How much *control* do you feel you have at preventing the following from occurring to you while visiting the park? *(For **each statement**, circle the number that best represents your response.)*

	No Control	Almost No Control	Nearly No Control	Neither	Some Control	Almost In Control	Complete Control
Seeing a coyote.	1	2	3	4	5	6	7
Being approached by a coyote.	1	2	3	4	5	6	7
Being approached by a coyote, snarling.	1	2	3	4	5	6	7

SECTION 3: These questions ask you for your opinion of *coyotes* and your experiences with these animals.

1. Do you think the coyote population is ***increasing or decreasing*** in Cape Breton Highlands National Park? *(Please check one that best represents your response)*

❏ Significantly Decreasing ❏ Moderately Decreasing ❏ Slightly Decreasing ❏ Neither ❏ Slightly Increasing ❏ Moderately Increasing ❏ Significantly Increasing ❏ Don't Know

2. About how many coyotes do you think live in Cape Breton Highlands National Park?

_____ # of coyotes   ❏ Don't Know

3. Have you ever seen a coyote in Cape Breton Highlands National Park?   ❏ Yes   ❏ No   ❏ Don't Know

4. Have you ever seen a coyote before?   ❏ Yes *(Go to Question #5)*   ❏ No *(Go to Question #7)*   ❏ Don't Know

5. Where were you the first time you saw a coyote?
   (Please provide a specific location, e.g., in my campsite in a National Park or walking my dog in a city park)

   _____

6. The first time you saw a coyote, what was your initial reaction?

   _____

   _____

7. Have you ever reported a coyote sighting or problem to an authority?   ❏ Yes   ❏ No

8. Have coyotes ever caused a problem for you?   ❏ Yes *(Go to Question #9)*   ❏ No *(Go to Section 4)*

9. What problem(s) have coyotes caused for you?

   _____

   _____

   _____

SECTION 4: These questions ask you for your opinions on *coyotes*.

1. To what extent do you *disagree or agree* with *each* of the following in regards to Cape Breton Highlands National Park? *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Parks Canada is doing a good job of managing the coyotes in the park.	1	2	3	4	5	6	7
Problems arising from coyotes in the park are everyone's responsibility.	1	2	3	4	5	6	7
I believe feeding …							
.. helps coyotes to survive.	1	2	3	4	5	6	7
.. reduces coyotes fear of humans.	1	2	3	4	5	6	7
.. makes coyotes dependent on people for food.	1	2	3	4	5	6	7
.. makes coyotes aggressive toward people.	1	2	3	4	5	6	7
.. a coyote results in a dead coyote.	1	2	3	4	5	6	7

2. In your opinion, how *unacceptable or acceptable* are the following actions?
   *(For **each statement**, circle the number that best represents your response.)*

How unacceptable or acceptable is it …	**Unacceptable** Extremely	Moderately	Slightly	Neither	Slightly	Moderately	**Acceptable** Extremely
To throw your food waste into the forest while hiking	1	2	3	4	5	6	7
To approach deer to get a photo	1	2	3	4	5	6	7
To make noises to attract moose	1	2	3	4	5	6	7
To make noises to attract coyotes	1	2	3	4	5	6	7
To feed …							
… birds	1	2	3	4	5	6	7
… squirrels	1	2	3	4	5	6	7
… deer	1	2	3	4	5	6	7
… coyotes	1	2	3	4	5	6	7

SECTION 5: These questions ask you about your knowledge of *coyotes*.

1. For *each* of the following statements, indicate whether you believe it is "**True**", "**False**", or are "**Not Sure**". *(Please circle your response)*

In areas where coyotes exist near residential neighbourhoods, their primary food is domestic pets.	T	F	Not Sure
In general, only one pair of coyotes in a family group breeds in any one year.	T	F	Not Sure
Coyotes consume human food sources only if there are not enough wild food sources.	T	F	Not Sure
In areas where coyotes live in close proximity to humans, coyote attacks on humans are rare.	T	F	Not Sure
The eastern coyote is bigger on average than other coyotes.	T	F	Not Sure
Coyotes have killed moose in Cape Breton Highlands National Park.	T	F	Not Sure
Coyotes have never killed a person in Cape Breton Highlands National Park.	T	F	Not Sure
If a coyote crossed a trail, you should feed the coyote.	T	F	Not Sure
If a coyote were to bare its teeth, you should run away.	T	F	Not Sure
If a coyote crossed a trail, you should back away slowly.	T	F	Not Sure
If a coyote were to approach you, you should make yourself big and stand your ground.	T	F	Not Sure

SECTION 6 Situations Involving Coyotes: We will describe 3 different situations involving coyotes. Think about what each situation would be like for you. Then respond to the questions about the situation.

SCENARIO #1: Imagine yourself walking along a trail in Cape Breton Highlands National Park and **a coyote crosses the trail ahead of you.** *(For each item, circle the answer closest to your own response.)*

1. Would you say that walking on the trail in the park and seeing a coyote cross the trail ahead of you would be a positive, negative or neutral experience? *(Circle the response that best represents your opinion.)*

Extremely Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Extremely Positive

2. If you were walking on a trail in the park and saw a coyote cross the trail a-head of you, to what extent would you *feel* … *(For **each row**, circle the number that best represents your response.)*

Relaxed	1	2	3	4	5	6	7	Nervous
Calm	1	2	3	4	5	6	7	Tense
Pleased	1	2	3	4	5	6	7	Upset
Not Excited	1	2	3	4	5	6	7	Excited
Not Surprised	1	2	3	4	5	6	7	Surprised
Not Scared	1	2	3	4	5	6	7	Scared
Not Worried	1	2	3	4	5	6	7	Worried
Not Alert	1	2	3	4	5	6	7	Alert

3. If you were walking on a trail in the park and saw a coyote cross the trail ahead of you, would you … *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Crouch down and try to hide from the coyote	1	2	3	4	5	6	7
Stand tall, talk loudly, and try to back away slowly	1	2	3	4	5	6	7
Run away	1	2	3	4	5	6	7
Throw stones or use pepper spray	1	2	3	4	5	6	7
Stand still and do nothing	1	2	3	4	5	6	7
Throw food to distract the coyote and leave	1	2	3	4	5	6	7
Notify the authorities as soon as possible	1	2	3	4	5	6	7

4. Given Scenario 1: how *unacceptable or acceptable* would it be for Parks Canada to take *each* of the following actions? *(For **each statement**, circle the number that best represents your response.)*

Management Action	Unacceptable Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Acceptable Extremely
.. do nothing	1	2	3	4	5	6	7
.. monitor the situation	1	2	3	4	5	6	7
.. educate the public	1	2	3	4	5	6	7
.. frighten the coyote away	1	2	3	4	5	6	7
.. capture then relocate the coyote	1	2	3	4	5	6	7
.. kill the coyote	1	2	3	4	5	6	7

SCENARIO #2: Imagine yourself camping in Cape Breton Highlands National Park and **you see a coyote in your campsite**. *(For each item, circle the answer closest to your own response.)*

1. Would you say that seeing a coyote in your campsite while camping in the park would be a positive, negative or neutral experience? *(Circle the response that best represents your opinion.)*

Extremely Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Extremely Positive

2. If you were camping in the park and saw a coyote in your campsite, to what extent would you *feel* … *(For **each row**, circle the number that best represents your response.)*

Relaxed	1	2	3	4	5	6	7	Nervous
Calm	1	2	3	4	5	6	7	Tense
Pleased	1	2	3	4	5	6	7	Upset
Not Excited	1	2	3	4	5	6	7	Excited
Not Surprised	1	2	3	4	5	6	7	Surprised
Not Scared	1	2	3	4	5	6	7	Scared
Not Worried	1	2	3	4	5	6	7	Worried
Not Alert	1	2	3	4	5	6	7	Alert

3. If you were camping in the park and saw a coyote in your campsite, would you … *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Crouch down and try to hide from the coyote	1	2	3	4	5	6	7
Stand tall, talk loudly, and try to back away slowly	1	2	3	4	5	6	7
Run away	1	2	3	4	5	6	7
Throw stones or use pepper spray	1	2	3	4	5	6	7
Stand still and do nothing	1	2	3	4	5	6	7
Throw food to distract the coyote and leave	1	2	3	4	5	6	7
Notify the authorities as soon as possible	1	2	3	4	5	6	7

4. Given Scenario 2, how *unacceptable or acceptable* would it be for Parks Canada to take *each* of the following actions? *(For **each statement**, circle the number that best represents your response.)*

Management Action	Unacceptable Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Acceptable Extremely
.. do nothing	1	2	3	4	5	6	7
.. monitor the situation	1	2	3	4	5	6	7
.. educate the public	1	2	3	4	5	6	7
.. frighten the coyote away	1	2	3	4	5	6	7
.. capture then relocate the coyote	1	2	3	4	5	6	7
.. kill the coyote	1	2	3	4	5	6	7

SCENARIO #3: Imagine yourself walking along a trail in Cape Breton Highlands National Park **and a coyote starts to approach you, snarling**. *(For each item, circle the answer closest to your own response.)*

1. Would you say that a coyote approaching you, snarling, while you are walking on a park trail would be a positive, negative or neutral experience? *(Circle the response that best represents your opinion.)*

Extremely Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Extremely Positive

2. If you were walking on a trail in the park and a coyote starts to approach you, snarling, to what extent would you *feel* … *(For **each row**, circle the number that best represents your response.)*

Relaxed	1	2	3	4	5	6	7	Nervous
Calm	1	2	3	4	5	6	7	Tense
Pleased	1	2	3	4	5	6	7	Upset
Not Excited	1	2	3	4	5	6	7	Excited
Not Surprised	1	2	3	4	5	6	7	Surprised
Not Scared	1	2	3	4	5	6	7	Scared
Not Worried	1	2	3	4	5	6	7	Worried
Not Alert	1	2	3	4	5	6	7	Alert

3. If you were walking on a trail in the park and a coyote starts to approach you, snarling, would you … *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Crouch down and try to hide from the coyote	1	2	3	4	5	6	7
Stand tall, talk loudly, and try to back away slowly	1	2	3	4	5	6	7
Run away	1	2	3	4	5	6	7
Throw stones or use pepper spray	1	2	3	4	5	6	7
Stand still and do nothing	1	2	3	4	5	6	7
Throw food to distract the coyote and leave	1	2	3	4	5	6	7
Notify the authorities as soon as possible	1	2	3	4	5	6	7

4. Given Scenario 3, how *unacceptable or acceptable* would it be for Parks Canada to take *each* of the following actions? *(For **each statement**, circle the number that best represents your response.)*

Management Action	Unacceptable Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Acceptable Extremely
.. do nothing	1	2	3	4	5	6	7
.. monitor the situation	1	2	3	4	5	6	7
.. educate the public	1	2	3	4	5	6	7
.. frighten the coyote away	1	2	3	4	5	6	7
.. capture then relocate the coyote	1	2	3	4	5	6	7
.. kill the coyote	1	2	3	4	5	6	7

SECTION 7: Please provide the following information about yourself. Thank you.

1. Have you ever participated in the following activities?

    Have you ever hunted? ❏ Yes ❏ No

    Have you ever trapped game? ❏ Yes ❏ No

2. Are you: ❏ Female ❏ Male

3. What is your age?
    ❏ 18-24 years ❏ 25-34 years ❏ 35-44 years ❏ 45-54 years ❏ 55-64 years ❏ Over 65 years

4. What is the highest level of education that you have achieved?

    ❏ Grade 8 or less ❏ College / Trade / Technical School

    ❏ Some High School ❏ Some University

    ❏ High School Diploma ❏ Undergraduate Degree (Bachelor's)

    ❏ Some College / Trade / Technical School ❏ Graduate Degree (Master's, Doctorate)

5. How many years have you worked in Cape Breton Highlands National Park?

    ❏ Less than 1 year ❏ 16-20 years

    ❏ 1-5 years ❏ 21-25 years

    ❏ 6-10 years ❏ 26-30 years

    ❏ 11-15 years ❏ Over 31 years

If you have any other comments, please feel free to share them with us:

_____

_____

_____

_____

_____

_____

On behalf of Memorial University and Parks Canada, thank you again for your participation.

Appendix D:
Resident Questionnaire

The following is the questionnaire mailed to residents living around the Cabot Trail.

Resident Attitudes Toward Coyotes Study
Cape Breton Highlands National Park of Canada

Dear Resident,

As you probably are aware there is a human-coyote interactions project being carried out in Cape Breton Highlands National Park. The project involves minimizing human-coyote interactions and the human dimensions aspect of this project focuses on understanding public attitudes and behaviour toward coyotes, knowledge about coyotes and coyote management.

This is a four-year project involving park visitors, park staff and local community residents. All responses, whether opposed to, in favour, or neutral, are valuable to our study and I encourage you to answer all questions. As your responses are completely anonymous, please answer the questions as openly as possible and do not include your name. Thank you in advance for your help with this important study. If you have any questions, please do not hesitate to contact me (email: carly.sponarski@mun.ca).

Thank you for expressing your opinion.

Sincerely,

Carly Sponarski
Project Coordinator
Memorial University PhD Candidate
carly.sponarski@mun.ca

A Study Conducted Cooperatively by:

MEMORIAL UNIVERSITY

Parks Canada / Parcs Canada

Social Sciences and Humanities Research Council of Canada

Conseil de recherches en sciences humaines du Canada

Canada

SECTION 1: In the following section you will be asked two similar sets of questions. The first set of questions is about **wildlife** in **general** and the second set of questions is about **coyotes** in **general**.

1. To what extent do you disagree or agree with **each** of the following? *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Humans should manage wildlife populations so that humans benefit.	1	2	3	4	5	6	7
Animals should have rights similar to the rights of humans.	1	2	3	4	5	6	7
We should strive for a world where there's an abundance of wildlife for hunting and fishing.	1	2	3	4	5	6	7
I view all living things as part of one big family.	1	2	3	4	5	6	7
Hunting does not respect the lives of animals.	1	2	3	4	5	6	7
I feel a strong emotional bond with animals.	1	2	3	4	5	6	7
The needs of humans should take priority over wildlife protection.	1	2	3	4	5	6	7
I care about animals as much as I do about people.	1	2	3	4	5	6	7
Wildlife are on earth primarily for people to use.	1	2	3	4	5	6	7
Hunting wildlife is cruel and inhumane.	1	2	3	4	5	6	7
We should strive for a world where humans and wildlife can live side by side without fear.	1	2	3	4	5	6	7
I value the sense of companionship I receive from animals.	1	2	3	4	5	6	7
Wildlife are like my family and I want to protect them.	1	2	3	4	5	6	7
People who want to hunt should have the opportunity to do so.	1	2	3	4	5	6	7

2. To what extent do you *disagree or agree* with *each* of the following? *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Humans should manage coyote populations so that humans benefit.	1	2	3	4	5	6	7
Coyotes should have rights similar to the rights of humans.	1	2	3	4	5	6	7
We should strive for a world where there's an abundance of coyotes for hunting.	1	2	3	4	5	6	7
I feel a strong emotional bond with coyotes.	1	2	3	4	5	6	7
The needs of humans should take priority over coyote protection.	1	2	3	4	5	6	7
I care about coyotes as much as I do about people.	1	2	3	4	5	6	7
Coyotes are on earth primarily for people to use.	1	2	3	4	5	6	7
Hunting coyotes is cruel and inhumane.	1	2	3	4	5	6	7
We should strive for a world where humans and coyotes can live side by side without fear.	1	2	3	4	5	6	7
I value the sense of companionship I receive from coyotes.	1	2	3	4	5	6	7
Coyotes are like my family and I want to protect them.	1	2	3	4	5	6	7
People who want to hunt coyotes should have the opportunity to do so.	1	2	3	4	5	6	7

SECTION 2: These questions ask you for your opinion on *coyotes*.

1. In general, do you *think* of coyotes as: *(For **each statement**, circle the number that best represents your response.)*

	Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Extremely	
Bad	1	2	3	4	5	6	7	Good
Harmful	1	2	3	4	5	6	7	Beneficial
Negative	1	2	3	4	5	6	7	Positive

2. To what extent do you *disagree or agree* with *each* of the following? *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Coyotes are nuisance animals in Cape Breton Highlands National Park.	1	2	3	4	5	6	7
Coyotes have a right to exist in Cape Breton Highlands National Park.	1	2	3	4	5	6	7
There are too many coyotes in Cape Breton Highlands National Park.	1	2	3	4	5	6	7
The presence of coyotes in Cape Breton Highlands National Park is a sign of a healthy environment.	1	2	3	4	5	6	7
I may never see a coyote but it is important to me to know they exist in the park.	1	2	3	4	5	6	7
Overall, coyote populations should be completely protected in Cape Breton Highlands National Park.	1	2	3	4	5	6	7
Coyotes pose a threat to people in the park.	1	2	3	4	5	6	7
If a coyote attacks a human in the park, the park should be allowed to selectively kill the animal.	1	2	3	4	5	6	7

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3. Given that coyotes are present in Cape Breton Highlands National Park, how do you *feel* about *each* of the following? *(For **each statement**, circle the number that best represents your response.)*

I fear for …	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	
... my own personal health or safety.	1	2	3	4	5	6	7	
... my children's health or safety.	1	2	3	4	5	6	7	n/a
... my pet's health or safety.	1	2	3	4	5	6	7	n/a
... the spread of diseases by coyotes.	1	2	3	4	5	6	7	

4. Imagine your are in Cape Breton Highlands National Park:

c. What is the *likelihood* of the following events occurring to you while in the park? *(For **each statement**, circle the number that best represents your response.)*

	Extremely Unlikely	Moderately Unlikely	Slightly Unlikely	Neither	Slightly Likely	Moderately Likely	Extremely Likely
Seeing a coyote.	1	2	3	4	5	6	7
Being approached by a coyote.	1	2	3	4	5	6	7
Being approached by a coyote, snarling.	1	2	3	4	5	6	7

d. How much *control* do you feel you have at preventing the following from occurring to you while visiting the park? *(For **each statement**, circle the number that best represents your response.)*

	No Control	Almost No Control	Nearly No Control	Neither	Some Control	Almost In Control	Complete Control
Seeing a coyote.	1	2	3	4	5	6	7
Being approached by a coyote.	1	2	3	4	5	6	7
Being approached by a coyote, snarling.	1	2	3	4	5	6	7

SECTION 3: These questions ask you for your opinion of *coyotes* and your experiences with these animals*.*

1. Do you think the coyote population is *increasing or decreasing* in Cape Breton Highlands National Park?
    (Please check one that best represents your response)

❏ Significantly   ❏ Moderately   ❏ Slightly   ❏ Neither   ❏ Slightly   ❏ Moderately   ❏ Significantly   ❏ Don't Know
   Decreasing   Decreasing   Decreasing   Increasing   Increasing   Increasing

2. About how many coyotes do you think live in Cape Breton Highlands National Park?

    _____ # of coyotes   ❏ Don't Know

3. Have you ever seen a coyote in Cape Breton Highlands National Park?   ❏ Yes   ❏ No   ❏ Don't Know

4. Have you ever seen a coyote before?   ❏ Yes *(Go to Question #5)*   ❏ No *(Go to Question #7)*   ❏ Don't Know

5. Where were you the first time you saw a coyote?
    (Please provide a specific location, e.g., in my campsite in a National Park or walking my dog in a city park)

    _____

6. The first time you saw a coyote, what was your initial reaction?

    _____

    _____

7. Have you ever reported a coyote sighting or problem to an authority?   ❏ Yes   ❏ No

8. Have coyotes ever caused a problem for you?   ❏ Yes *(Go to Question #9)*   ❏ No *(Go to Section 4)*

9. What problem(s) have coyotes caused for you?

    _____

    _____

    _____

SECTION 4: These questions ask you for your opinions on *coyotes*.

1. To what extent do you *disagree or agree* with *each* of the following in regards to Cape Breton Highlands National Park? *(For each statement, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Parks Canada is doing a good job of managing the coyotes in the park.	1	2	3	4	5	6	7
Problems arising from coyotes in the park are everyone's responsibility.	1	2	3	4	5	6	7
I believe feeding …							
.. helps coyotes to survive.	1	2	3	4	5	6	7
.. reduces coyotes fear of humans.	1	2	3	4	5	6	7
.. makes coyotes dependent on people for food.	1	2	3	4	5	6	7
.. makes coyotes aggressive toward people.	1	2	3	4	5	6	7
.. a coyote results in a dead coyote.	1	2	3	4	5	6	7

2. In your opinion, how *unacceptable or acceptable* are the following actions?
   (For each statement, circle the number that best represents your response.)

How unacceptable or acceptable is it …	**Unacceptable** Extremely	Moderately	Slightly	Neither	Slightly	Moderately	**Acceptable** Extremely
To throw your food waste into the forest while hiking	1	2	3	4	5	6	7
To approach deer to get a photo	1	2	3	4	5	6	7
To make noises to attract moose	1	2	3	4	5	6	7
To make noises to attract coyotes	1	2	3	4	5	6	7
To feed …							
… birds	1	2	3	4	5	6	7
… squirrels	1	2	3	4	5	6	7
… deer	1	2	3	4	5	6	7
… coyotes	1	2	3	4	5	6	7

SECTION 5: These questions ask you about your knowledge of *coyotes*.

1. For *each* of the following statements, indicate whether you believe it is "**True**", "**False**", or are "**Not Sure**". *(Please circle your response)*

In areas where coyotes exist near residential neighbourhoods, their primary food is domestic pets.	T	F	Not Sure
In general, only one pair of coyotes in a family group breeds in any one year.	T	F	Not Sure
Coyotes consume human food sources only if there are not enough wild food sources.	T	F	Not Sure
In areas where coyotes live in close proximity to humans, coyote attacks on humans are rare.	T	F	Not Sure
The eastern coyote is bigger on average than other coyotes.	T	F	Not Sure
Coyotes have killed moose in Cape Breton Highlands National Park.	T	F	Not Sure
Coyotes have never killed a person in Cape Breton Highlands National Park.	T	F	Not Sure
If a coyote crossed a trail, you should feed the coyote.	T	F	Not Sure
If a coyote were to bare its teeth, you should run away.	T	F	Not Sure
If a coyote crossed a trail, you should back away slowly.	T	F	Not Sure
If a coyote were to approach you, you should make yourself big and stand your ground.	T	F	Not Sure

SECTION 6 Situations Involving Coyotes: We will describe 3 different situations involving coyotes. Think about what each situation would be like for you. Then respond to the questions about the situation.

SCENARIO #1: Imagine yourself walking along a trail in Cape Breton Highlands National Park and **a coyote crosses the trail ahead of you.** *(For each item, circle the answer closest to your own response.)*

1. Would you say that walking on the trail in the park and seeing a coyote cross the trail ahead of you would be a positive, negative or neutral experience? *(Circle the response that best represents your opinion.)*

❏ Extremely Negative	❏ Moderately Negative	❏ Slightly Negative	❏ Neutral	❏ Slightly Positive	❏ Moderately Positive	❏ Extremely Positive

2. If you were walking on a trail in the park and saw a coyote cross the trail a-head of you, to what extent would you *feel* … *(For **each row**, circle the number that best represents your response.)*

Relaxed	1	2	3	4	5	6	7	Nervous
Calm	1	2	3	4	5	6	7	Tense
Pleased	1	2	3	4	5	6	7	Upset
Not Excited	1	2	3	4	5	6	7	Excited
Not Surprised	1	2	3	4	5	6	7	Surprised
Not Scared	1	2	3	4	5	6	7	Scared
Not Worried	1	2	3	4	5	6	7	Worried
Not Alert	1	2	3	4	5	6	7	Alert

3. If you were walking on a trail in the park and saw a coyote cross the trail ahead of you, would you …
   *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Crouch down and try to hide from the coyote	1	2	3	4	5	6	7
Stand tall, talk loudly, and try to back away slowly	1	2	3	4	5	6	7
Run away	1	2	3	4	5	6	7
Throw stones or use pepper spray	1	2	3	4	5	6	7
Stand still and do nothing	1	2	3	4	5	6	7
Throw food to distract the coyote and leave	1	2	3	4	5	6	7
Notify the authorities as soon as possible	1	2	3	4	5	6	7

4. Given Scenario 1: how *unacceptable or acceptable* would it be for Parks Canada to take *each* of the following actions? *(For **each statement**, circle the number that best represents your response.)*

Management Action	Unacceptable Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Acceptable Extremely
.. do nothing	1	2	3	4	5	6	7
.. monitor the situation	1	2	3	4	5	6	7
.. educate the public	1	2	3	4	5	6	7
.. frighten the coyote away	1	2	3	4	5	6	7
.. capture then relocate the coyote	1	2	3	4	5	6	7
.. kill the coyote	1	2	3	4	5	6	7

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SCENARIO #2: Imagine yourself camping in Cape Breton Highlands National Park and **you see a coyote in your campsite**. *(For each item, circle the answer closest to your own response.)*

1. Would you say that seeing a coyote in your campsite while camping in the park would be a positive, negative or neutral experience? *(Circle the response that best represents your opinion.)*

❏ Extremely Negative	❏ Moderately Negative	❏ Slightly Negative	❏ Neutral	❏ Slightly Positive	❏ Moderately Positive	❏ Extremely Positive

2. If you were camping in the park and saw a coyote in your campsite, to what extent would you *feel* … *(For **each row**, circle the number that best represents your response.)*

Relaxed	1	2	3	4	5	6	7	Nervous
Calm	1	2	3	4	5	6	7	Tense
Pleased	1	2	3	4	5	6	7	Upset
Not Excited	1	2	3	4	5	6	7	Excited
Not Surprised	1	2	3	4	5	6	7	Surprised
Not Scared	1	2	3	4	5	6	7	Scared
Not Worried	1	2	3	4	5	6	7	Worried
Not Alert	1	2	3	4	5	6	7	Alert

3. If you were camping in the park and saw a coyote in your campsite, would you …
   *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Crouch down and try to hide from the coyote	1	2	3	4	5	6	7
Stand tall, talk loudly, and try to back away slowly	1	2	3	4	5	6	7
Run away	1	2	3	4	5	6	7
Throw stones or use pepper spray	1	2	3	4	5	6	7
Stand still and do nothing	1	2	3	4	5	6	7
Throw food to distract the coyote and leave	1	2	3	4	5	6	7
Notify the authorities as soon as possible	1	2	3	4	5	6	7

4. Given Scenario 2, how *unacceptable or acceptable* would it be for Parks Canada to take *each* of the following actions? *(For **each statement**, circle the number that best represents your response.)*

Management Action	Unacceptable Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Acceptable Extremely
.. do nothing	1	2	3	4	5	6	7
.. monitor the situation	1	2	3	4	5	6	7
.. educate the public	1	2	3	4	5	6	7
.. frighten the coyote away	1	2	3	4	5	6	7
.. capture then relocate the coyote	1	2	3	4	5	6	7
.. kill the coyote	1	2	3	4	5	6	7

SCENARIO #3: Imagine yourself walking along a trail in Cape Breton Highlands National Park **and a coyote starts to approach you, snarling**. *(For each item, circle the answer closest to your own response.)*

1. Would you say that a coyote approaching you, snarling, while you are walking on a park trail would be a positive, negative or neutral experience? *(Circle the response that best represents your opinion.)*

❏ Extremely Negative	❏ Moderately Negative	❏ Slightly Negative	❏ Neutral	❏ Slightly Positive	❏ Moderately Positive	❏ Extremely Positive

2. If you were walking on a trail in the park and a coyote starts to approach you, snarling, to what extent would you **feel** … *(For **each row**, circle the number that best represents your response.)*

Relaxed	1	2	3	4	5	6	7	Nervous
Calm	1	2	3	4	5	6	7	Tense
Pleased	1	2	3	4	5	6	7	Upset
Not Excited	1	2	3	4	5	6	7	Excited
Not Surprised	1	2	3	4	5	6	7	Surprised
Not Scared	1	2	3	4	5	6	7	Scared
Not Worried	1	2	3	4	5	6	7	Worried
Not Alert	1	2	3	4	5	6	7	Alert

3. If you were walking on a trail in the park and a coyote starts to approach you, snarling, would you … *(For **each statement**, circle the number that best represents your response.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
Crouch down and try to hide from the coyote	1	2	3	4	5	6	7
Stand tall, talk loudly, and try to back away slowly	1	2	3	4	5	6	7
Run away	1	2	3	4	5	6	7
Throw stones or use pepper spray	1	2	3	4	5	6	7
Stand still and do nothing	1	2	3	4	5	6	7
Throw food to distract the coyote and leave	1	2	3	4	5	6	7
Notify the authorities as soon as possible	1	2	3	4	5	6	7

4. Given Scenario 3, how **unacceptable or acceptable** would it be for Parks Canada to take **each** of the following actions? *(For **each statement**, circle the number that best represents your response.)*

Management Action	Unacceptable Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Acceptable Extremely
.. do nothing	1	2	3	4	5	6	7
.. monitor the situation	1	2	3	4	5	6	7
.. educate the public	1	2	3	4	5	6	7
.. frighten the coyote away	1	2	3	4	5	6	7
.. capture then relocate the coyote	1	2	3	4	5	6	7
.. kill the coyote	1	2	3	4	5	6	7

SECTION 7: Please provide the following information about yourself. Thank you.

1. Have you ever participated in the following activities?

    Have you ever hunted?   ❏ Yes   ❏ No

    Have you ever trapped game?   ❏ Yes   ❏ No

2. Are you: ❏ Female   ❏ Male

3. What is your age?

    ❏ 18-24 years   ❏ 25-34 years   ❏ 35-44 years   ❏ 45-54 years   ❏ 55-64 years   ❏ Over 65 years

4. What is the highest level of education that you have achieved?

    ❏ Grade 8 or less   ❏ College / Trade / Technical School

    ❏ Some High School   ❏ Some University

    ❏ High School Diploma   ❏ Undergraduate Degree (Bachelor's)

    ❏ Some College / Trade / Technical School   ❏ Graduate Degree (Master's, Doctorate)

5. What activities, do you participate in: *(Please check all that apply)*

    ❏ Hiking   ❏ Biking   ❏ Camping

    ❏ Picnicking   ❏ Feeding Wildlife   ❏ Fishing

    ❏ Snow Shoeing   ❏ Cross Country Skiing   ❏ *Coyotes Among Us* Interpretation Program

6. In regards to outdoor activities, has your behaviour changed since the incident with ❏ Yes   ❏ No
    coyotes in Cape Breton Highlands National Park?

7. If yes, how has your behaviour changed?

    _____

    _____

    _____

    If you have any other comments, please feel free to share them with us:

    _____

    _____

    _____

    _____

On behalf of Memorial University and Parks Canada, thank you again for your participation.

The following are the reminder postcards sent to participating (a) park visitors and (b) residents.

Thank You

Dear Park Visitor,

Thank you for completing the questionnaire on coyotes and coyote management. Your answers will help our understanding of how Cape Breton Highlands National Park visitors feel about coyotes in the park. If you haven't sent the questionnaire back yet, please do so as soon as possible. We have sent out the questionnaire to a sample of park visitors and we really need to hear back from everyone whether you dislike, are neutral or like coyotes.

The questionnaire can be completed online. Please email me for the link. If you need another questionnaire or have any questions please do not hesitate to contact us at carly.sponarski@mun.ca.

Carly Sponarski
Project Coordinator
Memorial University PhD Candidate

(a)

Thank You

Dear Resident,

Thank you for completing the questionnaire on coyotes and coyote management. Your answers will help our understanding of how people feel about coyotes in Cape Breton Highlands National Park. If you haven't sent the questionnaire back yet, please do so as soon as possible. We have sent out the questionnaire to a sample of residents and we really need to hear back from everyone whether you dislike, are neutral or like coyotes.

The questionnaire can be completed online. Please email me for the link. If you need another questionnaire or have any questions please do not hesitate to contact us at carly.sponarski@mun.ca.

Carly Sponarski
Project Coordinator
Memorial University PhD Candidate

(b)

Appendix F:

Education Program Pre-test Questionnaire

The following is a copy of the pre-test questionnaire for the education program, *Sharing Space:*

Living with Coyotes.

Sharing Space:
Coyote Coexistence Program

Memorial University is conducting this study to learn about the effectiveness of a coyote awareness and safety program for program participants. Your opinion is important and all responses will be confidential.

1. Have you ever seen a coyote before? ❏ Yes   ❏ No   ❏ Don't Know
   (Go to Question #2)   *(Go to Question #5)*   *(Go to Question #5)*

2. Roughly how many coyotes have you seen? _____

3. The first time you saw a coyote, what was your initial reaction?

   _____

   _____

4. If you have seen more than one coyote, has your reaction changed? If so, how?

   _____

   _____

5. Have coyotes ever caused a problem for you? ❏ Yes *(Go to Question #6)*   ❏ No *(Go to Question #7)*

6. What problem(s) have coyotes caused for you?

   _____

   _____

   _____

7. In regards to outdoor activities, has your behaviour ❏ Yes *(Go to Question #8)* ❏ No *(Go to Question #9)*
   changed since the incident with coyotes in Cape
   Breton Highlands National Park?

8. If yes, how has your behaviour changed?

_____

_____

_____

9. How you ever participated in a coyote education program? ❏ Yes *(Go to Question #10)*   ❏ No *(Go to Question #11)*

10. Can you describe the coyote education program?

_____

_____

11. What would you like to get out of today's coyote program?

_____

_____

_____

12. The Nova Scotia Department of Natural Resources uses 'BAM' to help people to remember what to do in case they encounter a coyote. What does each letter mean?

B _____

A _____

M _____

13. In general, do you *think* of coyotes as: *(For **each statement**, circle the number that best represents your response.)*

	Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Extremely	
Bad	1	2	3	4	5	6	7	Good
Harmful	1	2	3	4	5	6	7	Beneficial
Negative	1	2	3	4	5	6	7	Positive

14. Imagine you are outside:
a. Given that coyotes are present, how do you *feel* about *each* of the following? *(For **each statement**, circle the number that best represents your response.)*

I fear for …	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	
... my own personal health or safety.	1	2	3	4	5	6	7	
... my children's health or safety.	1	2	3	4	5	6	7	n/a
... my pet's health or safety.	1	2	3	4	5	6	7	n/a

b. What is the *likelihood* of the following events occurring to you? *(For each statement, circle the number that best represents your response.)*

	Extremely Unlikely	Moderately Unlikely	Slightly Unlikely	Neither	Slightly Likely	Moderately Likely	Extremely Likely
Seeing a coyote in my yard.	1	2	3	4	5	6	7
Being approached by a coyote in my yard.	1	2	3	4	5	6	7
Being approached by a coyote, snarling in my yard.	1	2	3	4	5	6	7
Seeing a coyote in the park.	1	2	3	4	5	6	7
Being approached by a coyote in the park.	1	2	3	4	5	6	7
Being approached by a coyote, snarling in the park.	1	2	3	4	5	6	7
Being attacked by a coyote in the park.	1	2	3	4	5	6	7

c. How much *control* do you feel you have at preventing the following from occurring to you? *(For each statement, circle the number that best represents your response.)*

	No Control	Almost No Control	Nearly No Control	Neither	Some Control	Almost In Control	Complete Control
Seeing a coyote.	1	2	3	4	5	6	7
Being approached by a coyote in my yard.	1	2	3	4	5	6	7
Being approached by a coyote, snarling in my yard.	1	2	3	4	5	6	7
Seeing a coyote in the park.	1	2	3	4	5	6	7
Being approached by a coyote in the park.	1	2	3	4	5	6	7
Being approached by a coyote, snarling, in the park.	1	2	3	4	5	6	7
Being attacked by a coyote in the park.	1	2	3	4	5	6	7

15. Are you: ❏ Female ❏ Male

16. What is your age?
❏ 18-24 years ❏ 25-34 years ❏ 35-44 years ❏ 45-54 years ❏ 55-64 years ❏ Over 65 years

Thank you. We hope you enjoy the program.

Appendix G:

Education Program Post-test Questionnaire

The following is a copy of the post-test questionnaire for the education program, *Sharing*

Space: Living with Coyotes.

Sharing Space:
Coyote Coexistence Program

Memorial University is conducting this study to learn about the effectiveness of a coyote awareness and safety program for program participants. Your opinion is important and all responses will be confidential.

1. In general, how did **feel** about the coyote awareness program? *(For **each statement**, circle the number that best represents your response.)*

	Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Extremely	
Unsatisfied	1	2	3	4	5	6	7	Satisfied
Boring	1	2	3	4	5	6	7	Fun
Not Engaging	1	2	3	4	5	6	7	Engaging
otInformative	1	2	3	4	5	6	7	Informative

2. To what extent do you **disagree or agree** with **each** of the following? *(For **each statement**, circle the number that best represents your response.)*

I know how to …	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
… minimize coyote attractants in my yard.	1	2	3	4	5	6	7
… hike or walk safely in areas where coyotes live.	1	2	3	4	5	6	7
… protect myself if I come across a coyote.	1	2	3	4	5	6	7

3. The Nova Scotia Department of Natural Resources uses 'BAM' to help people to remember what to do in case they encounter a coyote. What does each letter mean?

B _____

A _____

M _____

4. Out of all the things you learned today, will you change any personal behaviours to minimize the chances of interacting with a coyote? ❏ Yes *(Go to Question #5)*   ❏ No *(Go to Question #6)*

5. What behaviour will you change?

_____

_____

_____

6. In general, do you *think* of coyotes as: *(For **each statement**, circle the number that best represents your response.)*

	Extremely	Moderately	Slightly	Neither	Slightly	Moderately	Extremely	
Bad	1	2	3	4	5	6	7	Good
Harmful	1	2	3	4	5	6	7	Beneficial
Negative	1	2	3	4	5	6	7	Positive

7. Imagine you are outside:
  a. Given that coyotes are present, how do you *feel* about *each* of the following? *(For **each statement**, circle the number that best represents your response.)*

I fear for …	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	
... my own personal health or safety.	1	2	3	4	5	6	7	
... my children's health or safety.	1	2	3	4	5	6	7	n/a
... my pet's health or safety.	1	2	3	4	5	6	7	n/a

  b. What is the *likelihood* of the following events occurring to you? *(For **each statement**, circle the number that best represents your response.)*

	Extremely Unlikely	Moderately Unlikely	Slightly Unlikely	Neither	Slightly Likely	Moderately Likely	Extremely Likely
Seeing a coyote in my yard.	1	2	3	4	5	6	7
Being approached by a coyote in my yard.	1	2	3	4	5	6	7
Being approached by a coyote, snarling in my yard.	1	2	3	4	5	6	7
Seeing a coyote in the park.	1	2	3	4	5	6	7
Being approached by a coyote in the park.	1	2	3	4	5	6	7
Being approached by a coyote, snarling in the park.	1	2	3	4	5	6	7
Being attacked by a coyote in the park.	1	2	3	4	5	6	7

c. How much *control* do you feel you have at preventing the following from occurring to you? *(For **each** statement, circle the number that best represents your response.)*

	No Control	Almost No Control	Nearly No Control	Neither	Some Control	Almost In Control	Complete Control
Seeing a coyote.	1	2	3	4	5	6	7
Being approached by a coyote in my yard.	1	2	3	4	5	6	7
Being approached by a coyote, snarling in my yard.	1	2	3	4	5	6	7
Seeing a coyote in the park.	1	2	3	4	5	6	7
Being approached by a coyote in the park.	1	2	3	4	5	6	7
Being approached by a coyote, snarling, in the park.	1	2	3	4	5	6	7
Being attacked by a coyote in the park.	1	2	3	4	5	6	7

8. Would you recommend this coyote awareness program to a friend or family member?   ❏ Yes   ❏ No

9. What things will you take away from the coyote awareness program?

_____

_____

_____

10. What aspects of the program could be removed or changed?

_____

_____

_____

We may want to contact you with a few follow up questions in the following months. Would you be willing to participate in a short online questionnaire?

If yes, what is your email address?

Email: _____

Thank you for participating.