

**Breaking Down Barriers to Coexistence:
Perspectives of North Shore Residents on Black
Bears, Bear Management, and Coexistence-related
Education and Policy**

by

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B.S., Colorado State University, 2016

Project Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Resource Management (Planning)

in the

School of Resource and Environmental Management
Faculty of the Environment

Report No. 741

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SIMON FRASER UNIVERSITY

Fall 2019

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Ethics Statement

The author, whose name appears on the title page of this work, has obtained, for the research described in this work, either:

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or

- b. advance approval of the animal care protocol from the University Animal Care Committee of Simon Fraser University

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Abstract

Conflicts between humans and wildlife are expected to become more frequent as urbanization and human development expand. In urban and suburban regions near wildlife habitat, the presence of human food waste and other anthropogenic attractants can draw potentially dangerous wildlife such as black bears (*Ursus americanus*) into residential areas, which may result in harm to both humans and wildlife. There is a pressing need to improve management of attractants and reduce negative interactions with wildlife. In this research, conducted in partnership with the North Shore Black Bear Society, I interviewed residents on the North Shore of Metro Vancouver, British Columbia, to investigate their perspectives on black bears and bear management, management of bear attractants, coexistence-related education, and regulatory policy. I make recommendations to improve education programs, management of attractants, bear reporting, and bylaw design and enforcement, and to build social capital and trust in support of these initiatives.

Keywords: human-wildlife conflict, human dimensions, black bears, coexistence, education, regulation

Acknowledgements

First of all, I would like to thank the 48 participants who volunteered to take part in this study and took the time to share their perspectives with me. It was an absolute pleasure being able to learn from all of your experiences and views and I am incredibly grateful for your help. None of this would have been possible without your contributions.

I would also like to express my gratitude to the North Shore Black Bear Society as well as Mitacs for funding this study. I would especially like to thank Christine Miller, Janet Zhu, and Luci Cadman for their engagement and consultation through the design and implementation of this project. I deeply enjoyed my time working with you all. To Luci, thank you so much for your help throughout the entire recruitment and interview phase of this study.

I am especially thankful for the support and advice of my senior supervisor, Murray Rutherford. It has been such a pleasure getting to work with you on this project over the last couple of years. I am so grateful for your help and patience as I navigated my way through graduate school and my research. I would also like to thank Mike Gibeau for his advice and feedback in the drafting of my 699 – your help is greatly appreciated.

I would also like to thank all of those who have supported me throughout this journey. To Adam, thank you for always believing in me and supporting me in my journey to pursue my passions. There will never be enough words to describe my appreciation for you. To my parents and Natalie, thank you always supporting my academic endeavours regardless of how far they've taken me from home.

Lastly, I would like to thank the REM staff and faculty who have supported not just myself, but other REMmers as well, throughout our time here in REM. It has been wonderful learning and working with you all. To my fellow REMmers, I am so grateful for the connections I've made while in REM. I wish you all the best in your exciting futures making a difference in this world and I look forward to crossing paths in the future.

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List of Acronyms

BC	British Columbia
COS	Conservation Officer Service
NSBBS	North Shore Black Bear Society

Glossary

Attractant (anthropogenic)	Food source originating from humans
Green can	<p>A container used for the storage and municipal collection of organic waste, including food scraps.</p> <p>In the City of North Vancouver, this refers to a 77L container with snap-fit lids collected at curbside. (Solid Waste Management Service Bylaw, 1997, No. 6920).</p> <p>In the District of North Vancouver, this refers to a 140 or 240L cart with wheels and lockable lids (fitted with carabiner clips and wire cables) collected at curbside. (Solid Waste Removal Bylaw, No. 7631, 2007).</p> <p>In the District of West Vancouver, this refers to a 45L container with a metal or plastic clasp (more specifically, a Norseman NPL 280/281 or Orbis 280A) collected at curbside. (Solid Waste Utility Bylaw No. 4740, 2012).</p>
Coexistence (with bears)	A state in which “bears and people jointly use some of the same environments but, to the greatest possible extent, that bears live without exploitation of human foods” (Herrero, 2018, p. 263).
Habituated bear	A bear which has become used to people as a result of repeated encounters with humans without adverse repercussions (Herrero et al., 2005; Herrero, 2018).
Food-conditioned bear	A bear which has formed an association between humans (including their scent, activities, areas of use, and food storage containers) with anthropogenic food (Herrero et al., 2005; Hopkins et al., 2010).

Chapter 1.

Introduction

1.1. Research Rationale

This research focuses on human factors that cause or contribute to conflicts between people and black bears (*Ursus americanus*) at the urban-wildland interface. Conflicts between humans and wildlife occur when the actions of humans have a negative impact on wildlife or vice versa (Conover, 2001). While the term “human-wildlife conflict” is often used to describe instances of animal-caused damage (Peterson et al., 2010), past research suggests that most of such conflict also involves conflict between humans, due to contrasting perspectives and objectives regarding conservation and other social objectives such as human livelihood and health and safety (Madden, 2004; Peterson et al., 2010; Redpath et al., 2015; Young et al., 2010). Also, conflicts between humans and wildlife are heavily influenced by human behaviour, which is in turn influenced by individual factors such as attitudes, knowledge and values, as well as broader social and institutional factors such as culture and social norms.

At a larger scale, there are several important trends and conditions that have led to an increasing frequency and degree of conflict between people and wildlife at the urban-wildland interface. First, an increase in urbanization in North America and other places in the world has led to human communities expanding into regions that historically had seen little urban development. In Northern America (including Bermuda, Canada, Greenland, Saint Pierre and Miquelon, and the United States, as defined by the United Nations), 82% of the human population was living in urban areas as of 2018, and the proportion in urban areas is expected to increase to 89% by 2050 (United Nations, Department of Economic and Social Affairs, 2019). Although the rate of urbanization is slowing, the trend is still positive (increasing). For black bears and other large carnivores, the issue of urbanization and increased urban sprawl is compounded by the ability of certain carnivore species to exploit urban environments (Bateman & Fleming, 2012; Gehrt et al., 2010), and an apparent increase in some carnivore populations using urban areas (e.g., Beckmann & Lackey, 2008; Gehrt, 2011). It is expected that these trends, along with the re-establishment of carnivores in areas where they had formerly

been extirpated (Zajac et al., 2012), will collectively increase the likelihood of interactions and conflicts between human and carnivore populations.

In Canada and the United States, conflicts involving black bears have been increasing over the past several decades (Baruch-Mordo et al., 2008; Hristienko & McDonald, 2007). Research indicates that black bear population numbers have also been increasing in many areas, which will likely be associated with an increased frequency of conflict occurrences in the future (Garshelis & Hristienko, 2006; Spencer et al., 2007). Black bears are highly adaptable and capable of utilizing anthropogenic food sources (“attractants”) that are often available in residential areas along the urban-wildland interface (Beckmann and Berger, 2003a; Beckmann and Lackey, 2008; Baruch-Mordo et al., 2014; Gehrt, 2010). Bears may be drawn into urban areas during years of poor natural food availability (Baruch-Mordo et al., 2014; Johnson et al., 2015), or simply in cases where anthropogenic food sources are available despite natural food availability (Merkle et al., 2013; Beckmann & Berger, 2003b). The expansion of urban areas in combination with growing black bear populations and black bear foraging patterns present a particular challenge for the management of conflicts between humans and black bears.

A reasonable goal for large carnivore management is to conserve carnivore populations and reduce conflicts with humans, while engaging the public and garnering their support (Clark and Rutherford, 2005). “Coexistence”-oriented programs are often promoted as a means to achieve this goal, and “human-wildlife coexistence” has been presented as a corrective to human-wildlife conflicts (Peterson et al., 2010). However, the term “coexistence” can be viewed in various ways. For the purpose of this research, I adopt Herrero’s (2018) definition of coexistence with bears, where “bears and people jointly use some of the same environments but, to the greatest possible extent, that bears live without exploitation of human foods” (pg. 263).

In this research I investigate human factors that could influence the fate of coexistence programs for black bears and people in urban and suburban areas on the North Shore of the Metro Vancouver Regional District, in British Columbia, Canada. Specifically, I investigate the views of residents of the North Shore about black bears, management of bears and bear attractants, and regulatory or educational programs designed to foster coexistence. As municipalities in the Metro Vancouver Regional

District continue to grow, and as black bear habitat becomes more fragmented due to urbanization and urban sprawl, it is imperative that effective approaches to coexistence, such as managing residential attractants, are designed and implemented.

1.2. Research Purpose and Objectives

The purpose of this research was to investigate the perspectives of residents of selected North Shore neighbourhoods about black bears, management of bears and bear attractants, and other community- and municipal-level efforts to address black bear-related conflicts in suburban areas. I was particularly interested in the roles of the North Shore Black Bear Society (NSBBS, also referred to as the “Society”), public education programs, and solid waste management bylaws of the District of North Vancouver and the District of West Vancouver. I conducted personal interviews with residents in select neighbourhoods in the District of North Vancouver and District of West Vancouver, qualitative data analysis of interview transcripts, and a review of relevant literature. The objectives of this research project were to:

1. Examine the attitudes and perceptions of residents in select neighbourhoods towards black bears as well as management actions targeting bears and humans to reduce incidents of bear-related conflicts on the North Shore
2. Identify and investigate the factors which relate to and influence residents':
 - attitudes and perceptions toward black bears;
 - attractant management behaviour
 - black bear reporting behaviour; and
 - perceptions of management actions targeting bears and humans on the North Shore
3. Assess public support and views towards existing educational programs and regulatory bylaws designed to reduce conflicts with bears on the North Shore and identify areas of improvement.

1.3. Standpoint Clarification

I originally contacted the NSBBS in 2017 as a first year Master's student in the School of Resource and Environmental Management at SFU with an interest in collaborating on a research project. After primary discussions, the NSBBS agreed to jointly fund the project with Mitacs, a national, not-for-profit organization that aids in funding student research in partnership with industry, government, and non-profit organizations. The project involved the research discussed in this paper and resulted in the creation of two reports: a condensed brochure highlighting key findings and a comprehensive final research report. The results of my research were used to create several recommendations (discussed later in this paper) to improve the current education program provided by the NSBBS to the North Shore community as well as North Shore municipal solid waste bylaws, with the objective of reducing conflicts between black bears and people on the North Shore.

My main potential biases with respect to this research stem from my educational background, previous employment and personal values. My academic background is in zoological sciences and most of my expertise prior to entering an interdisciplinary Master's degree program related to animal biology and behaviour. Throughout both my undergraduate and graduate programs, I have maintained an interest in animal behaviour within human-dominated landscapes and the human dimensions of wildlife management in general. With respect to my employment background, most of my previous volunteer and work experience involved animal care at various institutions including wildlife rehabilitation centres, a zoo, and a natural history museum. As part of my job at the museum, I delivered public education presentations about the natural history of local native wildlife species, the impacts of human activities on their populations, and human-wildlife coexistence. Despite my background, my exposure to black bear-related conflicts prior to the present research was relatively limited as I had not resided in an area with a high degree of black bear activity until moving to Canada in 2017. Having grown up in a suburb of a densely populated urban area, I am grateful to be able to share an environment with wildlife; however, I do also acknowledge the additional responsibilities and potential risks that come with this privilege. The newfound experience of living in a suburban area where black bears are relatively common has

strengthened my belief that residents hold the primary responsibility for minimizing and preventing bear mortalities within residential areas.

In terms of the typology of personal values developed by Harold Lasswell as part of the “policy sciences” approach to research on policy problems (Lasswell, 1971), I have assessed my own core values as falling primarily under the enlightenment and rectitude categories (those relating to receiving and sharing information, and responsible and ethical conduct, respectively (Lasswell, 1971; Clark, 2002)). My core values arise from and have influenced my academic and employment background, my role as a researcher, and my personal beliefs relating to wildlife conservation. With respect to this research project, I acknowledge that my core values may differ from those of the participants I interviewed. For example, some participants may be more oriented than I am toward power and wealth values, which are focused on decision-making authority and control of resources, respectively. Also, I have not lived on the North Shore or been regularly exposed to the risk of bear-related injury or property damage, and as a result, my well-being values (i.e., values relating to comfort, health, and safety (Lasswell, 1971; Clark, 2002)) may have less influence on my perception of bears than they do for some of my interview participants. However, participants who acknowledge the roles and responsibilities of residents in protecting black bears and preventing human-caused deaths may hold rectitude values similar to my own.

1.4. Report Organization

Chapter 2 provides background information about historical and modern approaches to the management of conflicts between humans and wildlife, theories about pro-environmental behaviour, and the current legal framework for the management of wildlife-related conflicts in British Columbia. Chapter 2 also summarizes the natural history and behaviour of American black bears and their management in BC. Chapter 3 then introduces the case study setting: the North Shore of Metro Vancouver. Next, Chapter 4 discusses the methodology used to conduct the research and analyze the data. Chapter 5 presents a detailed account of the results which are categorized by the eight different research areas investigated as part of this study (i.e., resident attitudes towards black bears, risk perception, acceptability of management actions, resident knowledge, information sources relating to attractant management and black bears, the

North Shore Black Bear Society, and resident behaviour). Chapter 6 provides a discussion of the key themes that arose through the analysis of the data and Chapter 7 describes the recommendations made to the NSBBS, based on the findings of the research and literature review. Finally, Chapter 8 concludes the report and identifies areas for future research.

Chapter 2.

Background

2.1. Conflicts Between Humans and Large Carnivores in North America

Historically, conflicts between humans and large carnivores were typically managed using lethal approaches such as local eradication of carnivores, government-run culling programs, public hunts, and selective killing of “problem” animals (Sanborn & Schmidt, 1995; Treves & Naughton-Treves, 2005). However, public opinion in North America about the acceptability of such lethal, often reactive, management actions has become divided. Urban residents, who are generally less vulnerable to wildlife-related conflicts and whose substantial tax contributions help to fund conflict management programs, often oppose lethal management of wildlife, while rural residents, who tend to experience more conflicts directly, may find lethal management to be acceptable (Manfredo et al., 1998; Kellert, 1985; Reiter et al., 1999). This dichotomy raises the question of how urban residents might respond in circumstances where they become more directly vulnerable to wildlife-related conflicts.

Of particular interest is the documented shift in wildlife-related values in North America over the past several decades. Research indicates that the prevalence of utilitarian¹ attitudes and values regarding wildlife and animals has decreased (Kellert, 1976; Manfredo & Zinn, 1996), and more positive attitudes and values have emerged (Kellert, 1976; Manfredo & Teel, 2008; Manfredo et al., 2009). Manfredo and his colleagues have proposed that there has been a re-emergence of mutualism value orientations² regarding wildlife (Manfredo & Teel, 2008; Manfredo et al., 2009). A study examining this hypothesis found that mutualism value orientations increased in the western United States between 2004 and 2018 (Manfredo et al., 2018). The researchers characterize mutualism wildlife value orientations as being negatively associated with

¹ Utilitarian views towards wildlife focus predominantly on the practical use of wildlife as resources that can provide benefit to humans (Kellert, 1976).

² See Section 2.3.1. “Wildlife Value Orientations” for more information about wildlife value orientations.

support for lethal bear management (i.e., those with mutualism views are less likely to support the lethal management of bears). Manfredo and his colleagues have attributed this shift to societal changes as a result of modernization such as increased education and income levels, and urbanization (Manfredo et al., 2003; Manfredo & Teel, 2008; Manfredo et al., 2009; Manfredo et al., 2018). The researchers assert that modernization, due to advances in agricultural production, has reduced society's need to use wildlife as a food source in the western United States (Manfredo et al., 2009). On the basis of this research on shifting wildlife values, it is reasonable to predict that public acceptance of lethal management actions will continue to decrease in Canada and the United States if the trend of increasing urbanization continues as forecasted by the United Nations (2019). To respond to these changes in preferences about management, social scientists and wildlife managers are investigating new, publicly acceptable approaches to the management of conflict between humans and wildlife, particularly in urban areas where protectionist and mutualist values are more prominent.

2.2. Applying Social Sciences to Wildlife Management Issues

Research in the field of conflict management has historically been focused on the management of wildlife rather than human behaviour. However, there has been increased pressure for wildlife managers to collaborate with social scientists to conduct research and evaluate management actions that predominantly focus on influencing human behaviour (Baruch-Mordo et al., 2009; Madden, 2004; Manfredo & Dayer, 2004; Manfredo, 2008; Treves et al., 2006). In this section I provide an overview of relevant human behavioural theories and models, and then describe two prominent approaches to characterizing the public's attitudes and perceptions towards wildlife. I then discuss the theoretical lens I used in my research to examine the roles of individuals and communities in minimizing wildlife-related conflicts.

2.2.1. Overview of Prominent Human Behavioural Theories and Models

Kollmuss & Agyeman (2002) define "pro-environmental" behaviour as "behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built world." Several models have been developed to demonstrate the pathways in

which a variety of factors can influence or deter behaviour. I provide a brief description of three commonly-used models and theories related to pro-environmental behaviors, both in general and specific to the management of conflicts between humans and wildlife.

The Information Deficit Model

The information deficit model proposes that the procurement of environmental knowledge can influence an individual's environmental attitudes, which in turn, can drive environmentally responsible behaviour (Burgess et al., 1998; Kollmuss & Agyeman, 2002). While information-based approaches, which target the "information deficit", are commonly used in non-governmental public communication campaigns (Kollmuss & Agyeman, 2002; Owens, 2000), some empirical research has found that knowledge and awareness of environmental concerns and issues does not result in pro-environmental behaviour (Kollmuss & Agyeman, 2002). Despite this, there have been several studies which have demonstrated the success of educational programs in influencing the public's attitudes towards wildlife (Sponarski et al., 2016) and certain wildlife management decisions (Lauber & Knuth, 2004). Also, at least one study has found that an educational program can improve resident compliance with garbage-related ordinances (McCarthy & Seavoy, 1994).

The Theory of Reasoned Action and the Theory of Planned Behaviour

The Theory of Reasoned Action postulates that behavioural intention, which is influenced by an individual's attitude towards performing the behaviour and the subjective norms surrounding the behaviour, is the primary determinant of behaviour (Ajzen, 1991). Attitudes are influenced by behavioural beliefs, including beliefs held by an individual regarding the ramifications of carrying out the behaviour (i.e., what an individual believes to be the outcomes of performing the behaviour) and the individual's evaluation of such ramifications (Montano & Kasprzyk, 2008; Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980; Ajzen, 1985). For example, if an individual believes that leaving their waste bins out overnight will attract wildlife into the neighbourhood and subsequently evaluate this outcome as being negative, this individual will develop a negative attitude towards that behaviour. Subjective norms, on the other hand, are influenced by normative beliefs, those held by an individual regarding others' perceptions of the behaviour as well the individual's motivation to act in accordance with such social norms (Montano & Kasprzyk, 2008; Fishbein & Ajzen, 1975; Ajzen &

Fishbein, 1980; Ajzen, 1985). Given that behaviours are predicated on attitudes and social norms, it is reasonable to conclude that managers can potentially motivate desirable behaviour changes by targeting individuals' attitudes and existing social norms.

The Theory of Planned Behaviour extends the Theory of Reasoned Action to include the component of "perceived behavioural control" as an additional factor which influences behavioural intent. This component recognizes the existence of internal and external factors that are not within an individual's control and is influenced by control beliefs or those held by an individual regarding whether they possess adequate resources, such as knowledge, skills, actions of others, and money, and opportunities to carry out a particular behaviour (Ajzen, 1985; Ajzen, 1991), as well as the individual's perceived degree of power over such factors (Ajzen, 1991). Perceived behavioural control influences behavioural intention in that individuals who believe that they have less control in carrying out a particular behaviour (due to the availability of resources or opportunities) have a reduced intention to carry out the behaviour and vice versa (Madden et al., 1992). Along with behavioural intention, perceived behavioural control can also directly impact behaviour (Ajzen, 1991).

Both the Theory of Reasoned Action and Theory of Planned Behaviour are relatively simple, which allows these models to be applied to a variety of scenarios and fields of study. However, the simplicity of the models presents a concern in real-world settings, which tend to be riddled with complex factors external to the individual actor. Several models have been developed to address these complexities and provide a more nuanced explanation of pro-environmental behaviour (e.g., Hines et al., 1986; Kollmuss & Agyeman, 2002).

The Value-Action Gap

The "value-action gap" represents "the differences between what people say and what people do" (Blake, 1999, pg. 275). Blake's (1999) model illustrates and incorporates the relationships that exist between individuals and social institutions and the role of such relationships in influencing environmental behaviour. Blake (1999) delineates three types of barriers which may exist between environmental concern and action in relation to that concern: individuality, responsibility, and practicality. Individuality refers to the barriers which pertain to individuals and their environmental attitudes,

including laziness, lack of interest, and the perception of themselves as being the “wrong type of person” to carry out particular behaviours. Responsibility barriers are those which pertain to social and institutional factors such as normative beliefs (i.e., what others think of certain behaviours) and perceived responsibilities with respect to the environment. Such barriers include beliefs that an individual’s actions may be ineffective as well as an individual’s delegation of responsibility to others. Lastly, practicality refers to the barriers pertaining to the internal or external factors that may prevent or hinder an individual from carrying out a particular behaviour, despite one’s attitudes or intentions to act. These factors include, but are not limited to: money, time, physical ability, and information.

Critiques of the Behavioural Models

The models previously discussed in this section have been applied in a wide variety of research on environmental behaviour (e.g., Bidwell, 2016; Flynn et al., 2010; Iyer & Kashyap, 2007; Lauber & Knuth, 2004). While each model is of value in certain applications, there is no single framework that includes all of the possible factors driving and hindering pro-environmental behaviour (Kollmuss & Agyeman, 2002). Although the information deficit model, Theory of Planned Behaviour, and value-action gap may not be all-encompassing, they do identify several key factors that are important in understanding and attempting to influence environmentally responsible behaviour. In my research, I focus on several of these factors to gain a better understanding of individual and community-level drivers of and barriers to environmentally responsible behaviour concerning black bears (e.g., proper attractant management) including: information availability and accessibility, resident attitudes towards carrying out desirable behaviours, perceived behavioural control and practicality of carrying out such behaviours, and subjective norms and perceptions of responsibility. By better understanding these factors, managers and external organizations can implement programs to target and identify ways to promote effective attractant management behaviours.

As previously mentioned, one of the key challenges of managing wildlife-related conflicts is designing management actions that are acceptable to the affected population and that are effective in influencing the behaviour of that population. Determining acceptable and effective management actions therefore requires an adequate understanding of the affected population, including the public’s perceptions of the wildlife

species to be managed as well as the types of potential management actions which may be carried out. In the following section, I will discuss two distinct approaches to identifying and categorizing individuals' perceptions regarding wildlife.

2.2.2. Human Perceptions Regarding Wildlife

Kellert's Wildlife Attitude/Value Typologies

Stephen R. Kellert's work pertaining to wildlife attitude and value typologies and public perceptions of animals and wildlife has been foundational in research on the human dimensions of wildlife conservation and management. In the early to mid-70's, Kellert conducted a large three-year, two-stage investigation using interviews and questionnaires from which he developed a typology of nine animal-related attitudes: naturalistic, ecologicistic, humanistic, moralistic, scientific, aesthetic, utilitarian, dominionistic and negativistic (Kellert, 1976). Of these attitudes, the ecologicistic, humanistic, moralistic, and naturalistic attitudes are most aligned with the conservation of wildlife, environmental protection, and animal welfare are (Kellert, 1976; Kellert, 1984). Findings from Kellert's initial study and a subsequent update to the research in the 1980's indicate that the most common attitudes held by Americans regarding animals were the humanistic, moralistic, negativistic, and utilitarian attitudes (Kellert, 1984).

Kellert's humanistic attitude is characterized by an affection for individual animals, particularly pets, and those with humanistic attitudes are generally concerned with the well-being of animals (Kellert, 1976). Individuals with a utilitarian attitude towards animals generally emphasize the benefits and practical use of animals (Kellert, 1976). Lastly, the negativistic attitude is characterized by the active avoidance of animals and several different anthropocentric feelings towards wildlife and animals, including indifference, dislike, and fear (Kellert, 1976; Kellert, 1984).

Manfredo and Colleagues' Wildlife Value Orientations

In the late 1990's, Fulton et al. (1996) introduced a different approach to categorizing the public's views towards wildlife based on "wildlife value orientations". According to Kluckhohn (1951, p.411, as cited in Manfredo, 2008), a "value orientation" is "a generalized and organized conception, influencing behavior, of nature, of man's place

in it, of man's relation to man, and of the desirable and non-desirable as they may relate to man-environment and inter-human relations." Value orientations represent an individual's set of values which are revealed by the pattern of their basic beliefs (Manfredo et al., 2003). Applying this concept to Ajzen & Fishbein's Theory of Planned Behaviour, value orientations influence one's attitudes and norms, which subsequently impact behavioural intention and thus, behaviour (Ajzen, 1985; Ajzen, 1991; Manfredo et al., 2003; Fulton et al., 1996). As such, value orientations can aid in predicting current and future patterns of attitudes and behaviours with respect to value-related problems, including matters pertaining to wildlife conservation and management (Fulton et al., 1996).

Wildlife value orientations are value orientations held by individuals with respect to wildlife (Fulton et al., 1996). Manfredo & Teel (2008) recognize two primary wildlife value orientation dimensions: domination and mutualism. Those who hold a domination wildlife value orientation generally view wildlife from a utilitarian standpoint, where wildlife are seen as being subordinate to humans and are framed as resources that provide benefits to humans (Manfredo et al., 2009; Manfredo et al., 2018). Individuals who hold a domination orientation may find lethal management of wildlife to be more acceptable (Manfredo & Teel, 2008). On the other hand, individuals who hold a mutualism wildlife value orientation tend to view wildlife from an egalitarian standpoint where wildlife species have rights and are capable of forming relationships with humans. Mutualists (those who hold mutualism orientations) are typically not supportive of harming or killing wildlife (Manfredo & Teel, 2008; Manfredo et al., 2009; Manfredo et al., 2018).

2.3. Designing Policy-Based Solutions to Minimize Conflicts Between Humans and Wildlife

Pal (2006) defines "public policy" as "a course of action or inaction chosen by public authorities to address a given problem or interrelated set of problems" (pg. 2). Policy instruments are the tools that are selected and implemented to address the identified policy problem(s) (Pal, 2006). There are two main types of policy instruments that have been used to manage and minimize the occurrence of negative interactions between humans and wildlife: information-based instruments and regulatory instruments. These policy instruments are discussed in greater detail in the following sections.

Information-based Instruments

Education is a type of information-based instrument which is commonly used around the globe as a means of addressing and reducing conflicts between humans and wildlife. Education can be used to influence human behaviour by addressing knowledge gaps, and beliefs and attitudes regarding wildlife, while also addressing other unique beliefs and values held by individuals and communities (Pal, 2006; Can et al., 2014; Slagle et al., 2013; Sponarski et al., 2016). Despite often being recommended as a management tool, the effectiveness of education programs varies and has lacked critical evaluation (Baruch-Mordo et al., 2011; Dunn et al., 2008; Gore et al., 2006a; Gore et al., 2008). As such, it is important that practitioners evaluate the effectiveness of existing and future education-based approaches aimed at reducing conflicts between humans and wildlife and use the lessons to improve these initiatives (Baruch-Mordo et al., 2011; Gore et al., 2006a; Spencer et al., 2007). Managers must also recognize that individuals and communities hold unique values and beliefs, and programs should be adapted to address the societal beliefs and values that exist in the local context.

Regulatory Instruments

Regulatory instruments (e.g., municipal bylaws) are often used in tandem with education programming and can aid in discouraging undesirable behaviours which may lead to conflicts between humans and wildlife while also encouraging behaviours that facilitate the reduction of conflicts. Research has shown that, when used on their own, education programs aimed at reducing such conflicts sometimes have limited impacts on changing human behaviour (Baruch-Mordo et al., 2011). Instead, multiple tools and tactics may be more successful to address conflicts (Gore et al., 2008; Madden, 2004). In particular, proactive enforcement (e.g., violation detection, and the imposition of penalties on non-compliant individuals) of wildlife-related laws aimed at reducing conflicts can bolster the success of education in conservation efforts (Baruch-Mordo et al., 2011). When using regulatory instruments in combination with education programs, it is important that managers and policymakers determine an effective, efficient, equitable and politically acceptable balance of education and regulation to maximize success of conflict reduction and prevention programs (Baruch-Mordo et al., 2011; Feighery et al., 1991; Pal, 2006; Jaccard et al., 2012).

Hybrid Instruments

In some cases, hybrid instruments may be used to approach policy problems. Hybrid instruments utilize multiple types of policy instruments. The BC Bear Smart Community Program (BC Ministry of Environment, n.d.; WildSafe BC, n.d.a) is a good example of a hybrid instrument. The Bear Smart program is a voluntary, proactive community conservation program that is administered at the local government level by the Ministry of Environment and Climate Change Strategy in partnership with the BC Conservation Foundation and the Union of BC Municipalities. The program aims to reduce conflicts between people and bears in the province. The Bear Smart program has established a set of criteria which must be met in order for a municipal government to be designated as a “Bear Smart community”. The program criteria include the use of both information-based and regulatory instruments by requiring the implementation of education programming, a bear-proof municipal solid waste program, and Bear Smart bylaws.

2.4. Legal Framework for Managing Bear-Related Conflicts in British Columbia

Relevant Federal Jurisdiction and Treaties

Under Section 91 of the *Constitution Act, 1867*, the Canadian federal government has the constitutional jurisdiction to regulate interprovincial and international trade and commerce. In 1975, the Canadian government entered into the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES), an international agreement signed by 183 parties around the world, with the purpose of protecting wild flora and fauna from the impacts of international trade on their survival (CITES, n.d.). All species of bears are listed under Appendix II³ of the Convention as a result of international concern regarding the conservation of bear species (British Columbia Ministry of Environment, Lands, and Parks, 2001). Species listed under Appendix II are provided with protections pertaining to their export. In addition to CITES, the Canadian federal *Species at Risk Act, 2002* (SARA) provides for the protection and recovery of wildlife species listed as threatened, endangered, or extirpated under the

³ Species listed under Appendix II are species that are not currently under threat of extinction but may become threatened absent of close control of their trade (CITES, n.d.).

Act. SARA also provides for the management of species designated as a species of special concern to prevent deterioration of their status. American black bears in BC are currently not listed under SARA. However, the federal government may exercise authority to manage bears when they are on federal land, such as lands within National Parks.

Relevant Provincial Legislation in British Columbia

With the exception of international/interprovincial trade, species at risk, and bears on federal lands, the provinces have jurisdiction under the Canadian constitution to manage bears. The *Wildlife Act* is the primary piece of legislation in BC which protects wildlife in the province by regulating human interactions with wildlife. Under Section 33.1 of the *Wildlife Act*, individuals are prohibited from intentionally, or unintentionally, feeding or attempting to feed dangerous wildlife (e.g., black bears) and placing attractants⁴ which may reasonably attract or be accessible to dangerous wildlife. Individuals who violate the provisions of this section are subject to monetary fines – up to \$100,000 for a first conviction or between \$2,000 to \$200,000 for a subsequent conviction for the violation of Section 33.1(1), or up to \$50,000 for a first conviction or between \$1,000 to \$100,000 for a subsequent conviction for the violation of Section 33.1(2). Such individuals are also subject to jail time (in addition to or absent of monetary fines) of up to one year for a first conviction and up to two years for a subsequent conviction for the violation of Section 33.1(1), or up to six months for a first conviction and up to one year for a subsequent conviction for the violation of Section 33.1(2) (Sections 84(3), (4), (5), & (6) *Wildlife Act*).

The BC Conservation Officer Service (COS) is a provincial law enforcement agency that is responsible for enforcing the provisions of the *Wildlife Act* and plays a key role in the proactive and reactive management of conflicts between humans and wildlife in the province. In terms of reactive management actions targeting humans, the COS has the statutory authority to penalize individuals who have violated provisions of the *Wildlife Act* through the issuance of fines (s. 84(3), *Wildlife Act*) or arrest (s. 87, *Wildlife Act*), and to issue dangerous wildlife protection orders for the relocation or removal of attractants (s. 88.1(3), *Wildlife Act*). Conservation officers are also authorized under the

⁴ “attractants” are defined under the *Wildlife Act* as “food or food waste, compost or other waste or garbage that could attract dangerous wildlife” and “a carcass or part of a carcass of an animal or fish, or other meat.”

Wildlife Act to carry out lethal management actions with respect to animals that are at large and likely to harm people, wildlife or wildlife habitat (s. 79(1), *Wildlife Act*). With respect to proactive approaches, the COS is also involved in providing public education to reduce conflicts between humans and wildlife. Furthermore, the COS maintains the Report All Poachers and Polluters hotline which allows individuals to report interactions between humans and wildlife. The COS also maintains records of the number of reports and actions taken by conservation officers.

As of February 2019, there were 164 full-time conservation officers located in BC working within 45 communities (British Columbia Ministry of Environment and Climate Change Strategy, 2019).

The Role of Local Government Bylaws in Managing Conflicts with Wildlife

Under Section 8(3) of the BC *Community Charter* municipalities have the authority to regulate, prohibit and impose restrictions or requirements relating to municipal public services such as solid waste management, health and safety of residents, animals, and protection of the natural environment through the adoption of regulatory bylaws. With respect to the management of conflicts between humans and wildlife, municipalities can use this authority to impose restrictions regarding the times in which residents may set out their garbage or organic waste bins. Some municipalities, such as the City of Castlegar (Bylaw No. 1198), the District of Sparwood (Community Standards Bylaw 1194, 2018), and the District of Squamish (Wildlife Attractant Bylaw No. 2053), have bylaws that specifically regulate the feeding of wildlife and the placement or deposit of wildlife attractants. Regional districts may also adopt similar bylaws for electoral areas within their jurisdiction.

2.5. The American Black Bear

The American black bear (*Ursus americanus*) is widely distributed in Canada. Based on a population estimate from 2001, BC is home to 120,000 to 160,000 individual black bears, which represents approximately one quarter of the entire black bear population in Canada (British Columbia Ministry of Environment, Lands, and Parks, 2001). Black bears can be found in most regions of BC, including human-dominated landscapes; however, their numbers are generally more plentiful in forests and areas in

wet climatic zones (e.g., the BC coastline and Vancouver Island) (British Columbia Ministry of Environment, Lands, and Parks, 2001; Eder & Pattie, 2001).

Food is the primary influencing factor in the movement and location of bears (Herrero, 2018). Black bears are opportunistic omnivores, which means that their diet is comprised of both plant and animal matter. The composition of their diet is dependent on the types of vegetation, prey, or carrion available to them. The proportion of vegetation versus animal matter that black bears consume is dependent on seasonal availability, with most of their diet consisting of plant material when human influences are not present (British Columbia Ministry of Environment, Lands, and Parks, 2001; Eder & Pattie, 2001). In the fall months, black bears experience a substantial increase in foraging activity (termed, “hyperphagia”) to increase fat reserves prior to entering torpor in the winter (Nelson et al., 1983). During this time, bears can consume more than 20,000 kcal a day, which is more than two times greater than their typical daily caloric intake (Nelson et al., 1983). Black bears are highly adaptable in terms of their diet and are capable of utilizing anthropogenic food sources (i.e., non-natural attractants, or simply, attractants), such as garbage, bird feeders, pet food, and fruit trees (Beckmann & Lackey, 2008; Hristienko & McDonald, 2007; Herrero, 2018). They may be more likely to use these food sources upon entering hyperphagia due to the caloric requirements associated with torpor. Anthropogenic food sources may also be used more intensely in years of poor natural food production (Lewis et al., 2015; Baruch-Mordo et al., 2014).

Given the adaptability of black bears in diet and behaviour, in tandem with the availability of non-natural attractants in suburban and urban areas, black bears can become conditioned to using these food sources (i.e., “food conditioned”). The behaviour of utilizing anthropogenic food sources may be learned independently (Breck et al., 2008; Hopkins, 2013) or may be transmitted from mother bears to their offspring through social learning and, therefore, may persist through multiple generations of black bears (Mazur & Seher, 2008; Hopkins, 2013). Furthermore, bears that regularly encounter humans (with or without the involvement of food) and are not scared off or harmed in response may become more tolerant to the presence of humans; that is to say, bears may become “habituated” to humans. In combination or independently, food-conditioning and/or habituation in bears increases the likelihood of having negative interactions with humans (Gunther, 1994; Hristienko & McDonald, 2007; Herrero et al., 2005; Herrero and Fleck, 1990; Herrero, 2018). As such, it is important that managers find creative

solutions to minimize the availability of attractants and minimize conflicts between humans and black bears, particularly in regions seeing rapid growth.

While black bear populations in BC are not at risk of endangerment, human-caused black bear mortalities and the reduction of such mortalities are important for bear conservation, particularly in suburban and urban settings where habitat fragmentation tends to be more pronounced. Black bears can legally be hunted or trapped with an appropriate species license or trapping license issued under the *Wildlife Act*. However, other types of human-caused mortalities of black bears have been documented, including vehicle-related deaths (i.e., road kill) and deaths related to concerns for public safety or property damage (Baruch-Mordo et al., 2008; Beckmann and Lackey, 2008; McCaffrey et al., 1976; Lindzey et al., 1976; McCarthy and Seavoy, 1994). Furthermore, a previous study by Baruch-Mordo et al. (2014) found that black bears that exploit urban areas during years of poor natural food availability have lower survival rates than bears during years of good natural food availability, and of the mortalities seen in urban areas during years of poor natural food availability, most were human-caused. As such, attention should be drawn to minimizing such preventable black bear mortalities and particular care should be taken in years when natural food availability is suboptimal.

Chapter 3.

Case Study: Black Bears and the North Shore

To explore the concepts describing in the preceding chapter, I conducted a case study on the North Shore region of British Columbia. The North Shore is a predominantly suburban region located north of the Burrard Inlet in the Lower Mainland of BC and includes the City of North Vancouver, the District of North Vancouver, and the District of West Vancouver⁵. The region is located within an urban-wildlands interface area, with the northern portion of the municipalities bordering forests, park lands, and mountains.

The Metro Vancouver Regional Growth Strategy adopted in 2011 projected the North Shore population (i.e., individuals residing in the City of North Vancouver, District of North Vancouver, and District of West Vancouver)⁶ to grow from 183,800 residents in 2011 to 242,000 in 2041, which represents a population growth rate of approximately 31.7% over this period, or approximately 1.1% per year. With the anticipated growth of the human communities on the North Shore, and with residential development and activity extending into areas that were historically less developed, anthropogenic food sources have become an increasing concern as attractants for bears.

3.1. The Conservation Officer Service

In 2017, the COS, other agencies, and members of the public killed 602 black bears in BC (BC Conservation Officer Service, 2019) – eighteen of which were killed on the North Shore as a result of becoming habituated or food-conditioned (North Shore Black Bear Society, n.d.). Bear mortalities caused by human activity are classified by the North Shore Black Bear Society (NSBBS) as “human-caused deaths”. A majority of these conflicts stem from bears becoming present in residential areas as a result of accessing attractants and becoming accustomed to using such foods as a primary food

⁵ Metro Vancouver Regional District also classifies the Village of Lions Bay as part of the North Shore, but Lions Bay is a small community that is geographically separated from the other three North Shore municipalities by several kilometres of mainly undeveloped wildland. I did not include Lions Bay in my research because its socio-political and environmental context differs substantially from that of the other North Shore municipalities.

⁶ Excluding the population of Lions Bay.

source (C. Miller, personal communication, May 22, 2018). **Table 1** provides an overview of the number of calls made to the COS regarding black bears in BC as a whole, the number of cases actually attended, the number of bears killed by the COS and other agencies or the public in response to conflicts, as well as the number of bears translocated.

Table 1 Summary of calls to the Conservation Officer Service regarding black bears in BC between 2014 - 2019 per fiscal year

	2014	2015	2016	2017	2018	2019 (As of August)
Calls to COS in BC	16,876	18,500	17,206	19,735	14,967	12,360
Cases attended by COS	2,209	2,048	1,942	2,090	1,768	1,219
Black bears killed by COS	437	564	497	487	378	249
Black bears killed by other agencies or the public	130	115	105	115	80	71
Black bears translocated by COS	20	15	8	4	6	6

Source: British Columbia Conservation Officer Service, 2019

3.2. The North Shore Black Bear Society

The North Shore Black Bear Society is a non-profit organization which works in partnership with local governments and other related groups to aid in reducing the number of conflicts between humans and black bears on the North Shore. The main role of the NSBBS is to provide education and outreach programs relating to bears and bear attractant management on the North Shore. The NSBBS also operates an independent wildlife sighting reporting service and maintains and reports records of sightings made to the Society as well as the COS on the North Shore (see **Table 2**). Additionally, the organization carries out canvassing activities within residential neighbourhoods and provides “bear-in-area” signage and informational material to neighbourhoods where bear activity has been reported.

Table 2 Reports to the Conservation Officer Service and the North Shore Black Bear Society regarding black bears in 2017 and 2018

	2017 – 2018	2018 – 2019 (Jan 1 – Oct 31, 2018)
Calls to the COS on the North Shore (total)	1184	939
<i>North Vancouver (City and District)</i>	675	405
<i>West Vancouver</i>	509	534
Reports (phone, web) to the NSBBS on the North Shore (total)	557	298
<i>North Vancouver (City and District)</i>	444	255
<i>West Vancouver</i>	113	43
Number of black bears killed on the North Shore⁷	18	2

Source: North Shore Black Bear Society, 2017; North Shore Black Bear Society, 2018; North Shore Black Bear Society, n.d.

3.3. North Shore Solid Waste Management Bylaws

Each of the three North Shore municipalities has its own bylaws pertaining to the management of solid waste as well as bylaws which define the monetary penalties associated with non-compliance. The solid waste management bylaws in the three North Shore municipalities include: the Solid Waste Management Service Bylaw, 1997, No. 6920 of the City of North Vancouver, the Solid Waste Removal Bylaw, No. 7631, 2007 of the District of North Vancouver, and the Solid Waste Utility Bylaw No. 4740, 2012 of the District of West Vancouver. See **Table 3** for a summary of the relevant provisions of the solid waste management bylaws and associated penalties for non-compliance.

⁷ Excludes bears killed as a result of motor accidents, and those which were illegally hunted, poached, or killed on private property (North Shore Black Bear Society, n.d.)

Table 3 Summary of solid waste management bylaws in the three North Shore municipalities

Municipality	Placement at Curbside Restrictions	Removal from Curbside Restrictions	Attractant and Container Storage Requirements	Penalties ⁸
City of North Vancouver (Solid Waste Management Service Bylaw, 1997, No. 6920)	No later than 7:30 a.m. on collection day	No later than 9:00 p.m. on the collection day	No storage requirements specified.	Garbage containers not protected from disturbance by animals: \$200.00 Garbage or recycling containers placed for emptying prior to designated collection day: \$100.00 (City of North Vancouver Bylaw Notice Enforcement Bylaw, 2018, No. 8675)
District of North Vancouver (Solid Waste Removal Bylaw, No. 7631, 2007)	No earlier than 5:30 a.m. and no later than 7:30 a.m. on collection day (unless notified otherwise in writing)	Within 18 hours of collection	For garbage (which includes animal and plant matter and food) that is stored outside of a building, the solid waste container for the garbage must be stored in a wildlife resistant enclosure, except during specified collection times. A wildlife resistant enclosure is defined as a fully enclosed structure consisting of walls, roof, and door(s), with no more than a one-centimetre gap or opening at any location, capable of being securely latched and of sufficient strength and design to prevent access to the contents by wildlife.	Improper storage of solid waste: \$100.00 Solid waste containers not placed or removed in a timely fashion: \$100.00 (Bylaw Notice Enforcement Bylaw, No. 7458)
District of West Vancouver (Solid Waste Utility Bylaw No. 4740, 2012)	No earlier than 5:00 a.m. on the collection day	No later than 9:00 p.m. on the collection day	Wildlife attractants must not be left outdoors where dangerous wildlife may be attracted, or where there is a reasonable possibility of dangerous wildlife being attracted unless the attractants are kept in a wildlife-resistant enclosure. A wildlife-resistant enclosure is defined as a fully enclosed structure consisting of walls, roof, and door(s), capable of being securely latched and of sufficient strength and design to prevent access to the contents by wildlife.	Failure to properly enclose wildlife attractants: \$300.00 Placement of solid waste out before 5:00am on collection day: \$100.00 (Bylaw Notice Enforcement Bylaw, No. 4368)

⁸ Each municipality has incentives and disincentives for the early or late payment, respectively, of specified penalties. The City of North Vancouver and District of West Vancouver also offer the possibility for compliance agreements.

Chapter 4.

Methodology

4.1. Qualitative Research

Qualitative research allows for an in-depth examination of matters of interest and has been applied to investigate human dimensions of wildlife management. Qualitative research on human subjects is typically characterized by five features:

1. Studying individuals or groups of individuals who are performing as they would in the real-world, outside of a controlled laboratory setting;
2. Capturing and representing the views and perceptions of study participants;
3. Addressing the unique contextual conditions which may influence the way in which participants act;
4. Seeking explanations of the drivers of social behaviour and processes by contributing to existing and developing theoretical concepts;
5. Using a variety of evidentiary sources to draw conclusions.

(Yin, 2011)

To summarize, qualitative research presents the opportunity to contribute to existing concepts or develop new concepts within the broad field of social behavioural research by investigating the views and perceptions of one or more individuals in a real-world setting, while taking into consideration the unique contextual conditions which may influence the way in which they perceive the world and behave within it (Yin, 2011).

4.2. Selection of Study Areas

I asked the NSBBS to identify neighbourhoods⁹ (contiguous areas ranging from 0.4 km² to 5.6 km²) on the North Shore for which there had been a high number of recent reports from the public of sightings or interactions with black bears. The NSBBS selected four neighbourhoods (hereon referred to as “hotspot communities”) to examine for the purposes of this project. To determine the hotspot communities the Society used previous reporting data from 2017 made to WildSafe BC’s Wildlife Alert and Reporting Program (WARP) (WildSafe BC, n.d.b; available at: <https://warp.wildsafebc.com/warp/>), and data collected by the Society through their reporting service¹⁰. For each hotspot community, the Society identified two streets which received the highest number of reports (“high report areas”) and one street which received fewer reports (“low report areas”). Some report areas consisted of a street name without specifying a particular location on the street as WARP does not provide exact locations of sighting reports (i.e., only a street name or general location is provided in many cases). Further, some of these report areas were main roads which had few residences. As such, based on consultation with the NSBBS, surrounding side streets with numerous residences perpendicular to the main road were included as part of these identified report areas. Conversely, other report areas had more specific parameters based on the Society’s past reporting data (i.e., specific locations on a street were identified as a report area). See **Section 4.4.1.** for more information about how households were sampled in each report area.

The hotspot communities included the British Properties and Caulfeild neighbourhoods in the District of West Vancouver, and the Braemar/Carisbrooke and Keith-Lynn neighbourhoods in the District of North Vancouver. No neighbourhoods were identified as hotspot communities in the City of North Vancouver. This is not surprising, as the City of North Vancouver is an urban municipality that is surrounded on three sides

⁹ In the District of North Vancouver, “neighbourhoods” refers to regions of the District with specified boundaries which were officially designated as neighbourhoods by the District of North Vancouver. Conversely, the District of West Vancouver does not have geographically delineated neighbourhood boundaries; however, the “neighbourhoods” for the purpose of this research are regions which are commonly, but not universally, accepted as neighbourhoods by residents.

¹⁰ Reports made to WARP do not include specific locations where bears were sighted or reported; as such, the NSBBS used the general location provided in WARP in combination with previous data collected by the Society to identify communities with the greatest numbers of reports.

by the District of North Vancouver and on the fourth side by the waters of Burrard Inlet. The numbers of black bear reports for 2017 per hot spot community are summarized below in **Table 4**.

Table 4 Number of black bear reports per hot spot community

Hot Spot Community	Number of Reports (in 2017)
British Properties (District of West Vancouver)	79
Caulfeild (District of West Vancouver)	75
Braemar/Carisbrooke (District of North Vancouver)	60
Keith-Lynn (District of North Vancouver)	44

Source: L. Cadman, personal communication, January 7th, 2019

The hotspot communities in the District of West Vancouver were selected based on the number of reports made within each neighbourhood (i.e., the areas selected were the areas in the District of West Vancouver for which the most reports were made). The Braemar/Carisbrooke neighbourhoods in the District of North Vancouver were selected as this was the area within the DNV that had the most reports. Keith-Lynn, despite having fewer reports, was selected as it was a target of an extensive degree of educational efforts by the NSBBS and was found to be an active area for wildlife in 2017 following the removal of a former green space in proximity to the neighbourhood.

4.3. Interview Questionnaire Design

I designed a semi-structured interview questionnaire based on relevant literature in the field of human dimensions of wildlife conservation and management as well as previous consultation with NSBSS. The questionnaire investigated the following:

- Resident attitudes and perceptions of risk relating to black bears
- Resident knowledge regarding attractant management
- Resident knowledge regarding municipal-level and regional-level waste management regulations
- Resident waste management behaviour
- Resident bear safety behaviour

- Resident views of possible black bear management actions.

The design of the questionnaire was guided by the Tailored Design Method (Dillman et al., 2014). The questionnaire used open-ended and closed-ended questions to obtain both quantitative and qualitative results. The semi-structured design allowed for the exploration of themes and ideas as they arose during the interviews.

4.4. Data Collection

4.4.1. Recruitment

Participants were recruited door-to-door in each of the four hotspot communities between July 3rd, 2018 and August 23rd, 2018. Residents who answered the door and agreed to participate would either take part in a same-day interview or schedule a return date for a personal or telephone interview. If a resident was not home during the recruitment period, a sealed envelope containing a recruitment letter with contact information to schedule an interview was left either at the front door of the home or in a mailbox.

Within the four hotspot communities, recruitment of residents in high and low report areas differed based on the spatial layout of the community. Report areas consisting of streets arranged in a predominantly gridded pattern were constrained by geographical barriers such as trails or a forested area. I recruited households within report areas with gridded streets by sampling a specific, pre-selected number of streets which ran perpendicular to the main street identified by the Society as a high or low report area. Residences on both sides of the street were sampled from street start to end. In contrast, some of the report areas identified by the Society consisted of long, often winding streets. Due to time and budget limitations, I recruited households in such areas by consulting with a representative of the Society to determine specific locations on the street which were known to have a higher number of reports (so as to not sample all residences on a street) and sampled each residence in the specified locations. Approximately 30-50 households were visited in each of these report areas. Similar to recruitment on gridded streets, households on both sides of the street were always sampled. Some report areas consisted of shorter streets with a limited number of households per street. I sampled all households on these streets.

In total, five-hundred-and-one homes were visited across the four hotspot communities. Recruitment rates are summarized below in **Table 5**. The number of interviews per hotspot community represents the number of households which were willing to participate in the study and consented to be interviewed. Each recruitment rate represents the proportion of households that completed interviews in the community out of the number of households visited for recruitment in that community (i.e., the number of households asked to participate).

Table 5 Hot spot community recruitment statistics

Hotspot Community	Number of Interviews	Number of Households Visited	Recruitment Rate
British Properties	9	117	7.69%
Caulfeild	12	124	9.68%
Braemar/Carisbrooke	10	142	7.04%
Keith-Lynn	14	118	11.86%
TOTAL	45	501	8.98%

The overall recruitment rate (total number of participants who were interviewed out of the total number of homes visited) was approximately 9%, with 87% of the interviews taking place with participants who lived in high report areas.

4.4.2. Semi-Structured Interviews

I conducted personal and telephone interviews between July 3rd, 2018 and August 27th, 2018. In total, 45 households were interviewed. Of the 45 interviews, 42 were with individuals and three were with couples (a total of 48 participants). Interviews ranged from 15.5 to 110 minutes in length and, on average, were 34 minutes long. Of the 45 interviews, 31 were conducted in-person and 14 were conducted over the phone. During all personal interviews, a representative of the NSBBS accompanied me for safety purposes and to provide answers to any questions related to the activities conducted by the NSBBS and attractant management in the North Shore context. All interviews were recorded using a digital audio recorder – with the exception of five participants who requested not to be audio-recorded and whose answers were noted by hand – and transcribed for further analysis of key, reoccurring themes. Each transcript was reviewed for accuracy, and direct and indirect identifiers were removed. Interview

transcripts were given four-digit random identification codes to track responses to participants and maintain their anonymity.

For each interview, demographic information was collected from each participant (see **Appendix A**). Key information collected included age, length of residence on the North Shore, length of residence in current home, whether or not the participant had one or more dogs, and preferred language for future information.

4.5. Data Analysis

The data analysis included thematic analysis and grounded theory methodologies. Prior to analyzing the interview transcripts, I read through each transcript and highlighted relevant text to ensure that the material to be analyzed was relevant to the study¹¹. After removing irrelevant dialogue, I uploaded each interview transcript into NVivo 12, a computer-assisted qualitative data analysis software. I then re-read each transcript and used an inductive, “open” approach (i.e., avoiding the use of codes pre-established by existing theories) to identify concepts, themes, and trends that emerged across interviews. This allowed me to organize and examine common themes across interviews, while avoiding limiting myself to the pre-identified topics which were being explored with each question. This approach to thematic coding is consistent with the objective of grounded theory methods, to generate theory from social research rather than from *a priori* hypotheses or assumptions (Glaser & Strauss, 1967). Following the initial coding process, I compared themes across interviews and developed a codebook to provide a description of each code, along with a set of criteria to standardize the use of each code in subsequent coding cycles.

After the initial cycle of coding, I reviewed the transcripts again and recoded them using a structured approach, using the concepts being explored in each interview question as a guide. Codes originating from the second cycle of coding were added to the codebook, following the same procedure described above for each entry. Structural coding of the data allowed for the comparison of responses to each question, thus

¹¹ For example, on several occasions, participants would move on to discuss an irrelevant topic such as my Masters program.

allowing me to quantify the number of responses in each response category for all closed-ended questions and open-ended questions with categorizable responses.

Upon completion of the second cycle of coding, I reviewed the codes in my codebook and compared them to my research questions and removed codes that were out of scope of the research purpose and objectives for the study. For example, I had coded responses as “land use changes” when participants would discuss the character of the North Shore (predominantly referring to the degree of residential developments) in the past compared to present day. While the topic was of interest from a planning standpoint, it did not fully address the purpose or objectives of my research.

4.6. Limitations

4.6.1. Subjectivity in Qualitative Research

Subjectivity is often a concern in qualitative research, in terms of both the participants in the research studies and the researcher. This project sought to explore the subjective views of the interview participants; therefore, subjectivity of the interview participants was not a concern. When addressing participants in interviews, I tried to remain neutral in my questioning to the fullest extent possible. Despite these efforts and my efforts to interpret the results fairly and objectively, my background and experiences are bound to influence the way that I view the world and to have an influence on my interpretation of my conversations with participants. To combat this, I maintained a distance from the other activities hosted by the NSBBS (e.g., public events) during the interview and analysis phases of the project to limit my personal investment in the Society’s work and objectives in the community. This allowed me to reduce the potential for bias towards the NSBBS and their work.

4.6.2. Survey Error

Because of the nature of this research and its topic, non-response error and social desirability bias may also be potential sources of bias. Participants who agreed to participate were likely those individuals who were more concerned about or fond of black bears and perhaps supportive of their protection. Additionally, participants who agreed to participate may have been particularly aware of the contentious issue of human-caused

black bear deaths on the North Shore. In other words, the interview participants likely recognized an issue and had a personal interest in finding a solution. Conversely, other individuals may have chosen not to participate if they were not interested in discussing the matter, or were concerned about revealing their own behaviour, or felt uncomfortable discussing their opinions with a representative of the NSBBS present.

Social desirability bias is a particular concern in personal and telephone interviews. Social desirability bias is the tendency for respondents to respond in ways that they believe will make them appear more favourable to the interviewer. This type of bias tends to occur in interviewer-administered questionnaires in which the interviewer has a connection with the questions being asked (Dillman et al., 2014). Specifically, in interviews for this study, interviewees were made aware of the fact that the study was being conducted in collaboration with the NSBBS. Additionally, a representative from the Society was present at all in-person interviews and during recruitment. As such, this information and the presence of someone from the Society may have influenced the way in which participants responded to questions regarding the NSBBS.

4.6.3. Sample Size & Recruitment

The sample size of this study was very small in comparison to the overall population of the North Shore (estimated to be over 181,000 people (Statistics Canada, 2016a; Statistics Canada, 2016b; Statistics Canada, 2016c)). Because of the small sample size as well as the likelihood that participants had a particular interest in local black bear populations, there may be an overrepresentation of certain values, attitudes, or sociodemographic groups in this study (i.e., coverage error). Therefore, while my research presents important insights into the views and perceptions of the participants, as well as into the realm of human dimensions of wildlife management research, the findings cannot be generalized and may not be representative of the North Shore population as a whole.

Another factor that may have affected coverage is that recruitment and interviews took place in July and August. The recruitment process was originally anticipated to begin in late May or early June, prior to the dismissal of elementary and secondary school students for their regularly scheduled summer break, which begins in late June. The delay in recruitment, and subsequently, in interviews, raises the concern of

coverage error, with families with school-age children potentially being excluded. Despite this concern, several interview participants indicated that they had children living at home.

Chapter 5.

Results

5.1. Attitudes Towards Black Bears

5.1.1. Views towards Black Bears

In order to identify residents' general attitudes and perceptions regarding black bears, participants were asked to describe their views about living in an area where black bears were present. Participant responses were coded as "positive", "neutral", "negative", or "ambivalent" (i.e., indicating mixed or contradictory feelings towards black bears). Most participants expressed views which were either positive (12/47; 26%)¹² or neutral (26/47; 55%). Four of the 12 positive responses indicated an appreciation for animals and wildlife, including the sentiments shared below:

"...I'm quite content with them being here. I think they add to sort of the charm of being able to live in this kind of community because you can have access to so much wildlife and it isn't just bears ... I have a range of wildlife that I get to see and who visit me on my property here..." (1138)

"I think we're very fortunate to be able to ... share such a beautiful place ... with black bears." (1793)

"I like the idea that there's bears living around. I think Canada has definitely got some amazing wildlife and I'm happy to share that space with the wildlife." (3740)

With respect to the responses categorized as "neutral", it should be noted that neutrality regarding black bears was not indicative of an individual's disregard for the species; rather, neutrality appeared to stem predominantly from an expectation and acceptance that black bears are present in the area. Individuals who provided neutral responses often indicated that it is normal or expected that bears are present in the area, noting the area as being black bear habitat or territory or that bears were present

¹² For each question, I report the number of participants who responded in a particular way out of the total number of participants who answered the question (e.g., 11 participants out of 47 total participants) followed by the percentage of participants who responded in a particular way out of the total number of participants who answered the question.

in the area before people were, (14/26; see Section 5.1.2. for more information) and/or that black bears were not bothersome or problematic (14/26).

Six participants provided responses that indicated that they were ambivalent towards black bears (13%), with each response demonstrating concerns about personal safety or property damage associated with bears. All participants within this response category noted that they have children who live at home, currently have or have had dogs, or have had previous property damage caused by bears.

“[it’s a privilege] to have the responsibility of being around nature in such close proximity. And [I’m] scared because I’m not used to creatures that can harm me or my children. I’m not used to having to be that responsible all the time ... I’ve read what to do and checked information, but ... I have children with special needs as well and I don’t know how we might deal with an encounter.” (0313)

“... historically, [I’ve felt] pretty indifferent because they are not keen on us, but ... I think they seem to be getting more bold ... They used to just sort of cruise around on the main road here, but the fact that it was on our deck, which involved climbing up some stairs ... approaching what is obviously a house with many human smells ... that makes me a bit nervous.” (2273)

Two participants, coded as providing “negative” responses, specifically mentioned concerns regarding public safety; however, neither of the participants expressed concern for their own personal safety.

“[It’s] not so much [a concern] for me ... I’ve been around bears, but when my kids are going to school—when they’re walking down the street ... when bears are around—and bears are around and they have been seen ... I think it’s a safety issue.” (1703)

5.1.2. “It’s their home”

Many participants regarded the North Shore as “home” for black bears and/or noted that black bears were on the North Shore first and that the area is their habitat or territory (21/48; 44%). Eighteen of these 21 participants held positive or neutral views of black bears. These views were frequently used as an explanation of why participants did not find the presence of black bears to be problematic or bothersome.

“Present? Hey, we’re in their territory. Right? ... it’s our civilization that’s expanded into their turf so we have to coexist with all of the animals that are [on] our street” (3675)

"I feel like it's to be expected. This is their natural habitat and we've moved into their neighborhood where we understand that there are black bears here. So ... I feel quite comfortable with it." (1448)

"I don't have any problem with that because we're infringing on their territory. I mean, how we're building and getting more up into the mountain and stuff. I mean, this is their area. It's their homeland before any humans were here so I have no problem with that." (2804)

"How do I feel about it? It's just how it is ... We live in Lynn Valley and it's the North Shore so there's bears ... it's just the way it is." (4177)

5.1.3. Resident Responsibilities in Bear Country

Participants were asked whether or not they believed that residents had a role to play in the protection of black bears, and to describe that role (question #4a¹³). Most participants (44/48; 92%) either stated that they believed residents had a role to play or described actions that residents could take to protect black bears. Of these 44 individuals, 35 focused on attractant and waste management as the focus of resident responsibilities. Several participants mentioned reporting bear sightings as being a role of a resident (5/48), with one participant mentioning specifically that they hoped other residents were not reporting complaints involving black bears. Three participants did not believe that black bears needed protecting; rather, two of the three believed that people needed to protect themselves from bears.

"...I guess ... the hardest thing to do is we have to be concerned about them becoming habituated to us. So, I guess we have to be worried about ... garbage. Making sure that we protect our garbage and making sure that they're not becoming habituated to the fact that they can come and get food from that. I guess fruit trees—which is a bit of an issue ... you have to be worried about that because that's a natural feed for them. Bird feeders ... you know, it all goes back to food ... we should make it tough for them to get [food] from us humans [so] ... they don't get in trouble." (1459)

"...we know that if you have a black bear around, the first thing to do is get in the house. And second is to phone ... The Black Bear Society." (3730)

"I would say protection of [residents] from black bears by keeping garbage in." (4256)

¹³ See **Appendix B** for questions referenced in this chapter.

5.1.4. Views on Human-Caused Deaths of Black Bears

Participants were told that 18 human-caused deaths of black bears occurred on the North Shore in 2017 and were asked a series of questions to explore perceived causes of the deaths and investigate the perceived ability of residents to reduce the number of human-caused deaths that occur annually (question #8a).

When asked why they believed human-caused black bear deaths occurred (question #8b), 25 participants (25/46; 54%) mentioned food, attractants, or bears becoming habituated to humans. Nine participants (9/46; 20%) said that the bears killed were possibly “nuisance” or problem bears or had returned after being relocated multiple times. Additionally, eight participants (8/46; 17%) believed that bears may have been put down if they were aggressive or posed a risk to people.

All but one of the 47 participants that were asked whether they believed residents had the ability to reduce the number of human-caused deaths of black bears, indicated that residents did have that ability (46/47; 98%; question #8c). Similar to the responses relating to resident responsibilities in protecting black bears, a majority of participants (33/46; 72%) stated that proper attractant management by residents was a way in which residents could reduce the number of human-caused deaths.

A few other participants indicated that residents can make an impact through their reporting behaviour (4/46; 9%). However, most participants who discussed reporting indicated reluctance to report or simply believed that not reporting could reduce the number of human-caused deaths of bears (see **Section 5.7.3.** for more information). A few participants also mentioned information and education, stating that residents need more education (3/46; 7%). Additionally, regulation was brought up twice, with one participant suggesting the use of heavy fines and another mentioning that residents should comply with bylaws.

5.2. Risk Perception

Most participants did not express concerns regarding personal safety or property damage (28/44; 64%), signalling that they perceived the risk associated with black bears to be low (question #1a). Three of these 28 participants mentioned their knowledge of bear behaviour or bear safety when discussing their lack of concern. Additionally,

several participants cited their outdoor experience or past experiences with bears when discussing why they were not concerned with the presence of black bears (5/28).

Ten participants shared that they had concerns (23%), with eight mentioning children, grandchildren, pets, or previous property damage as being reasons why they were concerned. Six of the 44 participants who responded to this question (14%) stated that their concerns were influenced by certain factors such as time of day, location, whether or not the participant was alone, and whether there had been previous sightings.

5.2.1. Children

Sixteen participants cited children and grandchildren as a subject of concern. The following quotes are from three participants who shared their beliefs regarding the behaviour and concerns of parents living in black bear habitat.

“...because I’m not familiar with the bears, the children don’t play unattended. These gardens are not fenced and I’m not comfortable with them being outside when I don’t know enough and ... they’re too young for me to know that they could know what to do.” (0313)

“[If] you’ve got babies playing in your backyard, you’re going to pay a little closer attention to keeping animals out of your yard, maybe ... You’ll probably find a lot of the parents from the school are hyper concerned about it, so they’re probably the ones who are trying really hard to keep everything smell-free and fruit-free and that’s just a thought.” (3419 – PA1)

“I think the biggest fear for parents around here is [that] ... a lot of them don’t let their children walk to school because they’re so concerned about the wildlife - like, cougars, coyotes, and bears. And to me ... my biggest sadness is that it’s such a beautiful area and the walk to school from here is so gorgeous—it’s through trails and little bridges that West Van has built, but ... we always feel like a parent has to accompany them ... [and] they don’t get as much freedom as say, I did growing up, because of all the wildlife. And you know, it’s hard ... to know what kids would do if they ran into that and how they could react and so we just don’t feel comfortable ... I wish that somehow, we could ... feel comfortable with our kids being able to walk to school together, but I’m not sure if there’s any way to overcome that really.” (1448)

Two participants who stated that they were not concerned about the presence of black bears in their neighborhoods also reported that they had been concerned in the past when their children were younger and/or that they did not leave their children unattended on their properties when they were growing up. Four other participants also mentioned children in general (not necessarily their own) when discussing human-

caused deaths of black bears and justification for killing black bears as a management action.

“When the kids were growing up, we would never leave them unattended playing outside in the backyard.” (3996)

“...it breaks my heart, but at the same time, I don't need to ... wait to have some kid mauled to death by a bear in his backyard before we make a decision on having cute bears trying to be relocated all the time and they keep getting more and more [present] until we wait until a problem happens...” (0683)

5.2.2. Other Wildlife

Seven participants noted that other wildlife species are of more concern than bears. Cougars, racoons, and coyotes were brought up multiple times in the interviews as being of more concern than having bears in their neighborhoods or on trails.

“It's not like a cougar that was going to stalk you right? So, I'm more worried about that.” (1448)

“...walking in the woods up in here, I'd be more concerned about a cougar, you know, if something was going to...to get you.” (3120)

“I think the biggest problem they had there are coyotes, aren't they? That's one of the biggest problems ... because you see all up in my telephone pole, you see some poor person crying away, putting up their sign about [how] they lost their little cat ... well, it's been chewed up by now...” (4206)

“I think raccoons are more of a concern, like, with cats and stuff.” (4667)

5.3. Acceptability of Management Actions

Participants were asked to rate the level of acceptability of six different proposed management actions to reduce conflicts between humans and black bears, on a five-point scale as *highly unacceptable, slightly unacceptable, neither acceptable nor unacceptable, slightly acceptable, or highly acceptable* (question #9): 1) decreasing development in black bear habitats, 2) reducing the amount of recreational activity in black bear habitats, 3) reducing the number of black bears by moving them short distances away¹⁴, 4) reducing the number of black bears by killing them, 5) improving the management of attractants by residents, and 6) changing resident attitudes.

¹⁴ The BC Ministry of Forest, Lands and Natural Resource Operations updated a Conservation Officer Service procedural policy in April 2016 which halted the process of long-distance relocation

Options 3 and 4 were re-worded part way through the study when I realized that participants might be interpreting the options inconsistently (i.e., some participants interpreted the statements as referring only to habituated black bears or “nuisance” bears while others may have included all black bears). After conducting thirty-eight interviews (41 participants) with the original wording, I revised the wording of the options to ensure that they were being interpreted consistently for the remaining seven interviews. The revised wording read as follows: 3) removing habituated black bears by moving them short distances away, and 4) removing habituated black bears by killing them. The results for the original and revised versions of these options are reported separately below.

5.3.1. Bear Management

Results with Original Wording

Twenty of the 41 participants who were asked the questions with the original wording stated that reducing the number of black bears by moving them short distances away is either slightly unacceptable or highly unacceptable to them (49%). Thirteen participants stated that this option was slightly acceptable or highly acceptable (32%). Two of these 13 indicated that they preferred moving bears over having them killed. Some participants regarded short distance relocation of black bears as ineffective (15/41; 37%), stating that bears tend to return after being moved. Of the 15 individuals who said that they believed short distance relocation was ineffective, one found this option to be slightly acceptable. Five other participants were uncertain of the effectiveness of short distance relocation. Three of these participants stated that short distance relocation was slightly acceptable or highly acceptable. Additionally, four participants indicated a preference for long distance relocation as it may be more effective than short distance relocation.

“Well ... when I answer it, am I reflecting the fact that I know that that’s pointless? ... If somebody were to ask me in isolation for example, reducing the number of black bears by moving them—is that preferable to shooting them? And I’d say ... yes. That would be highly acceptable. However, I know in terms of resolving the conflict issues, it’s pointless. So, I would say it’s highly unacceptable. Because I just don’t think it works.” (1138)

of “problem” carnivores due to ineffectiveness and high associated monetary and time-related costs (BC Forests, Lands and Natural Resource Operations, 2016; Dedyňa, 2016).

"How [relocation] impacts the bear after, I've got no idea. It grew up here. This is where its mom told it to get food - especially from garbage cans - and suddenly, you put it in the middle of nowhere where it's got no idea where to find food - that's tough. But I'd rather you know, try that than destroy it." (3151)

No participants stated that "reducing the number of black bears by killing them" was a highly acceptable management action. Three participants found this option to be slightly acceptable. Seven participants described circumstances in which it may be more acceptable to kill black bears as a management action (e.g., *"We don't want to kill them ... unless they have proven to ... [have] harmed a child..."* (2646)). These circumstances often included if a black bear was aggressive, harmed or killed a person, or if the bear presented a risk to public safety or the safety of children. However, most participants stated that reducing the number of bears by killing them was highly unacceptable to them (26/41; 63%) or expressed negative views towards this option that did not fit in the provided five-point scale of acceptability¹⁵ (9/41; 22%).

"...at the moment, I don't know of any other way of dealing with a habituated bear. And it seems to be reasonably clear that once you've got a habituated bear, that you cannot rehabilitate it. And you can't move it away, because it'll move back and it seems to be almost inevitable that ... [as] the bears become more and more comfortable with human contact, they then interfere more and more with human activity or daily life and they potentially become a risk to human safety because they either break into houses or they end up harming either pets or kids or whatever, then I just don't know. I mean, I'm inclined to say that in that context, that it's almost highly acceptable because ... I don't know what other alternative there is." (1138)

"I think we could do a better job. We don't need to be killing them. I guess that there's always going to be the odd bear that you're not going to be able to deal with and it's going to be aggressive and whatever and have to put down, but minimizing that is— I think—should be the goal." (2525)

"[It's situationally-based] in the number of conflicts you're having, in the style of conflicts you're having. If you have an overabundance of bears, every time a bear is on our property ... you increase the odds of someone getting hurt. If they were on our property once a year and they pass and go through - I got no issue - don't kill any bear. But out where the club is, we deal with them on a daily basis. They're there. And every time they're there, there's a level of risk that's taken on by populations and um, you're just playing the odds, you know? Whatever it is--one in five thousand encounters with a bear, will lead to a human injury as well. So where do you put the weight of your risk? So, killing—I have no problem killing bears. It's a very sad thing to do. We've failed at that point, but ultimately, we survive—the bears won't, so I hope that makes sense." (0683)

¹⁵ Some participants, when provided with the five-point scale, did not complete the scale choice and instead expressed views that were unable to be categorized under one of the scale choices (i.e., some participants only provided commentary regarding the proposed management action).

Results from Revised Wording

Of the seven participants who received the revised wording for these questions, three found “removing habituated black bears by moving them short distances away” to be a highly acceptable management action (43%). Two participants held neutral positions, stating that this management action was neither acceptable nor unacceptable, and both of these participants indicated that short distance relocation was not effective. Only one of the seven participants found this management action to be highly unacceptable. Most of the participants who received this wording mentioned that short distance relocation was ineffective (4/7; 57%), including one participant who stated that short distance relocation was a highly acceptable management action. One participant was uncertain of whether or not short distance relocation was effective. Two participants preferred the relocation of bears over bears being killed, with one participant stating that short distance relocation was favourable despite knowing that short distance relocation is ineffective, and the other supporting long-distance relocation rather than short distance. The participant who was uncertain of the effectiveness of short distance relocation said that they preferred long distance relocation of bears rather than having them be killed.

“Well, you know that doesn’t work very well ... at least, that’s what I always hear. That they come back where their food source is, so... it’s highly acceptable to move them if they are in danger of being put down.” (4934)

“Short distances are useless – they just come back. I’ve seen it before ... I’d like to see them moved further distances. Different area code.” (4710)

Similar to the responses from participants who received the original wording of the question, no participants found “removing habituated black bears by killing them” to be a highly acceptable management action. Two participants stated that this management action was slightly acceptable, with one participant discussing scenarios in which bears become a danger to humans and the other mentioning that the acceptability of this management action would depend on the total number of bears killed (e.g., it would be more acceptable if only two or three bears were killed). Three participants specifically mentioned that humans are at fault when bears are killed.

“I think that we have to co-exist and ultimately ... when they’re getting to a point where it’s becoming dangerous for like, the people that live here, then it’s a problem and... I don’t want to see them killed, but I think at some point ... I’d rather see them like, I don’t know, put in a zoo or something or like—but if that’s...yeah, it gets to a point where something has to be done I guess.” (4177)

"Why are we killing them? I mean...I don't agree with killing anything so why are we killing them? We're the reason they have to be killed, so ... if an animal is injured ... or they're dying of cancer, we put them down, but to kill a bear who keeps going back to the same place to get food sources—ludicrous." (4934)

5.3.2. People Management – Areas of Consensus

Two of the six proposed management actions discussed in interviews focused on making changes to resident attitudes and behaviour at the level of households and individuals: 1) improving the management of attractants by residents and 2) changing resident attitudes. Of the 48 participants who rated managing attractants as an action, 42 (88%) stated that improving resident management of attractants (**Fig. 1**) was slightly acceptable (4/42) or highly acceptable (38/42). On the other hand, 36 of 46 participants (78%) stated that changing resident attitudes (**Fig. 2**) was slightly acceptable (5/46) or highly acceptable (31/46), and four participants had neutral responses.

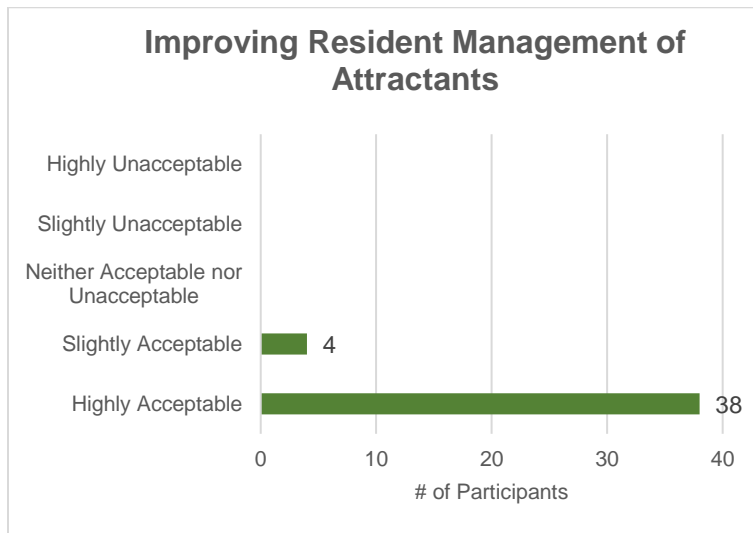


Figure 1 People management: improving resident management of attractants. Excludes 6 responses in which participants provided answers that did not fit into the 5-point-scale ranking.

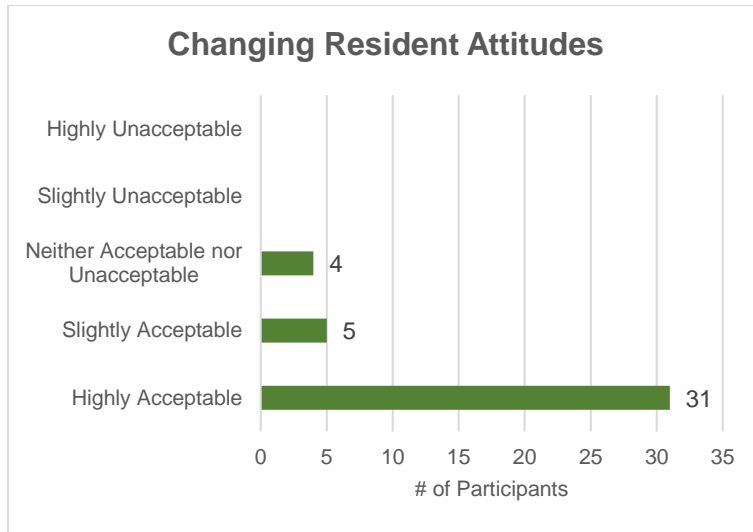


Figure 2 People management: changing resident attitudes. Excludes 6 responses in which participants provided answers that did not fit into the 5-point-scale ranking.

These two questions aided in sparking discussion about whether participants believed that the primary drivers of bear-related conflict events were simply poor household attractant management and negative attitudes towards bears. These responses offer insight into what participants perceived to be community norms.

“I would say ninety-five percent of people aren’t really familiar with black bears [in] West Vancouver and Vancouver ... It’s something we’re familiar with from childhood, but ... you pull the average ... ethnic group in this community growing up with bears? No. No. Let’s call it what it is and that is, they need to be educated. The two of us can live in harmony, but to a relative degree, but we’re not there anywhere where it should be. They’re not big, cute stuffed animals that sort of sit in your backyard and are there for photo ops.” (0683)

“I feel like most residents maybe share the same attitude I do which is like, it’s kind of a privilege and we shouldn’t do anything that endangers them or endangers ourselves. So, I sort of feel like most people I’ve talked to have a good attitude towards them and are trying to ... do things not to attract them” (1170)

“I think most people are on the side of the bear. And most people are willing—maybe not the brightest knives in the drawer—but are willing to try and you know, try and make it better for ... making the bears interaction that much more acceptable...” (1459)

“...so, like, if we’re the normal curve, I think I’m at the high end. I think most people are ambivalent and unfortunately, it’s the few people at the other end that I think are... [causing] the majority of the problems, right?” (4667)

“I find it’s mixed. I find people that have lived here a while have a more understanding view of them. The people that are fresh from another city –Toronto or wherever—they’re not used to it. It’s harder ... to teach them. But you know, it’ll come around eventually.” (4710)

5.3.3. People Management – Areas Without Consensus

While participants favoured household-level changes in behaviour and individual-level changes in attitude, there was far more variability in the responses concerning the management actions of “decreasing commercial and residential development” (**Fig. 3**) and “reducing recreational activity” (**Fig. 4**) in black bear habitat on the North Shore.

Decreasing development in black bear habitat largely drew responses on the positive end of the acceptability scale, with 11 of 46 participants rating this management action as slightly acceptable (24%) and 14 rating it as highly acceptable (30%).

"This is their territory. I figure that ... if you build a new subdivision and bears come into it, you should leave. They should close the subdivision down and let the bears have their old territory back." (3108)

"I guess just overall, the urban sprawl in most of the bear habitat is kind of above even where we live and we're at a thousand feet or in some of the green belts. I don't think those areas need to be developed particularly. So, yeah, it's just ... I'm sick of the traffic on the North Shore ... I think ... true areas that are bear habitat ... should not need to be developed. There's other lands." (3185)

"...I've lived here about ten years now and I look up at ... the mountain behind [me]... Lynn Valley and North Van ... they just go building more and more and more and they're squeezing those poor bears to the point where they really can't do much else ... I really, really have a problem with that." (3730)

Participants who found this management action to be unacceptable (12/46; 26%) often referenced human demand for land and the housing crisis in the region.

"Ha, wait until you try to buy a house. I mean, there's a balance between ... feelings for bears for example, and affordable accommodation, and we've got a crisis in Metro Vancouver especially for you young people and ... it wouldn't help the cause so-to-speak ... There's a lack of land here as it is. So, I'd be opposed to that ... we have a housing crisis in this city and that's just going to exacerbate it." (0133)

"...I'm not going to say we should accommodate bears really over people..." (2273)

"I don't know that we're in a position to be able to curtail growth in the area. I mean, just realistically I suppose and I'm taking this more as a planner than a resident ... I think it's hard. It would be difficult to accomplish whether [or not] it's a good idea. It's nice to stay stagnant and not get too much bigger, but I think that's unrealistic." (2525)

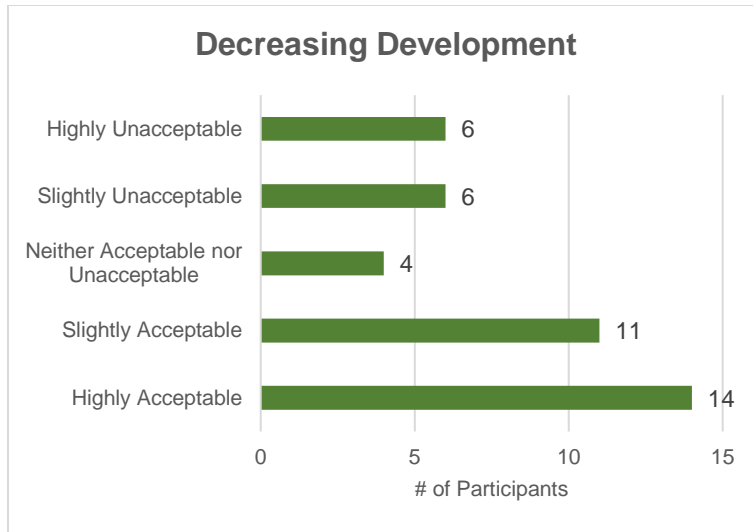


Figure 3 People management: decreasing commercial and residential development in black bear habitat. Excludes 5 responses in which participants provided answers that did not fit into the 5-point-scale ranking.

When prompted to discuss reducing recreational activity in black bear habitat, 19 of 44 participants (43%) reported that restricting or limiting such activity is slightly unacceptable (9/44), or highly unacceptable (10/44). In particular, four of these 19 participants described recreational activity as being a major component of the North Shore identity (i.e., people move to the North Shore for outdoor recreational opportunities). Additionally, six of these participants focused on bear safety (e.g., “smart” recreation, and a lack of negative encounters with black bears while recreating in the past) in their arguments against reducing recreational activity. Two of the 19 mentioned that they were uncertain of the impacts that recreation has on black bears or the frequency of bear-related conflict events. Overall, the responses to this proposed management action demonstrated a shift in participants’ focal point and approach. For all other management actions, participants often focused on the negative impacts of human activities on black bears, but the idea of restricting or limiting recreational activity prompted many participants to focus on negative impacts of black bear presence on humans.

"...this is why people move here, right? People move to the North Shore so that they could go play in the mountains ... There'd be an uproar if people couldn't do that." (1793)

"I don't think they need to. I don't think there's enough conflict to bother ... I don't think we should have to reduce our activities. We can all get along fine. Bears aren't that big a problem." (0959 - PA2)

"I don't think that that is required because I think that the areas are expansive, large enough that I don't think you're going to see a lot of interaction between people and bears unless people are irresponsible ... I've seen numerous bears when I've been hiking or biking in the Headwaters or the Demo Forest, but they're not interested in you, I would say ... I think you can peacefully coexist.

I mean, we live here—you live on the North Shore for a reason and also the North Shore attracts thousands of people for the outdoor activities. So, there is going to be some interaction, but I also know from experience that quite often there's going to be a bear around you, you don't even know because they've taken off and they either smell or hear you." (3675)

A few individuals who found reducing recreational activity to be “acceptable” or “neither acceptable nor unacceptable”, suggested the idea of imposing certain limitations rather than full restrictions (3/44). Potential limitations discussed by participants included: seasonal trail closures, dog restrictions, banning high occupancy vehicles such as buses at popular trailheads, and recreationalist registration/quotas in remote areas with “well-established ecosystems” (quoted from Interview Participant 2646).



Figure 4 People management: reducing recreational activities in black bear habitat. Excludes 3 responses in which participants provided answers that did not fit into the 5-point-scale ranking and 4 responses in which participants misinterpreted the question.

5.3.4. Most Acceptable Management Actions

After participants were asked to rate their level of acceptability for all six proposed management actions, they were asked to identify which action was the “most acceptable” management action to them out of the six options (question #9a). Of 46 participants (excluding two unclear responses), 21 (46%) indicated that changing

resident attitudes was the most acceptable. Eight of these 21 participants mentioned education when discussing their selection. Additionally, ten of these 21 participants said that resident’s attitudes and the improvement of attractant management by residents were related, explaining that a shift in resident attitudes is a precursor to improving attractant management. One participant said that the use of a bear repellent (sound, smell, or vibration) would be the most acceptable option.

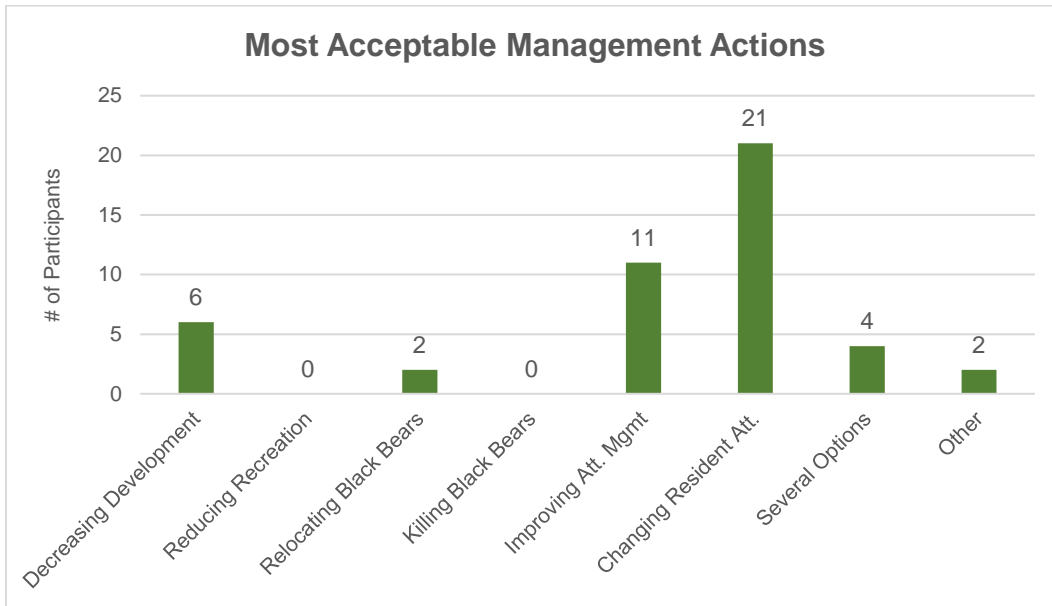


Figure 5 Management actions identified by participants as being the "most acceptable"

5.3.5. Least Acceptable Management Actions

In addition to identifying the most acceptable management action, participants were asked to identify which management action they considered to be the least acceptable. Of the 41 participants who were asked the question with the original wording for the proposed management actions, three said that “reducing the number of black bears by moving them short distances away” was the least acceptable of the six proposed management actions (7%). Thirty participants who were provided with the original wording of the question said that “reducing the number of black bears by killing them” was the least acceptable management action (73%).

Of the seven who were asked the question with the revised wording for the proposed management actions, six said that “removing habituated black bears by killing them” was the least acceptable management action (86%).

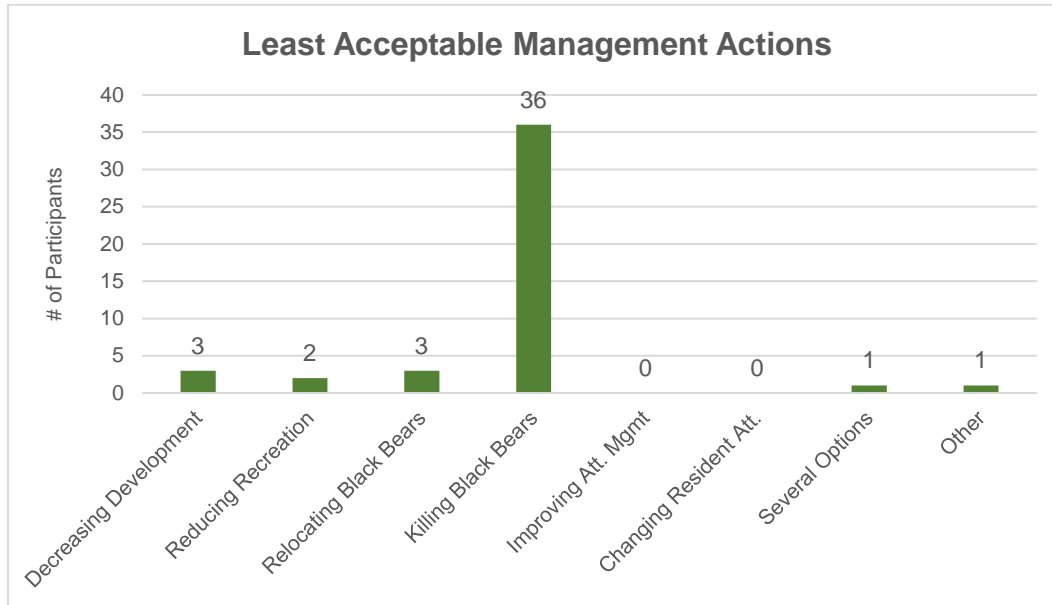


Figure 6 Management actions identified by participants as being the "least acceptable"

5.4. Resident Knowledge

5.4.1. Knowledge of Black Bear Presence on the North Shore Prior to Moving There

Thirty-two of 46 participants (70%) were aware of the fact that black bears lived on the North Shore prior to moving to the area (question #3). Four other participants were born on the North Shore and noted that they knew of the presence of black bears simply by growing up around them. Nine participants (21%) were unaware of the presence of bears prior to moving to the area, with a majority of those individuals having originally moved from areas outside of British Columbia.

5.4.2. Black Bear Attractants

When asked to list known black bear attractants, each of the 48 interview participants was able to name at least one item that could potentially attract a black bear into their neighborhood or onto their property (question #6). It was clear that these

residents were aware that black bears could be attracted by anything that is potentially edible to them. Of the attractants listed, garbage (37/48; 77%), fruit trees (27/48; 56%), bird feeders (19/48; 40%), and berries (18/48; 38%) were the most commonly cited.



Figure 7 Word cloud demonstrating the most commonly cited attractants

5.4.3. Newcomers

Ten participants mentioned that “newcomers” were probably unaware of how to manage their attractants or behave in bear habitats. Of the explanations regarding this perceived lack of awareness, the most commonly discussed topics included: gaps in bear-related knowledge and/or experience as a result of being new to the area, and language barriers.

“...the trouble is that there are people who have grown up here and lived with [bears] and not [had] an issue, and then there’s people like tourists and people who didn’t grow up here who ... don’t behave around them properly and so, we get more of a problem.” (4934)

5.4.4. Regulations – Provincial B.C. Wildlife Act

A majority of participants (40/47; 85%) were unable to demonstrate knowledge of the B.C. Wildlife Act outside of examples provided to them within the background context of the question (hunting and attraction of wildlife; question #18). Of the seven individuals who were able to provide additional information, most simply provided more specific

details regarding the hunting permitting process or spoke about grizzly bear hunting in BC – a topic covered heavily in the media in the year preceding the survey.

5.4.5. Regulations – Municipal Bylaws

Most participants (28/47; 60%) were able to make the connection between garbage-related rules (e.g., not placing garbage out the night before, securing attractants) and reducing conflicts between humans and black bears, regardless of whether or not they knew such rules were bylaws (question #19). Further, even individuals who did not make this connection were able to demonstrate that they knew garbage and food waste are attractants for bears.

5.5. Information Sources

In an open-ended inquiry, interviewees were asked to list their sources of information about bears and bear attractants, and to identify which source they considered to be their primary source of information. The question was split into two parts to determine: 1) where participants received most of their information regarding black bears, bear management, and bear safety (question #25), and 2) where participants received most of their information on managing attractants on their property (question #27).

5.5.1. Black Bears, Black Bear Management, and Bear Safety

Responses within the “black bear information” category contrasted with responses from the “attractant management” category, highlighting that residents either receive certain types of information from specific sources or seek out certain types of information from specific sources. While “news” was the third most cited source of information for attractant management, it was the most commonly cited primary source of information for black bears, black bear management, and bear safety, being cited as such by 17 of 47 participants (36%). The second most common response for bear information (8/47; 17%) was personal research, with many referring to the internet. Two options tied as the third most cited primary sources of information: communication with friends, family, or neighbours and block watch or the police (4/47; 9% each). The NSBBS was cited three times as a primary source of information within this category.

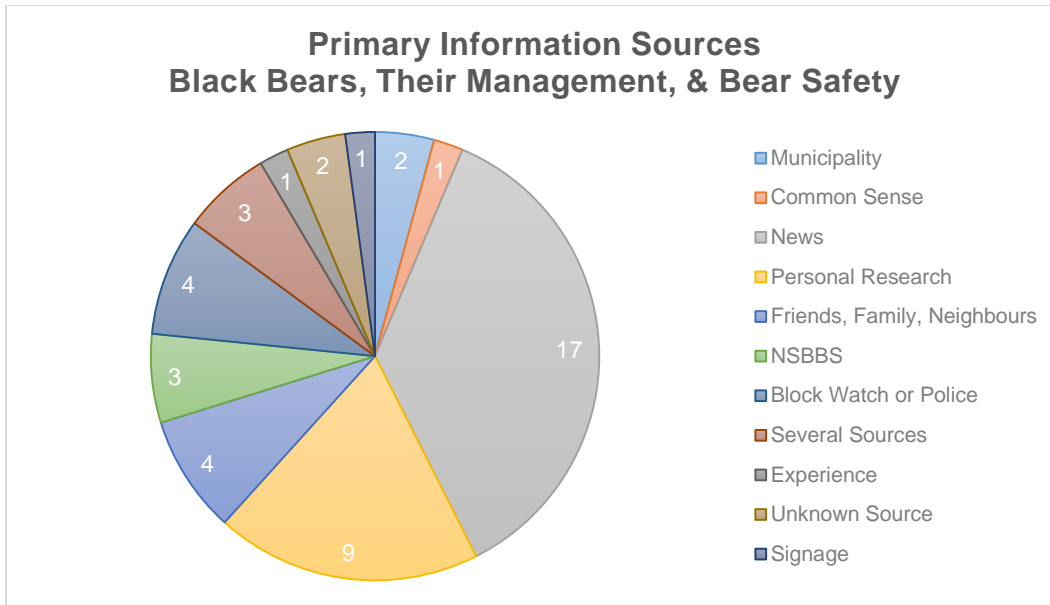


Figure 8 Primary information sources for information regarding black bears, their management, and bear safety reported by participants

5.5.2. Attractant Management

Of 45 participants, the most commonly cited primary source for information about attractant management was the municipality (14/45; 31%), with several participants mentioning that they had received flyers or newsletters from the municipality about garbage and recycling in the past. The second most commonly cited primary source for information was “common sense”¹⁶ (11/45; 24%). The theme of common sense is explored in the discussion section of this report. The third most commonly cited primary source was the news (7/45; 16%), including the North Shore News newspaper, TV, or radio. The North Shore Black Bear Society was only cited once as a primary information source within this category. Further, when asked whether it was difficult to find information on how to properly manage attractants on their property, most stated that this task was not difficult (37/47; 79%).

¹⁶ One participant, in addition to the 11, listed common sense and the municipality but did not identify their primary source.

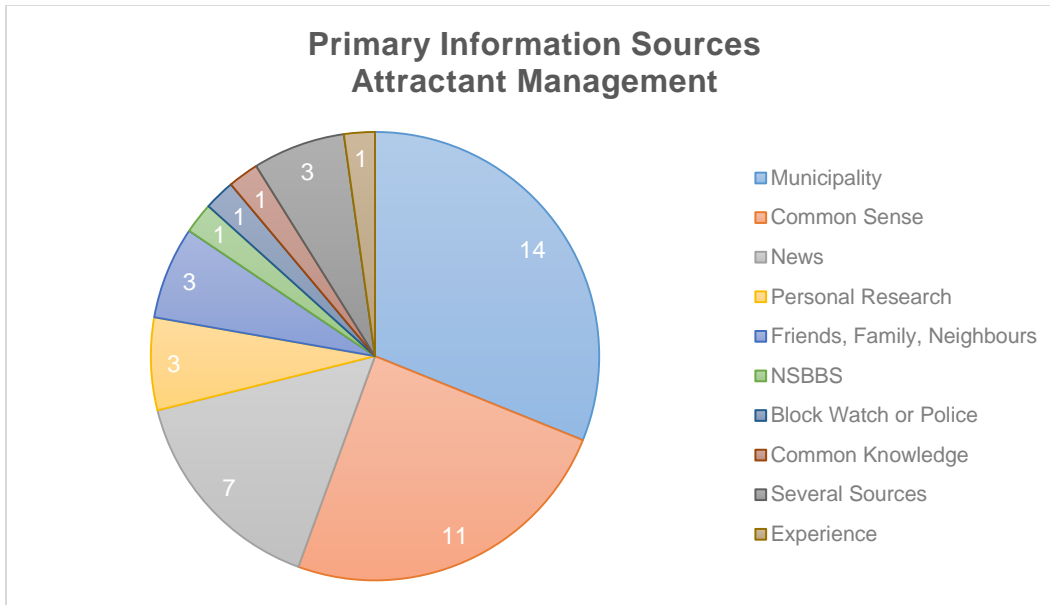


Figure 9 Primary information sources regarding the management of attractants reported by participants

5.5.3. Bear-related Incidents in the Media

During the interview phase of the research project, three major incidents involving bears occurred on or within a short driving distance of the North Shore and were heavily covered in the media. These three incidents were:

- July 11th, 2018 (earliest coverage by Azpiri, 2018): “Outrage over video showing North Shore family feeding black bears”
- July 16th, 2018 (earliest coverage by Azpiri, 2018): “Video captures grizzly bear charging at kayaker on Elaho River near Squamish”
- August 18th, 2018 (earliest coverage by CTV Vancouver, 2018): “Bear kills unleashed dog on Lynn Loop trail”

Eight participants referenced one or more of these news stories during their interview, demonstrating the potential of media coverage to reach residents and potentially impact their views of black bears and incidents involving black bears. The incident involving a family feeding black bears in West Vancouver was the most cited news story (cited by 8 participants) among the fifteen participants who brought up media in their interviews (including stories from the news other than the three listed above or

other media sources), with all eight of those participants expressing negative views regarding the incident.

5.5.4. Social Connectivity

Social connectivity (i.e., the degree of closeness between community members and the level of comfort participants feel about interacting with their neighbours) within neighborhoods was discussed by sixteen participants. With the exception of two participants in the British Properties, most of the other participants who discussed social connectivity indicated some degree of comfort in communicating or interacting with their neighbours (i.e., they have spoken to neighbours in the past or indicated that they would be comfortable speaking to them in the future) (14/16; 88%), with four participants specifically stating that they live in well-connected neighborhoods.

Participants discussed various ways in which they interacted with their neighbours. Four had spoken to neighbours in the past to correct their attractant management behaviour or had been given advice by a neighbour. Three participants mentioned that they had previously had their neighbours put their bins away for them if they forgot or were unable to do so themselves, or that they had done the same for their neighbours. Additionally, social media was discussed by three participants, who mentioned block watch and neighborhood and regional Facebook groups as means of communication between neighbours.

5.6. The North Shore Black Bear Society

One section of the interview questionnaire was dedicated to gathering information regarding participants' experiences with and views of the NSBBS. Participants were asked about their knowledge of the Society, information previously received from the Society, and suggestions for improvements to current informational and educational services provided by the Society.

5.6.1. Awareness

Twenty-eight of 46 participants (61%) stated that they were aware of the North Shore Black Bear Society (question #29). One of the 28 participants stated that they

thought the Society was focused on management and “some information” (quoted from Interview Participant 0313). Five other respondents stated that they *thought* they had heard of the Society before or were *somewhat* aware of its existence. Participants were informed prior to their interviews that the survey was being conducted in collaboration with the Society, so the responses of these five individuals may have been influenced to some extent by social desirability bias. Thirteen participants stated that they were previously unaware of the Society and its educational programs and services (28%).

5.6.2. Information Received

Participants were asked whether they had received any bear-related education or information from the NSBBS (question #30). Of the 28 participants who indicated that they were aware of the Society, 22 recalled receiving information in some form (mail, phone, or website) from the Society in the past (79%), while three were uncertain of whether they had received any information (11%), and three reported not having received any information (11%). All five respondents who stated that they thought they had heard of the Society before or were somewhat aware of its existence reported that they either had not received information from the Society or were unsure if they had. The following table summarizes the types of information received by participants from the NSBBS¹⁷.

Table 6 **Types or modes of information received by participants from the NSBBS**

Type/Mode of Information Received	Number of Participants
Pamphlet or Leaflet	10
In-Person at a Community Event	4
In-Person with Canvasser	3
Hot Spot Letter	3
Phone Call	2
Neighbour or Friend Shared Information	2
Society Website	2
Information from Children’s School Visit	1
Block Watch Meeting with Society Rep.	1
Newcomer Package	1

¹⁷ When asked what information they had received from the NSBBS, some participants listed more than one type or mode of information.

Of the 22 individuals who recalled receiving information from the Society, twenty discussed whether they believed that the information received had affected the way they managed their household waste or affected their views of black bears¹⁸ (questions #30c, d, and e). Fifteen stated that the Society's information did have an effect on their behaviours and views, with seven of these specifically stating that the information from the Society had aided in improving their waste management, two stating that they learned about black bear biology, behaviour, and safety procedures, and two stating that the information provided aided in building confidence or increasing a sense of empowerment.

Of the four participants who said that their waste management behaviour was not affected by the Society's information, one had grown up on the North Shore and said they had learned how to manage their garbage from growing up there and another stated that they felt as though they were already doing a good job with their waste management and had a positive view towards black bears. Furthermore, the responses of these four individuals to questions discussed in Section 4.7.1 of this report indicated that they all separate, wrap and/or freeze their food scraps regularly.

5.7. Resident Behaviour

5.7.1. Waste Management

For most of the 45 households interviewed, respondents demonstrated awareness that their waste management is important. Most households (39/45; 87%) reported separating their organic waste from their household waste. Additionally, a majority of households noted that they carry out supplementary waste management behaviours such as regularly wrapping (26/39; 67%) and/or freezing (21/39; 54%) their food waste prior to putting it out for collection. See **Figure 10** for a summary of waste management findings.

Disposal of Odorous Items

Most households (30/45; 67%) reported that they did not dispose of odorous items in their garbage (question #10). Four of the 13 participants who stated that they

¹⁸ In the case of the other two participants, the interviews had moved on to other subjects.

did dispose of odorous items had young children and one other participant did not separate their organics from their household garbage. Two participants gave unclear responses.

Separating of Food Scraps

Most households (39/45; 87%) reported that they used their green can regularly to separate their food scraps (question #11). There were five participants who stated that they did not use their green cans regularly. Each of these five participants was asked why they did not separate their food scraps from their household waste and the following reasons were given:

- Uses a garburator (2)
- Uses a compost pile (1)
- Limited food waste (1)
- “Too difficult” (1; quoted from Interview Participant 1117)

Wrapping of Food Scraps

Of the 39 households who reported using their green can, most stated that they regularly wrap their food scraps to reduce odours (question #12). Fourteen households specifically mentioned that they use biodegradable brown paper bags rather than or in addition to newspaper; however, two participants reported that they use biodegradable plastic bags, which are not permitted by Metro Vancouver. Three participants stated that they put their food scraps in their green can on the day of collection or that they freeze them but did not indicate whether or not they regularly wrapped them.

Freezing of Odorous Food Scraps

Of the 39 households who said they use their green can, most said they regularly freeze their food scraps prior to putting them out for collection (21/39; 54%; question #13).

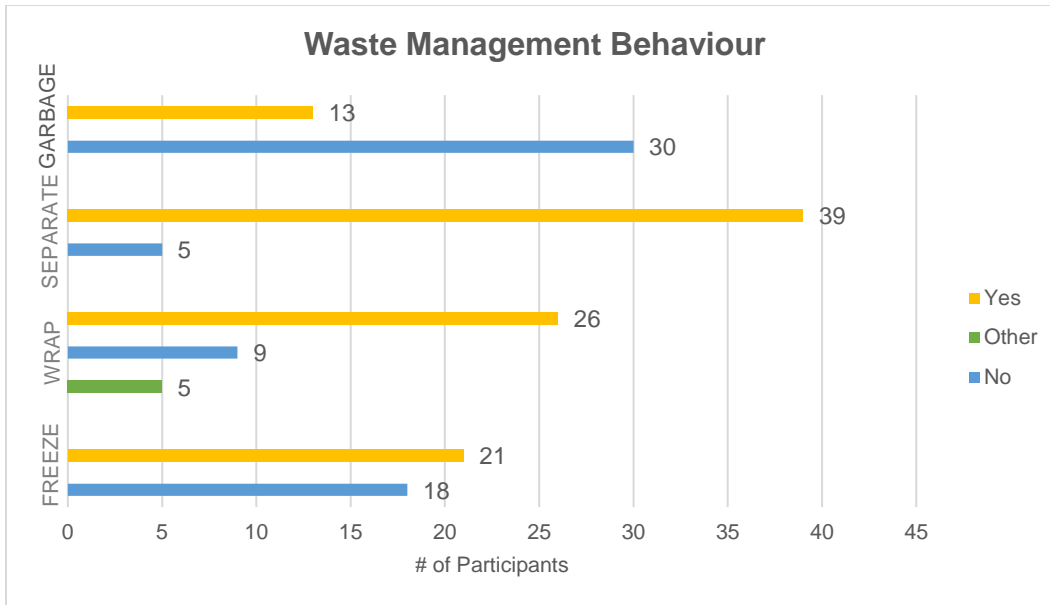


Figure 10 Summary of reported waste management behaviours. “Garbage” refers to the disposal of odorous items in garbage cans; Responses for “Separate”, “Wrap” and “Freeze” exclude one participant who provided an unclear response.

Storage of Green Cans

Many households (18/39; 46%) reported that they store their green cans outside of their homes without the use of an additional enclosure such as a shed (question #14). Of the 18, 7 indicated that they store them in these locations empty or filled only with yard clippings or that they do not place any waste into the green cans until collection day. **Figure 11** illustrates the various locations cited by participants as areas where they store their green cans.

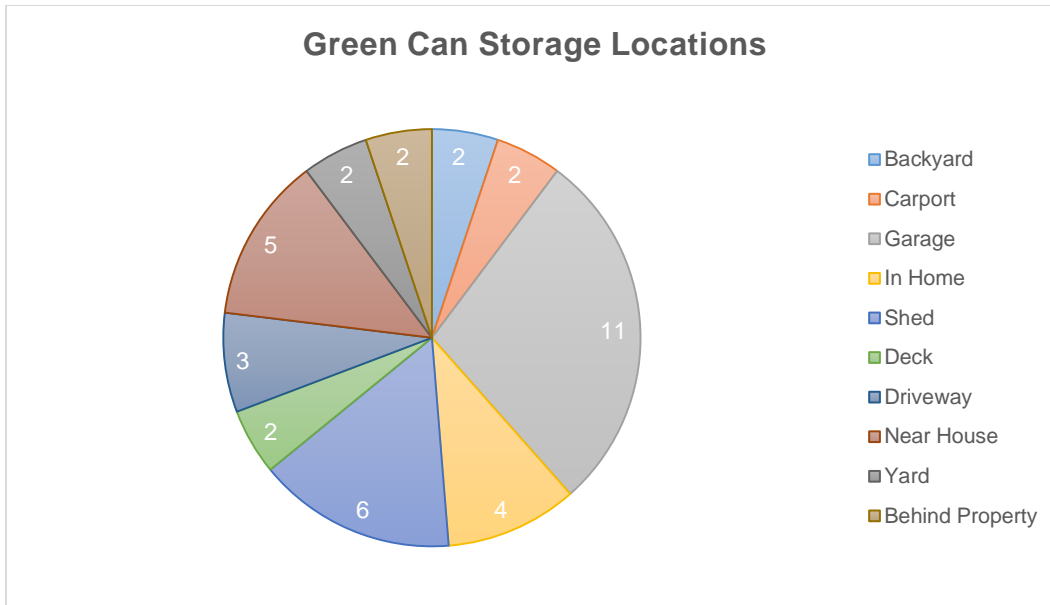


Figure 11 Green can storage locations reported by participants

5.7.2. Views Regarding Green Can Design and Efficacy

Five participants (four in the District of North Vancouver, and one in the District of West Vancouver) noted concerns regarding the design and/or efficacy of green cans in their respective municipalities. Three participants who discussed this matter in the District of North Vancouver stated that the locking components of their green cans had previously broken off, and one other participant stated that black bears have broken into the green cans in their neighbourhood. The participant in the District of West Vancouver indicated that they thought that the green cans in the municipality are ineffective.

5.7.3. Reporting of Black Bear Sightings

Participants were asked whether they had reported a black bear sighting or encounter within the past year or prior years. Of the 45 households that responded to the question, 28 (62%) stated that they had not reported a black bear sighting or encounter in the past year or ever before (question #5). One household did not indicate whether they had reported a black bear sighting or encounter in the past but indicated in their interview that they had never seen a bear since moving to their current home.

Figure 12 illustrates the different agencies and organizations to which participants had previously made bear-related reports. Of the 16 households who had made reports either in the past year or prior years, equal numbers of households had made their

reports to the Conservation Officer Service (COS) and the North Shore Black Bear Society (4/45 for each; 9% for each; question #5a). No household indicated having made reports to both the COS and the NSBBS for one sighting or encounter. Three households who had made one or more reports in the past were uncertain about which organization they had reported to, with two households stating that the municipality had referred them to an organization that they did not recall.

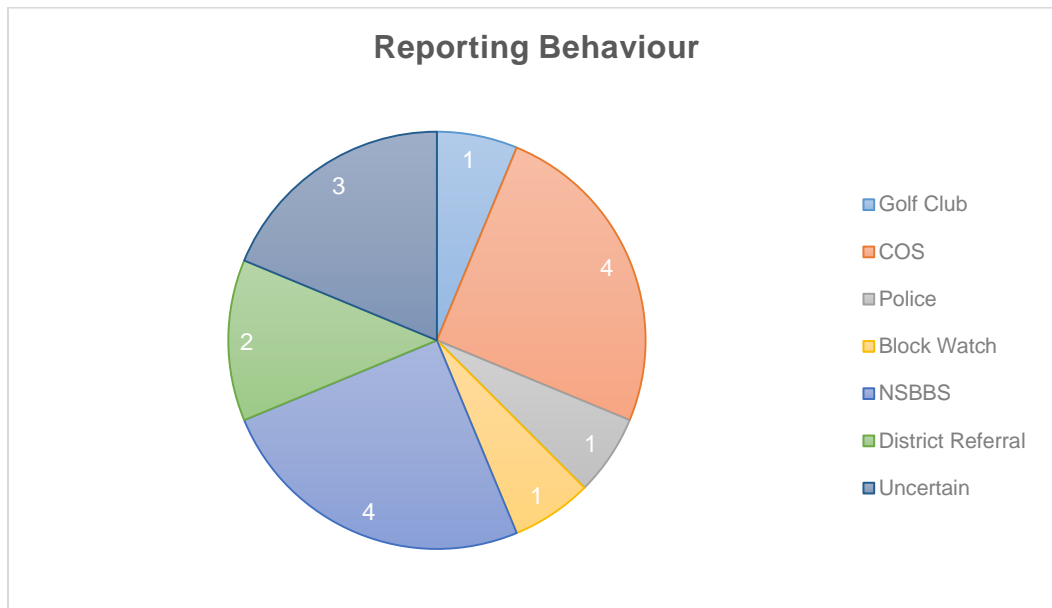


Figure 12 Agencies and organizations which have received black bear-related reports from participants

5.7.4. Hesitancy in Reporting

Six participants¹⁹ specifically indicated a sense of hesitancy in reporting bear sightings or encounters or stated that they do not report at all, or that others should not make reports, due to concerns that the bears would be killed.

“... [residents can] probably [reduce the number of human-caused deaths of black bears by] reporting the sightings, but the problem is I’m not sure how the agencies react, so if their response is to come and shoot them then that’s not really the greatest idea ... I wouldn’t want to be the source of the bear getting killed ... just because I spotted him on my property.” (0470)

¹⁹ One participant mentioned their hesitancy after their interview. I received verbal consent from the participant to include their response in my research.

5.7.5. Dog-Related Behaviour

Fifteen households (15/45; 33%) indicated that they were either current or previous dog owners (question #7). Of these households, eleven answered questions regarding leashing behaviours. Five of the 11 participants stated that they leashed their dog(s) regularly on a day-to-day basis (question #7a). Four individuals stated that their leashing behaviour was situation-dependent with most citing location (e.g., areas with traffic, on trails) as being the determinant of whether or not they would leash their dog(s). Two participants reported that they did not regularly leash their dogs, stating that their dogs (large breeds) needed to run.

When asked whether or not they would leash their dog(s) in a case where large predators (e.g., cougars, coyotes, or bears) had been sighted (question #7b), eight of the 11 participants who answered the initial question about leashing shifted their responses. Of these eight, only three shifted from being situation-dependent to certainly leashing their dog(s). The two participants who originally reported that they did not regularly leash their dogs both stated that if a large predator was sighted in the area, their leashing behaviour would depend on the situation (see below).

“If they are recently sighted then yes. Outside of the day, no ... because otherwise I’d have my dog on a leash twenty-four seven, three-sixty-five. I’ve lived on the North Shore as I said for all my life, so I’ve seen cougars—I’ve been stalked by them mountain biking ... you gotta ... live with the risks—life has risks ... if it’s an immediate threat, of course I’ll put it on a leash for sure, but if it’s, you know, a day or two gone by, no. Bears move. Cougars move. So, they’re not going to be hanging around for too long unless they ... have issues.” (4710)

“...cougars are a different issue in my opinion because ... they come out of nowhere, where a bear you can hear and see and deal and you know, not like I can outrun it, but they seem to not be bothered. Like, cougars are much more interested in um...eating my dog than I think, than a bear ... [cougars] seem to move quickly and get out of the area quickly so I’m never overly concerned because if someone saw one then I know the next day it’s miles away probably. That’s what I think. Where bears sort of...you know, hang around a bit ... Because I have big dogs, I’m not worried about coyotes ... I mean, what can I do about the cougar because ... if he’s there, I mean ... [it’s a] bad scenario, but you know, if someone tells me they saw a cougar, it doesn’t mean I’m not going to go the next day because as I told you, [I’m] confident.” (4234)

Interestingly, three other participants shifted their responses in a different manner when asked about large predators. One participant who originally stated that they leashed their dog(s) regularly said that they would not leash their dog(s) if a large predator had been sighted in the area. Additionally, another participant who originally

reported leashing their dog(s) regularly stated that they would sometimes let one of their dogs run off-leash, while leashing the other dog due to its behaviour around other dogs. One participant originally stated that leashing depended on the behaviour of their dog (i.e., whether or not the dog was responsive to commands), but later clarified that they generally preferred not to leash their dogs.

"No...I'm not fond of that ... I don't believe in the notion of having a dog on a walk in a forest on a leash. I think it defeats the purpose of walking your dog. I think a lot of people rely on a leash and they don't have the animal trained. And that's the only mechanism of controlling the animal, which then means you're seriously at risk ... I trained all three of our dogs and they did what they were told. Other than the one that [didn't listen to me] ... that dog was always on a leash." (2273)

Of the 15 participants with experience as dog owners, 11 reported that they had not had any known previous encounters between their dog(s) and black bears (question #7c). Of the four individuals who described previous encounters, two were not negative interactions (question #7e). Of these two interactions, one participant stated that bears had been present in areas near their dog, but there had never been any conflict. The other participant described an instance where one of their dogs had a close encounter in which it walked up to a cub, touching its nose on the bear's nose before turning around and walking away. Two other participants reported past scenarios in which their dogs had chased bears off, with one participant reporting only one instance and the other reporting that their previous dog chased bears off on a regular basis.

5.7.6. "Bear-in-Area" Signage

Forty-six out of 48 participants (96%) had previously seen "bear-in-area" signs in their municipality (question #17). When probed regarding how seeing the signs affected their behaviour, a large proportion of these participants (20/46) reported that seeing bear-in-area signs did not alter their behaviour (question #17a). Several participants stated that their behaviour was not affected because they were already properly managing their attractants (4/20) or were comfortable around bears (4/20) or believed that the bear had moved on since the sign was posted (3/20).

"Oh, [it doesn't change my behaviour] at all ... I don't know why—we're used to bears. We go hiking and see bears and we've had bears around here for years, so ... [I'm] comfortable with bears" (2457)

"...it hasn't because we haven't really encountered them that closely. " (2515)

"It had no effect. I thought, I'll never see it." (3120)

"Well, it doesn't affect my behaviour at all. I mean, because I've always been aware that the bears are here so, I mean, and I've always been very conscious of not trying to put anything out around my house that would attract them." (3185)

Additionally, 14 participants did not cite any behavioural change, but noted that signs raised their awareness (e.g., reminded them to keep an eye out for bears and be more careful outside).

"So, if I see 'em suddenly up here in the immediate neighborhood, I go and usually do anyways, like, if I'm going outside, I kind of scan the yard first ... or there's like some places in the alley way where you can go blackberry picking and ... I will kind of forget about it and then I'll like, remember and I'll take out my headphones to be more aware of my surroundings and start sort of singing to myself or something ... I know as long as you make [noise]—if they know you're coming, right? Usually they'll move on so ... I'm just a little more aware ... I should obviously always be aware, but just remind me to be aware, so." (4667)

"It didn't really change [anything]. When we started to see those signs, we're like, oh yeah, the bears are awake, but it doesn't really affect what we do on a day-to-day basis." (4177)

Eleven participants reported some shift in behaviour as a result of signs. Five of these participants raised concerns about being outside alone or at certain hours, three brought up children as a point of concern, and two cited shifts in dog-related behaviour.

"I talked a bit louder ... Years and years ago, I used to live by the Capilano River and there's a nice trail on the west side to go up to the dam and I used to run up there and you know, at the end of the summer, there'd be the warning bear-in-area and I'd be like, 'Hm, maybe I'll run to the water instead'. But that was just because I was by myself and younger. So, I thought, 'Hm...I'm a little nervous'. I wouldn't run on a trail if I knew there was a bear in the area. And people would come down and go, 'Oh, we just saw him'. Okay, I'm going down to the beach instead." (3419 - PA1)

"It did me ... If it were me, I wouldn't walk. I wouldn't go walking. I normally do garbage along Stevens Drive, but if I saw a sign that said "bear", I wouldn't go out with my garbage bag by myself. I would make [my husband] come with me." (0959 - PA1)

5.8. Solid Waste Management Bylaws

Each interview explored resident views on municipal solid waste bylaws. Specifically, questions prompted participants to discuss difficulties associated with bylaw compliance (question #20), as well as their preferences and views regarding fine amounts (question #21) and warnings for non-compliance (question #22). Additionally,

participants were asked to discuss what they would do in a hypothetical situation in which they noticed that one of their neighbours was not complying with solid waste management bylaws (Question #24).

5.8.1. Compliance

Forty of 48 participants (83%) stated that they did not find it difficult to abide by their municipality's solid waste management bylaw in terms of restrictions on green can storage and time of day for the placement of green cans on the street. Two participants who said they did not have difficulties themselves voiced concerns about elderly residents who, they stated, may find complying with restrictions to be inconvenient. Additionally, a few participants mentioned that they had assisted or been assisted by their neighbours in putting out or putting away their waste bins on time (e.g., if a participant forgot to put their bin away, their neighbour would put it away for them). Of the eight individuals who found some difficulty in abiding with the bylaws (whether or not they self-reported as being compliant), collection time was often cited as an issue (6/8).

5.8.2. Fine Levels

When asked about their views on the current levels of fines associated with non-compliance with their municipal solid waste management bylaw (**Fig. 13**), 15 of 45 participants (33%) indicated that the current fines were "about right", with most of these respondents (9/15) living in the District of West Vancouver where there are non-compliance fines of \$300 for improper enclosure of wildlife attractants and \$100 for placing bins out before a specified time.

"It seems like a lot ... I don't know, I'd be pretty pissed off if I got a ticket like that, but at the same time I think that the only way to gain compliance with people who are habitually non-compliant is to hit them in the pocketbook. And maybe I think the higher the price point, the more people associate it with something to avoid and that it's important, so you can compare that to the new fixation with handheld devices, you know? Is five hundred dollars or whatever it is reasonable? I don't think so, but it's trying to make a point. So, yes. I think that it's reasonable." (2273)

This contrasts with the results for the 12 respondents who stated that non-compliance fines were "too low," in that most of the latter group of respondents (8/12) lived in the District of North Vancouver where there are fines of \$100 for improperly storing solid waste and not placing or removing bins in a timely fashion.

“What’s saving a bear’s life worth? You know? You basically just put a price on a bear. So, you tell me [what the fine should be]. Everybody’s opinion of what a bear’s life is worth is going to be different. I’d say you’re probably looking at—I feel bad for saying it, but three thousand dollars. You don’t change people by soft shoeing the issue -- you change it by making a bold statement ... [the current] amount’s a joke because that’s just—pay it and move on. Small fines like that breed complacency in the rules. I would dramatically increase it.” (0683)

“I don’t think it’s going to affect people ... It might have a slight effect, but I can’t see anybody making an intelligible impression or a change in their mindset by a hundred dollars ... if you said five hundred, then it would have more of an impact on people I think. A hundred dollars is nothing.” (2136)

Several participants (10/45; 22%) indicated support for a tiered fine schedule in which repeat offenders are given higher fines as the number of offenses increases. Some participants believed that the current fine was about right for a first-time offense but should increase with the number of offenses, while others stated that the current fine was too high for a first-time offense and was more appropriate for a repeat offender.

“Well, since it doesn’t take that much to correct the situation, I think a hundred-dollar fine is ample. It sends a pretty strong message. It’s really annoying to have to pay a hundred dollars to correct a very easy to correct behaviour. Whereas a large fine, may be a little bit punitive, but the fine could escalate. Let’s say ... on the third time ... it sounds like you’re wealthy and don’t [care] about it and maybe you up the fine on a third offense.” (2646)

“I think it should be a sliding scale. The first offense should be a notification that you’ve broken the rules. The second one should be fifty. The third one should be a hundred. The fourth one should be two hundred and it ... should go up exponentially until the person stops ... If you keep breaking the law, there’s got to be some incentive to make you stop.” (3108)

A few other participants discussed other views on the fine schedules including negative views towards regulation in general (1/6), uncertainty surrounding the effectiveness of fines (2/6), concerns with respect to the enforcement of solid waste management bylaws (2/6), and the design and structure of green cans (1/6).

“it’s probably a little low, but again, the problem is ... when West Van supplied us with our green bins—they’re useless. They’re totally useless, like a three-year-old kid could open it and have dinner. So, if they were more fortified, then I think they would have the right to ... jack the fine up, but with ... the equipment they’ve given us, eh. No.” (4710)

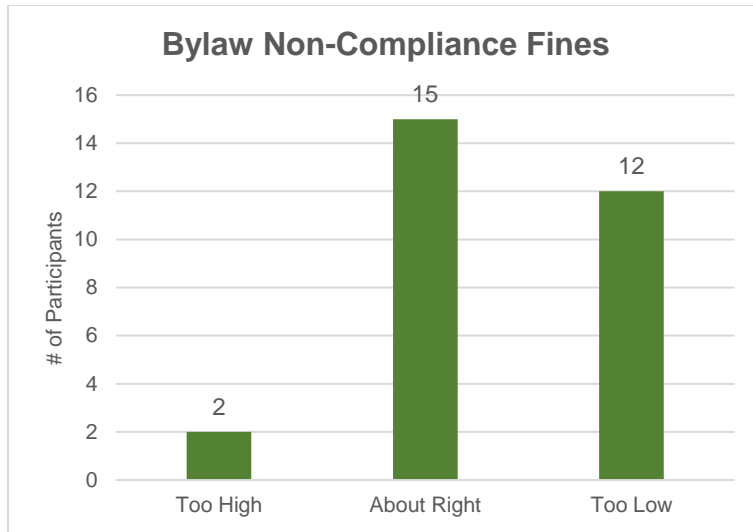


Figure 13 Participant views regarding fines associated with the violation of municipal solid waste management bylaws. Excludes ten participants who supported a tiered fine schedule for repeat offenders, six participants who did not choose one of the three response options provided and instead provided other commentary, and two participants who provided unclear responses.

5.8.3. Enforcement

Six participants identified enforcement as a point of concern. Two of these participants identified the scarcity of bylaw enforcement staff as a reason for minimal enforcement of the solid waste management bylaws.

“...it’s great to have bylaws, but if you don’t enforce them...what difference does it make?” (0470)

“...there is [enforcement], but it’s very spotty. It’s very, very spotty. Someone will put their garbage bins out and someone will visit them, but we have friends that live just at the end of this street ... and the people across the street from them-- there’s bears in their garbage all the time and they are warned constantly and they never do anything about it, so there’s no repercussions.” (3419 – PA1)

“[Bylaw enforcement officers are] few and far between so I think the risk to anybody is fairly low because they can only ... go around so much and the bylaw officers are looking. And there’s times they’re looking at lawn watering more than anything about garbage infractions.” (3675)

5.8.4. Preferred Number of Warnings

A majority of participants (27/48; 56%) supported having one warning prior to a fine in the case of bylaw non-compliance. Responses ranged from preferring no warnings to a maximum of three warnings (see **Fig. 14**).

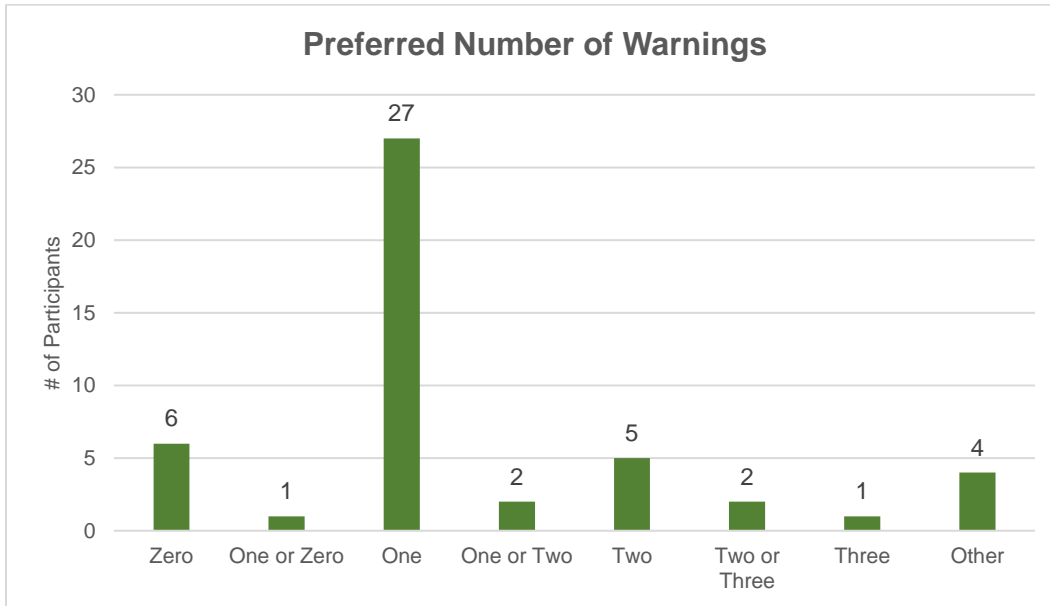


Figure 14 Participant views regarding the number of warnings which residents should receive prior to receiving a fine for violation of municipal solid waste bylaws

Four participants stated that if residents are well informed of the solid waste management bylaws, fines should be “almost automatic” (quoted from Interview Participant 1138) or dealt out without warning. However, two participants believed that warnings should be given out on a case-by-case basis.

“Depends on the circumstances, right? ...if you got some totally frazzled woman you ... and she’s stay at home, and she’s got five kids and [she] ... shows up in her house dress and her hair’s like this and the kids are all yelling and you’re going to fine her because she didn’t do her garbage exactly right? ... Or you got a couple of older geezerettes, like me, we’re kind of shuffling around the joint ... we forgot to put the garbage out, or we put the garbage out too late – are you going to fine me or warn me?” (1703)

“I think it depends on the situation and how vagrant they are about it, right? Like, if it happens and then it happens like, six months later or whatever and they were just like, oh, we went on vacation and we just wanted to put our garbage out so it wasn’t sitting there while we were gone for two weeks like, okay, like whatever, right? And it depends on whether it’s a problem, right? ... if it’s causing a problem, definitely, there should be a lot harder line taken on it whereas if it’s not causing a problem, it’s all grey area, right?” (4667)

5.8.5. Non-Compliance Reporting

Participants were given a hypothetical scenario in which they noticed one of their neighbours not complying with solid waste management bylaws and potentially attracting wildlife into their neighborhood and were asked to discuss what their course of action would be in addressing the issue. The question was closed-ended with the possible actions being that the participant would: talk directly with their neighbour; talk to their block watch captain if they had one; call the North Shore Black Bear Society; call the Bylaw Enforcement Officers; call the Conservation Officer Service; or do nothing. Responses were recorded based on the participant's first course of action (see **Fig. 15**), as some stated that depending on how the neighbour reacted, they would take additional actions.

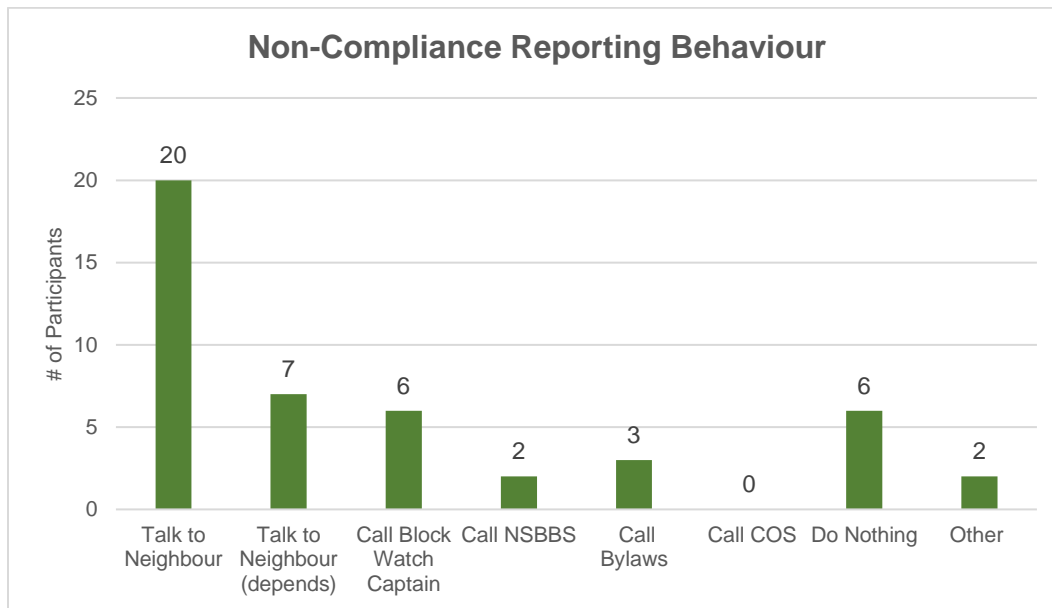


Figure 15 Preferred method of addressing neighbours who are not compliant with solid waste management bylaws, as identified by participants

Out of 46 participants, 20 (44%) stated that their primary course of action would be to talk directly with their neighbour if they noticed bylaw non-compliance. Several other participants (7/46; 15%) stated that their decision to talk to their neighbour prior to taking any other course of action would be dependent on their relationship with the neighbour. A few participants (6/46; 13%) noted that they would do nothing, with half of these explaining that they did not want to cause conflict with their neighbours.

A number of other participants who lived in neighborhoods with block watch programs said that they would talk to their block watch captain to report bylaw non-compliance (6/46; 13%). Few participants (3/46; 7%) stated that they would call the Bylaw Enforcement Officers as their first point of contact. No participants reported that their first response would be to call the Conservation Officer Service.

Two participants (4%) stated that they would call The North Shore Black Bear Society as their initial course of action. One other participant said that they would call the Society as they were aware the Society could talk to the neighbour for them, but their partner revealed that in the past they had done nothing regarding their repeatedly non-compliant neighbour.

Chapter 6.

Discussion

6.1. People and Black Bears

Previous research suggests that North American attitudes towards bears tend to be positive (Don Carlos et al., 2009; Kellert, 1994). In the present study, over eighty percent of participants demonstrated positive or neutral attitudes with respect to living in an area where black bears are present. While only 26% of participants clearly demonstrated positive attitudes towards black bears, most participants did not view black bears as a nuisance or a problem, with several stating that the North Shore is the black bear's habitat, territory, or home. This finding suggests that North Shore residents are generally accepting of black bear populations and tolerant of their presence within residential neighbourhoods.

Residential Attractant Management

Attractant management is a fundamental cornerstone of bear management (Hristienko & McDonald, 2007; M. Gibeau, personal communication, November 26th, 2019;). Residents and municipalities play a key role in local-level bear conservation efforts through the management of residential garbage and other attractants. As shown in **Table 3**, both the District of North Vancouver and the District of West Vancouver have provisions within their solid waste management bylaws that require the use of wildlife-resistant enclosures when solid waste is stored outdoors. However, my research found that nearly half of the participating households who use their green cans store them outdoors without the use of an additional enclosure (see **Section 5.7.1.**). Given the role of effective attractant management in the prevention and management of conflicts between humans and black bears, as well as in bear management, this finding highlights a noteworthy obstacle to coexistence efforts in the hotspot communities studied as part of this research.

While participants generally did not find it difficult to find information regarding attractant management, the inconsistent storage of green cans suggests that: 1) there may not be an adequate amount of information regarding the regulations surrounding

the outdoor storage of green cans and the potential consequences of improperly storing green cans outdoors, and/or 2) there are barriers that prevent or impair the proper storage of green cans (e.g., no garage). In general, there did not appear to be an information deficit with respect to attractant management – residents understand the need to manage attractants to reduce bear-related conflicts and human-caused black bear deaths. However, it is possible that this understanding is incomplete or is insufficient to motivate appropriate behaviour, as evidenced by the large proportion of residents who do not properly store their green cans in secure locations.

As most participants stated that attractant and waste management are part of a resident's role or responsibilities in the protection of black bears, there appears to be a disparity between what people believe that they, and other residents, should do and what they actually do. This demonstrates that there is a need to address this apparent value-action gap through the adoption or amendment of coexistence policies on the North Shore. Using Blake's (1999) model of the value-action gap as a guide, I examined three main barriers to "bear smart" behaviour. Individuality and responsibility barriers were not evident in this study as most participants understood residents' roles and responsibilities in the protection of black bears and indicated that they believed residents had the ability to reduce human-caused black bear deaths on the North Shore. Further, most participants stated that they believed that the 18 human-caused black bear deaths on the North Shore in 2017 were caused by attractants and habituation, signaling that participants likely evaluate poor attractant and waste management to be "bad" behaviours (i.e., their attitudes towards this behaviour are likely negative). This leaves one remaining barrier: practicality. Five participants expressed concerns regarding the effectiveness of the design of their green cans which suggests that existing green cans may need to be replaced with more durable containers or new provisions need to be put in place to secure green cans stored outdoors. While most participants agreed that it was not difficult to abide by the time restrictions or storage requirements associated with their solid waste management bylaws, there may be other barriers pertaining to the storage and placement of green cans which have not explicitly been captured by this research (i.e., lack of storage space, physical ability to place containers at curbside, views on the effectiveness of green cans in preventing access by black bears).

Bear Management

Public acceptability of lethal management actions towards wildlife is a highly complex subject, particularly in urban settings. This complexity is demonstrated in this study, wherein even the two participants who believed black bears were a public safety concern did not support black bears being killed as a management action (i.e., they did not find such management actions to be acceptable). This finding was particularly interesting as I initially expected that individuals more concerned with public safety would be more likely to support lethal management approaches. However, this was not the case in the present study, which highlights that negative attitudes towards black bears based on concerns for public safety are not necessarily indicative of an individual's preference for lethal management action.

Another example of the complexities surrounding resident acceptability of lethal management action related to the specific types of conflict occurrences. Although most participants were against killing bears as a management action, several participants indicated that in some circumstances killing habituated bears may be acceptable (e.g., aggressive bears). While this study did not investigate variation in the acceptability of management actions in the context of specific situations (e.g., how acceptable it would be to relocate an aggressive bear), this finding is consistent with previous studies which have found that the acceptability of reactive bear management, such as relocating or killing bears, in response to conflict events tends to be higher for incidents with more severe impacts (Don Carlos et al., 2009; Wittmann et al., 1998; Zinn et al., 1998). Further research is needed to explore the circumstances and factors (e.g., severity of interaction or conflict, location of sighting or behaviour) that affect the tolerance of North Shore residents for bears and the acceptability of killing "problem" black bears.

Regarding the relocation of habituated black bears, the acceptability of this management action appeared to be influenced by a participant's knowledge of bear behaviour and their beliefs about the effectiveness of relocation. Relocation of individual animals has been used to resolve conflicts between humans and wildlife; however, research indicates that such efforts are often unsuccessful (Linnell et al., 1997; Fishcer & Lindenmayer, 2000). Further, relocation can also be detrimental to the relocated animal (Linnell et al., 1997). With respect to "nuisance" black bears, the success of relocation efforts may vary based on the age and sex of the bear, and the distance of the

relocation, with adult bears being more likely to have recurrent nuisance behaviours and to return to their original sites after being relocated (Landriault et al., 2009).

Interestingly, Spencer et al. (2007) found that while most of the agencies they examined used relocation to manage “problem” bears, only 15% believed that it was effective. One possible explanation for this discrepancy is that relocation is generally more acceptable to the public than to management agencies (Witmer & Whittaker, 2001; Urbanek et al., 2011). This sentiment is reflected in the findings of my research, in which several participants indicated that relocation was preferable to having bears be killed. Further, given the resistance of urban residents to lethal wildlife management actions, particularly in response to encounters of low severity (e.g., sighting within a residential area, wildlife found accessing and consuming garbage) found in previous research (Don Carlos et al., 2009; Manfredo et al., 1998; Wittmann et al., 1998; Zinn et al., 1998) ,and as seen in the findings of my research, some residents may support non-lethal bear management approaches like relocation despite being aware that such approaches may be ineffective. While potentially more favourable to the public, wildlife relocation can be costly in terms of time, monetary, and staff resources (Linnell et al., 1997; Thompson & McCurdy, 1995). The contention surrounding relocation as a wildlife management tool therefore demonstrates the difficulties in balancing public acceptability, resource availability, and management effectiveness.

People Management

As expected, many participants supported non-lethal, information-based approaches that target the behaviour of people rather than approaches that remove bears or attempt to control bear behaviour. This finding is consistent with past research which has found that information-based approaches to managing human behaviour tend to be preferred by the public over non-lethal bear management (e.g., relocation) (Siemer et al., 2003; Don Carlos et al., 2009). However, in my research there was more dissonance in participants’ responses regarding management actions that involve restricting development and recreational activity as some participants supported such restrictions, but others said they were unacceptable. This finding highlights the importance of assessing the social (e.g., values, community identity) and economic (e.g., development, financial security) factors involved in the management of conflicts between humans and black bears in the context of the North Shore. Residents may hold non-

negotiable values that conflict with the values of others, or even have personal values that contradict one another (e.g., residents who strongly support the conservation of black bears, but do not believe that limiting development is appropriate).

6.2. Community Identity

Various aspects of participants' sense of the "identity" of the North Shore were revealed during the interviews. In particular, nature, wildlife, and outdoor recreation appeared to be important aspects of the North Shore identity for many of the participants. However, as seen across several interviews, occasionally one or more of these valued aspects of identity would conflict when judging approaches to managing and reducing negative interactions between humans and black bears. The clearest demonstration of this conflict is evident in the responses discussed in **Section 5.3.2.**, when participants were asked to discuss the acceptability of reducing recreational activity in black bear habitats as a means to reduce the number of black bears killed in response to conflict events. Participants were divided in their views on this management action, and several of the individuals who were opposed to reducing recreational activity emphasized that people move to the North Shore to partake in outdoor recreation. Based on their responses to other questions, this opposition to reducing recreation to protect bears did not stem from a negative attitude towards black bears, but rather from the importance of recreation to these participants as well as a lack of perceived risk relating to black bears. Additional factors may also have been involved, such as disbelief or uncertainty about the negative impacts of recreation on black bear populations.

While outdoor recreational activity can be detrimental to black bear survival rates (Goodrich & Berger, 2004), managers must also consider the potential impacts of black bears on human safety on trails and in the backcountry. Examining the issue from a more general standpoint, it is known that when black bears interact with humans the bears can become tolerant of, or habituated to, humans and their activities (British Columbia Ministry of Environment, Lands and Parks, 2001; Herrero, 2018). This raises several important questions. First, what is the likelihood of black bears becoming habituated to recreationists and recreational activities? Second, will this habituation result in increased incidences of black bear-related conflicts on trails in and outside of the backcountry? And lastly, should the responsible authorities be limiting recreational access to minimize the potential for recreation-related conflicts? My findings suggest that

participation in outdoor recreational activities is an important aspect of the North Shore identity. Therefore, regulations limiting trail or backcountry usage may not be acceptable to some North Shore residents, which may limit the success of such regulations and may also foster negative attitudes about bears. Local governments therefore have the difficult task of finding common ground among the interests of their constituents in terms of recreation-related values, wildlife conservation values, and public safety when designing recreation-related regulatory policies.

6.3. Social Capital and Connectivity in Managing Black Bear Conflicts

My research revealed some of the social characteristics of the four hotspot communities. In particular, interview responses provided insight into the degree of social capital and connectivity within these neighbourhoods. Social capital can be defined as the “features of social life such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit”, and is represented by the connections, or relationships, that exist between individuals (Putnam, 1995, p. 67; Putnam, 2000, p. 19). Social capital is therefore an important factor in facilitating collaboration between individuals within communities to find mutually beneficial solutions to shared problems.

The findings of my research suggest that social capital and connectivity may play an important role in minimizing conflicts between humans and black bears on a community or neighbourhood level. First, in neighbourhoods where social capital is higher and residents feel comfortable talking with one another, more experienced long-time residents may be able to correct behaviours which may attract black bears into the neighbourhood (e.g., setting out bird feeders for a prolonged period of time). Second, residents may be able to help each other by sharing the responsibility of managing attractants in the neighbourhood. For example, in cases where a resident forgets or is unable to put away their waste containers as required by bylaw, an available and willing neighbour may assist in ensuring that the containers are inaccessible to wildlife.

As noted by Blake (1999), an individual’s perception of responsibility may be a potential barrier to environmental action. More specifically, people may not carry out environmentally responsible behaviours when they believe that their actions, when carried out as an individual, would be ineffective (Blake, 1999). This idea was seen in my

findings where some participants noted that everyone in a neighborhood must properly manage their attractants and waste (i.e., residents must cooperate and comply with relevant bylaw provisions) in order to avoid attracting black bears and any subsequent invasive or lethal management action. Therefore, if attractant management is seen as a shared responsibility and social capital between neighbours is high, residents may be more likely to collaborate to minimize conflicts within their neighbourhoods.

It was clear that participants in this study had a shared interest in reducing conflicts between humans and black bears; however, the way in which the issue of bear-related conflicts was framed differed between individuals. Across all 48 participants, I identified two distinct objectives relevant to the study at hand: the conservation and well-being of black bears, and the well-being and safety of the public. While these objectives are not mutually exclusive, it was clear that some participants weighted one objective over the other. The relative weighting of these objectives may stem from participants' perceptions of risk regarding black bears, or from their attitudes and values toward wildlife generally, and black bears specifically (see **Section 2.2.2.** of this report). However, when considering both objectives, there is one clear mutually beneficial solution for the North Shore communities: in order to provide for both the well-being of black bears and North Shore residents, residents must manage their attractants properly to avoid creating an environment that attracts black bears, habituates them to residential neighbourhoods and humans and/or conditions them to human food sources (i.e., Herrero's (2018) definition of coexistence with bears). If residents choose not to manage their attractants in a way that prevents access by wildlife, there is a risk that black bears will be drawn into residential areas and become food-conditioned which poses a risk to their well-being and that of the public.

6.3.1. Combating Distrust in Collaborative Efforts

Distrust is a fundamental challenge for collaborative efforts (Ansell & Gash, 2008). With respect to the field of wildlife-related conflict management, trust in wildlife managers has been found to influence an individual's perception of risk associated with black bears (Gore et al., 2006b; Gore et al., 2007). Furthermore, past research has suggested that increased trust in one's management agency increases an individual's acceptance for black bear populations – in other words, trust in management agencies increases the perceived benefits and decreases the perceived risk associated with black

bears (Zajac et al., 2012). On the North Shore, it is therefore important to develop greater trust among residents, as well as between residents and managing bodies such as the COS and the North Shore municipal governments, and non-governmental organizations like the NSBBS.

The findings of my research suggest two potential ways in which trust-building among stakeholders on the North Shore may be particularly important for bear conservation. First, several participants indicated hesitancy or unwillingness to call the Conservation Officer Service to report bear sightings or encounters, due to apprehension that the bear would be shot. This finding potentially indicates a low level of trust in the COS as the agency responsible for managing black bears. Only one of the participants who said they would not call the COS to report bear sightings indicated that they would call The North Shore Black Bear Society instead. Participants may be hesitant to make reports due to known instances of bears being killed as a result of reporting in the past, but it is also possible that there are other factors involved, such as lack of awareness of the services provided by the Society, lack of appreciation of the importance of making reports, a high frequency of bear sightings, the perceived difficulty of making a report, or the accessibility of the Society.

Second, trust between residents may foster proper attractant management within neighbourhoods. Modeling (i.e., demonstrating) of a particular behaviour is an approach to social learning which can result in the diffusion of pro-environmental behaviour (McKenzie-Mohr, 2011). When there is a high level of trust and/or respect among individuals, modeling may be more effective (Bandura, 1977). In this case, a high level of trust between residents would provide an enhanced opportunity for the modeling of appropriate attractant and waste management behaviours. Modeling could be demonstrated by trusted members of the community (McKenzie-Mohr, 2011), including knowledgeable long-time residents, block watch captains, and education groups such as the NSBBS.

Another characteristic that can play a large role in encouraging “bear smart” behaviour across residents is the set of social norms present in a community. Social norms are unwritten social guidelines as to how one should behave, and such norms can influence an individual’s behavioural intention (Fishbein & Ajzen, 1975; Ajzen, 1985). These norms set out expectations that individuals within groups reciprocally hold

each other to through social approval or disapproval (Paluck & Ball, 2010), and can be self-policing and reinforced between residents (Mackie et al., 2015). With respect to bear smart behaviour, norms can reinforce effective attractant management at neighbourhood or community levels while also potentially influencing individual attitudes towards bears and attractant management.

6.4. The Concept of “Common Sense”

“Common sense” was a reoccurring theme among participants, particularly when discussing where they obtained information regarding attractant management. The term “common sense” was used by 18 participants – most of whom had lived on the North Shore for more than ten years.

“Participant 2: Mostly, [how to manage attractants is] common sense. You just know.

Participant 1 (spouse of Participant 2): Then why haven’t you taken down the apple tree? ... We save the apples for the bears – that’s why.” (0959)

“Well, for me, it’s common sense. People have common sense. I don’t think we need any more information.” (2136)

“...it’s common sense, really. Doesn’t need people to tell you...” (3151)

Although many participants referred to common sense, their conception of what was considered to be appropriate attractant and waste management were often inconsistent with waste management practices recommended by the NSBBS and North Shore municipal governments. Recommended practices include the following:

1. Separate food scraps from other household garbage;
2. Regularly wrap food scraps prior to putting them into a green can to reduce odours;
3. Regularly freeze odorous food scraps until collection day; and
4. Store green can in a secure location (e.g., indoors or in a secure enclosure such as a shed)

Of the 18 participants who said they used or suggested that others should use “common sense”, only three described practices that were consistent with all the

recommended practices listed above²⁰. This finding highlights the hazards of residents relying on “common sense” to manage their attractants and waste. Future education campaigns and informational material may wish to address the differing views of common sense in attractant and waste management.

6.5. Visibility of the NSBBS within their Community

Before conducting the interviews, I expected that most individuals who decided to participate in the study would already be aware of The North Shore Black Bear Society; however, this was not the case. Most participants did not consider the Society to be a primary source of information and did not rely on the services provided by the Society. Thirteen participants stated that they were unaware of the Society and its educational services, and some participants were uncertain which organizations they were reporting sightings to or receiving information from. This suggests that there is room for improvement in the branding and visibility of the Society on the North Shore.

²⁰ Two of the 18 participants who stated that they use “common sense” reported using their garburator instead of their green cans to dispose of organic waste. One other participant who gave an unclear response as to whether or not they used their green can also said that they used “common sense”.

Chapter 7.

Recommendations

7.1. Education and Public Outreach

Several participants identified newcomers and children as areas of concern. The North Shore Black Bear Society is involved in providing education programs and outreach services to both newcomers and local schools. In this section I provide a brief overview of potential areas of improvement in education and outreach on the North Shore. In **Appendix C** I provide the detailed recommendations that I made to the NSBBS pertaining to their education and outreach programs carried out on the North Shore.

7.1.1. Information Availability

The population of the North Shore is expected to increase over the next two decades. More specifically, between 2011 and 2041, the population of the City of North Vancouver is expected to increase by approximately 36.5%, the District of North Vancouver by approximately 29.9%, and the District of West Vancouver by approximately 29.6% (Metro Vancouver Regional District, 2017). In conjunction with concerns about population growth on the North Shore, several participants raised concerns regarding the differences in knowledge and experience of newcomers in comparison with longer-term residents with respect to living in an area with black bears. These concerns call attention to potential improvements that can be made with respect to the information currently being provided by the NSBBS as well as the North Shore municipalities.

One issue that was raised by several participants with respect to newcomers was the existence of language barriers. According to Statistic Canada's 2016 census data, English is the most commonly spoken language in households in all three North Shore municipalities (Statistics Canada, 2016a; Statistics Canada, 2016b; Statistics Canada, 2016c), but several other languages are spoken within North Shore households (see **Appendix D**). As such, it is recommended that education and outreach materials be

translated into other major languages spoken in each municipality and distributed as part of newcomer information packages (currently provided by the NSBBS) to ensure that information is widely available to non-English speakers as well as English speakers. Furthermore, it is recommended that educational materials be distributed at English Language Learner educational events and be made available online and in local public spaces, such as municipal halls or libraries.

7.1.2. Children and Schools

Children were identified by over 30% of participants as being a point of concern in terms of risk perception regarding black bears. Children are an excellent audience for environmental education given that environmental attitudes tend to develop during childhood (Bryant & Hungerford, 1977), and these attitudes tend to be fairly stable after their formation (Asunta, 2003). This emphasizes the important role that the Society plays in developing positive attitudes towards black bears in the local school system as well as in informal settings such as workshops.

Informal Education Programs

To address the concerns raised by participants regarding children living in areas with black bears, it may be helpful to design and host workshops in which parents and children can learn bear safety basics together. A study done by Sponarski et al. (2016) found that an experiential education program targeting public attitudes towards coyotes in Cape Breton Highlands National Park of Canada was successful in 1) positively impacting people's attitudes towards coyotes, 2) reducing their fear of coyotes, 3) decreasing their perceived likelihood of interacting with coyotes, and 4) bolstering their perceived control over interacting with coyotes. Using an experiential learning approach to teaching community members about black bears and bear safety can potentially improve the attitudes of parents towards black bears and decrease their fear of having an aggressive encounter with bears (Sponarski et al., 2016). Additionally, hosting workshops with multiple parents can allow for residents to discuss their own experiences and attitudes, which can reinforce social norms and influence behaviour. More research would be needed to assess the effectiveness of an experiential education program in the context of the bear-related conflicts on the North Shore.

School Events and Programs

To further address concern for the safety of children in areas with black bears, coexistence-related education should be provided to children within schools on the North Shore. This can be done through bi-annual assemblies in the Fall and Spring to provide education about coexistence with the variety of wildlife species that live on the North Shore. These assemblies would allow pertinent coexistence-related information, including wildlife safety, to reach a large number of children and teachers and provide schools and/or teachers the opportunity to set up other class or school-wide activities with local non-formal education organizations such as the NSBBS. This could also provide opportunities to create or reinforce the connections that these organizations have with teachers and school administrators.

A previous study found that across public schools in twelve states in the United States, most school-based environmental education relied on curricula created by teachers (Chapman, 2014). That study highlights the importance of non-formal education organizations in aiding local teachers in crafting environmental education curricula and, specifically in the case of my research, coexistence curricula. Chapman (2014) also found that a majority of school principals believed that there were very few opportunities for professional development in the field of environmental and sustainability education. Partnering with other local environmental education organizations (e.g., The Furbearers) and hosting professional development days for local teachers could provide opportunities for teachers and education coordinators from local non-formal education groups to learn from one another. Providing teachers with the tools needed to teach coexistence material in their classrooms would reduce the amount of time that non-formal education groups need to physically spend in classrooms while also ensuring that coexistence education is being provided accurately and effectively.

7.2. Reinforcing Bear Smart Behaviours in Residential Areas

Modeling, or demonstrating, desirable behaviour has been shown to encourage and reinforce such behaviour, improve attitudes, and deliver important educational messages, particularly when the example is set by individuals who are liked or highly respected within a community (Bandura, 1977; Stern, 2002; McKenzie-Mohr, 2011;

Morgan & Gramann, 1989). In the present study, Block Watch captains were identified as sources of information and potential recipients of bylaw non-compliance reports. Captains can act as community leaders in modeling bear smart behaviour, potentially influencing resident behaviour through social diffusion while also allowing for personal contact with, or detection of, residents who are non-compliant with waste management-related bylaws (McKenzie-Mohr, 2011). In **Appendix C**, I provide specific recommendations for the NSBBS on how they can work with Block Watch to reinforce proper attractant management, encourage reporting of wildlife sightings, and share information from the NSBBS in neighbourhoods on the North Shore.

7.3. Municipal Bylaws

In this study, participants were asked to discuss bylaw fines, warnings, and enforcement, to investigate whether improvements could be made to existing municipal waste management bylaws. The following recommendations for improvements have been informed by responses from participants, common characteristics of waste management and wildlife attractant management bylaws in other Canadian and U.S. municipalities in areas with large carnivore species, and best practices as identified by the Get Bear Smart Society (Get Bear Smart Society, n.d.). Note, however, that the effectiveness of bylaws in practice is difficult to measure and policies that have been successful in other municipalities may need to be revised and adapted to suit the North Shore context, or may not be suitable due to differences between North Shore communities and the communities in which the bylaws were successful.

7.3.1. Bylaw Non-Compliance Penalties

Aaron, Mann, and Taylor (as cited in Pal, 2006) argue that values, norms, and public policy are interrelated – values within society are not entirely rigid and can be developed or reinforced by public policy. As such, fines or penalties associated with a crime should reflect the importance, as appraised by society, of the deterrence of the crime (Stigler, 1974). In other words, penalties set by a municipality for the violation of a particular bylaw should reflect the level of importance that society attributes to preventing the violation of that bylaw. As most participants in the present research did not find killing black bears to be an acceptable management action and many indicated

preferred improvements to current bylaws, it is possible that current bylaws do not adequately reflect societal values on the North Shore.

Penalties can work in at least two different ways: 1) they can deter crimes and 2) they can influence the way that society perceives crimes (Cook, 1977). With respect to monetary penalties, twenty-two participants in my interviews indicated that current fines were either too low or supported a tiered fine schedule, which suggests that an appropriate fine schedule should be identified and implemented to reflect the importance of the prescribed behaviour and encourage long-term compliance. If the municipalities choose to set higher fines, they may be able to reduce the number of violations that occur while also sending a message to residents that conservation and public safety are important goals of the municipality and are taken seriously. As echoed by one participant while discussing bylaw non-compliance fines: “...*I think the higher the price point, the more people associate it with something to avoid and that it's important*” (2273).

Design and Implementation of a Tiered Fine Schedule

Tiered fine or penalty schedules can be used in two different ways. One option is the use of a tiered fine schedule, which increases fines for each subsequent violation of a waste management bylaw. This option has been recommended by the Get Bear Smart Society as a best practice for municipal coexistence-related bylaws (Get Bear Smart Society, n.d.), and was recommended by several interview participants. For municipalities where green cans are not required to be wildlife-resistant (e.g., District of West Vancouver), another option may involve the implementation of a tiered fine/penalty schedule in which residents may pay a fine or either purchase a wildlife-resistant bin or construct/purchase a wildlife-resistant enclosure. Alternatively, the mandatory purchase of a wildlife-resistant bin or the construction/purchase of a wildlife-resistant enclosure may also act as a penalty that is an alternative to a fine. If the fine is greater than the cost of purchasing a wildlife-resistant bin, this may be sufficient to discourage residents from simply paying a fine and continuing to be non-compliant in the future. Several counties and municipalities in the United States such as Pitkin County, Colorado, Carson City, Nevada, Incline Village General Improvement District, Nevada, and Washoe County, Nevada implement similar penalties.

7.3.2. Monitoring and Non-Compliance Detection

Several participants discussed the issue of enforcing waste management bylaws, with some pointing out that the low level of perceived risk of detection for residents who are non-compliant may be attributed to the low numbers of available enforcement staff. Increasing the detection rate of crimes has been found to be an important part of deterrence, rather than simply increasing the severity of penalties or fines associated with a crime (Ehrlich, 1973; Avio & Clark, 1978; Leader-Williams & Milner-Gulland, 1993). Additionally, proactive enforcement of bylaws can be more effective than education alone in managing conflicts between humans and wildlife (Baruch-Mordo et al., 2011). Despite its effectiveness, proactive enforcement can be costly to employ due to time and resource requirements (Keane et al., 2008). Moreover, enforcement efforts may be limited by uncertainty regarding the optimum number of staff for enforcement purposes and a lack of adequate funding (Beattie & Giles, 1979). If economically feasible, Bylaw Enforcement Officers should increase the frequency of their monitoring for compliance with waste management bylaws in hotspot communities on the North Shore. The North Shore Black Bear Society and Block Watch can also assist in detecting and reporting non-compliance to Bylaw Enforcement Officers.

7.4. Municipal Planning

Given that attractants are a primary concern within residential neighbourhoods, there may be opportunities to improve municipal planning approaches in areas that black bears are known to frequent. Municipal land use planning within the urban-wildland interface must consider wildlife and the natural environment. More specifically, it is imperative that municipal land use planning approaches minimize habitat fragmentation and provide for the movement of wildlife (Soulé, 1991).

One criterion of the BC Bear Smart Community Program is to conduct a human-bear conflict hazard assessment of the focal community and the surrounding area (WildSafe BC, n.d.a; Davis et al., 2002). A hazard assessment partially involves the identification of high-use bear habitat (including travel corridors and natural food sources) and anthropogenic food sources (e.g., orchards, landfills, agricultural operations), as well as mapping of past conflict reports and human-use areas where the potential for conflict is heightened (e.g., green spaces, recreational trails through natural

food sources) (WildSafe BC, n.d.a; Davis et al., 2002). Whether or not a municipality is pursuing Bear Smart status, consideration should be made to integrate the travel and foraging patterns of black bears (and other “dangerous wildlife” species) into land use planning documents such as zoning bylaws and official community plans, for the well-being of black bears and also for the safety of those who reside in the community.

As previously mentioned in this report, municipal councils, under Section 8(3) of the BC *Community Charter*, have the statutory authority to impose restrictions or regulations relating to the health and safety of municipal residents and the protection of the natural environment through the adoption of regulatory bylaws. Furthermore, as per Section 473(1) of the *Local Government Act*, official community plans must include restrictions on the use of land classified as environmentally sensitive to development. As such, municipal governments have the legislative authority to protect their residents and the natural features that exist within municipal boundaries. The following section discusses municipal planning efforts which can be undertaken to provide for the well-being of municipal residents and the conservation of local black bear populations.

7.4.1. Addressing Wildlife Attractants in Municipalities

Properly securing garbage and other attractants such that black bears are unable to access them is paramount to minimizing the number of conflicts between humans and black bears; therefore, it is important that municipalities regulate residential attractant management. This section discusses several approaches that municipalities can take to address the management of wildlife attractants within their jurisdictions: bear-proofing programs (e.g., distribution of bear-proof/resistant waste bins), imposition of restrictions or requirements on newly constructed homes, and amendment of existing bylaws or adoption of new bylaws to regulate the presence of attractants on residential and commercial properties.

Bear-Proofing Programs

One of the criteria of the BC Bear Smart Community Program is the development and maintenance of a “bear-proof” municipal solid waste management system (WildSafe BC, n.d.a). In order to partially qualify for Bear Smart status, a municipality must manage all components of their municipally-owned and operated solid waste management systems (composting, recycling, transfer, and waste collection and disposal) in such a

way that bears are unable to access them, such as through the use of bear-proof waste containers and adoption of regulatory bylaws (WildSafe BC, n.d.a; BC Conservation Officer Service, n.d.). Past studies focused on municipal bear-proofing efforts have demonstrated success in reducing the number of bears accessing residential waste. A study conducted in 2018 found that when bear-resistant waste containers were distributed in tandem with enhanced education programming and ordinance enforcement, garbage-related conflicts between humans and bears declined and compliance with wildlife-related ordinances increased (Johnson et al., 2018). Furthermore, the findings of that study suggested that the deployment of the bear-resistant waste containers had positively influenced the residents' perceived quality of bear management and increased their support for bear-proofing ordinances (Johnson et al., 2018). Thus, such a program could potentially aid in fostering trust between residents and managing bodies such as municipalities and the COS. A similar study relying on self-reported observations of bear interactions and bears accessing waste containers found that such observations decreased following the distribution of bear-resistant waste containers (Barrett et al., 2014).

Despite the success of bear-proofing efforts in certain parts of North America, the cost of implementing a bear-proof municipal solid waste management system can be high. Barrett et al. (2014) deployed two types of bear-resistant waste containers: a commercially manufactured rolling polycart and modified residential waste containers utilizing clip and gate hasp hardware. Both systems were successful in decreasing self-reported observations of bear interactions and bears accessing waste containers; however, the modification hardware was approximately one-tenth of the price of the commercial polycarts, with a greater proportion of respondents indicating that they were willing to share the cost of the modification hardware compared to the costs of the commercial polycarts (Barrett et al., 2014). The findings of that study show the importance of considering the economic feasibility of implementing bear-proof solid waste management systems. Therefore, I recommend that, should municipalities decide to require the use of bear-proof/resistant waste containers, a study be conducted to investigate residents' willingness-to-pay for bear-proof waste containers prior to implementation.

Restrictions and Requirements for New Residential Construction

As mentioned in **Section 5.7.1.** and shown in **Figure 11** of this report, almost half of the study participants who use green cans store their green cans in an unsecure location (i.e., outdoors without the use of an additional enclosure such as a shed). One factor that may contribute to this behaviour is that not all homes have a garage or have the available storage space within their garage to use for storing green cans. While it is likely not feasible or publicly acceptable to impose requirements on existing homes to construct a garage, municipal governments located in areas frequented by black bears or other potentially dangerous wildlife should consider amending zoning bylaws to address newly constructed residences in areas identified as potential bear conflict areas. For example, placing requirements on newly constructed residences that homes must provide for sufficient space to store green cans within garages, or, for homes without garages, requiring the construction or purchase of wildlife-resistant enclosures, may facilitate the appropriate storage of waste bins and decrease the number of bears accessing garbage in residential areas. The City of Port Moody, BC has a similar provision within their zoning bylaw which provides for a floor area exemption within detached accessory dwelling units (e.g., laneway homes and carriage houses) for the purpose of storing waste and recycling containers to reduce bear-related conflicts. To address existing homes without garages or those with limited storage space, municipalities should consider requiring the construction or purchase of wildlife-resistant enclosures for containers which are stored outdoors. However, as suggested by the findings of my research, such regulations would need to be enforced.

Solid Waste Management and Wildlife Attractant Management Bylaws

Alternatively, or in conjunction with the recommendation described above, the North Shore municipalities may wish to amend existing solid waste management bylaws or adopt a new bylaw specifically to address the management of wildlife attractants within their jurisdictions. The implementation and enforcement of “Bear Smart” bylaws are a required criterion to obtain the “Bear Smart” community status. While the North Shore municipalities have some provisions within their solid waste management bylaws that address the securement of waste containers and regulate the times in which they can be placed at curbside, the bylaws do not fully address non-natural attractants outside of household garbage (with the exception of the District of West Vancouver’s Solid Waste Utility Bylaw which defines the substances which may constitute a “wildlife

attractant”). The Get Bear Smart Society’s “better practices for municipal bylaws” state that bylaws should require residents to remove fallen fruit on a daily basis, keep outdoor refrigerators or freezers inaccessible to wildlife, and remove bird feeders during times of the year when bears are particularly active (Get Bear Smart Society, n.d.). Any newly amended or established bylaw should follow these recommended practices and information should be distributed by the municipalities to inform residents and businesses of any changes. Furthermore, for clarity, “wildlife attractants” should be defined within the bylaw targeting attractant management, whether it be a solid waste management bylaw or a bylaw strictly regulating wildlife attractants on residential and/or commercial properties. Examples of Canadian municipalities that have implemented bylaw provisions which target attractants in addition to garbage include: the Town of Canmore, Alberta, the City of Castlegar, British Columbia, the City of Revelstoke, British Columbia, and the District of Squamish, British Columbia.

7.5. Building Community-Level Social Capacity and Trust

While poor management of attractants is a fundamental issue for bear conservation and management (M. Gibeau, personal communication, November 26th, 2019; Hristienko & McDonald, 2007), there are often other underlying factors which allow this problem to persist, such as problems relating to governance and politics, trust and relationships among involved parties, constitutive power, cultural issues, and decision-making power held by land managers (Gibeau, 2012). In the context of my research, my findings highlight two major underlying factors that may be contributing to ongoing problems with black bear-related conflict management on the North Shore: distrust among residents, and between residents and management bodies, and cultural factors (e.g., language barriers and knowledge/experience gaps). To help to address these factors, residents may wish to conduct a prototype program within a hotspot community, designed to build social capacity and trust among residents while also finding innovative solutions to the problems of attractant management and other behaviours relating to the community-level management of black bear-related conflicts (e.g., sighting and encounter reporting). Prototypes are small-scale, exploratory initiatives, which are generally carried out by a small group of committed individuals to promote active learning through the implementation of trial changes to programs and/or policies, or even modes of communication (Clark et al., 2002). Successful prototypes may be used as

models to encourage the implementation of similar programs or policies in other settings (Clark et al., 2002). The small-scale nature of prototypes facilitates effective sharing of reliable information, fosters communication and collaboration, and develops support among team members, potentially leading to improvements in overall performance and innovation (Clark et al., 2002). Collaboration between individuals allows for consensus-based decision making and shared ownership of decision-making outcomes, while increasing capacity for people to learn, better identify values, solve problems, and resolve conflicts (Edwards, as cited in Gibeau, 2012). Further, successful local-level collaborative prototypes can foster the development of trust and connections between people, improve working relationships, and may promote voluntary compliance with regulatory policies aimed at reducing conflicts (McLaughlin et al., 2005; Borri-Feyerabend, as cited in McLaughlin et al., 2005; Starrs, as cited in McLaughlin et al., 2005).

Within the context of the North Shore, Block Watch may be a suitable existing program to host or collaborate in a coexistence-related prototype, for several reasons. First, Block Watch involves the operation of small-scale community-level initiatives that rely on the engagement, communication, and relationships between resident leaders (i.e., captains) and other residents within their communities (Block Watch Society of BC, n.d.). Second, Block Watch programs span numerous neighbourhoods on the North Shore, which would allow for replication should the prototype be successful. Lastly, while Block Watch was primarily established for the purpose of crime prevention, public safety can encompass wildlife-related conflict prevention and reduction, as certain wildlife species (e.g., large carnivores) may pose a potential risk to the safety of residents. If a prototype were to be employed within a hotspot community on the North Shore, it is recommended that the program be spearheaded by the residents within the community, as opposed to officials from the local or provincial government, as factors such as power dynamics may limit the effectiveness of prototyping when governments take the lead role (Clark et al., 2002; McLaughlin et al., 2005; Cestero, as cited in McLaughlin et al., 2005; Dryzek, as cited in McLaughlin et al., 2005). A well-designed prototyping program would provide for an alternative, bottom-up approach to combatting coexistence challenges, rather than the top-down approach currently seen with the existing efforts on the North Shore. This would further localize the responsibilities of residents in reducing conflicts between humans and black bears, and facilitate community-level collaboration to find

mutual solutions to a shared problem, subsequently building trust and social capital among residents.

Chapter 8.

Conclusion

8.1. Areas of Future Research

This research has highlighted two new potential areas of future research in the field of wildlife-related conflict management: social connectivity and community identity. First, this research revealed the potential impact of social capital and connectivity in fostering appropriate attractant and waste management behaviour through communication between neighbours. Communication between long-time residents and newcomers may help to address concerns regarding the ability of newcomers to manage their attractants in bear country in cases where long-time residents are aware of, and communicate, correct bear smart behaviour. Communication may also aid in reinforcing correct attractant management behaviours when residents address improper bin storage or attractant management by their neighbours. Additionally, in areas where social capital is high, residents may feel comfortable enough to ask their neighbours to assist in the management of their attractants (e.g., putting their bins out or away if they are out-of-town, working, or simply if they are physically unable to do so themselves) which can reduce the availability of attractants. Given the potential role of social capital and connectivity in reducing conflicts between humans and black bears, I recommend that future research explore these concepts in the context of wildlife-related conflict management in further detail.

Second, community identity was identified as being a potentially important aspect of policy design and implementation. As previously mentioned, community identity should be considered when designing policy due to its implications for the public acceptability of future policies, particularly policies that regulate matters that are found to be closely tied to the identity of the community. Given the importance of public acceptability in the success of public policy, I recommend that future research explores the role of community identity in coexistence policymaking, particularly in scenarios where aspects of community identity conflict with other values held by a community.

8.2. Concluding Remarks

Conflicts between humans and wildlife are highly complex and multifaceted, which warrants the attention of wildlife professionals, social scientists, and policymakers. Despite these complexities, the occurrence of conflicts between humans and bears in residential areas often arises simply from poor management of anthropogenic attractants. Attractant management is a cornerstone problem in bear management and municipalities and residents are at the forefront of combating this problem. Unless residents act accordingly, these conflicts will continue to persist and may increase as the North Shore population continues to grow.

While the problem of attractant availability in residential areas is one that exists in many jurisdictions (e.g., Boulder, Colorado, Incline Village, Nevada, Port Moody, BC), one-size-fits-all programs are likely to be ineffective given the unique ecological, political, and social context of each community experiencing conflicts with wildlife. My research highlights the importance of considering these factors at the community and municipal levels when designing effective education programs and regulatory policies. My research also highlights some of the challenges that local governments face in trying to find common ground when conservation-related objectives and values conflict with values held by residents that closely relate to the identity of the community in which they reside (e.g., recreational activities in adjacent wildlands). Given the ecological, social, and financial ramifications of the decisions made to manage these conflicts, further research is encouraged on the local and provincial level to determine appropriate policies that will be effective in minimizing negative interactions between humans and wildlife.

As human populations continue to grow and expand, it becomes increasingly crucial that local governments, non-governmental organizations, wildlife management bodies, and residents collaborate to break down barriers that currently exist to achieving coexistence with wildlife. My research sought to bring the North Shore community and other similar suburban communities closer to achieving coexistence between humans and black bears. I have identified the following potential areas of improvement: 1) visibility of the NSBBS, 2) information availability for newcomers and parents, 3) bylaw design and enforcement, 4) hesitancy in bear reporting, and 5) improper storage of wildlife attractants such as solid waste. Coexistence is a key goal, not only for the well-being of wildlife, but for the well-being of human populations as well. The issues

involved in the management of conflicts between humans and black bears are complex; however, the findings of this research present an opportunity to address these complexities in the North Shore context. In particular, my findings provide a foundation for the creation of a broader survey of North Shore residents to further explore resident perspectives regarding current solid waste management systems, education programs, and regulatory bylaws pertaining to black bears and black bear attractant management. I recommend that this survey be distributed online to a larger set of potential participants across the North Shore municipalities to obtain broader results to present to municipal policymakers as well as the Society board of directors and Conservation Officer Service. Such studies would provide an opportunity for the involved parties to gain relevant, context-specific insight on resident behaviours, information needs, and public support of current proactive and reactive conflict management approaches.

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Legislation and Municipal Bylaws

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City of North Vancouver, Bylaw No. 8675, *Bylaw Notice Enforcement Bylaw, 2018, No. 8675* (24 September, 2018), at 17

City of North Vancouver, Bylaw No. 6920, *Solid Waste Management Service Bylaw, 1997, No. 6920* (8 September, 1997), ss 301, 701, 703, & 704

City of Port Moody, Bylaw No. 2937, *City of Port Moody Zoning Bylaw, 2018, No. 2937* (10 July, 2018), s 5.3.4.(viii)

City of Revelstoke, Bylaw No. 2178, *A bylaw to provide a system for the collection, removal and disposal of garbage and to control wildlife attractants* (23 May, 2017), s 3 & 8

Community Charter, SBC 2003, c. 26, s 8(3)

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District of North Vancouver, Bylaw No. 7458, *Bylaw Notice Enforcement Bylaw* (19 April, 2004)

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District of Sparwood, Bylaw No. 1194, *Community Standards Bylaw 1194, 2018* (4 September, 2018), ss 7.24, 7.27

District of Squamish, Bylaw No. 2053, *Wildlife Attractant Bylaw No. 2053, 2009* (8 September, 2009), s 8

District of West Vancouver, Bylaw No. 4368, *Bylaw Notice Enforcement Bylaw 4368, 2004* (26 April, 2004), at 18

District of West Vancouver, Bylaw No. 4740, *Solid Waste Utility Bylaw No. 4740, 2012* (3 December, 2012), ss 4.1, 5.1.9, 5.1.10, 6.13, & 10.3

Incline Village General Improvement District, Nevada, Ordinance No. 1, *An ordinance regulating solid waste matter and the collection, removal, and disposal thereof by the Incline Village General Improvement District* (14 December, 2016).

Local Government Act, RSBC 2015, c. 1, s 473(1)

Pitkin County, Colorado, County Code, § 6-44-030

Species at Risk Act, SC 2002, c. 29

Town of Canmore, Bylaw No. 2017-10, *A bylaw of the Town of Canmore, in the province of Alberta, to regulate wildlife attractants* (2 May, 2017), ss 3.2, 3.4, & 3.5

Washoe County Health District, Nevada, Regulations of the Washoe County District Board of Health Governing Solid Waste Management, § 040.112 (27 October, 2011), <https://www.washoecounty.us/health/files/ehs/regulations/ehs/animal-proof-containers-2011.pdf>

Wildlife Act, RSBC 1996, c. 488, s 33.1(1) & (2)

Appendix A.

Demographic Information

	Demographic Trait	Number of Participants (%)
Participant Age	26-35	1 (2.1%)
	36-45	9 (18.8%)
	46-55	10 (20.8%)
	56-65	7 (14.5%)
	66+	21 (43.8%)
Length of Residence on the North Shore	<5 years	4 (8.3%)
	5-10 years	3 (6.3%)
	10+ years	41 (85.4%)
Length of Residence in Current Home	< 5 years	7 (15.6%)
	5-10 years	6 (13.3%)
	11-20 years	15 (33.3%)
	21-30 years	8 (17.8%)
	31+ years	9 (20%)
Dog Owner	Yes, currently	7 (15.6%)
	No, previously	11 (24.4%)
	No	27 (60%)
Preferred Language for Future Materials	<i>English</i>	45 (93.8%)
	<i>Farsi</i>	2 (4.2%)
	<i>Chinese (Mandarin)</i>	1 (2.1%)

Appendix B.

Interview Questionnaire

Interview Script

1. How do you feel about the fact that black bears are present in this area?

1a. Why?

2. Are you proud to live in a place where there are black bears?

Yes

No

3. Before moving here, did you know that black bears lived on the North Shore?

Yes

No

4. Who do you think is currently responsible for the protection or management of black bears?

[DO NOT LIST CHOICES]

Conservation Officer Service

Municipal Police

The North Shore Black Bear Society

Residents

Other _____

4a. Do you think that residents have a role to play in the protection of black bears?

Yes

No

4b. How so?/Why not?

5. One way residents can help is to report bear sightings in their neighborhoods. Have you reported or notified anyone of any black bear encounters or sightings in the past year?

Yes

No

5a. Who did you notify or report these to?

5b. Did you find the respondent helpful?

Yes

No

5c. How were they helpful?/Why not?

6. Residents can have a big impact on the degree of conflict between themselves and black bears. For example, residents are responsible for managing the “attractants”, or bear-attracting materials, that are present on their property. What do you think are considered to be attractants for black bears?

6a. Can you think of any others?

7. While a number of things can attract bears to your property, there are sometimes other things on our property that are indirectly responsible for bears being scared off properties. Dogs have been credited for alerting residents of the presence of wildlife, including bears, and also have been known to chase bears away. However, it is important to note that dogs have also been known to chase bears towards their owners. Because of this, I want to better understand the experiences of residents with dogs. Do you have a dog?

Yes

No

[IF “YES”]

7a. Do you generally walk your dog leashed or off-leash?

Leashed

Off Leash

Why?

7b. Would you keep your dog on a leash when walking on trails or in areas where large predators like cougars, coyotes, and bears have been sighted?

Yes

No

Why?

7c. Has your dog had any encounters with bears?

Yes

No

7d. How many can you recall in the past year?

7e. How does your dog react?

8. Conflicts involving humans and black bears in residential areas generally stem from bears accessing attractants or being hit by motor vehicles. These may ultimately end up in the death of black bears and these deaths are then considered to be “human-caused deaths”. Can you tell me how many human-caused deaths of black bears occurred on the North Shore last year?

[ASK THEM TO ESTIMATE THE NUMBER]

Yes _____

No

8a. There were 18 human-caused black bear deaths last year, not including deaths caused by vehicle collision. What are your thoughts on this?

8b. Why do you think that these bears were killed?

8c. Do you think that there is anything that residents can do to reduce this number?

Yes

No

8ci. How so?/Why not?

9. There are a number of management actions that have been proposed to reduce the number of black bears killed in response to conflict events with humans as well as the overall conflict between humans and bears on the North Shore. I am going to list several possible management actions and I would like you to indicate the acceptability of each management action to you, based on your own experiences and views regarding black bears. Please indicate whether each of these possible management actions for the North Shore is: "highly unacceptable, slightly unacceptable, neither acceptable nor unacceptable, slightly acceptable, or highly acceptable" to you.

Decreasing residential/commercial/industrial development in black bear habitats

Reducing the amount of recreational activity in black bear habitat

Removing habituated black bears by moving them short distances away

Removing habituated black bears by killing them

Improving the management of attractants by residents

Changing resident attitudes

9a. I am going to list the management actions again, and this time I would like you to indicate which of the management actions you think is the most acceptable? The least acceptable? Why?

The next handful of questions that I'll be asking you pertain to the way in which you manage your household waste. Each of the following questions can simply be answered with a yes or a no.

10. First of all, do you dispose of odorous items like diapers, unwashed food packages, and unwashed fast food containers in your garbage?

Yes

No

11. Do you separate your food scraps and put them in your green can?

Yes

No

[IF "NO"]

11a. Why not?

12. Do you wrap these food scraps in newspaper prior to putting them in your green can to reduce odours?

Yes

No

13. Do you freeze your odorous food scraps such as fish and meat scraps until collection day?

Yes

No

14. How and where do you store your green cans on days that they are not being collected?

15. In 2015, Metro Vancouver implemented the green can/organics separation program. Can you tell me what the purpose of this program is and what residents had to do differently after its implementation?

16. Have you noticed any difference in the number of bears around your neighborhood since the implementation of the green can/organics separation program?

Increase

Decrease

No Difference

[IF "INCREASE" OR "DECREASE"]

Why do you think that is?

17. Have you seen a "Bear-in-Area" sign in your municipality?

Yes

No

[IF "YES"]

17a. How did seeing the sign change your behaviour? [PROBE ABOUT DOGS, CHILDREN, ATTRACTANT MANAGEMENT, TIME SPENT OUTSIDE]

18. British Columbia has a law that oversees the interactions between humans and wildlife whether this interaction be through hunting or the attraction of wildlife. This main law is called the B.C. Wildlife Act. Are you familiar with this law?

Yes

No

[IF "YES"]

18a. What do you know about it?

19. What can you tell me about the bylaws in [District of North Vancouver/District of West Vancouver] that aid in reducing conflicts between humans and black bears, and wildlife in general?

[IF WASTE MANAGEMENT BYLAWS NOT MENTIONED]

While the municipality does not have specific bylaws that focus on attracting wildlife, they do have solid waste management bylaws that dictate when and where you can put your garbage, recycling, and green cans out on collection day, how to maintain and store your containers, and the fines associated with non-compliance of these bylaws.

[IF IN WEST VANCOUVER] *In your municipality, management of wildlife attractants is also covered by your solid waste bylaw.*

20. Do you find it difficult or an inconvenience to abide by the waste management bylaws specifically in terms of the time restrictions for putting out your bins and how to store your bin?

[IF IN WEST VANCOUVER, INCLUDE WILDLIFE ATTRACTANT MANAGEMENT]

Yes

No

What about it do you find challenging?

21. Do you think that the fine of [\$100 (DNU)] associated with non-compliance with waste management bylaws is:

[IF IN DWV: Do you think that the fines of \$100 for the placement of bins before 5a.m. and \$300 for failure to enclose wildlife attractants is:]

Too high

Too low

About right

22. How many warnings do you think residents should receive before being fined?

23. Do you think that the enforcement of these waste management bylaws is:

Too loose

Acceptable

Too strict

Why?

24. If you noticed that one of your neighbours was not complying with the bylaws concerning waste management and possibly attracting wildlife into your neighborhood, what would you do?

Talk directly with your neighbour

Talk to the block watch captain if you have one

Call the North Shore Black Bear Society

Call the Bylaw Enforcement Officers

Call the Conservation Officer Service

Do nothing

25. Where do you get most of your information about black bears and bear management and safety on the North Shore?

Friends and Family [(GRAND)CHILDREN?]

The Municipality

- Personal Research (Internet or books)
- The North Shore Black Bear Society
- The Conservation Officer Service
- Other: _____

26. Which is your primary source?

27. Where do you get most of your information about how to manage attractants on your property?

- Friends and Family [(GRAND)CHILDREN?]
- The Municipality
- Personal Research (Internet or books)
- The North Shore Black Bear Society
- The Conservation Officer Service
- Other: _____

28. Which is your primary source? [PLACE AN ASTERISK NEXT TO THE PRIMARY SOURCE]

[IF NSBBS NOT MENTIONED]

29. Are you aware that the North Shore Black Bear Society is a resource for bear related education?

- Yes
- No

30. Have you received any bear-related education or information from the North Shore Black Bear Society?

- Yes
- No

[IF "YES"]

30a. From where?

- Community Events
- Adult Presentations

- Child or Grandchild’s School Presentations
- New Homeowner Welcome Package
- Block Watch Meetings
- Over-the-Phone Communications
- In-person Communications with Canvassers
- NSBBS Social Media Inc. Facebook & Instagram
- Door Hangers

30b. Which of these programs or means of distributing information was the most helpful?

30c. Do you think that the informational and educational programs by the North Shore Black Bear Society have affected the way you view black bears or how your management your household waste?

- Yes
- No

[IF “YES”]

30d. How so?

30e. How about in improving how you manage your household waste?

- Yes
- No

31. Are you satisfied with the informational and educational services that the North Shore Black Bear Society provides to residents on the North Shore?

- Yes
- No
- No Opinion

[IF “NO”]

31a. What more would you like to see?

32. Do you find that you have sufficient information to properly manage your attractants?

- Yes

No

33. Do you feel that finding information on how to properly manage attractants on your property is difficult?

Yes

No

33a. Why is it difficult?

34. In general, how do you think that we can improve the way that conflicts between humans and bears are currently being managed?

35. Finally, I would like to ask you a few questions about yourself to gain a better understanding of the different characteristics of our participants in this study. First, which age range do you fall into?

19-25

26-35

36-45

46-55

56-65

66+

36. How long have you lived in this home?

37. How long have you lived on the North Shore (i.e., the City of North Vancouver, the District of North Vancouver, and the District of West Vancouver)?

Under 5 years

5-10 years

10+ years

38. In terms of the information that you receive relating to bears and bear attractant management, are there any other languages other than English that you would prefer to receive future information in?

Yes _____

No

Appendix C.

Recommendations to the North Shore Black Bear Society

Education and Public Outreach

This research has highlighted several potential opportunities for the expansion of existing education and outreach programs led by the North Shore Black Bear Society (NSBBS). With respect to the concerns raised by several participants of this study regarding black bears and children on the North Shore, I recommend that the NSBBS expand existing public and in-school programs. As mentioned in Section 7.1.2., the creation of workshops aimed at improving bear safety skills for parents and children could be beneficial for improving parents' attitudes towards black bears and decreasing their fear of having aggressive encounters with bears. Such workshops could be developed and led by the NSBBS to assist North Shore parents and address the concerns raised by participants in this study.

The NSBBS should also consider expanding their existing school-based education programs. As previously mentioned, non-formal education organizations play an important role in assisting local teachers in their design of environmental education curricula, including wildlife coexistence curricula. As such, I recommend that the NSBBS work with educators to establish and implement a black bear curriculum in black bear hot spots. Working with educators would allow the Society to create a black bear conservation-oriented curriculum that meets provincial, school district, and school-level requirements while also ensuring that important information is being conveyed accurately to target audiences. This would also provide the Society with useful information on how to create teacher resource guides.

Reinforcing Bear Smart Behaviours in Residential Areas

As mentioned in Section 7.2 of the report, modeling can be an effective way of encouraging, diffusing, and reinforcing desirable behaviours within communities (Bandura, 1977; Stern, 2002; McKenzie-Mohr, 2011; Morgan & Gramann, 1989).

Modeling may also be more effective when there is a high level of trust and/or respect among individuals (Bandura, 1977). As such, Block Watch captains may play an important role in promoting and diffusing “bear smart” behaviours within neighbourhoods. The Society may wish to create Block Watch Bear Smart programs in which blocks that meet “bear smart” criteria are recognized publicly and awarded “Bear Smart Block” awards. The Society could also host workshops with Block Watch captains to teach captains about different ways in which they can bear-proof their blocks. These workshops could also include training on how to run Bear Smart Block audits. Captains can also potentially be asked to report back to the Society in cases where additional assistance is required to work with residents.

The Society may also work with Block Watch to encourage the use of social media as a platform for neighbours to report local wildlife sightings. For example, one interview participant (2646) discussed the use of Facebook by their local Block Watch group, which allowed their Block Watch captain to share information regarding police bulletins and also acted as a public forum for residents within the local neighbourhood to report wildlife sightings. In cases where wildlife sightings are reported on the Facebook page, Block Watch captains could recommend that neighbours contact the Society and/or the COS to report their sightings. The use of Block Watch social media groups would also allow captains to distribute information from the Society (e.g., downloadable materials described earlier) for basic coexistence-related education when sightings are reported.

Appendix D.

Languages Spoken on the North Shore

The following are top five languages most often spoken at home in each North Shore municipality.

City of North Vancouver	District of North Vancouver	District of West Vancouver
English: 76.1%	English: 82.9%	English: 72.2%
Farsi: 5.9%	Farsi: 4.2%	<u>Chinese</u> : 11.2% Cantonese: 1.1% Mandarin: 9.7%
<u>Chinese</u> : 1.8% Cantonese: 0.7% Mandarin: 0.9%	<u>Chinese</u> : 2.8% Cantonese: 0.9% Mandarin: 1.7%	Farsi: 6.4%
Tagalog: 1.7%	Korean: 1.3%	Korean: 1.1%
Korean: 1.6%	Spanish: 0.7%	Russian: 0.5%

Source: Statistics Canada, 2016a; Statistics Canada, 2016b, Statistics Canada, 2016c