HUMAN DIMENSIONS OF BLACK BEARS, CARIBOU AND COYOTES ON THE ISLAND PORTION OF NEWFOUNDLAND AND LABRADOR

MAGGIE SUTHERLAND

Human Dimensions of Black Bears, Caribou and Coyotes on the Island Portion of Newfoundland and Labrador

By Maggie Sutherland

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Abstract

The overall purpose of this human dimension in wildlife management study is to understand the attitudes of the urban and rural general public toward black bears, caribou, and coyotes on the island portion of Newfoundland and Labrador. Data was collected through a mail-out questionnaire to a representative sample of rural (n=396) and urban (n-390) residents. Attitudes toward caribou were the most positive and attitudes toward black bears were relatively positive. Residents held negative attitudes toward coyotes with many expressing no future generation or existence values for the animal. These negative attitudes were linked to fear and perceptions of impact coyotes have on caribou, small game and livestock. Differences in strength of attitudes did exist between rural and urban residents. This research documents the challenges wildlife managers face when setting policy actions regarding predators and provides an example of managing along the conflict-coexistence continuum.

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Contents

List of Tables

List of Figures

List of Appendices

Chapter 1: Introduction

In geography there has been a long tradition of exploring human-environment relationships (Pattison, 1964). Resource geographers have explored topics dealing with environmental perception, values, human impact and the nature of public involvement in a variety of resource management decision-making situations (Saarinen et al., 1984; Tuan, 1990; White and Kates, 1993). Historically values and behaviours have been identified as an important part of wildlife management (Decker, 2001). More recently resource geographers have been applying their skills of understanding how attitudes and values vary over space in wildlife management issues (Bath, 1998; Bath et al. 2008). The emergence of a scientific field to address these issues is often the response to what has been recognized as culturally important (Livingstone, 1993).

The field of human dimensions emerged to fulfill the needs of the evolving wildlife management philosophy and demands by society. Interactions with wildlife are often perceived differently by various interest groups, the general public and whether residents are urban or rural (Bath and Enck, 2003). Understanding people's perception of wildlife interactions and how they prefer the wildlife to be managed is essential for successful management (Decker et al., 2001). When a human-wildlife conflict is perceived it is important to begin resolution with a baseline assessment of attitudes concerning the species. Human dimension of wildlife management is a field of inquiry that "focuses on the public's knowledge levels, expectations, attitudes and activities concerning fish and wildlife resources and associated habitats. There is a close tie between human dimensions and conservation education research" (Adams, 1988).

Geographers, with their long tradition of studying environmental perceptions are able to study human-wildlife relationships and provide resource managers with a better understanding of the social and cultural dynamics within a spatial context.

As human populations continue to expand further onto the natural landscape, human-wildlife interactions increase (Whittaker et al., 2005; Woodroffe et al., 2005; Carlos et al., 2009). This can create conflict between the species who are losing their habitat and humans that are living in, or using the resources in this area. Rural residents are often the people most affected and those who can most affect the successful management of these species as they share the same space and resources (Heberlein and Ericsson, 2005).

Since the mid 1990's caribou populations have been declining on the island portion of Newfoundland. In addition the island has seen the arrival of a new carnivore, the coyote (Department of Environment and Conservation, 2006). The extinction of wolves in the early 20th century coincided with the caribou decline although it is not clear if the decline of the wolf is from hunting, trapping or government bounties. This left the caribou in a unique ecosystem in Newfoundland where coyotes are present and wolves are not. Increased news coverage in 2008 and 2009 concerning the negative impacts caused by coyotes such as sheep depredation, threats to outfitters and a 15.3 million dollar commitment by the provincial government to develop a five year strategy to address the caribou decline has sparked public debate. In order to deal with a complex wildlife management situation such as the caribou- predator issue on the island of Newfoundland, it is important not only to understand the species biologically but to understand the human

dimensions. Perceptions of caribou and two of its major predators the black bear and coyote may not reflect what the biological research suggests. For example, the attitudes toward coyotes may be characterized much in the same way as the feelings, myths and folklore of the Newfoundland wolf. Managing wildlife is often more about managing the people and decisions may be difficult to implement and ineffective in the long term without support.

Integrating people and social science into wildlife management remains relatively new in the field of natural resource management and has had limited application in Newfoundland and Labrador. The "Green Paper" in the mid 1980's was one of the first initiatives to involve the public in wildlife management issues and it helped form many of the policies and regulations that are in place within the province today (Minty and Oosenbrug, 1986). The Department of Environment and Conservation in Newfoundland has recognized the importance of listening to public attitudes for resolving complex human-wildlife conflicts.

The overall purpose of this human dimension study is to better understand the attitudes of the urban and rural general public toward three species (i.e., black bears, caribou, and coyotes) on the island portion of Newfoundland and Labrador. This project has an applied focus such that the purpose for obtaining attitudes of the urban and rural general public is to identify areas of support and opposition toward various management options. A baseline assessment of attitudes helps to identify weaknesses in knowledge, credibility issues and areas of support or opposition toward management options (Treves

et al., 2006). It will allow managers to monitor attitude change as the species populations fluctuate and different policies are implemented over time (Decker et al., 2001).

For the purpose of this study attitudes were defined as made up of three components: affective (i.e., liking or disliking of the species), cognitive (i.e., beliefs about the species that may or may not be true) and behavioural intention (how people say they will behave in a certain situation and their intention to support or oppose certain management options related to the species) (Fishbein and Ajzen, 1975). Identifying attitudes toward black bears, caribou and coyotes is the first step toward conflict resolution as it allows for an understanding of the nature of the conflict within wildlife management (McCleery et al., 2006). By listening to local residents different types of conflict can be addressed when management decisions are made (Mitchell, 1991).

Within the field of human dimensions there has always been an emphasis on research involving large carnivores (Kellert, 1985; Bath 1989; Treves and Karanth, 2003). Conflict with carnivores in particular seems greater than ever as a result of both habitat destruction and recovery programs. This conflict is pronounced because carnivores have such a large range and compete with humans for space and resources. (Linnell, 2002). Researchers, however, have usually focused on understanding a single species such as wolves (Bath and Majic 2000; Williams et al., 2002,) or bears (Kellert, 1994; Kaczensky et al. 2004), and human dimension research on large herbivores (other than deer) is particularly uncommon (Decker et al., 2010). Along with being the first human dimension study on black bears, caribou and coyotes in Newfoundland, this master's research is

unique because it compares attitudes toward three species at the same time; two of the species are carnivores (black bears and coyotes) and the other is a herbivore (caribou).

Within the human dimension field, few studies have focused on having urban and rural residents attitudes toward multiple species at the same time (Messmer, 2000; Heberlein and Ericsson, 2005). Understanding factors affecting rural resident attitudes toward species is becoming increasingly important as wildlife species often exist in such rural landscapes and their survival depends on the support of the rural population. Newfoundland and Labrador is considered a rural province and decision making has always received much attention from the rural communities as there is a significant interest in rural support. Likewise understanding urban attitudes is important as these areas continue to expand and the potential for more human-wildlife interactions increases. Urban sprawl and increased development may not be a major issue in Newfoundland but it is the urban populations' access of these areas which is causing potential human wildlife interactions. The attitude of the urban portion of the public and their impact on the natural landscape is different from those which have traditionally used the land.

Specifically this research project will answer:

- What are the attitudes (specifically the affective component) toward each species and toward various management options regarding each species?
- What are the differences in the attitudes among and between the urban and rural residents across the three species?

By answering these questions, it will be possible to explore why residents feel the way that they do about black bears, caribou and coyotes and various management options regarding the species. While, attitudes toward coyotes may be negative, due to the nature of public opinions found throughout the media it will be important to determine what is influencing these perceptions such as demographics, fear, experience and how this compares to attitudes toward black bears and caribou. This information can provide direction for future management actions that could be targeted to influence the current perceptions. The research will help understand the key messages that may need to be conveyed to the public and the best way to provide recommendations to direct policy application and any future communication and public awareness efforts.

This is the first human dimension study in the province on black bears, caribou and coyotes it will provide decision makers with insight on how people feel toward the species and their management. The research provides an opportunity to demonstrate to wildlife agencies the importance of understanding the people component and how such information can inform wildlife management decision-making. Human dimension research is an integral part of wildlife management and while this research can be considered a one-shot case study the strength of such projects is to move to longitudinal monitoring of the attitudes and beliefs and continue building human dimensions into the planning process. At this stage the rural and urban general public has had the opportunity to become engaged. This research is the beginning of potentially a more active engagement by the provincial wildlife managers with Newfoundland and Labrador residents. As the status of the wildlife populations change in the future, (for example

caribou continue to decline; coyotes and black bears continue to increase), and the rural-urban character of the province alters, it will be interesting to explore whether attitudes change from tolerance toward coexistence.

Chapter 2: Literature Review

2.1 An Introduction to Human Dimensions

Human dimension research has influenced wildlife management. From the development of the field to the expansion of its application from North America to Europe, it is rooted in the relationship humans have with wildlife, whether through hunting or wildlife viewing. The field of human dimensions (HD) of wildlife management emerged to better understand the interaction between people and wildlife (Decker et al., 2001). Research has focused largely on managing human-wildlife conflicts with specific species, particularly large carnivores. There are few human dimension studies that involve large carnivores or herbivores at the same time. Understanding human wildlife interactions are complex and conflict is not necessarily connected to only one wildlife species. By understanding the relationship between carnivores, herbivores and people, human dimensions of wildlife management can contribute toward co-existence on the natural landscape.

Early wildlife management issues were defined predominately from a biophysical standpoint where managers trained as biologists made the decisions (Manfredo et al., 1998). Conservation leaders such as Gifford Pinchot and Aldo Leopold contributed significantly to the utilitarian methods that dominated early wildlife management (Decker et al., 2001). The earliest use of human dimensions began in the 1940s when King (1948) recognized the need for understanding how the public felt about wildlife conservation issues. In the 1950s there was a movement away from consumptive wildlife use (Manfredo et al., 2009). Aldo Leopold, ("the father of wildlife management") changed

from his earlier biological focus and said that the problem of game management was not how we should manage wildlife but how we should handle the people (Flader, 1974). Wildlife management began to broaden from a species perspective to habitat and eventually to people (Bath, 1998). Public interest in wildlife has expanded over time as non-consumptive forms of wildlife recreation have become increasingly common.

Manfredo (1989) and Bath (1998) summarize the evolution of the human dimensions field. The field really began to develop in the 1960s and through the 1970's research themes included wildlife related recreation, hunter satisfaction, urban wildlife, economic studies, non-consumptive wildlife, large carnivores and the future of human dimensions. Wildlife management became increasingly complex in the 1990s, as human populations continued to increase, species began declining more rapidly and urban wildlife interactions became more common. Bath (1998) summarizes research themes shifting away from hunting toward defining the field, funding non-game programs, future direction, challenges and needs of future research. The combination of an increase in regulations and the number of people demanding to be involved in wildlife issues has made management that much more challenging (Decker et al., 2001). As a research field, human dimensions provides information to wildlife managers so they can make more effective decisions through integrating how people feel and behave toward wildlife Decker and Chase, 1997). Human dimensions research can provide valuable inputs to assist in minimizing conflicts as wildlife and humans share the same landscape. In order to maintain ecosystem diversity wildlife managers need to recognize people as an integral component for sustaining wildlife (Manfredo et al., 2009). However, it is not only

recognizing the need for public involvement it is also obtaining objective human dimension information and using that along with the biological to inform decision making and avoid making assumptions concerning public attitudes.

For the long term effectiveness of wildlife management it is important to emphasize to managers that considering the social perspective is necessary. Manfredo et al. (1998) identified four reasons why human dimensions is important for wildlife management. The first is that human dimensions aids in addressing the interests of the entire public where traditionally decision making was only between hunters or anglers and wildlife professionals. In certain situations it can be more effective to target specific interest groups since they may have more knowledge and experience concerning the issues and be more connected to success of management strategies (Manfredo, 2009). Another is that since human dimensions considers public attitudes and values management reflects the interests of the people that are most affected facilitating effective decision-making. A third reason is that human dimensions is able to predict certain types of behaviour, which is useful when deciding upon management in the future.

In the field of human dimensions, an area of debate surrounds whether or not attitudes can actually predict behaviour. Many social science theories (Festinger, 1957, Fishbein and Ajzen, 1975, Fazio 1986, Fulton et al., 1996, Prislin, 1996, Verplanken et al., 1998, Manfredo, 2008) have been developed concerning attitudes and behaviour but often human dimensions studies do not make use of these frameworks and are criticized because of the assumptions they make, which decrease their validity (McCleery et al., 2006). For example, the theory of reasoned action is commonly used as the theoretical

context for understanding belief-attitude-behavioural and intention-behaviour relationships (Fishbein and Ajzen, 1975). Finally, the importance of human dimensions is to develop ways that influence behaviours from which wildlife management problems arise. Therefore, if the behaviour can be targeted the most desirable management objective can be reached. By using human dimensions, wildlife management will be more effective since the public attitudes, values and beliefs are included in the decision making process (Purdy and Decker, 1989; Manfredo et al., 1998, Riley et al., 2002).

2.2 Theoretical Context

Human dimension research demonstrates that how people value wildlife is shaped by their perceptions of human wildlife interactions which influence how they prefer the wildlife to be managed. (Decker et al., 2001). In order to understand the context of attitudes, one must first understand values (Fulton et al., 1996). A value is "an enduring belief that a specific mode of conduct or end state of existence is personally or socially preferable to an opposite or converse mode of conduct or end state of existence" (Rokeach, 1973). The characteristics of values suggest that they belong to a "hierarchy of cognitions" that help form behaviour through influencing attitudes. Values are part of cultural learning as they are developed carefully over time (Manfredo, 2008). Once established, value orientations are difficult to change and they are expressed through basic beliefs toward an object such as wildlife (Vaske and Donnelly, 1999). For example, if a portion of the public has protectionist values then they may be unwilling to accept lethal control as a management option. Therefore education or any other attempt to gain support in this area will most likely be ineffective (Vaske and Needham, 2007).

Fishbein and Ajzen (1975) describe attitudes as a favourable or unfavourable evaluation of an object. Attitudes are made up of three components: affective (i.e., liking or disliking of the species), cognitive (i.e., beliefs about the species) and behavioural intention (how people say they will behave in a certain situation and their intention to support or oppose certain management options) (Fishbein and Ajzen, 1975; Eagly and Chaiken, 1993). In the 1980s as theoretical research in human dimensions increased it was recognized that theory is an important part of understanding attitudes (Fulton et al., 1996; Manfredo et al., 1998). Kellert (1985) began working on understanding American attitudes toward wildlife and developing a typology of attitudes. The typology of attitudes is a cognitive theory that was created to understand perceptions defining utilitarian, negativistic, naturalistic and ecological attitudes that varied over space. People in urban areas held more aesthetic views and were emotionally positive toward animals while rural areas had utilitarian attitudes, were emotionally detached and had less protectionist attitudes (Kellert, 1985). Vaske and Needham (2007) found a similar pattern, where residents in the urban area of Denver, Colorado had protectionist wildlife attitudes toward coyotes. Emotions strongly influence attitudes toward animals, therefore by studying emotional experiences with animals our understanding of the relationship with animals can be improved (Jacobs, 2009). Attitudes are different from values in several ways. Attitudes emerge from certain cognitions and thoughts and while an individual may have many attitudes they have only a few value orientations (ex. Protection-use, biocentric-anthropocentric). For example, the value orientation may be toward all wildlife whereas the attitude may be more specific, such as how one might feel about coyotes (Vaske and

Needham, 2007). In order to increase the validity of human dimension research it is important to connect the research results to attitude theories (Manfredo, 2008).

A baseline assessment of attitudes can also help to identify weaknesses in knowledge, credibility issues and areas of support or opposition toward management options (Treves et al., 2006); therefore when management decisions are made, different types of conflict can be addressed based on the understanding of attitudes (Krueger & Mitchell, 1977). Mitchell (2004) proposes that there are four types of conflict: cognitive (from different understandings of a situation), values (from differences in how things should happen), interests (from differences concerning benefits and costs), behavioural (from personality of individuals and the situation such as personal history). While the different types of conflict are separated they do not necessarily happen as one or the other, for any conflict could include several different types. Therefore, being aware of these is important for solving them effectively. Through the integration of local knowledge and scientific information it will aid in conflict resolution and conservation efforts will be more effective (Mitchell, 2004).

Wildlife managers need to avoid making assumptions about perceptions so they do not ineffectively manage the human-wildlife interaction. While there is an overarching shift toward valuing the natural ecosystem, wildlife managers still face incredible challenges with conflicting interests (Bath and Enck, 2003). Human dimension research can aid in making decisions that increase tolerance and in doing so improve acceptance of 'conservation efforts' so that the conflict is reduced and the decision is more sustainable in the long-term (Treves et al., 2006). Conflict resolution and effective conservation can

be achieved through incorporating the biological information and considering the diverse values of those connected to the human-wildlife conflict (Decker et al., 2001; Scwartz et al., 2003).

2.3 Human-Wildlife Conflict

Human-wildlife conflict is a significant conservation challenge as the "fate of many wildlife populations depends on their capacity to coexist with humans" (Treves et al., 2006). In the past, the response to a human wildlife conflict has been to kill the species and destroy their habitat (Manfredo, 2008). How a person is affected in the human-wildlife conflict is related to how they view the particular wildlife as conflict arises from differences in values (Messmer, 2000). The movement toward non-utilitarian values has turned human-wildlife conflict into one between people and wildlife to one between people and institutions. For example, local residents can feel resentment towards conservation initiatives or be negative toward managers due to impacts caused from wildlife and resist management options that do not impose a form of control (Treves et al., 2006). This occurred in Yellowstone National Park when the reintroduction of wolves was met with considerable resistance from local livestock owners who felt the wolves threatened their livelihoods. The restoration effort was a power struggle between the federal and state government (Bath and Buchanan, 1989).

The reasons for human wildlife conflict are complex and an understanding of the development, fluctuation and ecology of human-wildlife conflicts provides valuable insights toward conflict resolution (Messmer, 2000). It is becoming increasingly important to understand how perceptions influence human wildlife conflict and the

acceptance of research results and management actions (Treves et al., 2006). Bath and Enck (2003) describe a four dimensional framework to help understand human-wildlife conflicts. One dimension is perspective, which is the impact of the interaction from the perspective of the human or wildlife. For example, a certain portion of the general public may not support lethal coyote control; however, a sheep farmer may view this as the only way to protect his livelihood. Another is motivation, which is the intentional or unintentional cause of the interaction from the perspective of the human or wildlife. For example, someone may go into the woods hunting caribou and intentionally seek out the animal, or someone may be berry-picking and see a coyote walk across their path. The third way to aid in understanding wildlife conflicts is in terms of the direct and indirect effects of different types of interactions. A direct interaction can occur from visual or physical contact with wildlife, such as seeing a black bear while hiking in the woods, and an indirect can occur from human use of the landscape such as forestry practices altering foraging grounds of caribou. The fourth dimension is impact, which from the perspective of humans or wildlife can be desirable or undesirable. This dimension is complex because an individual's perception influences how an interaction will impact them which is a determinant of their attitudes and the subsequent behaviour. For example, to some people a decline in caribou populations is of no interest to them and caribou numbers have no impact upon them. However for an outfitter who depends on this species for their business the status of caribou is very important if they want to make a living from that occupation.

In order to manage human-wildlife conflicts, baseline research is necessary to study the location, time, and behaviour surrounding a conflict. Through this preliminary research perceptions of the conflict can be measured and objectives can be developed through participatory planning to determine the acceptability and sustainability of the proposed management actions (Treves et al., 2006). If a conflict is not appropriately handled, the public may resent and reject that decision. This in turn can influence the trust and credibility they may have in the management agency, reducing the effectiveness and future of the project (Messmer, 2000; Vaske et al., 2007). By monitoring the conflict it can aid in determining the effectiveness of the implemented project and lead toward a more successful outcome (Treves et al., 2006). It is important to monitor the conflict over time as attitudes change along with the species population.

Research on large carnivores has always been a common theme within human dimensions. The relationship with carnivores has been formed by three different interactions between humans and the land: hunting, shepherding and agriculture. In each situation carnivores were the competition, and impacted those who depended upon this for their livelihoods (Schwartz et al., 2003). Large carnivores were removed from most of their former range throughout Europe and North America through bounties, habitat destruction and the elimination of prey (Boitani, 1995). However, values toward carnivores are changing, most notably in the last two decades, away from utilitarian attitudes of carnivore control toward conservation and management (Majic and Bath, 2010).

As attitudes change over time and vary between species it is important for interpretation to understand underlying factors that influence attitudes. Perception of impacts is one factor that influences attitudes toward carnivores. Other predictors of attitudes include age, gender, education, profession and whether you are a rural or urban resident (Williams et al., 2002). It is often expected that an increase in knowledge has a direct relationship with positive attitudes. However, with large carnivores this is not necessarily the case as fear can also influence attitudes (Kaczensky et al., 2004). Regardless of one's knowledge positive attitudes can be negatively influenced by fear. One of the reasons for human-wildlife conflict is fear of being attacked. While the focus of human-wildlife attacks is on cats, bears and wolves there is in fact as many deaths by large herbivores worldwide as large carnivores (e.g., elephants in India, hippos in Africa) (Woodroffe et al., 2005). While certain animal attacks may not be relevant at a local scale (i.e. where hippos are not an issue); it is important to keep in mind that risk and fear may not always be in proportion to one another. Indeed perception of risk increases fear toward a species (Agee & Miller, 2009; Siemer et al., 2009). By addressing a particular fear through education efforts it may alter previous knowledge by eliminating the fear and therefore making the attitude toward the carnivore more positive. In this situation it is important to target the portion of the population that is most afraid. For example, older people, males, people with lower education level, people working in natural resource dependent professions and people living in rural areas are often more negative toward carnivores than those that are younger, female, and from urban areas (Teel et al., 2002; Williams et al., 2002; Kaczensky et al., 2004).

In areas with a small population of large carnivores lethal control may not be an option. Therefore employing several different methods of nonlethal modification such as changing human behaviour or lethal control targeted to individual animals may be most effective. Changing the behaviour of a carnivore can be accomplished in several ways including observation and self reporting. Observation measures changes in behaviour directly. For example, one can reduce a human-bear conflict by having proper trash containers. In self reporting the change in behaviour is obtained through interviews or questionnaires, and human dimension information gathered thrugh wildlife managers working withsocial social scientists (Baruch-Mordo et al., 2009). Changing behaviour can involve killing the individual animal, sterilizing or relocating it. These methods can be effective if they are highly selective, however there is often a strong public opposition to lethal control and relocated animals may return to the area (Treves and Karanth, 2003). Moving a carnivore is a non-lethal method which can be effective if the animal is taken far enough away, but their needs to be public support for this decision; it also requires considerable funds and the success depends largely on the particular carnivore (Linell et al., 2002). Aversive conditioning is another non-lethal method which attempts to deter the animal from an area or important human resource. However, the effectiveness of chemicals, sound or light is limited as it can impact species that were not supposed to be targeted and have unpredictable consequences. Other methods include interventions which are changes to traditional human-livestock behaviour. For example, donkeys, llamas and livestock guarding dogs can repel coyotes but not necessarily other carnivores. However, this is not always possible in certain rural or developing areas (Treves and

Karanth, 2003). Technological fixes such as electric fences used throughout the world or dense, thorny bushes around small villages in Kenya are additional examples of minimizing or eliminating the conflict. Methods of control must be based upon biological and social scientific information instead of perceptions of local fear and intolerance (Treves and Karanth, 2003). Each human-wildlife conflict is unique depending on the place, although they most commonly occur in the urban-rural interface. The success of human dimensions research is improved through understanding the human landscape.

2.4 Rural and Urban Wildlife Management

Continued development and competition for space has caused human-wildlife conflicts to increase as the space between city and wilderness becomes less distinctive. Changing patterns of wildlife populations increase interaction especially in urban settings. The urban and rural populations hold distinct values and attitudes towards wildlife that varies across regions. Therefore, by understanding the urban and rural portions of the public, effective wildlife management decisions can be made based on the unique characteristics of these two categories of the population.

Coexistence of carnivores with humans is challenging for management, especially in areas where the traditional wildlife habitat has become restricted (Woodroffe et al., 2005). Increasingly, raccoons get into garbage, crocodiles appear in pools and coyotes live in cities. Rural residents are those who may be most impacted by wildlife conflicts as they often depend on the land or livestock which use the land for their livelihood (Heberlein and Ericsson, 2005). Landscape characteristics and local landowner practices on residential property are important in influencing wildlife interactions (Kretser et al.,

2009). In the United States and Canada, a large portion of the rural landscape is privately owned; therefore wildlife populations are largely dependent on how that land is used. Landowner perceptions and experience of wildlife damage (e.g. crop damage from ungulates, livestock losses from predator) influences their attitudes toward wildlife management. Tolerance is closely related to their familiarity with the economic threat, and since wildlife can cause damages to their livestock or crops, it influences their livelihood and source of income (Messmer, 2000; Decker, 2001). However, tolerance can be developed through incentives (which are often economic), which can help toward increasing a person's value toward wildlife (Messmer, 2000; Woodroffe et al., 2005).

Traditional forms of wildlife management have changed to adapt to the increasingly urban human population that has resulted in increased wildlife interaction. This is due to the different demographic and value orientations of the diverse portion of the public that wants to be part of the wildlife decision making process (Vaske and Needham, 2007). The shift is caused not only by rural residents moving to the urban areas but also urban residents moving to rural areas which create a new dynamic within the traditional rural landscape. The rural residents are different from the urban in that they have both a greater appreciation for wildlife and a more utilitarian attitude toward wildlife than the newer residents (Heberlein and Ericsson, 2005). While most people highly value the existence of wildlife, rural residents in particular may express this view more strongly (Messmer, 2000).

As urban expansion continues, human-wildlife conflict will increase among those who have little previous experience or interaction with wildlife because perceptions are

influenced by the surrounding environment. Research has also shown that people from an urban background tend to view wildlife more favourably, and that urban residents also tend to be more opposed than rural residents to predator management practices (Teel et al., 2002). In contrast, if someone lives in or near a bear habitat then they may be more positive about interactions with bears, a perception related to their increased experience with bears. To minimize conflict it will be important to shift attitudes from wildlife concern to wildlife tolerance and enjoyment. This can be done through encouraging appropriate behaviour and limiting interaction before they are perceived as negative (Messmer, 2000; Kretser et al., 2009).

2.5 Black Bears, Caribou and Coyotes

Understanding the unique human-wildlife conflict depending on the landscape one is within (i.e. urban or rural) can aid in the management of a particular species. Studies of predator-prey relationships are becoming more important for managing complex interactions and understanding the impacts from destruction of the natural environment (Schwartz et al., 2003). Human dimensions research on herbivores in general is limited, with the exception of a few studies (Scwartz, 2003; Hurley et al., 2009; Decker et al., 2001). On the other hand, human dimensions research on carnivores is extensive (Messmer, 2000; Woodroffe, 2000; Williams et al., 2002; Treves and Karanth, 2003; Carlos et al., 2009, Majic and Bath, 2010).

2.5.1 Caribou

Few studies have been carried out on the human dimensions associated with caribou. Research in Northern Europe has focused on reindeer, such as in Norway (Gjernes, 2008) and Sweden (Widmark, 2006); however, these represent the local conflict and the issues may not necessarily resemble those surrounding caribou. While it has been rare to compare predator and prey in the same study, in Alaska a study was recently completed on resident attitudes concerning wolves, grizzly bears, caribou and moose. The study focused on support and opposition toward management scenarios. For example, hunters were concerned that wolves and grizzly bears need stricter management to restore moose and caribou populations. However, a value conflict was identified between those who oppose predator control and those who wish predators reduced and this made setting wildlife policy a challenge (Decker et al., 2006).

The studies that have been done on caribou tend to have an applied focus, which is most likely driven by the decline of caribou populations around the world. There are several examples of decreasing herds within Canada. The Beverly caribou herd in the Northwest Territories (NWT) is very small, although its numbers are not known (Beverly and Qamanirjuaq Caribou Management Board, 2010). The Beverly and Qumanirjuaq caribou management board (BQCMB) is an aboriginal-led co-management board of hunters, biologists, land and wildlife managers that has advised governments and communities since 1982 on conservation of the Beverly and Qamanirjuaq barren-ground caribou herds of northern Canada (Beverly and Qamanirjuaq Caribou Management Board, 2010). In 2009, the BQCMB identified several ways to help the declining

populations of caribou including the need for governments to protect areas that are important to caribou such as the calving grounds and protect the caribou from habitat loss due to the recent increase in mineral exploration (Soubliere, 2009).

Surveys done from 2007-2009 in the Northwest Territories reveal that there are less animals in the June calving season than before (Beverly & Qamanirjuaq Caribou Management Board, 2010). It is expected that the cause of this is due to a combination of natural and human influences. A recent workshop occurred in Saskatoon in February, 2010 and comprised of 75 elders, hunters and others from Saskatchewan, NWT, Manitoba, Nunavut, Alberta, Yukon, British Columbia and Ontario. The purpose was to begin the first steps toward ensuring that the caribou population exists into the future through sharing knowledge about caribou (Beverly & Qamanirjuaq Caribou Management Board, 2010).

Elsewhere in Canada caribou populations are also decreasing. In Ontario populations have declined 50% since the mid-1800s and the cause may be related to human activity (forestry, habitat fragmentation, and over-hunting), disease and predation. The population is labelled as threatened by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) (Ontario Woodland Caribou Recovery Team, 2008). As part of the initiative the recovery strategy and the science panel has committed to involving Ontarians as they recognize this component is necessary for effective conservation and recovery (Ministry of Natural Resources, 2008). The feedback received through a questionnaire, stakeholder session, advice provided in the Caribou Recovery Strategy and by the Woodland Caribou Science Review Panel was considered when the

draft Caribou Conservation Plan was developed (Government of Ontario, 2010). Such efforts are an example of human dimensions as an applied facilitated workshop approach where key issues are addressed through groups working together toward solutions.

In Newfoundland and Labrador caribou herds are also on the decline (Mahoney and Weir, 2009). Similar discussions as those taking place in the Northwest Territories, Ontario and Alaska are occurring regarding reasons for the decline. There has not been a human dimension study on caribou within the province until this study.

2.5.2 Black Bears

In contrast to caribou, considerable human dimensions research has been conducted on black bears as a first step toward an applied approach of integrated workshops and management planning (Teel et al., 2002; Agee and Miller, 2009; Carlos et al, 2009). In the United States, human-bear conflict is becoming increasingly common as the urban-rural interface becomes more blurred. Much of the research focuses upon determining the location of the human-wildlife interactions and how it will be perceived. This is where social science information becomes important to aid in understanding the interaction, whether it is perceived positively or negatively and the strength of the perceptions (Kretser et al., 2009).

Some residents perceive bears as a threat to humans and pets, others believe that bears are a nuisance, and there are those residents willing to tolerate and even enjoy seeing bears. There are several factors influencing perceptions toward bears. Positive perceptions of bears were related to higher levels of education and more knowledge about

the species (Kretser et al., 2009). Perceptions of carnivores (including black bears) were more negative for people who were older, female, worked in natural resources extractive industries, or lived in rural areas (Agee and Miller, 2009; Kretser et al., 2009). In contrast, other research has found males to be more negative (Teel et al., 2002, Williams et al. 2002). People that held a "strong positive attitude towards bears would likely: support actions favourable to bears, tolerate bear damage and maintain their position in case of conflict" (Kaczensky et al., 2004). Experiences with a bear causing damage or approaching a family member, along with attitudes expressing concern about wildlife in general, were the most closely related to determining perceptions and predicting interactions with black bears as negative (Kretser et al., 2009).

Wildlife managers have a limited number of options of control to deal with human-bear problems. One strategy is to capture and relocate the bears to less populated areas. Another is lethal control, which often occurs when no other option is available but, it commonly results in negative public opinion toward the state wildlife officials or agencies. For more severe situations there are higher levels of support for more intensive agency action (Agee & Miller, 2009; Carlos et al., 2009). A high perception of risk from bears was associated with acceptance of lethal control. This suggests that information, educational approaches about bear behaviour and methods to reduce bear contact or damage may be successful in mediating the negative attitudes (Agee & Miller, 2009; Siemer et al., 2009). For example, acceptance of trapping and relocating bears is influenced by existing value orientations, and knowing this may help explain the negative public reaction in situations where a bear was destroyed when there was no threat

apparent. In a certain situation, the public may not understand the need for trapping and relocating a bear and this will require an effort by managers to inform the public on the practicality of relocation instead of lethal control (Agee & Miller, 2009). To avoid the direct lethal control, trapping or relocation adaptation and co-existence can be an alternative. For example, the British Columbia Ministry of Environment created the "Bear Smart Community Program" to address bear conflicts. The program aims to reduce risk of human safety and the number of bears killed. There is a set of criteria which a community must implement in order to be recognized as "bear smart" such as creating a conflict management plan, education programs and a bear-proof solid waste system. In Whistler, there are approximately 100 bears living among 10,000 residents and 1, 000,000 annual tourists and the community is working toward becoming "bear smart" (Resort Municipality of Whistler, 2010).

Human-bear conflict in urban areas will likely remain a significant wildlife management priority in the future as human development continues across the wide distribution of black bears in North America. By understanding attitudes of those living within the proximity of bears it can help managers explore the potential implications of their actions and avoid conflict (Carlos et al., 2009). Residents in urban areas where black bears are present represent a large group of interests with a diverse set of values which make finding publicly accepted solutions a challenge.

In Newfoundland, human wildlife conflict with black bears is minimal however, it will be important to monitor attitudes as populations change in the future. For example, if the black bear population increases it may cause increased human-wildlife interactions

with campers and other recreationalists. Monitoring attitudes when perception of conflict is low also provides a base to guide future research and direct wildlife management.

2.5.3 Coyotes

Human dimensions research on coyotes is extensive throughout the United States and Canada (Kellert, 1985a; Fox, 2006; Vaske and Needham, 2007; Hudenko et al., 2008; White and Gehrt, 2009). The applied component of human dimensions is also present in these regions as they incorporate the research findings to work toward reducing the human-wildlife conflict. As wolves were eradicated throughout much of the continental United States and parts of Canada, it enabled coyotes to expand their range (Department of Environment and Conservation, 2006). As the landscape became increasingly urbanized coyotes adapted to this new environment and today coyotes have lived for generations in urban and suburban areas (Fox, 2006). Coyote sightings in residential areas can increase risk perception. Since coyotes live in close proximity to humans the human-wildlife interactions perceived as conflicts are increased. Attacks on pets are often reported by the media which increases risk perception and negative attitudes toward coyotes (White and Gehrt, 2009).

In response to the concern regarding human interaction with coyotes management options to control the species is usually suggested by wildlife managers. However, an individual's response to human-wildlife interactions with coyotes can be considerably different depending on the proposed management option (e.g. killing or relocating), the context (e.g. if it killed a pet or it was seen in the area), and location (e.g.it was seen in a neighbourhood or the wilderness) (Vaske, Needham, 2007). Kellert found that people

who had positive attitudes toward coyotes also liked animals in general and were concerned about wildlife protection and conservation. The general public across the United States did not like coyotes or approve of lethal methods of coyote control. Livestock owners in particular had negative attitudes toward coyotes and supported reduction using poison (Kellert, 1985a). On Prince Edward Island experience seeing a coyote decreased the acceptance of lethal control and those that were older, male, hunters and had impacts caused by coyotes were in favour of lethal control. For coyote management in this region the most accepted control technique was selected removal and wildlife managers were required to justify the reason for this choice of control to ensure it was publicly accepted (Martinez-Espineira, 2006).

It is important when conducting human dimensions research to understand the methods which are publicly accepted, instead of those that are effective biologically. For example, leg-hold trapping is one of the most effective methods to modify behaviour of coyotes and is used in Los Angeles County. Trapping can correct the problem of coyotes attacking pets and people and has been observed to put fear of humans in coyotes(Baker and Timm, 1998). While shooting may be the most effective method for encouraging a coyote to move out of an area, support for shooting is usually low, especially in urban areas. Contrary to common beliefs, the reason for predatory coyote behaviour is not always hunger or protection of dens. The food available to coyotes in urban areas (such as the southern California suburban-wildlife fringe) contributes to their behaviour; however, in some situations if people showed aggression toward them they may have more fear humans. The change in human attitudes toward wildlife in general has enabled coyotes to

further take advantage inhabiting human-created environments that contain abundant food sources (Baker and Timm, 1998).

When coyotes lose their fear of humans (often linked to humans feeding coyotes), attacks in parks and urban areas begin. It is evident that people who have little experience with coyotes, or have recently moved to an area where coyotes are present have more concern. In Westchester, NY urban residents that had recently moved into rural areas had little tolerance for coyotes and expressed anxiety toward them (Hudenko et al., 2008).The availability of garbage to coyotes contributes to their habituation to humans (Carbyn, 1989). Public education is important for reducing human-wildlife conflicts, such as how to avoid attracting coyotes and how to maintain a fear of people (Fox and Papouchis, 2005). Education on methods of fencing, sanitation, frightening techniques and how to react when attacked are also useful especially in areas where coyotes are already present. In Glendale, California they have a program where citizens who experience wildlife

with coyotes and the young, urban residents were even willing to pay for their protection which is significant toward the support for management (Stevens et al., 1994).

2.5.4. Conclusion

Large carnivores have been studied extensively in the form of species specific research as various conflicts arise, but rarely simultaneously with a herbivore. In the natural ecosystem there is a complex relationship among wildlife which is exemplified by humans influence on the landscape. A basic challenge in human dimensions research is to measure attitudes toward a variety of management scenarios to represent the local scale of values, attitudes and beliefs (Decker et al., 2006). Through understanding these complex interactions human dimensions has enriched wildlife management to represent the entire resource constituency. Human dimensions allow decision makers to implement practices that influence human-wildlife interactions (Manfredo, 2009). Human dimensions research is necessary for wildlife management because the integration of this insight with the biological information enables human-wildlife coexistence. (Decker et al., 2001; Manfredo, 2009). In order to effectively maintain the unique balance within an ecosystem, understanding people ultimately determines how the wildlife will be managed.

Chapter 3: Study Context

Mitchell (1977), a resource geographer, organized various dimensions of resource management into an illustrative framework including various perspectives (e.g., biophysical, economic, social, political, legal, institutional and technological), a spatial component (e.g., local, regional, national and international) and a temporal dimension (e.g., past, present and future). This framework (Figure 3.1) provides a useful means to organize the sections of this chapter and the issue of black bear, caribou and coyote management. While there are some divergences between "resources" (i.e. minerals, forests) and wildlife, each resource management issue has two components: human and biophysical. Within the human and biophysical are the various perspectives Mitchell (1977) has integrated into a framework. Human dimension research explores these perspectives over a temporal and spatial scale (Bath, 1998). The issue of black bear, caribou and coyote management is comprised of these various dimensions. The framework helps to illustrate and understand the complexity that exists in resource management issues and the importance of the various issues, which dominate the perspectives of human dimensions of wildlife management.

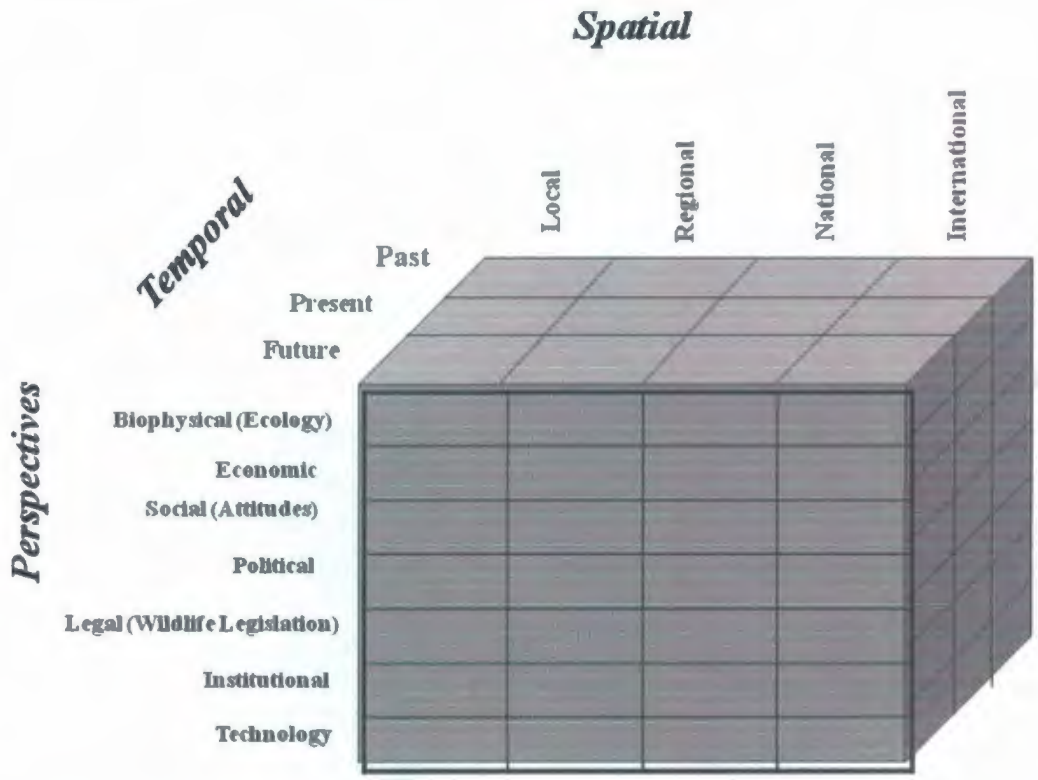

Figure 3.1 Dimensions of Resource Management as applied to Black Bear, Caribou and Coyote Issues (adapted from Mitchell, 1977)

3.1 Biophysical (Ecology)

The biophysical perspective of this wildlife resource management issue involves understanding the basic biological characteristics of the three species and from a biogeographical viewpoint, where the species are found (i.e. the distribution of black bears, caribou and coyotes), and their associated habitats. All three species, especially the coyote, can exist within a rural and urban landscape, thus it is important, as Mitchell (1977) implies, to link these biophysical characteristics with the human dimension perspectives.

The island portion of Newfoundland and Labrador is found between the latitudes 46.5°N and 61°N. Newfoundland and Labrador, the most easterly province in Canada is 111,369 square kilometres of primarily boreal forest habitat. This is the study area for the research and the scale for the discussion of all perspectives. The three species (black bear, caribou and coyotes) share this biophysical environment with a variety of native (e.g., arctic hare) and non-native (e.g., moose) species. Perhaps most important to note is the extinction of the wolf, the previous large carnivore in the system and the large numbers of moose, a species introduced in the early 1900s. General biology, habitat, distribution and population status trends will be described for each species as part of this biophysical description.

3.1.1 Caribou

Woodland caribou (*Rangifer tarandus*) are native to the island of Newfoundland and it is theorized that they arrived on ice bridges thousands of years ago (Department of Environment and Conservation c, 2009). The woodland caribou are part of the boreal population of caribou and there are 13 subpopulations of caribou on the island portion of Newfoundland. Each of these populations has an overlap in their range except the Corner Brook Lakes herd which is considered a spatially distinct herd (Mahoney and Virgl, 2003). Caribou have a short, stocky body which allows them to conserve heat, and long legs which enable them to move through deep snow. Their coats insulate them against the harsh winter winds and temperatures. Caribou rely on lichens as their main source of food, especially in the winter and Northern regions where vegetation is limited. The caribou breed in the fall and usually give birth to one caribou calf in the spring

(Department Environment and Conservation, 2009). During calving, the females isolate themselves from other caribou and the young are able to walk within a few hours of birth, which is a defence mechanism against predators (Mahoney and Virgl, 2003).

Since the late 1990s the caribou populations on the island portion of Newfoundland have declined (Figure 3.2). It is possible to suggest that the up and down pattern is cyclical, since the literature reveals that caribou populations which have a rapid increase also decrease quickly (Mahoney and Weir, 2009).

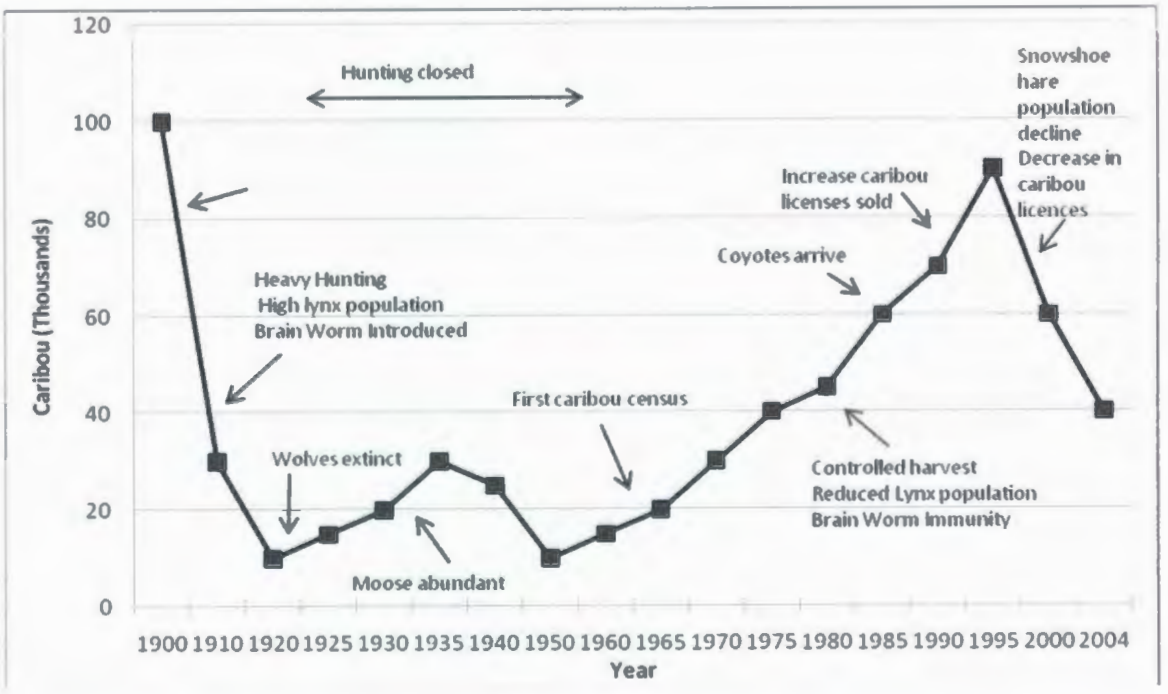

Figure 3.2 Caribou Population Trend (adapted from Department of Environment and Conservation d, 2009)

There has been considerable research on the woodland caribou in Newfoundland (examples: Mahoney and Schaefer, 2002, Schaefer and Mahoney, 2007, Mayor et al., 2009) but their demography and migration are still not fully understood. The Government

of Newfoundland and Labrador has studied caribou herds within the province since the 1950s. This data set determined the recent population decline and enabled studies to be designed to identify significant causes. There are several contributing factors to the caribou decline which may affect population recovery. Human activity is impacting the caribou populations in Newfoundland through resource use such as forestry, hydroelectric development, mining and recreational use such as snow machines and hunting. This causes habitat loss and fragmentation (Hummel and Ray, 2008). Caribou avoid human disturbances which displace them from habitat they may prefer to choose (Mahoney and Weir, 2009). For example, forestry practices may have caused caribou to avoid areas that were recently harvested, because there was less food available and more predators (Mahoney and Virgl, 2003). However, the impact of disturbance on the recent decline is still not fully understood and the additional role of disturbance (habitat loss or fragmentation, density, weather, and hunting) is being investigated as part of new caribou research.

The habitat is not only being altered by humans but other species present on the landscape. It has been suggested that the overabundant moose population is impacting the forest, causing changes which may affect the resource base available to sustain caribou numbers (McLaren et al., 2004). From years of intense trophy hunting of caribou the selection of larger animals may have decreased the body size over time and the percentage of adult males. Another factor is that the caribou population is aging, which could also have an impact on calf recruitment as more of the population is past

reproductive age. These impacts are currently being investigated more in the 2008-2013 research (Mahoney and Weir, 2009).

Caribou habitat selection is dependent upon the presence of lichens, particularly *Cladina* when it is not covered in snow. The caribou tend to choose accessibility over abundance of food in order to balance the energy required to get the food (Mayor et al., 2009). Therefore, predators may also influence the migration of the caribou and where they select food; as predator avoidance is a factor controlling where caribou obtained their food (Rettie & Messier, 2000). However, in other boreal regions outside of Newfoundland, it has been found that habitat selection was primarily driven by the need for an abundant food source especially in the winter. For example, Briand et al. (2009) found in Saguenay, Quebec that caribou were using open areas for feeding on lichen instead of the forests where the food was actually more abundant and put them less at risk to predators.

A high mortality rate in caribou calves is most commonly linked to predation (Bergerud, 1974; Gustine et al., 2006 and Briand et al., 2009). Research under the caribou strategy for 2008-2013 is focusing on predators. Low calf survival is the proximate reason for decline and predation by black bear, lynx and coyotes is the major cause of death for calves. On the island portion of Newfoundland and Labrador, the main predators on caribou calves are black bears (which cause 35.1% of explained mortality) and coyotes (which cause 16 % of explained mortality) although several other predators exist on caribou to a lesser degree such as lynx (causing 14.5% of explained mortality) and eagles (causing 8.4% of explained mortality) (Figure 3.3). Therefore, it is the combination of all

predators that is responsible for the declining calf survival. By discovering the impact of predation it provides direction to protect the most vulnerable portion of the caribou population (Mahoney and Weir, 2009). As part of the new caribou strategy work, the government is considering options for predator management (such as predator removal) (Mahoney and Weir, 2009), and this study was designed to contribute to understanding the relationship between predators from a human dimension perspective.

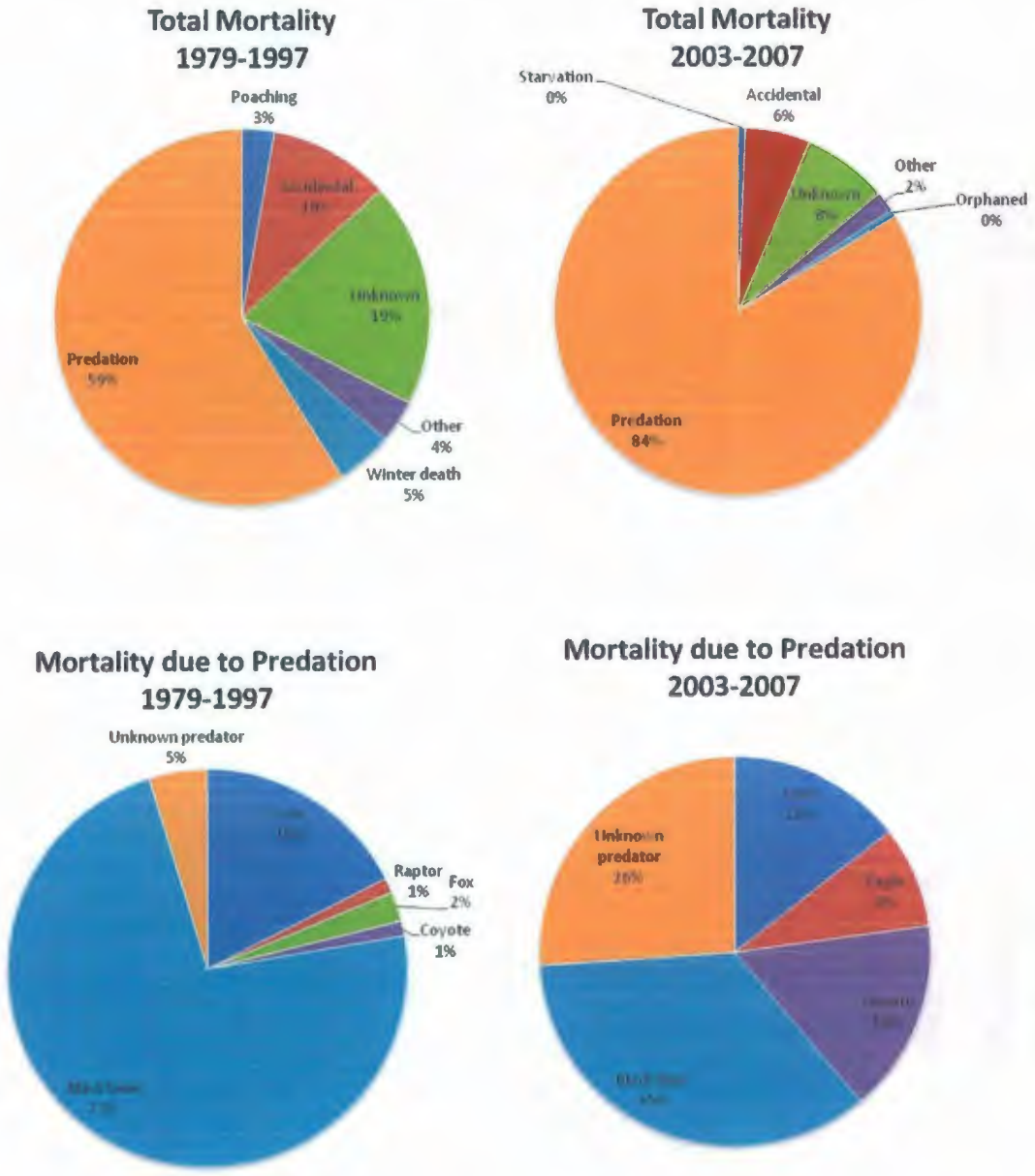

Figure 3.3 Changes in the Cause of calf mortality: 1979-1997 and 2003-2007 (adapted from Mahoney and Weir, 2009)

3.1.2 Black Bears

Black bears are native to Newfoundland & Labrador and are found throughout the province (Department of Environment and Conservation e, 2009).

The diet of black bears consists mainly of plants, berries and animals such as caribou and moose calves. Bears can weigh up to 600 lb. (272kg) but most commonly the males are 200-300 lb. (90-136kg) and females smaller at 110-180 lb. (50-82kg). Black bears have large home ranges (larger than anywhere else in North America) in Newfoundland and Labrador, the males 200km^2 or more, and females 60km^2 which has made efforts to understand and manage their relationship with caribou challenging. Throughout the winter, black bears hibernate in dens which they make in sheltered spots such as caves, brush piles, burrows or tree cavities (Powell et al., 1997). The females have 2-3 cubs in mid-winter and the females remain in the den with the cubs until spring. The cubs generally stay with their mothers for two years. Based on hunter harvesting numbers, the black bear population has increased in insular Newfoundland since the early 2000's, and is estimated at 7,000-10,000 (Wildlife Division, 2009).

Black bears are most active during dawn and dusk and are fairly timid except when human food is available (Department of Environment and Conservation e, 2009). It is common to find black bears in communities once they have found a food source. Bears that become comfortable around humans are called habituated as they lose their fear of humans which can make them become dangerous as they search for food. Food conditioned bears are an increasing problem in the United States and Canada (Decker and Chase, 1997). As the population of black bears increases the human-wildlife interactions

will inevitably increase as well (Treves and Karanth, 2003). Such interactions may be mostly perceived as negative therefore, it becomes increasingly important to employ management strategies such as proper food and garbage storage in communities so that black bears will not be attracted to the area and conflicts can be minimized (Carlos et al, 2009, Department of Environment and Conservation e, 2009; Siemer, 2009). For example, in Terra Nova National Park garbage management messages were created and the problem has been reduced over years since its implementation (Cote, A., personal communication, Feb.2, 2010).

The Newfoundland Wildlife Division created the provincial black bear index program with the purpose of defining population trends in the province so that an accurate estimate of numbers can be made across the island. One method that is being used to determine this is collecting black bear fur in barbed wire hair snag stations (Dreher et al., 2006). The hair provides DNA information on individual black bears allowing biologists to estimate density based on capture-recapture methodologies within the area. With enough samples, the overall population can be estimated. The new caribou strategy involves an investigation of the ecology of black bears and their interaction with caribou and other predators (Department of Environment and Conservation f, 2009).

3.1.3 Coyotes

The coyote expanded its range to eastern Canada in the 1970's and moved from New Brunswick to Nova Scotia in the 1980's. Wolves were eradicated from the island portion of Newfoundland in the 1920's, which possibly allowed for coyotes to fill the niche of large carnivore. Coyotes are considered native to Newfoundland as they arrived

in 1985; they were first found on the Port au Port Peninsula. During years of heavy sea ice in the Gulf of St. Lawrence it is expected that they crossed on ice bridges from Nova Scotia, (a distance approximately 540km), which has a high population of coyotes. (Government of Newfoundland & Labrador, 2006).

The eastern coyote is larger than those in western Canada and the United States; they generally range in size from 25-40 lbs (11-18kg) (Way, 2007; Environment and Conservation, 2009). Their size may be due to adaptations to the climate, such as different prey (Boer, 1992). However, it has been found that they have historically bred with the wolf possibly making size an important factor in the eastern coyote's ability to be a predator of caribou (Silver and Silver, 1969; Kyle et al., 2006). Coyotes have a bushy tail and greyish, black-tipped coat with yellowish legs and muzzle and white throat and underside and thus in some parts of Canada contribute to the fur industry. On the island of Newfoundland, coyotes have a large home range of 140-190km^2 (Department of Environment and Conservation, 2006). Coyotes mate for life and breed usually in February or March. They choose a den and after approximately 60 days females usually have 3-12 pups, which are ready to hunt after 10 weeks. While coyotes are not known to travel in packs, this formation is sometimes observed as an effort to make hunting large prey more effective. Research on pack behaviour has revealed many possible explanations for the complex social structure of coyotes such as food characteristics and survival rates (Boer, 1992). In Newfoundland pack-like formations have been observed by residents but it is still unclear whether this is a family of coyotes travelling together or

if they are hunting efficiently in a group (Department of Environment and Conservation b, 2009).

Currently it is estimated that there are 3,000 to 10,000 coyotes on the island portion of Newfoundland. Wide range population estimates are common when referring to large carnivores as they cover a large territory. Coyotes have been studied extensively in other parts of Canada and the United States (Kellert, 1985, Hudenko et al., 2008, Fox et al., 2005 and Ellins, 2005) but, on the island portion of Newfoundland they are in a unique ecological system where caribou are present and wolves are not. Therefore it is important to understand the dynamics of this particular ecosystem in order to effectively manage this species (Department of Environment and Conservation, 2006).

Caribou numbers began declining approximately ten years after coyotes arrived on the island portion of Newfoundland. While, many would like to blame coyotes as the cause of the decline, this is difficult to assess due to the presence of other predators such as black bear, lynx, and eagles. Part of the new caribou strategy work involves investigation of the ecology of coyotes in three areas and their interaction with caribou and other large predators. Current biological research on coyotes includes a central Newfoundland study using snow tracking of coyotes to determine their diet, health and range (Government of Newfoundland & Labrador, 2009). There is a voluntary carcass collection program that was initiated by the Wildlife Division in 1989, shortly after coyotes were known to inhabit the Island. The program was expanded in 2000 and offered a $25 collection fee to trappers. The collection of coyote carcasses received from hunters and trappers provides information on morphology, reproductive rates, health, diet,

location harvested and age (Department of Environment and Conservation 2006; Department of Environment and Conservation a, 2009).

3.2 Economic

The economic perspective of resource management involves the costs and benefits associated with the use or protection of the particular resource. In terms of this wildlife management study, there are economic benefits to certain interest groups. For example, outfitters depend largely on caribou for big game hunting; therefore the protection of the caribou herd is beneficial for their businesses. Different levels of government can also gain benefits, such as Tourism advertising the presence of caribou and other species within the Newfoundland wilderness to attract visitors to the province. There are also economic costs to different interest groups. For example, farmers may be impacted from coyote predation on their livestock. This may also affect the overall Agriculture industry as fewer farms are able to sustain their operation as a result of these economic costs.

Newfoundland has a total population of 505,469, with a rural population of 213,370 and an urban population of 292,099 (Statistics Canada a,b, 2009). Rural Newfoundland communities were shaped around the fisheries, and since the cod moratorium in 1992 populations in these areas have been significantly declining (Baker, 2001). There is also a large amount of out-migration of young people from rural areas to further their education or find employment in urban areas of Newfoundland or out of the province. The loss of young people in the rural areas means that the population in rural communities is aging causing dwindling employment opportunities. The demographic changes in rural Newfoundland are placing challenges on business, health systems,

education and other sectors of society (Department of Finance, 2006). There have been efforts within the province to stimulate rural communities through the Department of Innovation, Trade and Rural development and Municipalities Newfoundland and Labrador (Department of Innovation, Trade and Rural Development, 2010; Municipalities Newfoundland and Labrador, 2010). Economic threats to rural communities are a significant concern in Newfoundland as their is a large effort to sustain these communities within the province.

3.2.1 Caribou and Black Bears

The Newfoundland outfitting industry provides recreational hunting opportunities for big game animals and among these are caribou and black bears. Big game hunting has become an integral part of the Newfoundland economy as it brings hunters from outside the province, commonly from the United States (Goudie, 2008). There are approximately 100 outfitters in the province and 1200 people are employed on a seasonal basis (Newell, 2008). The industry contributes $40 million annually to the economy, most of this concentrated in rural areas (Mahoney and Weir, 2009). Hunters are drawn to the Newfoundland wilderness which boasts high hunting success rates and the unique experience of caribou hunting. It is the caribou hunt that is most popular among the outfitters but since the population decline, licences are becoming fewer each year.

The increasing licence restrictions came at an unfortunate time for those who have recently started the business and may be unlikely to sustain it since those who have been outfitting for 30 years are facing the same challenges. Losing the outfitting industry could

have far reaching implications for the economies in rural Newfoundland. The outfitters bring in visitors from away which stimulate local businesses such as restaurants and gift shops. With the loss of the seasonal visitors coming in and out of these communities, there will inevitably be an impact on the local scale. Closing the caribou hunting will have an impact on rural communities, from the recreational hunter to the outdoor enthusiast it will affect the sustainability of their economy (Mahoney and Weir, 2009).

3.2.2 Coyotes

Economics is not usually a reason for hunting coyotes but within the province the Department of Environment and Conservation pays $25 for those who return a coyote carcass. The $25 is to act as an incentive for hunters to bring in the (Department of Environment and Conservation, 2006; Department of Environment and Conservation c, 2010). However, many hunters within the province feel that a greater economic incentive is required for those hunting coyotes as it requires a considerable investment for the equipment (Sutton, 2008).

In Newfoundland & Labrador there are only a few regions of the province where sheep farming is viable. These include the Avalon Peninsula, Bishop's Falls, Codroy valley and the northwest region of Deer Lake (Taylor, 1949, H. Morry personal communication, February 6, 2009). The sheep industry in Newfoundland has significantly declined since 2001. During this time total sheep numbers have declined by 41.2% which is higher than the Canada-wide decline of 9.5%. . In 2003 there were 7,200 sheep on the island of Newfoundland; however as of July 2009 there were 4,000 sheep (Statistics

Canada c, 2009). While Newfoundland Agriculture identifies that there are opportunities for sheep farming in Newfoundland they also recognize the challenges involved including competition from products offshore and predator problems (Agrifoods, 2009). According to local livestock owners the decline in the Newfoundland sheep industry is attributed in part to predation by coyotes that has put significant stress on their livelihood (H. Morry, personal communication, February 6, 2009). The sheep farmers are affected by coyotes. If management decisions are made for the benefit of the caribou to reduce predators, such as coyotes, this will also have implications for those who farm sheep.

3.3 Social (Attitudes)

The social perspective of resource management focuses on understanding attitudes, beliefs and values of the resource constituency. This is especially important for those who are connected directly to the resource, as these groups tend to have the strongest feelings about the resource (positive or negative) and may be most affected by management decisions. In Newfoundland context, the perceptions vary significantly across the three species and between the urban and rural portions of the general public.

3.3.1 Caribou and Black Bears

Hunters, outfitters and sheep farmers may have economic incentives behind their connection to these species but they are just a few of the people that are connected to the caribou-predator issue. Within the province, other residents who enjoy non-consumptive wildlife recreation such as wildlife viewing, berry-picking or hiking in the woods also share an interaction with these species and may be impacted through their management. Their perceptions of black bears, caribou and coyotes may be different than those with a

direct economic or consumptive connection to the species. While this general public may encompass a wide range of views concerning these species and their management, it is their support that will ensure the successful management and conservation for the future (Decker and Chase, 1997).

To many Newfoundlanders, caribou are an important species which is seen as a cultural symbol that represents the history and wilderness of the province. The caribou is found on the crest of the Newfoundland regiment which is an important part of the province's heritage. The caribou is also an important cultural symbol at the national level and is found on the Canadian 25 cent piece. The presence of wildlife can symbolize a variety of meanings which influence a person's perception of them. For example, wildlife can symbolize quality of the environment and life in general (Manfredo, 2008). As the landscape becomes more urban the symbolic meanings of animals increases as they become disconnected from traditional utilitarian values. For example, deer symbolize the American wilderness for even those who view them in urban settings (Leong, 2010). While other species such as the wolf are often seen as a symbol of dominance over rural areas or those closely connected to nature, representing the urban-rural differences (Heberlein and Ericsson, 2005). While the wolf was once a symbol of a villain as values changed it became viewed as a symbol of the wilderness (Kellert, 1985a; Manfredo, 2008).

Black Bears are a more recent symbol of the Newfoundland wilderness. Attitudes toward bears in the 1960's and 1970's were largely negative. However, efforts to shift perceptions of them as a scavenger has helped to change attitudes to the positive views

evident today (S.Mahoney, personal communication, December, 2009). North American culture has grown up with images of bears from childhood. However, attitudes toward black bears, especially in Newfoundland, may be linked to images of a scavenger, garbage dump bears, competent predator and campground nuisance. Within the general public, a variety of views of the black bear likely exist.

3.3.2 Coyotes

The coyote has been consistently portrayed negatively within the Newfoundland media. Words such as kill, crisis, destruction, problem and enforcement are commonly used in local newspaper articles across the province. Headlines such as "government ignoring outdoorsmen on coyote crisis", "caribou woes: coyotes more relentless than wolf" and "outfitter calls for immediate coyote cull to protect caribou" reveal that media reports often link the coyote as the cause of the caribou decline. The newspaper articles focus largely on interest groups with the loudest voice such as outfitters and sheep farmers. The coyote has been labelled an alien and invasive species in the media. This may be related to its recent arrival and the perception by some people that it does not belong on the island. However, there are others that view the coyote's arrival as a natural range expansion and something that has occurred throughout North America over time. In addition, with a recent attack in Atlantic Canada by a coyote resulting in the death of a young adult woman (CBC News, 2009), a newly released article documenting coyote attacks in North America (White & Gehrt., 2009), and increased sightings of large animals near human settlement, fear is elevated at this time. It is these social perspectives

(e.g., beliefs, attitudes, perceptions of impacts, degree of fear and tolerance of risk) that become so important in understanding this complex human-wildlife interaction.

In other regions of Canada, attitudes toward coyotes seem to have moved through various stages from control to tolerance, to acceptance and eventually coexistence. For example, Stanley Park in Vancouver has a population of coyotes. In order to deal with these urban coyotes which have a very high potential for human-wildlife interactions, the city developed a coexistence program (Stanley Park Ecological Society, 2009). In San Francisco, coyotes move between parks including the popular Bernal Heights dog and walking park. The city has a program similar to the one in Vancouver; San Francisco officials have realized after attempted control that there is no other effective option for coyotes except coexistence (Project Coyote, 2009). Vancouver and San Francisco are just two examples but in cities throughout Canada and the United States coyotes are now a part of the landscape and residents have learned to accept their presence.

Newfoundland is currently at the beginning stage of the human-wildlife conflict where tolerance is low and there is a strong desire for control of the predators. This may be the necessary first step in evolution of perceptions of this human-wildlife conflict that in other locations has moved eventually toward acceptance and coexistence. On an island it may be possible to eradicate coyotes using poison and intensive hunting but it would be extremely expensive and such methods may not be publicly supported even though attitudes may be negative toward the coyote.

3.4 Political

The political perspective of resource management encompasses the government interest in the resource issue, proactive involvement in influencing the decision-making processes and is often reflected in the amount of money or political attention paid to the issue.

The caribou decline is important to the Newfoundland government. In February 2008, a $15.3 million commitment was made to develop a comprehensive research program. A large portion of these funds are targeted toward understanding predator ecology and its role in the decline. Through the involvement of the Wildlife Division a minor portion of this funding is directed toward "how to hunt a coyote" workshops. The workshops are designed to provide further awareness about coyote biology and impacts toward caribou and other wildlife in Newfoundland and Labrador. It also helps the Wildlife Division to address responsible and humane harvest of coyotes.

Politicians have found it necessary to comment in the public forum because of the interest shown by Newfoundland residents on open line programs on the radio. Media coverage of this issue has been quite high within the province since this announcement of large amounts of funding. From the range of individuals who wish to give their voice on this issue, it is evident that Newfoundlanders have varying opinions concerning caribou and their management. The challenge is not only in deciding which management option is suitable for these species but, which action will receive support from interest groups and the public. How the government chooses to balance public opinions with the scientific information is a significant factor in the long term success of wildlife management.

3.5 Institutional

The institutional arrangements perspective of resource management focuses upon the various organizations which have the authority to play a role in the management of the resource (Juda and Hennessey, 2001). Such institutional arrangements require understanding the mandates of the various organizations and/or government agencies, the linkages or networks between them and how each is mandated to work on various aspects of the resource management situation and what opportunities or historical precedence exists in the ability to work together toward managing the resource. The institutions may be impacted or impact the use of the resource based on their role or the decisions they make (Andersson and Ostrom, 2008).

Caribou management on the island portion of Newfoundland has become quite political. There are numerous institutions involved in different capacities. There are various provincial government departments which have overlapping interests that connect them to this resource management issue. The provincial government is represented by several departments including: The Department of Natural Resources, the Department of Environment and Conservation, the Department of Innovation, Trade and Rural Development, the Department of Tourism, Culture and Recreation. Within these departments there are divisions and branches which create a complex structure of institutional arrangements (Figure 3.4). The mandates of these organizations have overlapping themes. For example, tourism's mandate emphasizes supporting "development of sustainable economic growth in the tourism and cultural industries; support the arts and foster creativity; preserve the province's cultural heritage and historic

resources and recognize their importance; and promote participation in recreation and sport and support sport development" (Government of Newfoundland and Labrador, 2009) while the Department of Innovation, Trade and Rural Development "...supports regional development and economic diversification" (Government of Newfoundland and Labrador, 2009). While the themes in these departments and the various divisions associated with them overlap, they are separate within the government structure therefore making effective coordination a challenge (Figure 3.4). For example, Newfoundland tourism advertises hunting in Newfoundland with an emphasis on the abundance of caribou. Hunting found under "things to do" in Newfoundland is described using headings such as "unspoiled, untamed, unforgettable", and "you can never have too many trophies". They describe the herd as one of the world's largest with tens of thousands in 150,000 sq. miles of wilderness. (Newfoundland and Labrador Tourism, 2009). Selling these sort of messages puts pressure on decision makers to try and maintain this image.

The involvement of the government also comes down to the local scale where the municipal government may make decisions in the best interest of their community. Other organizations are involved in the caribou issue in Newfoundland that are not part of the government. Memorial University is one, with a research based role, and many student and professor projects are being conducted or have been completed connected to the caribou issue. This research base will aid decision makers in choosing appropriate management options for caribou and its predators. However, it has been interesting to note that the student theses to date on caribou have been from an entirely biological perspective. The outfitters association, trappers association, hunters, sheep farmers are

closely connected to the caribou issue as their livelihood and businesses depend upon the species. Non-governmental organizations such as the Newfoundland Wildlife Federation and Protected Areas Association have a role connected to preservation and conservation of various species and landscapes. The contradicting mandates of those involved in the issue causes a complex management situation which requires strategic conflict resolution. The need exists to use a human dimension facilitated workshop to pull the various groups together so they can work through goals and objectives.

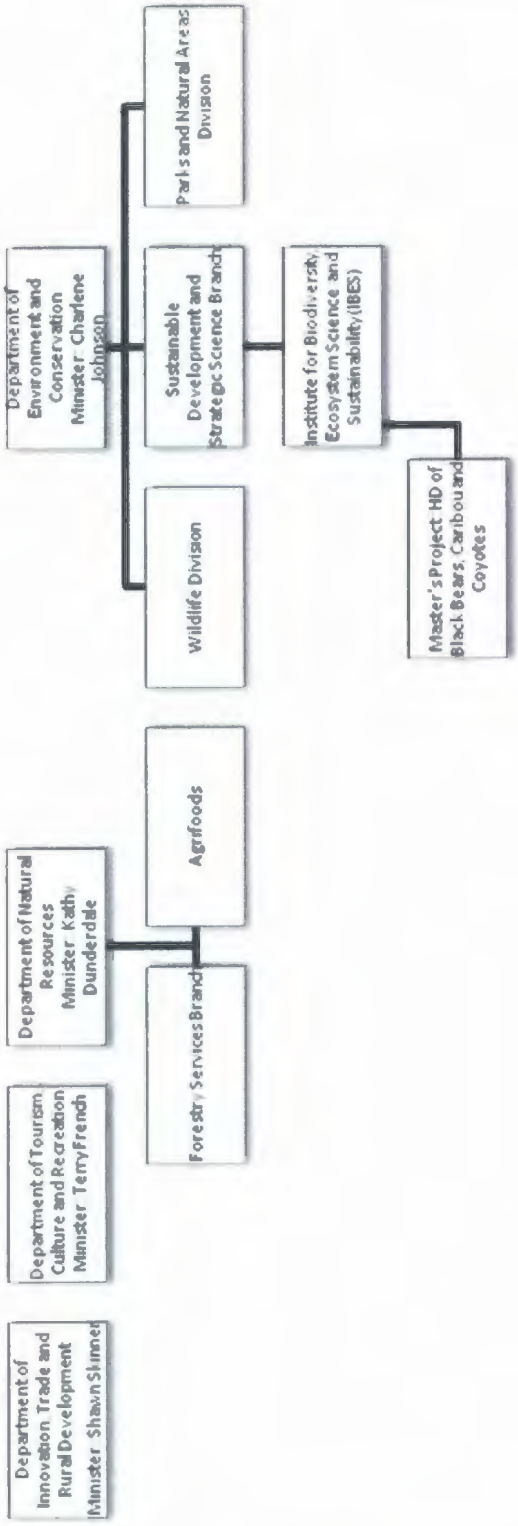

Figure 3.4 Institutional Arrangements in Newfoundland

3.6 Legal (Wildlife Legislation)

In Newfoundland there are separate hunting and trapping regulations concerning caribou, black bears and coyotes. Each has a specific hunting season and management zones throughout the island. This generally varies from year to year and the information is published in the annual Hunting and Trapping Guide produced by the Department of Environment and Conservation.

The black bear spring hunt generally opens in May and closes in July for all of the designated Bear Management areas (BMA). There is a quota of two bears per licence, and sales have increased slightly over the last ten years. Figure 3.5 shows the management areas across the island portion of the province. The BMA's follow the moose management areas (MMAs), but are closed to black bear hunting in area 31-36, 38 and 43-44.

Figure 3.6 shows the Caribou Management areas (CMAs) across the island portion of the province, the light grey represents the closed areas and the dark grey the open areas. For the 2009 caribou season there are 880 licences, this is a decrease of 355 licences from the last year in 9 of 19 caribou management areas (CMA). The decrease in licences issued is part of the 5-year caribou strategy to lessen the effects that hunting may have on the caribou herd. Hunter success has declined significantly from 85% in the 1980s to 60% in 2005, and less than 45% in the Middle Ridge herd. Where caribou have traditionally been found they are now present in fewer numbers or cannot be found at all causing decreased satisfaction amongst hunters and growing concern for outfitters.

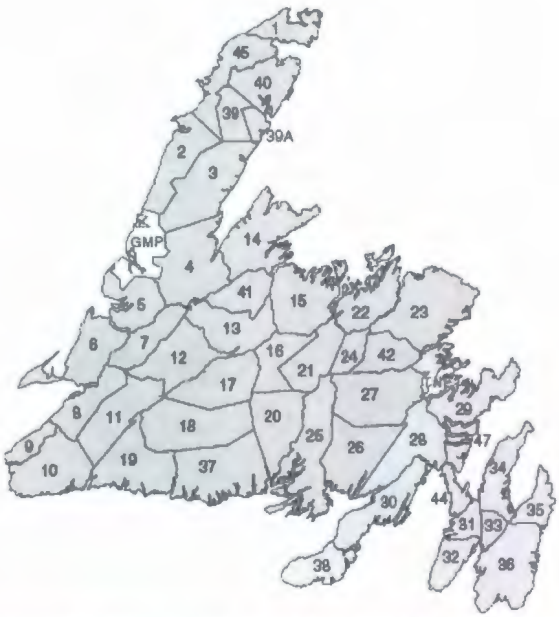

Figure 3.5 Newfoundland Moose and Black Bear Management Areas (Department of Environment and Conservation, 2010)*

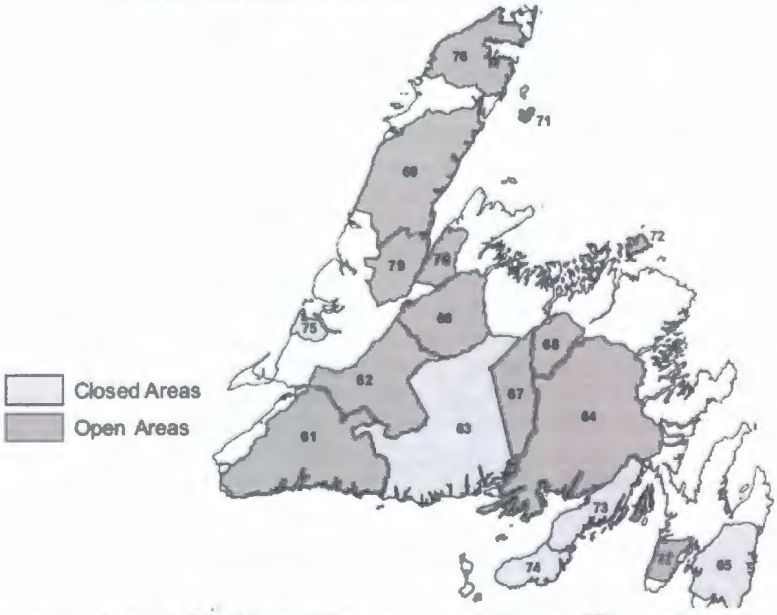

Figure 3.6 Newfoundland Caribou Management Areas (Department of Environment and Conservation, 2010)*

*Figure 3.5 and 3.6 are from the public document: Department of Environment and Conservation, 2010. 2010-2011 Hunting and Trapping Guide. http://www.env.gov.nl.ca/env/wildlife/hunting/hunttrap.pdf. Copyright permission to print these maps has been granted by the Wildlife Division.

Current coyote management within the province involves four strategies. One is a trapping season from October to February. Another is to allow those with a big game or small game licence to harvest coyotes in the management zones which pertain to their licence, use firearms allowed by that licence and harvest until the season closes or the licence is no longer valid. A third management strategy is a permit to shoot coyotes which may be given to those who have livestock or domestic animal predation. The fourth strategy is a specific coyote shooting licence, which is for those interested in hunting only coyotes and the season is from September to July. Coyote hunters are required to submit the carcass so the number of coyotes harvested can be recorded, and in doing so they receive $25 (Department of Environment and Conservation, 2006; Department of Environment and Conservation c 2009). It is important to understand the nature of this payment. Some label it a bounty, a throwback to the 1930s where management of predators meant killing them all, and using whatever means including poison and paying people to do it. While the media may still use the term "bounty" the fee paid is to encourage the coyote carcass to be deposited for scientific purposes. The number of carcasses returned helps provide a more accurate assessment of coyote mortality numbers, which aids in total population estimates.

3.7 Technology

The technological perspective of a wildlife resource management issue involves the various methods of monitoring, capturing and killing of individuals.

For this particular resource situation, the technological dimension can refer to methods used to understand and address the issue. From a biological perspective common techniques such as radio-collaring animals and DNA information from hair snags were used to obtain data. From a social science perspective mail-out questionnaires can be used to obtain beliefs and attitudes of the general public, and also how they felt about certain management options. If a management option is chosen then the combination of biological and social science information would aid in the decision by the government.

3.8 Conclusion

Mitchell's dimensions of resource management framework offers a way to identify and organize various characteristics of the study from an integrated geographical perspective. Within the complexity of the field of resource management there is always a level of uncertainty within the various perspectives involved.

Chapter 4: Methods

4.1 Questionnaire Design Process

In human dimension research, particularly in North America, the use of a mail-out questionnaire is a common method for obtaining resident attitudes toward wildlife. A mail-out questionnaire was chosen for this study due to the nature of the island portion of Newfoundland and Labrador. Rural and urban communities in Newfoundland and Labrador are distributed over a large area making personal interviews an inefficient, costly process. The questionnaire was designed to explore the attitudes and beliefs of the urban and rural general public toward black bears, coyotes, caribou and various management options concerning these species on the island portion of Newfoundland and Labrador. The research instrument consisted of affective, cognitive, and behavioural intention items. Standard questionnaire design and implementation methods outlined by Dillman's (1978, 2007) total design method were followed. Specifically, the questions were close-ended using a 5-point Likert scale ranging from strongly dislike to strongly like and strongly disagree to strongly agree. Space was also provided at the end of the questionnaire for respondents to write additional comments.

The questionnaire was in a two page booklet format consisting of four sections. Information on the cover of the questionnaire explained the purpose of the survey and provided a phone number that residents could call if they had further questions. Section 'A' asked respondents about their attitudes toward black bear, caribou and coyotes and consisted of 12 items (e.g., which best describes your feelings toward the following species?). Section 'B' asked about their beliefs and had 4 items (e.g., how many of each

do you believe currently exist on the island portion of Newfoundland?). For the purpose of this study beliefs were defined as factual knowledge an individual has which may or may not be true. Section 'C' asked respondents about their opinion of various management options and contained 10 items (e.g., there should be a fee paid to hunters for a coyote carcass) to which respondents agreed or disagreed. Section 'D' contained demographic items such as gender, age and also specific questions on hunting experience and whether the respondent was an outfitter or had livestock. The questionnaire was reviewed by Memorial University faculty, Wildlife Division, IBES (Institute of Biodiversity and Ecosystem Science) and the university ethics committee prior to implementation. Ethics approval for implementation of the questionnaire was given by Memorial University. A complete copy of the research instrument can be found in Appendix 1.

4.2 Questionnaire Distribution

Consistent with the objectives of the study, a rural and urban population were identified to receive the mail-out questionnaire. There are many definitions that can be used for urban and rural; the Canadian census defines urban communities as those over 1,000 population. However, due to the interest of the government agencies involved, the municipalities of Newfoundland definition was used which defines urban communities as those greater than 4,000 (Municipalities Newfoundland and Labrador, 2010). This definition identified 16 communities on the island portion of the Newfoundland and comprised 56% of the total island population (Table 4.1). The rural sampling was determined using the census divisions and subdivisions for communities under 4,000

people which comprised 44% of the entire population. A total of 1600 questionnaires were mailed to a random selection of Newfoundlanders proportional to the urban (n=800) and rural populations (n=800). A large number of questionnaires were mailed out in anticipation of receiving a 50% response rate, which allows results to be accurate plus or minus 5%, 19 times out of 20. As it was important to have two independent samples representative of the urban and rural residents the same number of questionnaires were sent to each segment of the Newfoundland public. For most human dimension studies "a sample size of approximately 400 is considered suitable for generalizing to a population at a 95% confidence level with a ±5% margin of error" (Vaske, 2008). Human dimension research is very applied in nature and this methodology is used to ensure a representative sample of the entire resource constituency for political decision-making processes.

Table 4.1: Urban Population Sampling

Community	Urban Population	% Sampling Selection	Urban Sampling
Bay Roberts	10,180	3.875	31
Carbonear	7,199	2.750	22
Channel-Port aux Basques	4,319	1.625	13
Corner Brook	20,083	7.625	61
Gander	9,951	3.750	30
Grand Falls-Windsor	13,558	5.125	41
St. John's	100,646	38.00	304
Goulds	4,587	1.625	13
Stephenville	6,588	2.500	20
Torbay	6,281	2.375	19
Mount Pearl	24,671	9.375	75
Paradise	12,584	4.750	38
Conception Bay South	21,966	8.250	66
Deer Lake	4,827	1.875	15

Clarenville	5,274	2.00	16
Marystown	5,436	2.00	16
Portugal Cove- St.Phillips	6,575	2.50	20
	264,725	100	800

Newfoundland telephone books were used as the sampling frame to contact potential respondents by telephone to ask for their willingness to participate in the study and confirm their mailing address before being sent a questionnaire. To contact a random individual within the household the next birthday rule was applied to individuals over 18 years of age (Sheskin, 1985). Undergraduate Memorial University geography students were hired to aid in the telephone calling which began at the end of May and continued until the end of July, 2009. Phone calls were made from 5:30-9pm Monday to Thursday and questionnaires were sent out to the addresses obtained the next day so to increase the probability of a returned questionnaire. As suggested by Dillman's total design method, a postcard thank-you/reminder (Appendix 2) was sent approximately one week after the questionnaire to all potential respondents (Dillman 1978, 2007). The questionnaires were numbered for data entry purposes to allow for effective means in identifying any data entry errors and cleaning of the data. The identification number was not linked to the resident addresses in order for the questionnaires to remain anonymous. A total of 42 questionnaires were non-deliverable of which an additional 27 were sent out in late summer and early fall to those same communities. While Dillman would suggest earlier in the year as a better time to mail out questionnaires, unfortunately due to budget and timing issues data collection had to occur in the traditional geography field season of spring and summer. Taking into account that 1585 questionnaires reached potential

respondents, a response rate of 50% was obtained. This was broken down into a slightly higher response rate for rural residents (n=396) compared to urban residents (n-390). With such a response rate , results are accurate 19 times out of 20, ± 5%. Labrador is included in the census data, but it makes up a small percentage of the total population of the province so it is possible to use the Newfoundland and Labrador demographic information to compare with the sample. When age of the respondents is compared across gender, there are more male respondents and less female respondents over 40 years of age (Table 4.2).

Table 4.2 Demographics, Census 2006 Newfoundland and Labrador and Sample Respondents, Newfoundland

Census			Sample		
Age	Males	Females	Age	Males	Females
20-24	8.12	7.76	20-24	1.78	2.91
25-29	6.92	7.02	25-29	3.09	6.47
30-34	7.75	7.98	30-34	2.21	7.12
35-39	9.21	9.37	35-39	5.74	8.09
40-44	10.66	10.54	40-44	12.14	11.65
45-54	22.27	21.30	45-54	26.71	27.83
55-64	18.28	17.14	55-64	32.00	22.00
65+	16.77	18.88	65+	16.33	13.91

4.3 Data Analysis

Data exploration was conducted as suggested by Tabachnick and Fidell (2001) who focus on multivariate statistical procedures, and Vaske (2008) who focuses on statistical techniques for analyzing data in the human dimensions. All statistical analyses were conducted using SPSS software version 16 (SPSS 2007). To better understand the

patterns underlying attitudes various multivariate statistical procedures were used. Initially, principal component analysis was used to identify the most important items within the data and how they clustered together, thus aiding in data reduction (Tabachnick and Fidell, 2001). New combined variables such as coyote attitudes and coyote management were created. Cronbach's alpha reliability estimate was then used to measure the consistency of these items within these new scores. Cross tabulations were used to explore descriptively relationships between variables, particularly demographic information such as respondent age and sex (Vaske, 2008). Independent sample t-tests were used to identify the differences in attitudes across the urban and rural portions of the public, the three species and management options. Multiple regression analysis was used to identify variables that predicted attitudes and management options. An ANOVA post hoc comparison test (Tukey's *honestly significant* difference) was used to further explore how variables predicting attitudes varied across the respondents. A liner regression was used to analyze the relationship between a dependant variable and several independent predictor variables (Vaske, 2008).

4.4 Limitations and Assumptions

Response rates from a mail-out questionnaire can vary significantly as well as the interpretation of the response rate. For example, a Parks Canada report said "an overall response rate of 16.5% is excellent for a mail out survey" (Parks Canada, 2009). There are several possible reasons why a higher response rate was not obtained. One is the time of year the questionnaire was distributed. Dillman (2007) suggests the best time for distribution is January to March. Initially, the objective was to complete questionnaire

distribution by the end of June, as this would be within the regular school year and residents would be more likely at home. However, it took much longer than expected to obtain all of the mailing addresses which delayed the mailing, resulting in the final distribution not being complete until September. In August, additional efforts were made to improve the response rate by random telephone calls to residents asking if they completed the questionnaire. Most of those contacted said they had already sent in the completed questionnaire. For those who did not complete the questionnaire they commonly said they were on vacation or were busy with other summer activities and had forgotten about it.

Questionnaires are commonly used as a tool for data collection on attitudes and values toward natural resource issues. Often people do not realize that their attitudes and knowledge are important whether they know a little or a lot, or their views are positive, neutral or negative. In many of the additional comments people stated that they were unsure about being qualified to answer the questions. Several thought since they didn't know anything about the species that their opinions were not of value. This indicates that it was not entirely clear that knowledge of the species was not important for the questionnaire and that it was the beliefs residents had toward the species (which may or may not be true) that were most important for this research. This could have been emphasized more in the introduction which may have encouraged more people to respond. This problem may also be linked to the nature of some of the questions, especially the beliefs section which did ask some questions about numbers, weight and behaviour of the species. Perhaps, if some of the questions were less specific, people

would not have been as concerned with their possible lack of knowledge and been free to share their beliefs. Some of the questions may have been too complex. For example, one question was in the form of a fairly complicated matrix and proved difficult for many respondents; most did not fill it out (Table 4.3). There were phone calls about this question and many of the additional comments written on the questionnaire were concerning the difficulty of understanding it. This question was also near the beginning of the questionnaire so there is the possibility that people became discouraged by this question and gave up on the rest of the questionnaire. This could have been avoided if the questionnaire had been pretested more effectively with a representative sample of residents from Newfoundland as this challenge then may have been identified.

Table 4.3 Question 12: What is the biggest cause of the decline in caribou?

	Black Bears **A**	Coyotes **B**	Disease **C**	Eagles **D**	Hunting **E**	Logging **F**	Lynx **G**
Black Bears **A**							
Coyotes **B**	**A or B**						
Disease **C**	**A or C**	**B or C**					
Eagles **D**	**A or D**	**B or D**	**C or D**				
Hunting **E**	**A or E**	**B or E**	**C or E**	**D or E**			
Logging **F**	**A or F**	**B or F**	**C or F**	**D or F**	**E or F**		
Lynx **G**	**A or G**	**B or G**	**C or G**	**D or G**	**E or G**	**F or G**	

Human dimension research on the island portion of Newfoundland still remains in its infancy. In fact, this study is the first province wide work focused on black bears, caribou and coyotes and one of only a few studies, (apart from The Green Paper in the

1980s) that have addressed Newfoundland residents attitudes toward any wildlife management issues. Thus, methodologies that are most effective to engage Newfoundland residents are still being developed. This research contributes to that understanding. Even when considering these limitations, sufficient sample sizes across the island to be representative of urban and rural residents independently were obtained. Wildlife managers and those involved in political decision-making processes can move forward using this data which is representative of the entire resource constituency.

Chapter 5: Results

Understanding rural and urban differences regarding wildlife issues remains an important area of study in the field of human dimensions and was a fundamental part of the purpose of this research (Freudenburg, 1991, Heberlein 2005). Understanding the attitudes of the Newfoundland general public was expressed as an area of interest by the Wildlife Division and IBES from the beginning of the project. Rural and urban residents may be affected or affect wildlife management regarding coyotes, black bears and caribou and therefore were seen as important segments of the general public.

In Newfoundland, the biological research suggests that there are 4 major predators of caribou (Figure 5.1). Caribou calves (N=128) were collared from 2003-2005 and of the surviving 111 calves, 33% of all deaths were caused by black bears, 13% by coyotes, 10% by lynx and 10% by bald eagles. In contrast, when residents were asked what they believed were the major causes of the caribou decline their perception was considerably different from the biological research. When each predator was compared with coyotes, rural and urban residents consistently believed that coyotes were the major cause of the caribou decline.

Therefore by understanding the characteristics of the sample and the attitudes and beliefs of rural and urban residents, wildlife managers can effectively target messages and implement management options understanding the levels of support or opposition. This chapter begins by discussing the characteristics of the sample before presenting descriptive results to comparative exploration of how attitudes vary across these species.

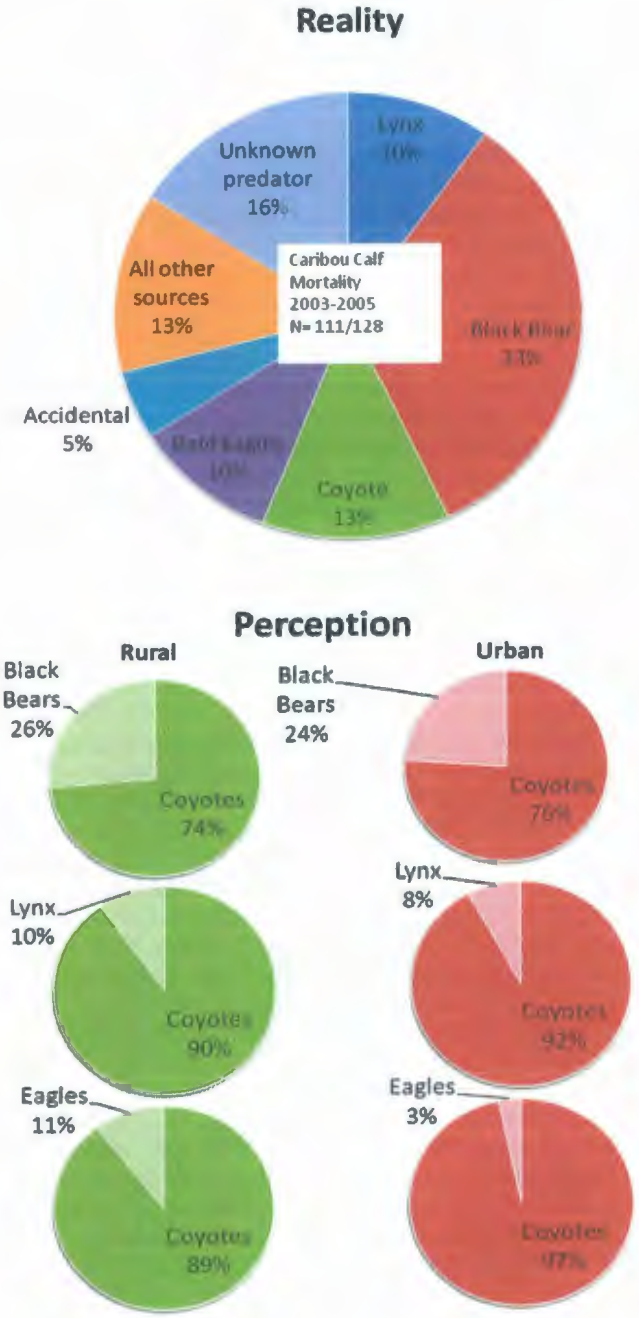

Figure 5. 1: Reality vs. Perception of the Major predators of Caribou in Newfoundland (adapted from the Department of Environment and Conservation, 2010).

5.1 Characteristics of the Sample

In the sample there were nearly an equal number of males and females across the rural and urban regions (Table 5.1). In rural areas 39.5% of residents were female and 60.5% were male while in urban areas 41.6% of residents were female while 58.4% were male. A large percentage of males (32%) from the sample were 55-64 years of age and the largest percentage of females (27%) were found in the 45-54 years of age bracket. Most of the sample was over 40 years of age with those in each category under 39 years of age (20-24, 25-29, 30-34 and 35-39) being 10% or less which is reflected in the demographics of Newfoundland (Table 4.2).

Residents were asked how long they lived in their current community so that their experience living either in a rural or urban landscape could be used to determine if it influenced their attitudes (Table 5.2). It was hypothesized that residents who had lived longer in a rural area would have more negative attitudes. In Newfoundland where people have the highest rate of home ownership in the country a large percentage of the urban and rural residents had lived in their community for more than 20 years. Although, this may also be related to the age category of the sample, as many were older and therefore more likely to spend time in one place.

Table 5. 1: Gender of Rural and Urban respondents

Region	% Females	% Males
Rural	39.5	60.5
Urban	41.6	58.4

Table 5. 2: Length of time (in years) respondents lived in their current community.

	Rural (%)	Urban (%)
less than 1 year	1.1	2.1
1-5 years	6.7	9.6
6-10 years	5.6	12.4
11-15 years	4	7.8
16-20 years	5.6	6.7
over 20 years	77.1	61.4
Total	100	100

Several questions were asked about respondents' experience with the species. One was regarding whether they had ever seen each in the wild (Table 5.3). Most rural (92%) and urban (86%) residents had seen a caribou at least once. Rural (83%) and urban (81%) residents had also seen a black bear at least once. However, fewer rural (63%) and urban (43%) residents had seen a coyote at least once.

Hunting was also used as a way to measure experience with the species (Table 5.4). Most (rural- 80%, urban- 88%) of the respondents did not hunt any of the three species. However, for those that did hunt (rural- 20%, urban- 12%), caribou was hunted the most with rural residents (34%) hunting more than the urban (23%). When residents were asked whether they hunted big game in Newfoundland in the last 3 years, most rural (54%) and urban (72%) residents had not. However, of those residents who did hunt, more rural (46%) residents than urban (28%) residents had hunted big game. Participation

in hunting in Newfoundland is among the highest in Canada (along with the other Atlantic provinces of Nova Scotia and New Brunswick) (Environment Canada, 2008).

Table 5. 3: Have you ever seen in the wild?

	Black Bear		Caribou		Coyote	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Rural	83.2	16.8	92	8	63.2	36.8
Urban	80.8	19.2	86.3	13.7	43	57

Table 5. 4: Have you ever hunted?

	Black Bear		Caribou		Coyote	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Rural	16	84	33.8	66.2	9.5	90.5
Urban	9.4	90.6	22.8	77.2	5.2	94.8

Results show that caribou management is important to the urban and rural general public in Newfoundland (Figure 5.2). When residents were asked about this issue the mean for the urban residents was 7.31 and the mean for the rural residents was 8.01 out of a possible 10.0, both values indicating the issue was very important.

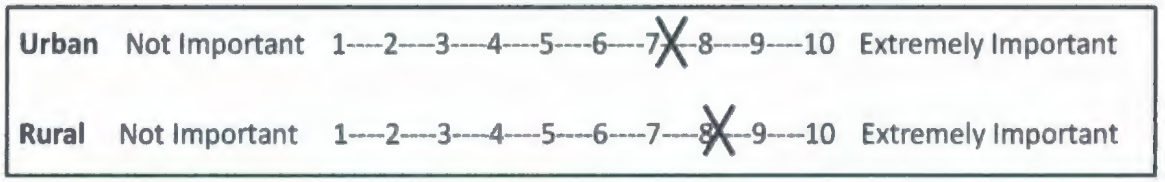

Figure 5. 2 On a scale from 1 to 10, how important is the issue of caribou management in Newfoundland to you personally?

The results are divided into several sections, similar to the questionnaire with descriptive statistics appearing first followed by tests for significant differences. Descriptive statistics allow for an introductory understanding of attitudes toward the three species and an initial comparison of urban and rural attitudes. Multivariate statistical procedures were used to explore key themes that emerged from the data.

5.2 Affective (Differences between the species, and between the urban and rural residents)

The general public was asked: "Which best describes your feelings toward the following species?" Many respondents whether urban ($\bar{x}_U$=3.41) or rural ($\bar{x}_R$=3.01) liked black bears (Figure 5.3). Approximately 41% of rural respondents and 51% of urban respondents said they liked black bears in some way. Interestingly, a relatively large percentage of urban residents were neutral (32%). However, there was a significant difference ($t= 4.771$, $p< 0.001$) between rural and urban residents. The urban residents were more positive than their rural counterparts toward black bears. In contrast, large percentages of rural (43%) and urban (38%) residents strongly like caribou and most rural (87%) and urban (82%) residents like caribou in some way. There is no significant

difference between the mean ($\bar{x}_U$= 4.17, $\bar{x}_R$= 4.24) attitude of these two groups regarding caribou (t=1.137, p=0.256). In contrast, residents have somewhat different views about coyotes. More than 57% of rural respondents and 44% of urban respondents strongly disliked coyotes, while 67.2% of urban and 80.8% of rural residents dislike coyotes in some way. There is however a significant difference in the mean ($\bar{x}_U$=2.08, $\bar{x}_R$= 1.76) attitudes between rural and urban residents (t= 3.878 $p< 0.001$) where rural residents are significantly more negative than urban residents toward coyotes. Human dimensions research is interested not only in the direction of attitudes but also the strength of the attitudes. Such strong attitudes in favour of caribou and against coyotes indicate views that are strongly formed and thus potentially challenging to influence.

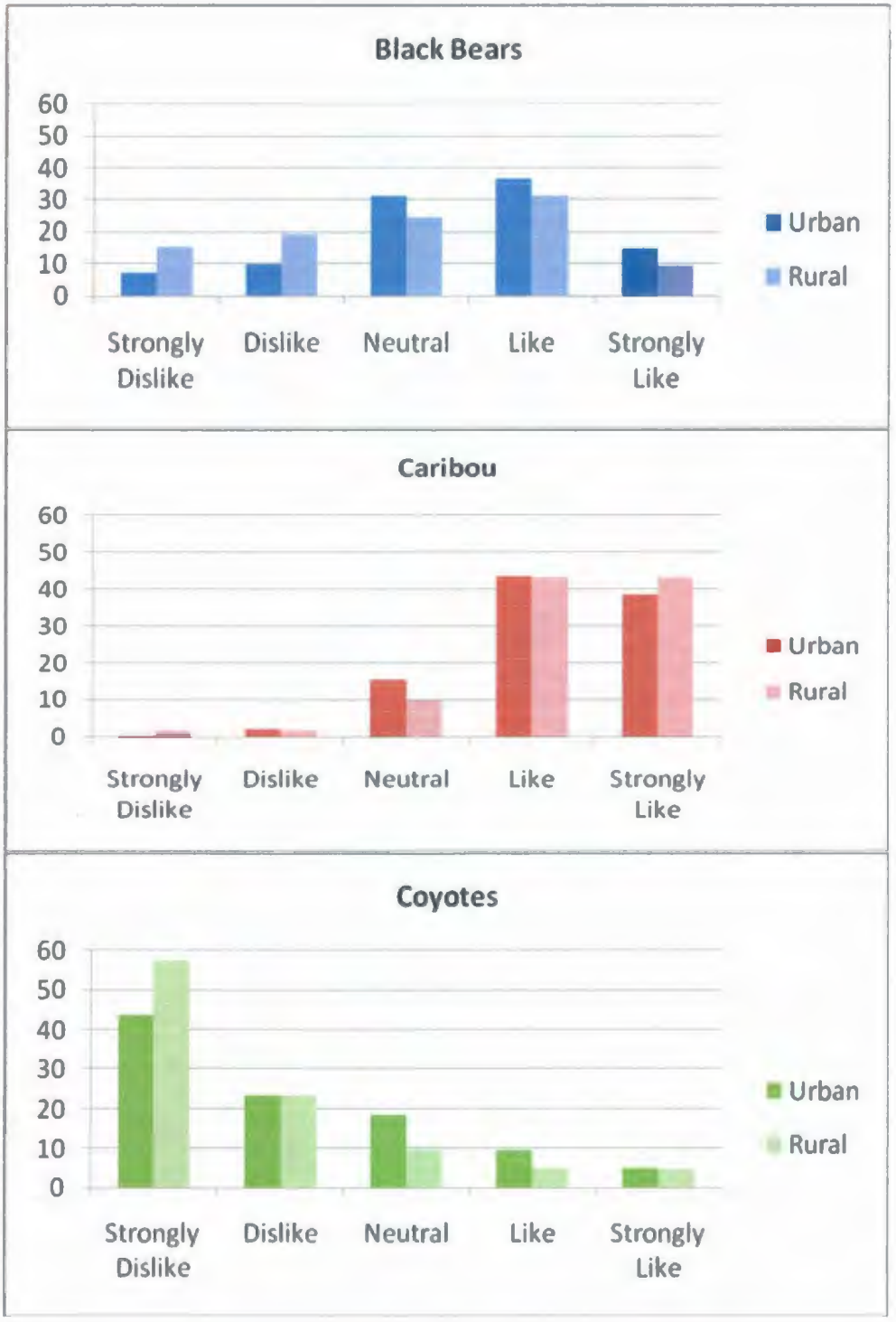

Figure 5. 3: Which best describes your feelings toward the following species?

To explore values of species for the future, the general public was asked: "It is important to maintain populations of the following species in Newfoundland for future generations". Most urban ($\bar{x}_U$= 4.52) and rural ($\bar{x}_R$= 4.55) residents have future generation values for caribou and black bears ($\bar{x}_U$ = 3.94, $\bar{x}_R$= 3.58), but not for coyotes ($\bar{x}_U$= 2.27, $\bar{x}_R$= 1.87) (Figure 5.4).

This can be broken down into 63.5% of rural and 59.7% of urban residents who strongly agree, with a large percentage of the rural (89%) and urban (92%) residents agreeing that it is important to maintain populations of caribou for future generations. For black bears 23% of rural respondents and 33% of urban respondents strongly agreed; most rural (63%) and urban (75%) residents agree that it is important to maintain black bear populations for future generations. There was no significant difference between the mean attitude of these two groups regarding caribou (t= 0.522, p=0.602). However, for black bears there is a significant difference (t= 4.407 p< 0.001) between rural and urban residents where urban residents are more positive than rural residents. Once again, coyotes are on the negative side of the spectrum, 56.6% of rural respondents and 44.6% of urban respondents strongly disagreed that the coyote population should be maintained for future generations. There is a significant difference in the mean attitudes between rural and urban residents (t= 4.103, p< 0.001) where rural residents are more negative than the urban. A similar pattern was observed to the question: "Whether or not I would get to see these species it is important to me that they exist". Urban residents tended to be more positive toward black bears and caribou but negative attitudes persisted toward coyotes.

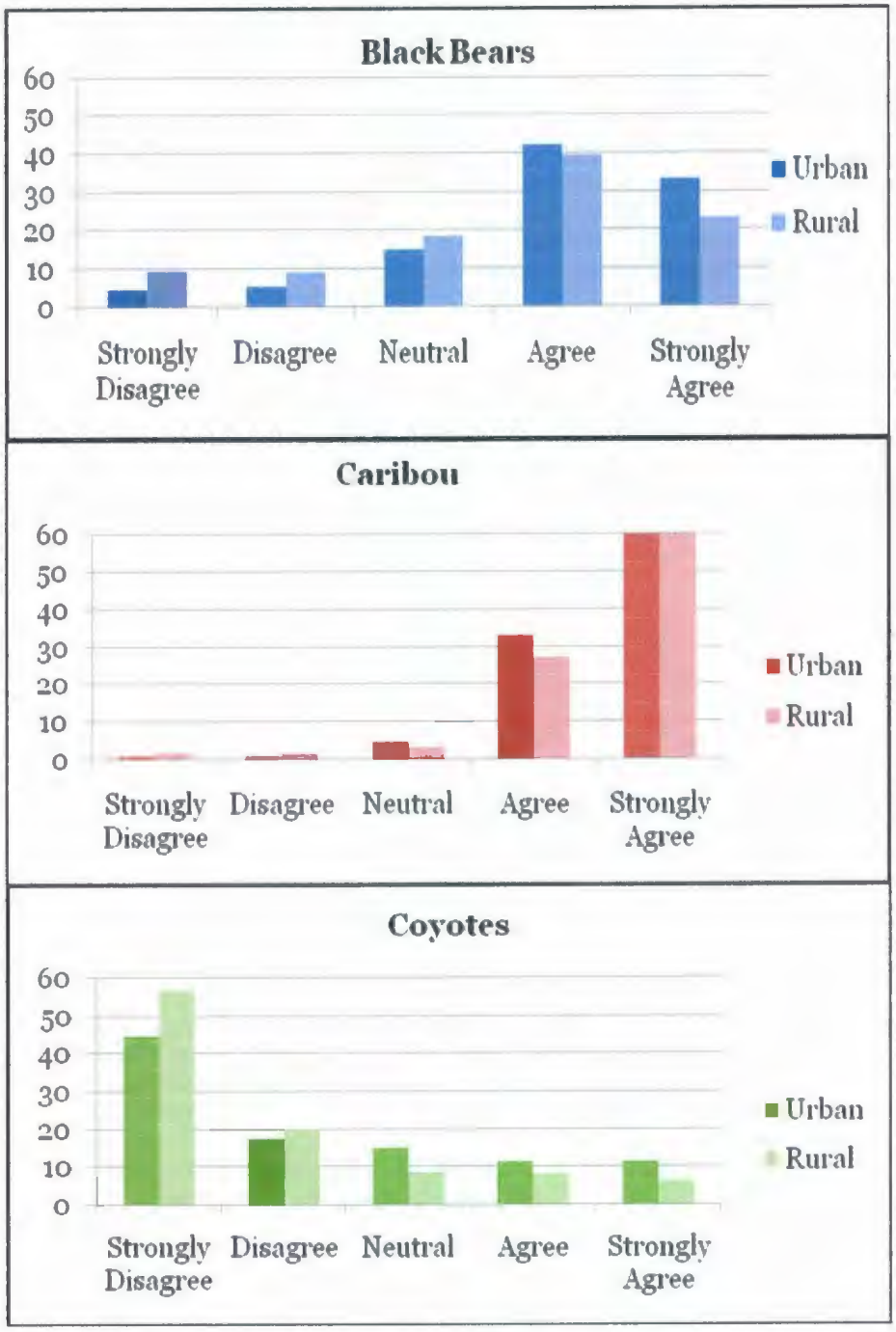

Figure 5. 4: It is important to maintain populations of the following species in Newfoundland for future generations

5.3 Beliefs/Cognitive Component (Differences between the species and urban and rural residents)

When residents were asked about the number of caribou the urban (48%) and rural (48.7%) residents felt there were too few (Figure 5.5). For black bears the urban residents are nearly split between the number of bears being "about right" (39.4%) and not sure (47.2%) while the rural residents are mainly not sure (49.9%). However, most urban (53.7%) and rural (60.9%) residents agreed there were too many coyotes.

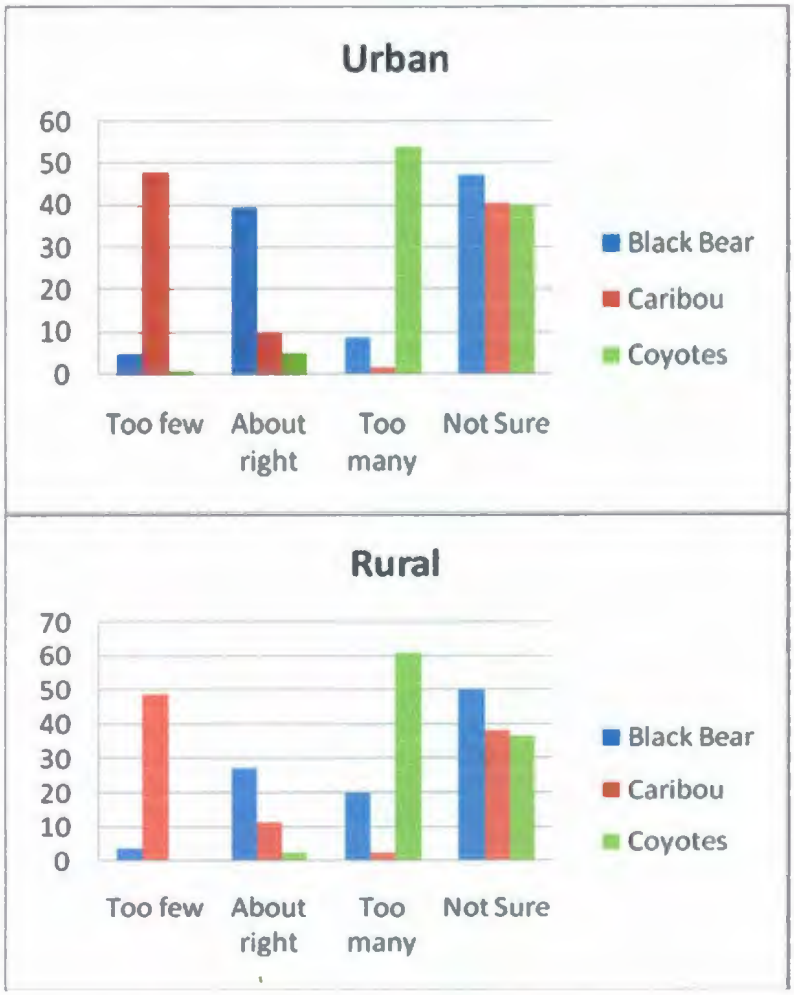

Figure 5. 5: How many of each species respondents believe currently exist on the island portion of Newfoundland and Labrador?

Respondents were asked: "in your opinion, how dangerous to people, if at all, are the following animals?" For this item, residents responded by marking on a line from harmless to dangerous (Figure 5.6). The line was a total of 8.2cm long and mean scores for each measured mark indicate how residents felt about each species. The rural residents (4.8) felt that black bears were slightly more dangerous than the urban residents did (4.45); however, this was not significantly different. For caribou, rural (1.0) and urban (1.1) residents both felt the animal was harmless. There was a significant difference ($t = 2.323$, $p = 0.020$) between rural and urban residents where rural residents (5.7) felt coyotes were more dangerous than the urban residents did (5.3).

Figure 5. 6: How dangerous to people each of the following animals are in the opinion of respondents

The public was asked about their beliefs of the current status of each species on the island (Figure 5.7). Most urban ($\bar{x}$ = 3.08) and rural ($\bar{x}$ =3.37) residents believed that black bear numbers were remaining about the same. This is broken down into 47% of rural respondents and 51% of urban respondents believing numbers of black bears were remaining the same. However, there was a significant difference (t= 4.650, p< 0.001) between rural and urban residents where urban residents believe the bear population is more stable and rural residents believe black bears are increasing. Both urban ($\bar{x}$ = 1.60) and rural ($\bar{x}$ = 1.61) residents believed that caribou were significantly decreasing. Rural (87%) and urban (88%) residents believed that caribou were decreasing with many believing that numbers of caribou are significantly decreasing. There was not a significant difference (t=0.162, p=0.871) between the beliefs of the urban and rural respondents, meaning each believed that the caribou were decreasing. In contrast, most urban ($\bar{x}$ = 4.47) and rural ($\bar{x}$ = 4.67) residents believed that coyotes were significantly increasing. A large percentage of rural and urban residents (approximately 87%) believed that coyotes were increasing with many stating that numbers of coyotes were significantly increasing. There was a significant difference between the mean beliefs of these two groups (t= 3.702, p< 0.001); rural residents believed more strongly than the urban residents that the population was significantly increasing.

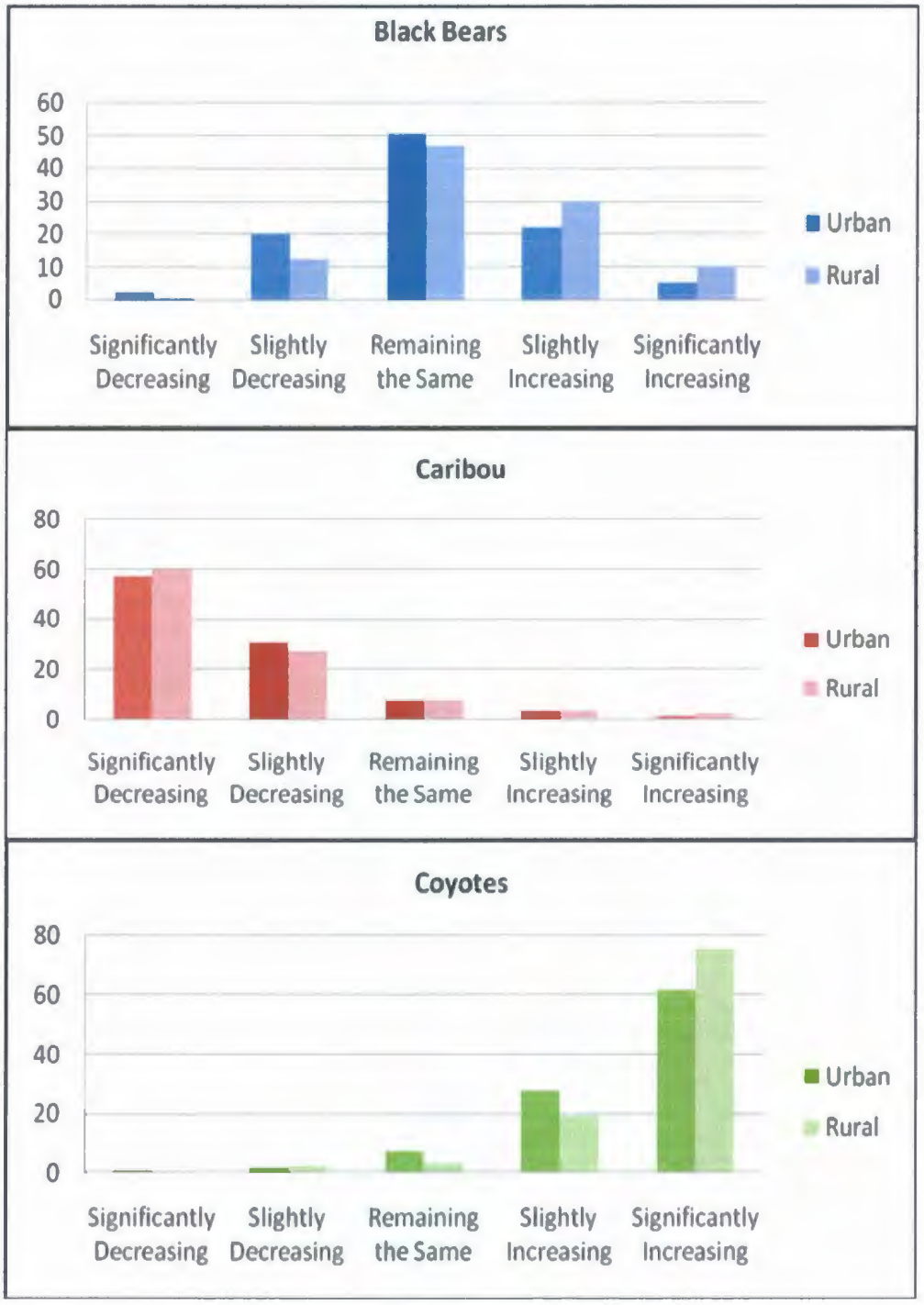

Figure 5. 7: Resident beliefs concerning the population trend of the three species in Newfoundland.

5.4 Behavioural Intention/ Management Issues (Differences between the species and the urban and rural residents)

The affective and cognitive components of attitudes influenced the behavioural intention toward specific management options. In this case for specific management options, mean values could ranged from 1.00 (strongly disagree with killing) to 5.00 (strongly agree with killing) (Figure 5.8). Rural residents had stronger attitudes either positive or negative toward the species than the urban residents (Table 5.6). There was a significant difference observed between the means of the two groups concerning whether killing the individual animal would be acceptable when a black bear was seen in a residential area ($t= 4.006$, $p< 0.001$) with 34.1% of the rural residents responding 'agree' to killing the bear and 30.3% of urban respondents responding 'disagree'. There is also a significant difference in attitude of what to do when a black bear was seen in your yard ($t= 4.205$, $p< 0.001$) with 31.2% of the rural residents responding 'strongly agree' to killing the bear and 26.7% of the urban residents responding 'agree'. There was not a significant difference when residents were asked about killing caribou; both rural and urban strongly disagreed with killing caribou when it was seen in a residential area (51.5% and 45% respectively) and when it was seen in your yard (50.5% rural and 44% urban). While both urban and rural residents support killing a coyote if it was seen in a residential area ($\bar{x}_U= 3.95$, $\bar{x}_R= 4.27$); rural residents hold stronger views about killing the animal ($t= 3.638$, $p< 0.001$). A similar response was found for killing a coyote if it was seen in your yard ($\bar{x}_U= 4.03$, $\bar{x}_R= 4.37$), where the rural residents support killing the

animal more strongly than the urban residents (t= 3.826, p< 0.001). Rural and urban residents both supported killing coyotes under these situations.

When residents were asked how they felt about current management of the three species, urban residents were mostly neutral for black bears (47%) and caribou (37.1%) while rural residents agreed that black bears (34.2%) were being managed effectively and disagreed that caribou (27.5%) were being managed effectively. In contrast, both urban and rural residents felt that coyotes were not being effectively managed (Figure 5.9).

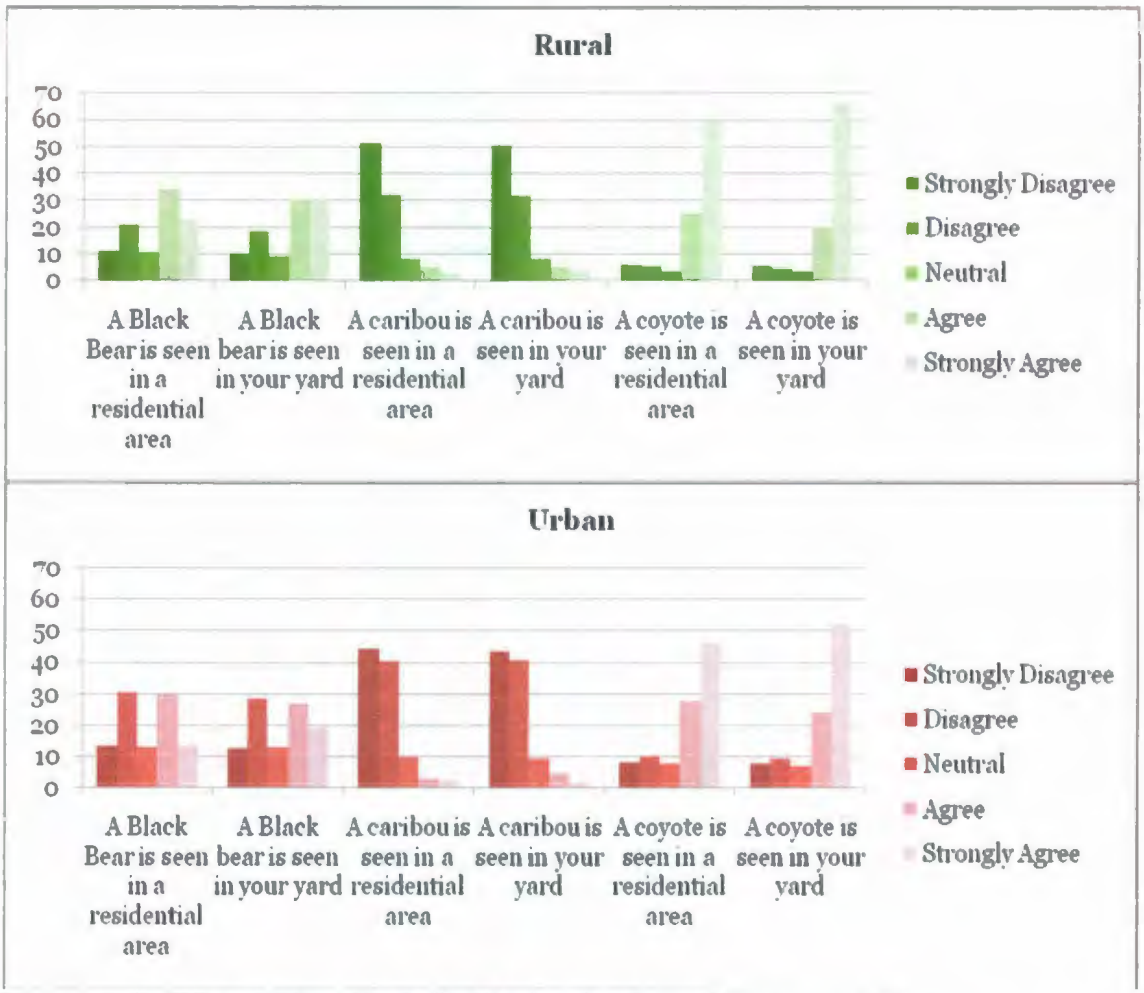

Figure 5. 8: When killing the individual animal would be acceptable.

Table 5. 5: Mean ($\bar{x}$) of when it is acceptable to kill an individual animal.

Mean scores can range from 1.0 (strongly disagree), 2 (disagree), 3(neutral), 4 (agree) and 5 (strongly agree).

	Urban ($\bar{x}$)		Rural ($\bar{x}$)	
	Residential Area	Yard	Residential Area	Yard
Black Bear	2.99	3.12	3.37	3.53
Caribou	1.78	1.80	1.75	1.80
Coyote	3.95	4.03	4.27	4.37

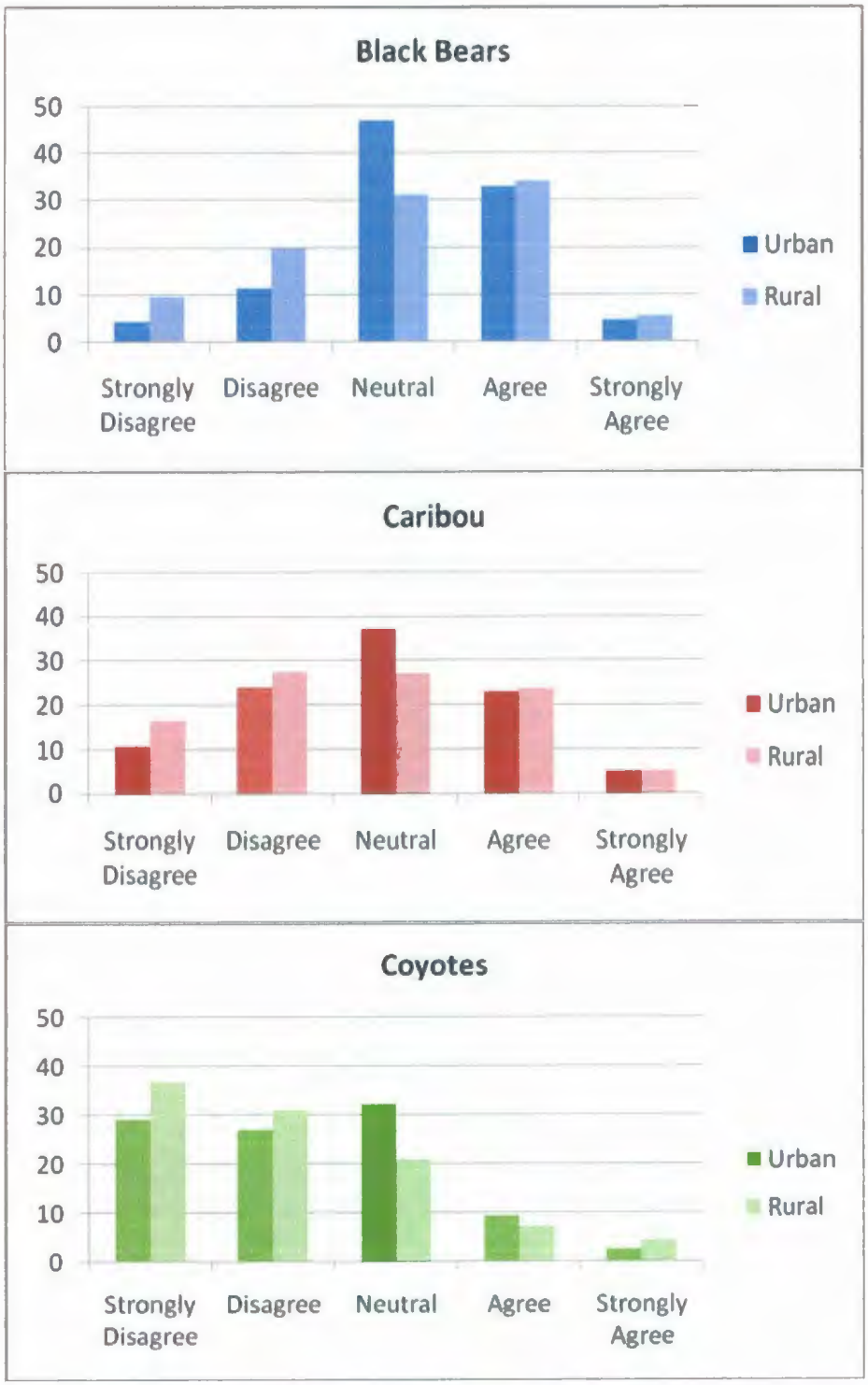

Figure 5. 9: The perceived effectiveness of the Newfoundland government agencies involved in wildlife management in managing caribou, black bears and coyotes.

5.5 Coyote Issues (Differences between the urban and rural residents)

In this section understanding factors affecting attitudes toward coyotes will be explored. To create separate attitude variables, all attitudes toward coyotes were explored in a principal component analysis. The literature (Zimmerman et al. 2001; Decker et al., 2001; Majic and Bath, 2010) suggests there should be three underlying themes that could explain attitudes: an affective component, a perception of impacts component and a fear element. In this Newfoundland-based research, clearly three components emerged with high loadings over 0.7 which could be labelled consistent with what the literature might suggest (Table 5.7). Cronbach's alpha reliability estimate, confirmed the consistency between the items within the component analysis: for attitudes 0.869, for perception of impacts 0.829 and for fear 0.821.

Table 5. 6: What is influencing respondents attitudes toward coyotes?

	Component		
	Attitudes	Perception of Impacts	Fear
Liking/Disliking	.791		
Future generation values	.873		
Existence values	.882		
Impact livestock		.725	.348
Impact hunting		.861	
Impact outfitters		.829	
Coyote attacks			.853
Afraid of coyotes presence			.908

Rural and urban residents were asked how they felt about specific methods of coyote control (Table 5.8). Approximately 45% of respondents agreed with shooting or trapping as many coyotes as possible year round. Respondents also agreed with trapping individual coyotes known to have killed livestock (44%), killing a coyote that was seen in a residential area (53%) and killing a coyote seen in your yard (59%). However, respondents disagreed with several of the management options including using poison (53%), killing pups (32%), introducing disease (67%), capturing and relocating coyotes (36%) and sterilizing coyotes (28%). The strength in attitudes varied across the management options. Where respondents agreed most strongly with killing a coyote if found in a residential area or yard, shooting or trapping as many year round. In contrast, residents disagreed most strongly with the use of poison. Given the negative attitudes toward coyotes there are still limitations in the type of management options people will accept to reduce them.

A principal component analysis concerning methods to control coyotes revealed three components. Items associated with killing coyotes grouped as one component, while a second component included the more extreme methods of control (e.g., use of poison and killing pups) and a third component emerged with variables that could be considered as less lethal methods of control (e.g., sterilizing coyotes and translocation). Cronbach's alpha reliability estimate confirmed the consistency between the first two components (0.843 and 0.679). The third component had a low reliability estimate (0.176), indicating that these items are not as inter-related as the PCA would suggest. This is evident also by the shared loading of two of these items on other components. However, since the items emerged mainly as a separate component, this indicates that there is some separation of individuals across these management options.

Table 5. 7: PCA: which type of coyote control do the respondents accept?

Rotated Component Matrix[a]

	Component		
	1	2	3
Shoot or trap as many coyotes year round	.804		
Trap individual coyotes known to have killed livestock	.548		.554
Capture and relocate coyotes	-.536		.636
Use of poison		.861	
Killing pups	.476	.632	
Sterilizing coyotes		.444	.584
Introducing disease		.771	
Killing a coyote is acceptable if it is seen in a residential area	.896		
Killing a coyote is acceptable if it is seen in your yard	.890		

Multiple regression analysis using coyote attitudes (i.e. liking/disliking coyotes) as the dependent variable was used to identify what variables could be used to predict attitudes (i.e. perception of impacts or fear). The results (Table 5.9) indicate several predictors of attitudes in order of their strength at predicting attitudes. The strongest predictor of negative attitudes is perception of impacts which explained about 27% of the variance. The respondents may have negative attitudes toward coyotes if they perceive they are causing impacts. Another predictor of negative attitudes is age: older respondents tend to be more negative in their attitudes toward coyotes than younger respondents. If the respondent has experience hunting big game in the last 3 years then this also predicts their attitudes toward coyotes where they may be more negative toward them. Fear is also a predictor of attitudes where more fear toward coyotes result in more negative attitudes toward coyotes. Gender is another predictor, where males may have more negative attitudes toward coyotes than females. Experience hunting a coyote, seeing a coyote and region (whether rural or urban) were included in the regression analysis but were not statistically significant variables in predicting attitudes. However, it should be noted that only 36% of the variance is explained by these variables for predicting attitudes suggesting that there are still other factors driving attitudes that need to be identified and further explored.

Table 5. 8: Regression: Which variables predict respondents attitudes toward coyotes?

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.525[a]	.275	.274	.95722
2	.562[b]	.316	.314	.93073
3	.576[c]	.332	.329	.92049
4	.594[d]	.352	.349	.90681
5	.601[e]	.361	.356	.90172

a. Predictors: (Constant), Perception of Impacts

b. Predictors: (Constant), Perception of Impacts, Age

c. Predictors: (Constant), Perception of Impacts, Age, hunted big game in last 3 years

d. Predictors: (Constant), Perception of Impacts, Age, hunted big game in last 3 years, Fear

e. Predictors: (Constant), Perception of Impacts, Age, hunted big game in last 3 years, Fear, Gender

Additional analysis was used to further explore the element of fear, identified as the third component important to residents in terms of their views about coyotes. Tukey's *honestly significant difference* test (HSD) uses the studentized range statistic to make multiple comparisons between a large number of categories (Vaske, 2008). This test determined how fear, which was found to be a predictor of attitudes in the previous analysis, varied across the respondents (Table 3.10). As the t-test revealed that there was no significant difference between the means of the two groups (urban and rural) concerning fear of coyotes ($t = 1.728$, $p = 0.084$), the two groups were analyzed together to further understand this fear element. The results from the post hoc comparison test shows that people with the most negative attitudes toward coyotes are the group of people who are most afraid of coyotes. People who have less negative attitudes toward coyotes

are the least afraid of coyotes. This indicates that the level of fear one has about coyotes tends to influence their attitudes. The previous multiple regression analysis also supports this finding but the issue becomes even more evident when examining the results in Table 5.10.

Table 5. 9: Regression: How a person feels about coyotes compared to their perception of fear of coyotes.

Tukey b

		Fear of hiking in the woods if coyotes were present. Subset for alpha = 0.05		
How you feel about coyotes	N	Most Afraid	Afraid	Not Afraid
Strongly dislike (1.0)	227	1.5609		
Dislike (2.0)	217		2.0108	
Neutral (3.0)	142		2.3028	2.3028
Like (4.0)	91			2.4579
Strongly Like (5.0)	51			2.4706

Means for groups in homogeneous subsets are displayed.

The multiple regression analysis reveals which variables may predict attitudes towards the control of coyotes (Table 5.11). The predictors of the dependant variable of coyote control are: attitudes toward coyotes, beliefs of coyote numbers, experience hunting big game in last 3 years and gender. Nearly half of the total variance was explained (48.5%) by these variables for predicting killing as a form of coyote control. Attitudes emerged as the strongest predictor of coyote control, where negative attitudes toward coyotes lead to greater acceptance of coyote control. Beliefs of coyote numbers also emerged as a strong predictor; respondents who believed that coyotes were increasing were more likely to support control options. If the respondent had more

experience hunting then they would be more supportive of controlling coyotes. Finally, gender also emerged as a predictor of coyote control where males supported lethal methods of control more than females.

Table 5. 10: Regression: Which variables predict how respondents want coyotes controlled?

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.648[a]	.419	.418	.85750
2	.682[b]	.465	.464	.82352
3	.694[c]	.482	.480	.81107
4	.699[d]	.488	.485	.80708

a. Predictors: (Constant), Attitudes

b. Predictors: (Constant), Attitudes, Beliefs of coyote numbers

c. Predictors: (Constant), Attitudes, Beliefs of coyote numbers, experience hunting big game in last 3 years

d. Predictors: (Constant), Attitudes, Beliefs of coyote numbers, experience hunting big game in last 3 years, gender

5.6 Behavioural Intention/ Credibility Conflict (Differences between the species and urban and rural residents)

Thus far affective and cognitive conflicts and issues have been explored across the three species and between urban and rural residents. The behavioural intention component of attitudes explores conflicts not only concerning management options but also in credibility of the agency involved in making the decisions (Mitchell, 1977).

Residents stated that they would believe most of the information about wildlife if it was provided by the Wildlife Division ($\bar{x}_U$= 3.69, $\bar{x}_R$= 3.60) (Table 5.12). The urban residents (57%) believed more of the information from the Wildlife Division than the rural residents (51.4%) (Figure 5.10). However, this means that the other 43% of the population does not believe information provided by the Wildlife Division. The Newfoundland Wildlife Federation ($\bar{x}_U$= 3.66, $\bar{x}_R$= 3.55) and IBES ($\bar{x}_U$= 3.47, $\bar{x}_R$= 3.22) also have a high degree of credibility but, not as much as the Wildlife Division. In contrast, only half of the information provided from Provincial Tourism (urban- 33.9% and rural - 34.1% respectively), and the Outfitters Association (urban - 37.2%, rural- 33.9%) would be believed. Newfoundland trappers had higher credibility with rural residents than the Protected Areas Association, Provincial Tourism or the Outfitters Association. In contrast, for urban residents the Protected Areas Association had much higher credibility than the other organizations. This suggests that when deciding who should deliver information about these species it should be from a different source depending on the whether it is reaching rural or urban residents.

Newfoundland residents receive most of their information on provincial wildlife issues from the television or newspapers (Figure 5.11). A total of 57.7% of urban residents and 64.3% of rural residents obtain their information from the television, while 45.7% of urban residents and 35.3% of rural residents obtain their information from newspapers. Thus to effectively reach the targeted rural and urban residents these media should be prioritized. Interestingly, while radio has been used to communicate messages

about wildlife-related issues, these results suggest that the focus should be on different media.

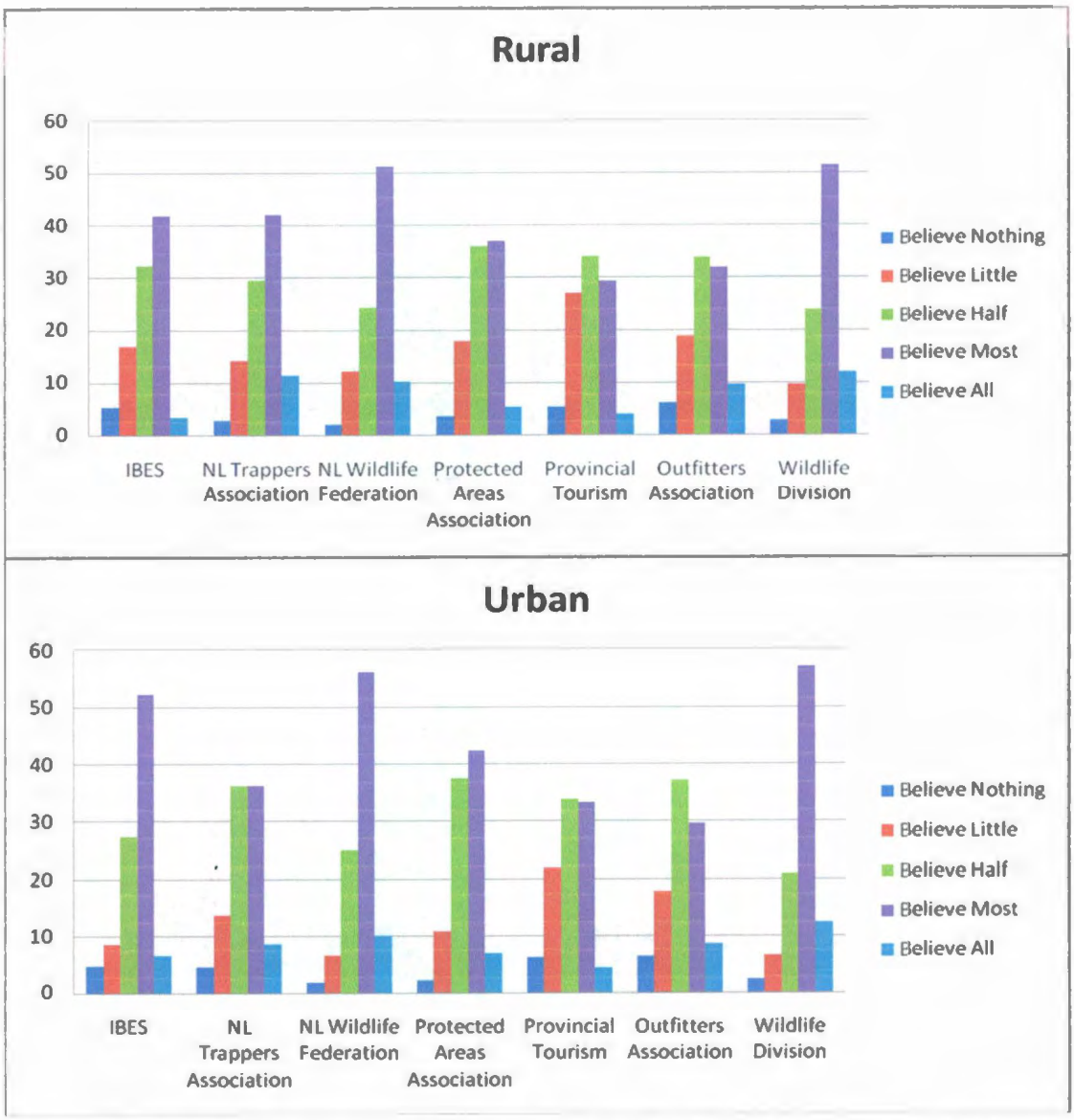

Figure 5. 10: Organizations Newfoundlanders believe that provide information about caribou, black bears, and coyotes.

Table 5. 11: Organizations Newfoundlanders believe that provide information about caribou, black bears and coyotes (Mean $\bar{x}$).

Organization	Urban $\bar{x}$	Rural $\bar{x}$
IBES (Institute of Biodiversity, Ecosystem Science and Sustainability)	3.47	3.22
Newfoundland Trappers Association	3.31	3.45
Newfoundland Wildlife Federation	3.66	3.55
Protected Areas Association	3.41	3.23
Provincial Tourism	3.07	3.00
Outfitters Association	3.16	3.20
Wildlife Division	3.69	3.60

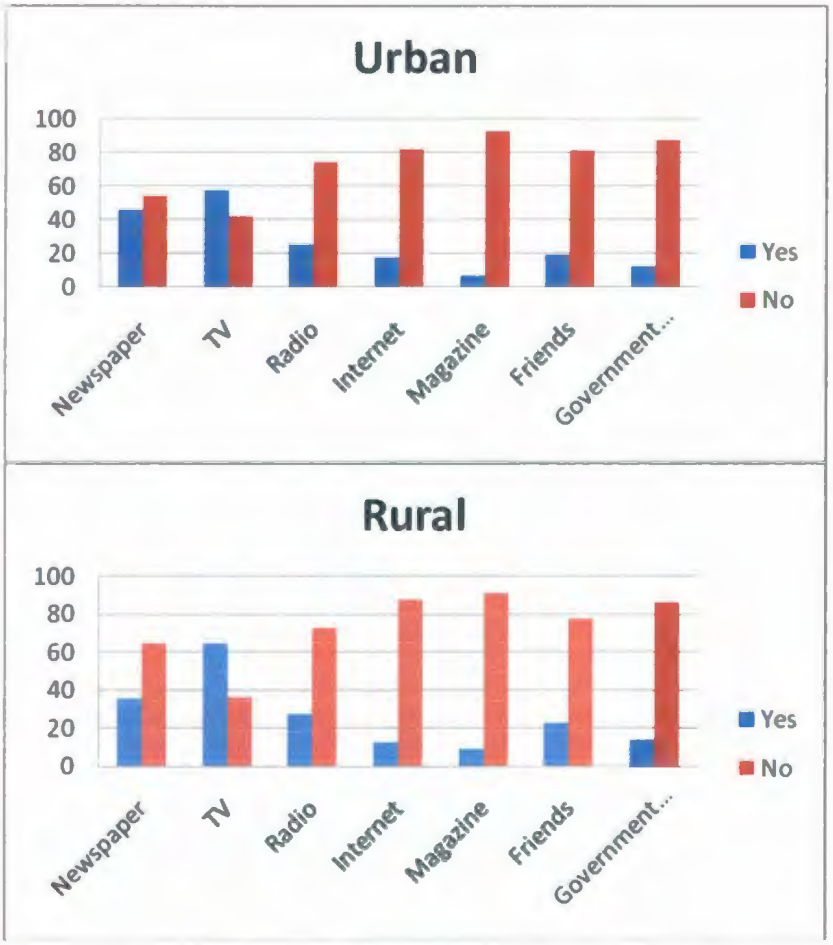

Figure 5. 11: Where Newfoundlanders get most of their information about wildlife issues in the province.

As predicted by attitude theory, the affective and cognitive components of attitude were important for understanding the behavioural intention component, which is measured by intention to support or oppose management options. By exploring the attitudes and beliefs that influence the behavioural intention, this research follows the attitude theory and allows managers to have a better understanding of why support or opposition toward management options exist. Exploring credibility conflicts helps managers address image issues of their own agency. In addition, such knowledge

provides an indication of not only what the message should be (e.g. addressing fear toward coyotes) but who should deliver it (i.e. Protected Areas Association to urban, Wildlife Divisions to rural). Understanding how a representative group of urban and rural residents feel about management options allows managers to select and move forward with effective management planning. Knowing the cognitive conflicts (e.g. fear), value conflicts (e.g. future generation values) and behavioural conflicts (e.g. credibility of management organizations) is the first step toward building consensus and achieving conflict resolution.

Chapter 6: Discussion

"Government never listens to people, they seem to listen to people who know nothing about wildlife or have never hunted in their life. We have too many people in wildlife who know nothing about wildlife." - Respondent

When there is a perceived conflict human dimension research provides insight to the relationship among attitudes, beliefs and behavioural intentions (Fulton et al. 1996, Treves, 2006). Human dimensions allows for an understanding of human-wildlife interactions. This enables the facilitation of effective wildlife management at a local or regional scale (Kretser et al., 2009). Throughout the exploration of attitudes across the urban and rural residents on the island portion of Newfoundland and Labrador several themes and patterns emerged regarding black bears, caribou and coyotes. In contrast to the opening quote, through this research the Newfoundland government can listen to the concerns of residents, and target management options toward particular groups.

Throughout human dimension research an emphasis is placed on the importance of considering all of the interest groups when beginning management planning. Human dimensions has influenced wildlife management by including the people, however it can be enriched by considering multiple species within the same study. The relationship between species is complex and their interactions within the ecosystem can contribute toward understanding the attitudes, values and beliefs represented by the people. By considering the influence of the perceived interrelationship among species it will lead toward sustainable wildlife management. This study has involved the public at the beginning of management planning. By studying multiple species at the same time, it

provides an understanding of the perceived relationship between the species and the attitudes and values people have toward them.

6.1 Attitudes, Experience and Fear

6.1.1 Black bears and Caribou

Across the island portion of Newfoundland the urban and rural population value the existence and presence of black bears and caribou for future generations. Positive attitudes toward black bears and caribou are reflected among all ages, across gender and independent of whether they have had experience hunting them or seeing them in the wild. For caribou, these attitudes are expected as we see in the pattern across the rest of Canada and elsewhere where populations of caribou are declining. When an animal becomes threatened people generally develop more concern towards it (Manfredo, 2008). Fear toward black bears and caribou in Newfoundland is low. For black bears this lack of fear is in contrast to other regions such as New York, where perception of risk caused by human-wildlife interactions in parks is amplified through media attention the topic receives and creates higher sense of fear (Gore et al, 2005; Siemer et al., 2007). In New York, considerable human dimension research has been conducted as a response to perceived human-wildlife conflicts (Carlos et al., 2009; Kretser et al., 2009; Siemer et al., 2009). However, it is evident by the attitudes of the rural and urban general public in Newfoundland that they value black bears existence and they have little interest in reducing the population which they believe is stable.

6.1.2 Coyotes

Across North America the arrival of coyotes to a region has been met with attitudes shifting through stages of control, tolerance, acceptance and coexistence. The recent expansion of coyotes to the island portion of Newfoundland and Labrador has resulted in predominantly negative attitudes where there is little tolerance, and a desire to control the population. While the questionnaire focused on coyotes it was clear from additional written comments that even those that had not thought much about coyotes before quickly developed opinions toward them. One respondent said:

"I don't know much about the habits of bear or caribou, but I know even less about coyotes. I realized after I filled this out that I seem to be an anti-coyote. I think it's because they are newly arrived and we are used to bears and caribou cohabitating with us, with few encounters."

There are several possible reasons which can explain the negative attitudes toward coyotes in Newfoundland. As found within the literature (Decker et al., 2001; Bath & Enck, 2003), on the island portion of Newfoundland perceptions of impacts are the strongest predictor of attitudes toward coyotes. If people believe that a coyote is going to cause damage, (especially economic), then they will resent it being in their area (Messmer, 2000). Perception of negative impacts caused by coyotes is strong within the province, and even more so among rural residents. Rural residents tend to be more negative because they are often the most impacted since they live in such close proximity to wildlife (Heberlein and Ericsson, 2005). The rural residents tend to have seen coyote's

more than urban residents and have had the most negative experiences. One rural respondent commented:

"My family (brothers) have lost many, many lambs and sheep because of coyote which is part of their livelihood therefore I think everyone should be able to kill coyote they are of no value to anyone."

Demographic variables, particularly age and gender, are linked to more negative attitudes toward carnivores (Kaczensky, 2004; Kretser, 2009). However, this does not mean that as people grow older their attitudes become more negative but instead it is a characteristic of the values of that particular generation (Majic & Bath, 2010). The largest portion of the sample was males over 40 years of age, the nature of the sample may have contributed to the portion of negative attitudes measured. This does not necessarily reflect that young people are disinterested but the demographics of the province which is an older population. In the future it may be useful to conduct a study targeting the younger people. As literature suggests that younger people support conservation and oppose control (Freudenburg, 1991; Agee and Miller, 2009; Majic and Bath, 2010). However, this is difficult to generalize across all regions especially where hunting and fishing is an inherent tradition. There was a relatively even split between males and females among the urban respondents, however there were nearly twice as many male respondents than female in the rural areas. Males are usually less likely to oppose management options particularly lethal methods of control than females (Teel et al, 2002; Agee & Miller, 2009). Therefore, the negative attitudes and favour toward control methods among rural respondents may have been influenced by the predominance of males within that sample.

Experience with wildlife contributes to the formation of attitudes. A negative experience will often influence the negative attitudes a person develops (Decker et al., 2001; Kretser et al., 2009). For example, those that experienced loss of livestock due to coyote predation would have more negative attitudes toward coyotes and favour control methods. Experience in the context of this study included any resident that lived for an extended period of time in a rural area, had seen the species in the wild, or had hunted the species or any big game in the last 3 years. Most people had lived for a long period of time in their current community and had seen at least one of the three species. Therefore, it is important to consider this group when decisions are made as those directly connected to the wildlife conflict inevitably determine success of the implemented management Manfredo, 2009).

Fear is another variable that influences negative attitudes toward the species (Zimmerman et al., 2001; Kaczensky, 2004). On the island portion of Newfoundland and Labrador, people who are afraid are more negative toward coyotes, even if they have more experience (i.e. live in rural areas). Perhaps it is the close proximity to the wildlife or the increased chance on a daily basis that they have of an encounter which makes them more afraid. At the time of the study, Newfoundlanders expressed fear toward coyotes, that they were afraid to hike in the woods, they were afraid to let their children alone outside or go berry-picking. One respondent commented:

"What will these animals turn to when the caribou is gone for food-our children?"

Recognizing that fear is a cause of the wildlife conflict is important as it can be addressed through management planning (Treves & Karanth, 2003). Fear is related to information people have about a particular issue and their level of knowledge and fear can be increased from media attention a topic receives (Gore et al., 2005; Gore & Knuth, 2008). Coverage of a recent coyote attack in Cape Breton, Nova Scotia has inevitably increased awareness in this already present fear (Moore, 2010). Fear may be increasing among the urban residents as recent media coverage across the Avalon region of the province describes coyote sightings in communities such as Torbay and Conception Bay South. In response to this the town of Torbay's website has issued a public notice concerning coyotes and a link to the Department of Environment and Conservations website on "Living with Coyotes in Newfoundland and Labrador" (Town of Torbay, 2010; Department of Environment and Conservation, 2010). Upon realizing coyotes had been seen in the community, Middle Cove, Logy Bay and Outer Cove also made residents aware with a notice within their newsletter. The message was mainly one of how to reduce coyote-human interactions (e.g. feed pets indoors), but it stressed that many communities have learned to coexist with coyotes.

6.2 Management and Coexistence

6.2.1 Black Bears and Caribou

"I truly believe the gov't has waited too long to effectively manage the caribou herds and they will very soon go the way of the codfish." - Respondent

In human dimension research, the strength (i.e. strongly disagree and strongly agree), direction and the percent of neutral attitudes are important for understanding

behaviour (Majic & Bath, 2010). Strong attitudes that are positive or negative are better predictors of behavioural intention, while neutral attitudes represent those that can easily change (Prislin1996; Verplanken et al. 1998). When residents were asked if they felt that the Newfoundland government was effectively managing the species they responded with mostly neutral attitudes toward black bears and caribou. The urban residents had even higher percentages of neutral responses than rural residents. While implementing management options for this largely neutral portion of the public may be easier than those who strongly disagree or agree, the fact that neutral attitudes are present indicates that respondents are unsure if the wildlife agencies are effectively managing the species. This should be of concern for the agencies involved in making decisions, as support and awareness of current management ensures its effectiveness.

The urban and rural general public was split on whether killing black bears in a residential area or yard was acceptable. This is likely highly dependent on the situation and whether the bear is a perceived threat (Agee and Miller, 2009). It was clear that residents did not want caribou killed although the acceptability of regulated harvests was not included in the questionnaire. These results support previous research on perceptions of human-wildlife interactions where respondents from an urban background are less likely to accept methods of lethal control (Teel et al., 2002; Heberlein and Ericsson, 2003; Treves and Karanth 2003).

The current biological research reveals that black bear predation is causing more of an impact to the caribou population than coyotes. However the human dimension results indicate that the public believed differently. The attitudes toward coyotes were

clearly influenced by the perception that coyotes are significantly contributing toward the caribou decline. One way to begin influencing this perception is to target educational information emphasizing that predation by several species is the major cause of deaths of calves and this is contributing toward the overall decline.

6.2.2 Coyotes

In Newfoundland the attitudes toward coyotes are extremely negative compared to other regions of the world with similar or much greater carnivore conflicts. This is reflected in comments such as this one from a respondent:

"To me coyotes are very sly and dangerous. Wildlife have a right to live as much as human beings but like I've said coyotes should be done away with. I like animals but I do not like coyotes."

In Croatia, wolves were seen as vermin which is similar to the view in most parts of the world. Wolves have always been present in Croatia and are recently increasing, which has prompted attempted eradication and illegal killings. However, despite the negative attitudes residents have positive future generation and existence values toward the species (Bath and Majic, 2000; Majic and Bath, 2010). In France, wolves have recently expanded their range into densely populated regions. People may not like wolves but future generation and existence values are still important to them (Bath, 2000). In Newfoundland, people not only strongly dislike coyotes but they have no future generation or existence values. If people are not willing to share space with coyotes that have become part of the landscape, it has implications for management and the future of the species.

In other regions throughout North America the arrival of a new species has been met with limited local tolerance and a desire to eradicate the species. However, even with significant funding put in to coyote removal, such plans remain ineffective for long term population control (Fox and Papouchis, 2005). A pattern emerges in human wildlife conflicts where residents move from no tolerance to acceptance of sharing space with these species and eventually to coexistence in the natural environment. Newfoundland is at the first stage of the human wildlife conflict where there is no tolerance. Since it is an island some of the public may feel it is possible to eliminate a species; it has been done in Britain with coypu (Baker, 2006) and rats on islands off the coast of New Zealand (Taylor and Thomas, 1989). However, coyotes in Newfoundland have a large home range across largely inaccessible habitats, and the possibility to continuously cross the Gulf in years of heavy pack ice places significant limitations for eradication efforts. Even if eradication was possible, the public may not support attempted killing of so many animals, as it was found they were resistant to certain types of lethal control (i.e. use of poison, killing pups). Newfoundland could repeat the history of wolf eradication and try to eradicate coyotes by spending huge amounts of money in these efforts and more than likely continue to face public opposition on the process. Already in history there has been a movement toward tolerance. As societal values have changed it is evident that certain methods of control are no longer accepted. This reveals that through adaptive learning tolerance can change over time. It is important for the Newfoundland government invest in active public engagement, education and to continue building tolerance which will lead toward coexistence.

Coexistence may seem like an unreachable option at the moment, but it is an inevitable management strategy if we look at other regions. For example, the history in Marin County, California is similar to that of other regions throughout the United States. There was an attempt to eradicate coyotes more than 50 years ago through trapping and poisoning campaigns. In the last 20 years coyotes have returned to the area and lethal control was again used up to the year 2000 when a non-lethal predator management plan was implemented due to public controversy (Fox, 2001). This region has a large agriculture area and assistance is provided to encourage non-lethal methods such as livestock guarding dogs and improved fencing which has reduced damage to livestock. In suburban areas of Marin County, conflict with coyotes has been mitigated through community education programs that began in 2000 which encourage non-lethal control methods and coexistence (Fox, 2006)

Vancouver is an example where coexistence with carnivores has been achieved in one of the most challenging settings, an urban landscape. When the coyotes began moving into the city they attacked pets and bit some children which created concern among residents. However, from the beginning city officials and wildlife officers chose not to cull coyotes. Media reports documented responses and complaints of certain incidents but government agencies were unable to provide consistent information regarding the conflict. A University of British Columbia master's student provided foundational information for understanding the ecology of coyotes in an urban environment and enabled decision makers to move forward toward an appropriate management plan (Webber, 1993). Information that was obtained on public attitudes and

beliefs helped identify key concerns and target messages. It was found that Vancouver residents were willing to change and adapt their lifestyles to exist with wildlife in the city. The co-existence program was initiated in 2001, and was an applied human dimension workshop approach based on the involvement of several interest groups (e.g. SPCA, wildlife officials and animal control). The program provides accessible information through a variety of media on co-existing with coyotes, and therefore reduces the human-wildlife conflict. The educational campaign is extensive, including an information hotline, signs, a website with a place to report sightings and even cards that people can put in a neighbour's mailbox if they are doing something that is attracting coyotes (Stanley Park Ecology Society, 2010). The program is so effective that it is a model for urban coyote management, and similar programs are adopted by municipalities across Canada and the United States every year (Fox, 2006; Stanley Park Ecology Society, 2010). By working with all the interest groups and addressing behavioural conflicts it was possible for this program to succeed. As coyotes increasingly are seen in surrounding communities of St. John's, the capital city, and eventually within the city, the next steps seem to be to work with people rather than against coyotes.

The advantage of knowing the progression in other regions of the world is that currently in Newfoundland we have the opportunity to skip the step of attempted eradication. We can act on science instead of political pressure for immediate action and instead have successful management in the long term at a reduced cost. In Newfoundland we can choose a coexistence campaign as they have done in Vancouver immediately, and

apply it on a largely rural landscape where the wilderness has always been an integral part of the culture. One respondent wrote:

"I am not in favour of coyotes living in Newfoundland. That being said, there is very little that can be done about it after the fact they are here now and they came here naturally..."

Another respondent commented:

"I believe that many people see coyotes as a threat, but I believe they have just as much right to be here as the moose and caribou."

Even though people appear to dislike coyotes it does not mean that they are unwilling to learn how to share the landscape with them. However, the first step toward effective coexistence is to have messages delivered through a source that is trusted and through a medium where people most often obtain their information.

6.3 Credibility

"I gather you are trying to ascertain the public's opinion on coyotes. Unfortunately I have no real knowledge of those animals or their behaviour. Any information I have has been gathered from what is possibly biased comments made through the media. Hunters and big game outfitters seem to feel negatively towards these creatures. I feel it would be preferable if all these animals could co-exist." - Respondent

The media has devoted a great deal of attention to the decline in caribou populations as they are extremely important to Newfoundlanders and considered a cultural symbol of the province. One respondent describes this connection:

"Caribou are nature's dancer's they walk so gracefully. When we were a country the caribou was a proud symbol and they mean a great deal to us."

In newspaper articles, coyotes are often identified as the cause of the decline of caribou and other predators such as the black bear are rarely mentioned. This has inevitably influenced attitudes of those who obtain their information from this source. One respondent commented:

"The caribou is such a majestic animal it would be a shame if they are being destroyed as you often hear by the coyotes plus the coyotes are not even nice to dogs."

Newspaper articles focus on the threat the caribou decline has to outfitters, farmers and recreational hunters. However, it is evident that the caribou are not only important to these specific interest groups but also those in the general public who enjoy wildlife viewing and value the existence of caribou for future generations.

In human dimensions research, wildlife conflict is often related to trust in the agency involved in making decisions. For wildlife management it is important to consider the possible credibility conflict as it can influence behaviour (Messmer, 2000; Treves et al., 2006; Vaske et al., 2007). Proposed management objectives may continue to fail if they are provided through a messenger that has no credibility. In Newfoundland it was found that the urban and rural general public believed most in the Wildlife Division and

the Newfoundland Wildlife Federation, while they believed little in Provincial Tourism and the Outfitters Association. This would indicate that if communication messages are to be given it should be issued from either the Wildlife Division or the Newfoundland Wildlife Federation. While the Outfitters may have a loud voice based on the media coverage, this organization is not trusted by the rural and urban general public for the information it provides. However, it is important to note that even though the Wildlife Division is believed most by the people almost 50% still do not believe all of the information from this source. In the future, it would be worthwhile to determine which areas of this agency are less credible as trust in the agency is key for successfully delivering messages.

Newfoundland residents indicated that they receive most of their information about wildlife from the television and newspapers. The focus within the media on coyotes as the cause of the caribou decline and the negative impacts to various individuals of different interests is possibly a contributor to the attitudes toward these species. Within the media, the organizations trusted most such as the Wildlife Division is rarely mentioned possibly due to government policies regarding interviewing employees. As the internet was not identified by rural or urban residents as a forum for information, the current "living with coyotes in Newfoundland and Labrador" information on the Department of Environment and Conservation's website may not be reaching the desired audiences. Therefore by knowing where the credibility lies for urban and rural Newfoundlanders and where they obtain their information about wildlife, managers can move toward focusing communication efforts more effectively. Communication is not

only about "talking" to people but about "listening" effectively. An active engagement of community residents within the rural and urban landscapes must occur and this study is a first step toward that. Active human dimension facilitated workshop sessions like those used to address caribou decline issues in Ontario, Alaska and the Northwest Territories may be needed here in Newfoundland with all of the key interest groups (Decker et al., 2006; Ontario Woodland Caribou Recovery Team, 2008; Beverly and Qamanirjuaq Caribou Management Board, 2010). The information obtained from these workshops will be integrated into management planning where decisions are made based on group consensus.

6.4 Future Direction

As this is the first human dimension study regarding these three species on the island portion of Newfoundland it cannot answer all of the questions, or address all of the social science research needs of the provincial government decision-makers. The results of this study can be integrated into management planning to provide direction for the focus of future research such as follow-up studies and community workshops. By using an applied human dimension approach to integrate the biological and human dimension information the next steps toward wildlife management can be taken (Decker et al., 2001, Treves & Karanth, 2003).

Communication messages are important for influencing attitudes of the urban and rural general public. In contrast to what the biological research suggests, residents believed that black bear populations were remaining the same, and that they were not a major predator to caribou. Residents believed that coyotes are significantly increasing and that they were

the major predator to caribou and the cause of the decline. This could be an area where education messages are targeted. Information should be directed not to decrease the tolerance for bears but, to inform the public that coyotes are not the sole contributing factor in the caribou decline. This will be most effective if the source trusted the most (i.e. Wildlife Division) delivers the message using the media where people obtain most of their information (TV and newspaper). Communication messages should include educational information about the species such as behaviour, risk of encounter and how to react when seeing wildlife which can help mediate the negative attitudes (Agee & Miller, 2009). To incorporate different levels of knowledge information should be directed differently toward different segments of the public (Kaczensky et al., 2004). This will help limit future human-wildlife conflicts by influencing the negative perceptions and allowing tolerance (Kretser et al., 2009). Continuing to monitor attitudes in the future as they evolve with changing population dynamics and societal values will be important for determining if the rural and urban population is effectively moving toward acceptance and coexistence with the species. By focusing future research on specific interest groups through community workshops or follow-up surveys their values, attitudes and beliefs can be effectively integrated into management planning.

6.5 Conclusion

"Hope the results of your study will allow for sustainability of most species, and help avoid endangering others. Balance will help." - *Respondent*

Human dimensions is an applied research field which integrates biological and human dimension information to create an effective wildlife management plan that

considers the ecology of the species and the human landscape. Without public support for wildlife management initiatives, human wildlife interactions will continue to increase and the conflict become increasingly complex (Treves and Karanth, 2003). One purpose of human dimensions is to monitor attitudes as they change over time. By doing so conflicts can be addressed before they arise and management plans adapt to changing societal values. In Newfoundland, a human dimension study of this design has never been done on caribou, black bears and coyotes. An examination of three species at the same time across urban and rural residents provides the ground for a unique comparison that fits among few other studies in the human dimension field.

"The value of other species to humans and their role in the ecosystems they historically inhabited lies not merely in their continued existence, but in their existence in a given place or places" (Carroll et al., 2010). As human populations continue to use resources the traditional landscape changes and wildlife patterns adapt. The perception of human-wildlife conflict is influenced by the historical presence of wildlife in a place. While Newfoundlanders may be more willing to support the existence of a species that has always been present, they need to acknowledge that human induced habitat changes throughout the last century have altered the ecosystem. By understanding attitudes toward multiple species it is possibly to recognize the value of species to the people in a particular place.

In Newfoundland, it is clear that negative attitudes toward coyotes are linked to the beliefs they are a cause of the caribou decline through predation. Perceptions of impacts and fear of coyotes is also influencing residents concerns. If we understand the

dimensions influencing negative attitudes then it is possible through communication and education to direct messages influencing these perceptions. In order to achieve coexistence it is important to convey biological and awareness information to the public in a way which reflects the concerns of that particular segment of the population. These messages could be directed broadly, such as the rural or urban population or more specifically to rural males over 40 years of age. As the populations of black bears, caribou and coyotes increase or decrease in the future and rural-urban dynamics continue to change, monitoring attitudes may ensure effective wildlife management. This research provides an opportunity to document attitudes from the beginning of the perceived human-wildlife conflict. By using this knowledge, there is an opportunity to take into consideration the patterns observed in other regions of Canada and the world and move from limited tolerance to co-existence. Biological wildlife management can only go so far before understanding the people and their complex interactions with the natural environment becomes the more important focus for successful wildlife management.

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Appendix 1: Questionnaire

Memorial
University of Newfoundland

What Do You Think About Black Bears, Caribou and Coyotes?

Memorial University of Newfoundland in cooperation with the Department of Environment and Conservation's Wildlife Division and Sustainable Development and Strategic Science Branch, IBES (Institute of Biodiversity, Ecosystem Science and Sustainability) are interested in learning more about Newfoundlander's opinions toward black bears, caribou and coyotes on the island portion of the province. Thank you for agreeing over the phone to take a few minutes to answer the following questions and return this as soon as you can. Your answers, combined with those of other residents, will provide valuable insights into the way people of Newfoundland feel about these species and how they should be managed. Your responses, whether against, in favor, or neutral, are valuable, and we encourage you to answer all of the questions. Your individual answers will be grouped with those of others, and individual responses will be kept strictly confidential. Thank you very much for your help with this project. If you have any questions please feel free to call Maggie at 709-749-2312.

Sincerely,

Dr. Alistair Bath

Project Supervisor

Maggie Sutherland

Site Project Coordinator

SECTION A: The first few questions ask about your feelings toward black bears, caribou and coyotes. Please circle your response.

2

1. Which best describes your feelings toward the following species?

	Strongly Dislike	Dislike	Neither	Like	Strongly Like
Black Bears	1	2	3	4	5
Caribou	1	2	3	4	5
Coyotes	1	2	3	4	5

To continue, we are going to list a series of statements. Please circle the response that best describes your opinion according to the following scale:
1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2. It is important to maintain populations of the following species in Newfoundland for future generations					
Black Bears	1	2	3	4	5
Caribou	1	2	3	4	5
Coyotes	1	2	3	4	5
3. Whether or not I would get to see the following species it is important to me that they exist in Newfoundland					
Black Bears	1	2	3	4	5
Caribou	1	2	3	4	5
Coyotes	1	2	3	4	5
4. It is important for humans to manage wildlife populations in Newfoundland	1	2	3	4	5
5. I would be willing to co-exist with coyotes in Newfoundland	1	2	3	4	5
6. Coyotes cause significant damages to livestock in Newfoundland	1	2	3	4	5
7. Coyotes significantly reduce hunting opportunities for big game animals	1	2	3	4	5
8. Coyotes are a significant negative impact on the outfitting industry in Newfoundland	1	2	3	4	5
9. I believe that healthy coyotes would attack a human without any reason	1	2	3	4	5
10. I would be afraid to hike in the woods if coyotes were present	1	2	3	4	5

3

11. In your opinion, how dangerous to people, if at all, are the following animals? Please mark an 'X' on the line.

	Harmless	Dangerous
Black Bears	I----------	----------I
Caribou	I----------	----------I
Coyotes	I----------	----------I

Instructions: In the next question we want your opinion on what is the biggest cause of the decline in caribou. We would like you to compare each possible reason with the others. Here is an example of how this works.

Example: If you preferred roses (A) to every other flower lilies (B), tulips (C), daisies (D) and dandelions (E) you would circle four "A's" in the first column, if you preferred tulips (C) to lilies (B) you would circle "C" and so on until comparisons have been made with each flower.

	Roses A	Lilies B	Tulips C	Daisies D	Dandelions E
Roses A					
Lilies B	A or B				
Tulips C	A or C	B or C			
Daisies D	A or D	B or D	C or D		
Dandelions E	A or E	B or E	C or E	D or E	

12. What is the biggest cause of the decline in caribou?

	Black Bears A	Coyotes B	Disease C	Eagles D	Hunting E	Logging F	Lynx G
Black Bears A							
Coyotes B	A or B						
Disease C	A or C	B or C					
Eagles D	A or D	B or D	C or D				
Hunting E	A or E	B or E	C or E	D or E			
Logging F	A or F	B or F	C or F	D or F	E or F		
Lynx G	A or G	B or G	C or G	D or G	E or G	F or G	

SECTION B: The next few questions ask your beliefs about black bears, caribou and coyotes. Please circle or fill in the blanks with a response that you feel best answers the question.

1. How many of each do you believe currently exist on the island portion of Newfoundland?

Number of:	Not Sure	Is This: Too Few	About Right	Too Many
_____Black Bears	❑	❑	❑	❑
_____Caribou	❑	❑	❑	❑
_____Coyotes	❑	❑	❑	❑

2. Do you believe the numbers of the following species in Newfoundland are currently:

	Significantly Decreasing	Slightly Decreasing	Remaining The Same	Slightly Increasing	Significantly Increasing
Black Bears	1	2	3	4	5
Caribou	1	2	3	4	5
Coyotes	1	2	3	4	5

3. How much does the average adult male coyote weigh in Newfoundland? Please specify whether your answer is in pounds _____(lbs) or in kilos _____(kg) Not Sure ❑

4. Do coyotes hunt and kill prey in packs in Newfoundland?

Definitely No ❑ Probably No ❑ Probably Yes ❑ Definitely Yes ❑ Not Sure ❑

SECTION C: The last few questions ask about your feelings toward various management practices concerning black bears, caribou and coyotes. Please circle the response that best describes your opinion, using the following scale: **1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree.**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. There should be a fee paid to hunters for a coyote carcass	1	2	3	4	5
2. Livestock owners that lose livestock due to coyote attacks should be compensated	1	2	3	4	5
3. Populations of the following species should be controlled					
Black Bears	1	2	3	4	5
Caribou	1	2	3	4	5
Coyotes	1	2	3	4	5
4. I feel the Newfoundland government agencies involved in wildlife management:					
Share similar values as me	1	2	3	4	5
Take similar actions as I would	1	2	3	4	5
Are making the right decisions	1	2	3	4	5
5. I feel Newfoundland government agencies involved in wildlife management are effectively managing the following species:					
Black Bears	1	2	3	4	5
Caribou	1	2	3	4	5
Coyotes	1	2	3	4	5
6. Which methods would you approve of using to control coyotes:					
Shoot or trap as many coyotes year round	1	2	3	4	5
Trap individual coyotes known to have killed livestock	1	2	3	4	5
Capture and relocate coyotes	1	2	3	4	5
Use of Poison	1	2	3	4	5
Killing pups	1	2	3	4	5
Sterilizing coyotes	1	2	3	4	5
Introducing disease	1	2	3	4	5

7. Killing the individual animal would be acceptable when:	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
A Black Bear is seen in a residential area	1	2	3	4	5
A Black Bear is seen in your yard	1	2	3	4	5
A Caribou is seen in a residential area	1	2	3	4	5
A Caribou is seen in your yard	1	2	3	4	5
A Coyote is seen in a residential area	1	2	3	4	5
A Coyote is seen in your yard	1	2	3	4	5

8. Of the following organizations that could give you information about black bears, caribou and coyotes what, if anything, would you believe?

	Believe Nothing	Believe Little	Believe Half	Believe Most	Believe All
IBES (Institute of Biodiversity, Ecosystem Science and Sustainability)	1	2	3	4	5
Newfoundland Trappers Association	1	2	3	4	5
Newfoundland Wildlife Federation	1	2	3	4	5
Protected Areas Association	1	2	3	4	5
Provincial Tourism	1	2	3	4	5
Outfitters Association	1	2	3	4	5
Wildlife Division	1	2	3	4	5

9. Where do you get <u>most</u> of your information about Newfoundland wildlife issues? <u>Please check 2.</u>

Newspaper ❑ **TV** ❑ **Radio** ❑ **Internet** ❑

Magazine ❑ **Friends** ❑ **Government Reports** ❑

10. On a scale from 1 to 10, how important is the issue of caribou management in Newfoundland to you personally?

Not important 1-----2-----3----- 4---- -5---- -6-----7----- 8----- 9-----10 Extremely important

SECTION D: With respect to you. Please circle your response.

1. Are you: 1) Female 2) Male

2. What is your approximate age?

a) 20-24 b) 25-29 c) 30-34 d) 35-39 e) 40-44 f) 45-49 g) 50-54

g) 55-59 h) 60-64 i) 65-69 j) 70-74 k) 75-79 l) 80-84 m) 85+

3. How many years have you lived in your current community?

a) less than 1 year b) 1-5 years c) 6-10 years d) 11-15 years e) 16-20 years f) over 20 years

4. Have you ever seen in the wild?

Black Bear	1) Yes	2) No
Caribou	1) Yes	2) No
Coyote	1) Yes	2) No

5. Have you ever hunted?

Black Bear	1) Yes	2) No
Caribou	1) Yes	2) No
Coyote	1) Yes	2) No

6. Have you ever attended a how to hunt a coyote workshop? 1) Yes 2) No

7. Have you hunted big game in Newfoundland in the past 3 years? 1) Yes 2) No

8. Are you a big game outfitter or guide? 1) Yes 2) No

9. Do you have livestock? 1) Yes 2) No

Thank you for your co-operation. If you have any other comments please share them with us.

_____

_____

_____

_____

_____

_____

_____

_____