

Retelling the Polar Bear Story:  
Human Responses to Polar Bear-Human Interactions in Churchill, Manitoba

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By

**Aimee Schmidt**

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## **ABSTRACT**

Polar bear-human interactions are increasing throughout the Canadian Arctic, pose a significant threat to both people and polar bears, and serve as catalysts for social conflict over how polar bears are studied and managed. Despite a relatively large body of scientific literature on polar bears there have been few studies on the human dimensions of polar bear-human interactions and conflicts. The purpose of this research was to examine the underlying assumptions and expectations that influence responses to polar bear-human interactions in Churchill, Manitoba. Data were collected using multiple social science methods including semi-structured interviews, talking circles, focus groups, and a problem solving workshop. This research investigated how understandings of polar bear-human interactions in Churchill, Manitoba are shaped by discourse. I found that study participants used discourses to create and impose boundaries that dictated where polar bears (and humans) were permitted and defined the possible ways humans and polar bears could interact. Understanding discursive boundaries and the processes by which they are produced provides insights into why stakeholders often hold divergent opinions over how people should interact with polar bears. This research also examined how local people and management agencies responded to a polar bear-inflicted human injury. My findings show that polar bear management agencies respond remarkably well to errors in procedure, but are often unable to address underlying systemic drivers of polar bear-human conflict. I also found that some community members had fatalistic attitudes towards polar bears, which may make them less likely to respond to educational efforts to reduce risk-taking behaviour around polar bears. Finally, this study documented local knowledge of polar bear behaviour during interactions, clarified perceptions and interpretations of polar bears, and examined the linkage between local experts' knowledge, perceptions, and actions. I found that differences in perspectives on the predictability of polar bear behaviour and in interpretations of the nature of bears significantly influenced strategies for responding to bears. I also found that there is a need to develop richer models for understanding what motivates and influences human behaviours and responses towards bears. Overall, this dissertation provides significant insights not only into how people understand polar bear-human interactions but also into how these understandings translate to specific on-the-ground practices.

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## **DEDICATIONS**

In loving memory of my father, Ulrich Schmidt.

To Phil Timpany: master guide, mentor, and friend. Thank you for showing me who bears  
*really* are.

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## **LIST OF ABBREVIATIONS**

MB	Manitoba
PBA	Polar Bear Alert
WNP	Wapusk National Park
CWMA	Churchill Wildlife Management Area

# **CHAPTER 1: INTRODUCTION TO BEAR-HUMAN INTERACTIONS AND THEIR HUMAN DIMENSIONS**

## **1.1 Introduction**

The study of bear-human interactions has diverse origins and includes research from anthropology (Hallowell 1926), history (Brunner 2007), women's studies (Kailo 2008), archaeology (Helskog 2012), geography (Dempsey 2010), biology (Herrero 1985; Herrero and Fleck 1990) and ecology (Coleman et al. 2013). Hopkins et al. (2010: 157) define the term "human-bear interaction" as "an occurrence when a person and bear are mutually aware of each other." Although I follow this definition I also use it more broadly to describe the wide variety of ways that humans engage in relationships with bears. Bear-human interactions consist of both the symbolic, cultural meanings associated with bears, as well as the physical, biological, and behavioural qualities of the bears themselves. I also follow Hopkins et al.'s (2010: 157) definition of bear-human conflict as a situation in which a bear caused a person to take extreme evasive action, made physical contact with a person, exhibited predatory behaviour, or in which a bear was harmed or killed by a person.

To date, research on bear-human interactions has been predominantly biological and focused on identifying drivers of conflicts between people and bears (Herrero 1985; Herrero and Fleck 1990; Smith et al. 2005; Herrero et al. 2011; Artelle et al. 2013; Elfström et al. 2014; Can et al. 2014). This research has led to important insights into the causes of these conflicts and how to avoid them. Biological literature has also has focused on identifying effective methods for

preventing bear-human conflicts, primarily by changing bear behaviour towards humans (Schirokauer and Boyd 1998; Gillin et al. 1994; Mazur 2010; Beckman 2004; Clark et al. 2002; Stenhouse 1989).

Increasingly though, controversy and conflicts over highly symbolic bear conservation issues have given rise to literature that highlights the need to address the human dimensions of bear management (Clark et al. 1996; Cromley 2000; Gibeau 2012; Kellert 1994; Mattson et al. 1996; Primm 1996; Primm and Murray 2005; Richie et al. 2012). Some scholars have noted that while biological information is a necessary component of bear conservation, it is not sufficient to ensure effective management (Wilson and Clark 2007:137; see also Gibeau 2012; Kellert 1994; Mattson et al. 1996). Conflicting human values, and symbolic linkages between bears and larger unrelated political issues, can significantly hinder bear conservation efforts (Clark et al. 2008; Clark et al. 2014; Cromley 2000; Peacock et al. 2011; Primm and Murray 2005).

The policy sciences have become a prominent model for research seeking to address and resolve social and political conflicts over bear conservation (Clark et al. 1996; Clark et al. 2008; Cromley 2000; Gibeau 2012; Kellert 1994; Mattson et al. 1996; Primm and Murray 2005; Richie et al. 2012; Wilson and Clark 2007). Policy scientists call for problem-oriented approaches, shared decision-making processes, and bear conservation policies that more adequately reflect the concerns of the various stakeholders they impact (Clark et al. 2014; Clark et al. 1996; Cromley 2000; Gibeau 2012; Mattson et al. 1996; Primm and Murray 2005; Richie et al. 2012; Wilson and Clark 2007). Participatory, integrative approaches to resolving conflicts

over grizzly bear conservation have been effective if they are implemented in a timely manner and are attentive to local context (Cromley 2000; Primm and Murray 2005; Wilson and Clark 2005; Wilson et al. 2014).

Another prominent area of research on the human dimensions of bear-human conflicts focuses on understanding the perceptions, attitudes, and values of people living alongside bears (Gore et al. 2006a; Zajac et al. 2012; Slagle et al. 2013). This research commonly seeks to identify how people's perceptions of risks associated with bears influence their tolerance of these species (Gore et al. 2006a; Zajac et al. 2012; Slagle et al. 2013). Much of this work has focused on measuring risk perceptions and providing managers with tools - primarily in the form of educational messaging - designed to aid conservation efforts by increasing public acceptance of bears (Gore et al. 2006a; Zajac et al. 2012; Slagle et al. 2013).

Literature on the human dimensions of bear-human interactions has focused predominantly on grizzly bears and black bears. However, gaps in understandings of bear-human interactions may arise when lessons derived from studies on one species are presumed to apply to others. Bear-human interactions are highly context-dependent (Smith et al. 2005; Can et al. 2014) and research that addresses the context-specific social and political dimensions of polar bear-human interactions is rare in the literature. The section below gives a brief summary and critical review of the state of knowledge on polar bear-human interactions in the scholarly literature.

## **1.2 What is Known and Unknown about Polar Bear-Human Interactions**

Communities across the Canadian Arctic have reported increases in polar bear-human interactions and conflicts (Dowsley and Wenzel 2008; Tyrrell 2007; Lemelin et al. 2010; WWF 2013; Ewins et al. 2016). Although there is a relatively large body of scientific literature on polar bears, there have been few studies on the human dimensions of polar bear-human interactions (Clark et al. 2012). Clark et al. (2012:24) define the human dimensions of polar bear-human interactions as “the diverse human activities, attitudes, values, knowledge and institutions influencing the probability and consequences of interactions between polar bears and people.” This lack of study is a significant omission given that differences in opinions about bear management exist between people with various different interests in and expectations for how bears should be managed (Clark et al. 2008; Cromley 2000; Schmidt and Dowsley 2010; Peacock et al. 2011). Multiple competing perspectives about polar bear management polarize the decision-making process and the various views, demands, and expectations of northern inhabitants are not well understood, nor are they addressed in current management (Clark et al. 2008).

### **1.2.1 Polar Bear-Human Conflict and Environmental Factors**

Much literature on polar bears has documented the link between the warming Arctic climate and losses in sea ice that have resulted in reduced access to food sources and poorer physical and reproductive conditions in polar bears (Derocher et al. 2004; Stirling and Derocher 1993; Stirling and Derocher 2012). While climate change may have negative impacts on polar bears, sea ice loss is not the only variable that can affect polar bear body condition and population numbers (M.G.

Dyck et al. 2007; Bromaghin et al. 2015). Non-climatic impacts on body condition may include stress resulting from polar bear-human interactions, food availability, and competition (Dyck et al. 2007). Much of the literature that addresses climate impacts on polar bears also predicts increases in polar-bear human conflicts as nutritionally stressed polar bears seek out more anthropogenic food sources (Derocher et al. 2004; Stirling and Derocher 1993; Stirling et al. 1999; Stirling and Parkinson 2006; Stirling and Derocher 2012).

Stirling and Derocher (2012) and others (see also: Stirling 1999; Stirling and Parkinson 2006; Towns et al. 2009) argue that there is a statistically significant relationship between the number of problem bears and the date of sea ice break-up. This explanation fails to take into account variables other than sea ice, however, and does not address the potential effect that changes in how polar bear-human interactions are reported, or increases in polar bear population numbers, might have on this correlation. As Clark et al. (2012) note in their review paper there is a need to test how factors other than reductions in sea ice influence trends in polar bear-human conflicts.

### **1.2.2 Polar Bear-Human Conflicts and Bear Behaviour**

Scientific knowledge of polar bear behaviour and understandings of how to manage polar bear-human conflicts are significantly less advanced than they are for other bear species (Clark et al. 2012). While local and traditional knowledge of polar bear behaviour is substantial, this knowledge is often not well-documented and therefore not accessible to managers. Polar bears are known for their curiosity and apparent lack of fear during interactions with humans (Amstutz 1986; Clark 2003; Dowsley



2010). This behavioural tendency is likely to contribute to the high numbers of polar bears that are killed during interactions with people (Fleck and Herrero 1988; Gjertz 1987). Although polar bears are frequently killed in encounters with humans, incidences of human injury or death are very low (Herrero and Fleck 1990). Although Herrero and Fleck's study is almost three decades old, there continues to be a low rate of polar bear-related human injuries or fatalities (James Wilder, pers. com.). Sub-adult males are more than twice as likely to be involved in aggressive interactions with humans than any other age class, and therefore are also more likely to be killed by people during conflicts (Fleck and Herrero 1988; Dyck 2006; Stenhouse et al. 1988). It is worth noting that the studies cited here are relatively dated because no recent literature on this topic exists. A more current analysis of data on polar bear-human conflicts is required to determine if these trends continue to hold true for more recent incidents. For example, over the last 4-5 years the Polar Bear Alert Program in Churchill, Manitoba has noted that the age class of problem bears has shifted from primarily sub-adult males to largely adult males (Brett Wlock, pers. com.).

Attractants are present in most aggressive interactions between people and polar bears (Herrero and Fleck 1990; Lunn and Stirling 1985) indicating that food conditioning is as problematic for polar bears as it is for other bear species (Herrero 1985). Most studies of polar bear-human conflicts involve the analysis of incident records (Dyck 2006; Fleck and Herrero 1988; Gjertz et al. 1993; Herrero and Fleck 1990; Stenhouse et al. 1988), with the exception of the occasional study in which researchers interacted with polar bears to test the effectiveness of deterrents (see

Stenhouse 1982). Nikita Osvyanikov (1996) conducted perhaps the most in-depth study of polar bear behaviour during interactions with humans; however, his sample size was limited to himself and therefore results from his study are not widely generalizable.

Current scientific and resource manager understandings of polar bear behaviour during interactions with humans is incomplete for effective management of polar bear-human conflicts (Clark et al. 2012). More research that draws on the knowledge of people who frequently have first-hand experiences with polar bears is necessary, as well as more studies that focus specifically on documenting polar bear behaviour during interactions with humans. Local experts have well developed knowledge of polar bear behaviour and have effective strategies of interacting with bears (Voorhees et al. 2014; Joint Secretariat 2015; Keith et al. 2005; Ewins et al. 2016). This pragmatic knowledge can contribute significantly to informing effective and locally relevant management responses to polar bear-human interactions.

### **1.2.3 Human Dimensions of Polar Bear-Human Conflicts**

Most studies of the human dimensions of polar bear-human interactions have focused on documenting traditional ecological knowledge (TEK) of polar bears (Dowsley and Wenzel 2008; Lemelin et al. 2010b; Tyrrell 2009; Tyrrell 2006; van Daele et al. 2001; Voorhees et al. 2014). This body of work tends to approach findings in two different ways: by using TEK observations to contribute to biological and behavioural understandings of polar bears, and by demonstrating how different cultural relationships between bears and humans present challenges to polar bear management systems. Studies that focus on eliciting the factual evidence embedded

in TEK have documented insights into polar bear population dynamics and distribution, polar bear behaviours, polar bear denning habits, and local polar bear health (Dowsley 2007; Keith et al. 2005; Lemelin et al. 2010b; Voorhees et al. 2014).

Disagreements over how polar bears should be managed are often rooted in different understandings of polar bear-human relationships and assumptions about who bears are (Dowsley and Wenzel 2008; Schmidt and Dowsley 2010; Tyrrell 2009; Wenzel 1983). Scientific studies of bear populations often clash with local observations about the number and health of bears in a given population (Dowsley and Wenzel 2008; Lemelin et al. 2010b; Tyrrell 2009; Tyrrell 2006). Conflicts over polar bear management are heightened by the symbolic nature of polar bears (Clark et al. 2008; Tyrrell and Clark 2014). This has resulted in significant national and international pressure for polar bear conservation and has increasingly left northern communities and Arctic indigenous people feeling as though their needs are secondary to those of the general public (Clark et al. 2008; Nirlungayuk and Lee 2009; Meek 2011; Tyrrell 2009).

Social factors influencing conflicts with polar bears pose a proximate risk to management efforts and deserve more attention (Clark et al. 2008; Peacock et al. 2011). Human behaviours contributing to conflicts with polar bears have been assessed but have focused on the activities of people prior to conflicts and human behaviour towards bears during interactions (Fleck and Herrero 1988; Herrero and Herrero 1997; Osvyanikov 1996). The ways that human perceptions and attitudes influence the probability and consequences of polar bear-human conflicts remain

relatively unknown (Clark et al. 2012). Hence, more research is needed to provide insights into how people understand and respond to polar bear-human interactions. Such research can help managers to better understand the basis of social conflicts over polar bear-human interactions, and to design socially acceptable management practices. Furthermore, knowing about how people understand and respond to bears will increase understandings of why people behave the way they do towards bears. Understanding what influences and motivates human behaviours and responses to polar bear-human interactions provides an important foundation for developing more effective management that targets human-related factors.

#### **1.2.4 Why the Human Dimensions Matter**

The current lack of knowledge of human dimensions of polar bear-human conflicts must be addressed because it has potentially negative consequences for polar bears and their conservation. As Clark et al. (2008) point out polar bear management is hampered by polarization and confrontation between different groups of stakeholders. Hence, there is a pressing need to understand the basis of social conflicts over polar bears to ensure their effective management. More knowledge is needed to understand why people have such different interpretations of what the appropriate ways to interact with polar bear are. Increases in tourism and resource exploration, as well as, the growing human population in the Canadian north will result in more human activity in areas inhabited by polar bears in the future (Vongraven and Peacock 2011; Clark et al. 2012). In addition, the impacts of climate change may also result in more interactions between polar bears and humans (Stirling and Derocher 2012).

Furthermore, the types of interactions between people and polar bears are changing, specifically in the Churchill region, but likely elsewhere as well. The polar bear viewing industry in Churchill is shifting due to changing consumer demands. More polar bear viewing tourists are beginning to seek out on-the-ground interactions with polar bears and the polar bear-viewing industry is likely going to evolve to meet these demands. This means that more people will be having on the ground interactions with polar bears than ever before. As a result, it is becoming increasingly important to understand why people behave the way they do around polar bears, and to identify what strategies are effective for facilitating safe polar bear-human interactions. Ultimately, figuring out more ways to co-exist with polar bears requires that we broaden our focus from bears to understanding how people contribute to bear-human conflicts.

I undertook this research because I felt strongly that increased knowledge on the human dimensions of polar bear-human interactions is critical to reducing and mitigating polar bear-human conflicts and effectively managing polar bears. I hoped that this research would help managers would to recognize how significant a role people's perceptions and knowledge of polar bears play in shaping their responses – both to management strategies and to bears themselves. Management systems that focus only on polar bears fail to consider one half of the problem. This shortcoming needs to be addressed because polar bear-human conflicts have real world consequences. Polar bear-human conflicts can result in human injury or death and are ultimately bad for polar bear conservation. When someone is injured or killed by a polar bear, people become increasingly fearful of polar bears and often demonized

them. Hence, polar bear-human conflicts lead to reactive management strategies and decreased tolerance towards bears by community members. This results in more polar bears losing their lives during interactions with humans.

The applied focus of this research was influenced by my hope that these findings might inform existing strategies for preventing polar bear-human conflicts. Learning to successfully co-exist with polar bears will require developing a more holistic understanding of what role humans play in bear-human interactions – and I hope in some small way that this work can contribute to that goal.

### **1.3 Research Purpose and Objectives**

Although there is a relatively large body of scientific literature on polar bears, there have been few studies on the human dimensions of polar bear-human interactions (Clark et al. 2012). The purpose of this research was to examine the underlying assumptions and expectations that influence responses to polar bear-human conflicts – shaping what local people and institutions say and do when they interact with bears. Specific objectives were:

**Objective 1.** To identify and describe discourses about polar bear-human interactions and their management in Churchill, Manitoba. Examine how the discourses people take up inform understandings of polar bear-human interactions in the Churchill community. Specific research questions included:

- 1) What are the discourses about polar bear-human interactions and their management in Churchill, Manitoba?
- 2) How are these discourses produced and maintained?

3) What are the effects of discursive boundaries?

**Objective 2.** To document community and agency responses to bear-related crises in Churchill: describing what is said (about polar bears, about people, about the incidents) and what is done (changes in behaviours, changes in policies/practices).

Specific research questions included:

- 1) How do agencies respond to polar bear-human conflicts? How do they respond to polar bear-inflicted human injury?
- 2) How do Churchill residents respond to bear-human conflicts? How do they respond to polar bear-inflicted human injury?
- 3) What patterns or trends exist in responses to polar bear-inflicted human injuries? What are the implications of these trends for preventing future conflicts?

**Objective 3.** To document local knowledge of polar bear behaviour; clarify perceptions and interpretations of polar bears; and examine the linkage between knowledge, perceptions, and actions. Specific research questions included:

- 1) What do local people know (or claim to know) about polar bears and their interactions with humans in Churchill, Manitoba?
- 2) What are individual strategies for responding to and avoiding conflicts with polar bears? What interpretations of polar bear behaviour inform these strategies?

#### **1.4 Theoretical Frameworks**

This section describes the evolution of my theoretical framework and the methodology I used in this investigation. The initial findings from my field seasons in 2013 and 2014 revealed a number of themes from which I developed many of my research questions. This research process has been highly iterative, adaptive, and opportunistic. For example, I did not originally set out to investigate community and agency responses to polar bear attacks; however, references to the 2013 mauling were so prevalent in my 2014 data set that the incident became a logical point of inquiry. Similarly, I did not initially include focus groups in my research methods, but added them to gain a better understanding of what issues were pertinent to different groups of participants (e.g. long-term residents, managers, tourism operators).

During the early stages of this project my research approach was shaped by the philosophical and methodological principles of both community-based participatory research and Indigenous research paradigms (Grimwood et al. 2012; Koster et al. 2012; Kovach 2009; Wilson 2008). The guiding principles of Indigenous methodologies in particular resonated with me. The main goal of Indigenous methodologies is to ensure that research is conducted in a manner that is ethical, respectful, and sympathetic to community needs, and benefits “Indigenous people in some way, shape or form” (Kovach 2009: 93; see also McGregor et al. 2010). Indigenous axiology - the ethics or morals that guide the search for knowledge – is focused on fulfilling roles and obligations in research relationships (Wilson 2008). Although community-based participatory research also promotes an ethical



approach to conducting research, I found that the explicit focus on relational accountability within Indigenous methodologies was influential in shaping how I conducted this research. Although my research methodology cannot be described as fitting within the Indigenous research paradigm, the ethical framework that guided how I collected data and interacted with my participants was drawn from Indigenous methodologies.

The focus on giving back to the research participants and on doing research that was beneficial to the Churchill community informed the applied and practical focus of my research analysis. My overall analytical framework developed out of a strong emphasis on pragmatic considerations and a flexible qualitative research design. Human perceptions of and responses to polar bear-human interactions are a complex and multifaceted problem and require multiple frames of inquiry to be fully understood. Drawing from more than one theoretical framework (discourse analysis and incident analysis) enabled me to examine polar bear-human interactions from multiple angles and to develop a robust picture of what motivates and influences human understandings and responses to these interactions. Although I do not use the policy sciences framework explicitly, this work could be considered within the policy sciences' tradition of inquiry because it is contextual, multi-method, and problem-oriented (Clark and Willard 2011; Clark 2002).

#### **1.4.1 Discourse Analysis**

I chose discourse analysis as a theoretical framework to gain insights into how northern residents and managers make sense of polar bear-human interactions.

During my field work it became increasingly clear to me that “correct, right, or safe”

ways of interacting with polar bears are often grounded in beliefs about how the world is and should be – discourses that people engage in. Discourse analysis provided a framework through which I was able to examine what participants said about polar bear-human interactions and to identify the deep-rooted underlying assumptions embedded within these statements.

Discourses refer to generally agreed upon norms, each of which represents a set of “specific assumptions, judgments, contentions, dispositions, and capabilities” that inform the way people think, speak, act, and interact (Dryzek and Niemeyer 2008:481). Discourses are more than just language or text; they embody particular versions of reality that shape the way humans define, interpret, and respond to social and physical phenomena, both individually and collectively (Dryzek 1997). At any given time, multiple discourses can exist in relation, dialogue, and opposition to each other (Mills 1997). As Vernon et al. (2015) point out, social context, culture, and institutions significantly influence how discourses are created, and which discourses are upheld and circulated. Since they are often taken for granted or appear to state the obvious, the ways that discourses produce and reproduce meaning are not usually immediately evident to the people who subscribe to them (Hajer and Versteeg 2005). Hence, interpreting or making visible discourses and their (re)production can help “us to better understand how and why an idea, social practice, or institution exists, operates, and perpetuates itself”(Lynn 2010: 79).

#### **1.4.2 Incident Analysis**

Incident analysis is a theoretical framework that has been used to investigate other instances of human wildlife-conflict and reactions to these specific conflicts (see

Cromely 2000; Mattson and Clark 2012; Vernon et al. 2015). Incident analysis appealed to me as a framework of analysis since it is a meta-approach that focuses on a specific situation and allows for the application of a variety of qualitative methods (see Cromley 2000; Vernon et al. 2015; Mattson and Clark 2012). The practice of investigating a specific incident – such as a bear attack – comes from international law and policy (Reisman and Willard 1988; Reisman 1984).

Incidents function to clarify people’s perspectives and expectations about management actions and have the power to shape management policy and practice (Reisman1984; Clark and Rutherford 2005; Mattson and Clark 2012). Incidents can be identified by changes in the frequency of references to focal issues made by stakeholders, and are characterized by an amplified attention to defining problems, and promoting specific solutions (Birkland 1998; Reisman 1988). As Mattson and Clark (2012: 333) point out, “incidents’ became opportunities for redefining problems and debating and contesting the merits of management methods, decision-making processes, and other status quo arrangements.”

### **1.5 Study Context**

Located approximately 1500km north of Winnipeg, Churchill, Manitoba has a population of about 810 people (Statistics Canada 2013). The community has a long history of settlement, dating back to the fur trade, with the first permanent Hudson’s Bay Post being built there in 1717 (Stirling et al. 1977). Situated at the mouth of the Churchill River and on the south west coast of the Hudson Bay, Churchill has a rich cultural history. The town site falls at the intersection of the traditional territories of the Caribou Inuit, Sayisi-Dene, and the Swampy Cree aboriginal peoples (Groulx et

al. 2014). Churchill is also home to a significant population of Metis people, who settled there after the fur trade was established (Brandson 2012). The resident Churchill population has fluctuated significantly over the years and has steadily declined since the phasing out of the Fort Churchill military base in the 1960's. Currently, Churchill is home to a mixture of long-term residents (some of whom have lived in the Churchill region for generations) and transient residents who typically reside in the community only for short periods of time. Transient residents are usually employed in temporary or seasonal positions by one of Churchill's main economic pillars: the Regional Health Authority, the Port of Churchill, or the tourism sector.

Churchill has been known as the "polar bear capital of the world" since the 1970's and it is estimated that between 6000-10,000 tourists travel to the community each year to view polar bears (Dawson et al. 2010). Churchill has developed into an international tourism destination as tourists come to view high densities of polar bears that aggregate along the shores of the Hudson Bay, awaiting the formation of sea ice (Lemelin 2006). This natural phenomena occurs each year for a period of about six weeks between early October and mid-November and is widely referred to as "bear season." Most bear-viewing activities take place in the Churchill Wildlife Management Area (here after referred to as the CWMA), located just 21km east of the Churchill town site (Lemelin 2006). Polar bear viewing also extends into Wapusk National Park, another protected area that immediately borders the CWMA. Within the CWMA and the Park, polar bear viewing is restricted to custom designed tundra vehicles that require a permit to operate (issued by

Manitoba Conservation) (Herrero and Herrero 1997). Only 18 permitted vehicles are allowed to operate in this area and currently two private companies, Tundra Buggy Adventures and Great White Bear, split the allotted permits. Polar bear viewing also takes place outside in the area between the CWMA and the Churchill town site, primarily from passenger vans and buses operated by local tour guides, and also from private vehicles. These types of viewing activities are relatively unregulated and visitors frequently view or photograph bears from outside their vehicles (Herrero and Herrero 1997).



**Figure 1.1 Map of Churchill region indicating the Churchill Wildlife Management Area Boundary.**

Polar bears in the Churchill region have a long history of interaction and conflict with humans (Kearney 1989; Stirling et al. 1977; Struzik 2014). Although polar bears had been present in this area since before European settlement, they

were not the focus of much attention until the Fort Churchill military base, located 8km east of the current town site, was established in 1943 (Kearney 1989; Stirling et al. 1977). Reports of polar bears around Churchill and Fort Churchill were not uncommon, but polar bear-human interactions did not become an issue of concern for residents until the 1960's (Kearney 1989; Stirling et al. 1977). Following a reduction in military activities and as polar bears began to frequent garbage dumps located in the vicinity of the community, polar bear-human interactions rapidly increased (Stirling 1977). By the late 1960's polar bear-human conflicts had become so commonplace that residents felt the situation was intolerable (Kearney 1989; Struzik 2014). Consultations between local, provincial and federal government officials led to the establishment of the Polar Bear Alert Program in 1969 (Kearney 1989; Struzik 2014).

Since its inception, the Polar Bear Alert Program, which is coordinated by Manitoba Conservation, has undergone numerous revisions and modifications but has maintained its mandate to protect people from polar bears and polar bears from people (Struzik 2014). In its present form, the Polar Bear Alert Program consists of patrols that deter, capture, or, when they deem necessary, destroy polar bears that venture near any inhabited area around Churchill (Manitoba Conservation and Water Stewardship 2014). Polar bears who are repeatedly captured around town, or who are otherwise deemed problem animals, are immobilized and transferred to the Polar Bear Holding Facility. Commonly referred to as the "polar bear jail" by Churchill residents, the Facility functions to temporarily contain polar bears in order to minimize their contact with humans and to prevent them from getting into

conflicts with humans (Manitoba Conservation and Water Stewardship 2014). Polar bears are held for up to 30 days before they are relocated by helicopter to an area either north or south of the Churchill community. In addition to Manitoba Conservation, several other institutions contribute to polar bear management: Parks Canada is responsible for managing polar bear-human interactions in Wapusk National Park and at various national historical sites in the Churchill vicinity, and the Town of Churchill deals with garbage disposal and the management of other attractants.

Although Churchill residents typically experience hundreds, if not thousands, of polar bear-human interactions per year, at the time I started this study there had not been a bear-inflicted fatality in the community since 1983. Recently, however, Churchill has experienced a rash of bear-related incidents and in the fall of 2013, two separate polar bear attacks resulting in human injury occurred. The second mauling hospitalized two people and served as a particularly poignant reminder of the dangers of living in such close proximity with a large carnivore for many local people.

## **1.6 Methodology**

### **1.6.1 Research Sample**

I selected initial research participants during a preliminary visit to Churchill in June 2013. Research participants included both Aboriginal (Inuit, Cree, Metis, and Dene) and non-Aboriginal Churchill community members. I initially targeted community members who were considered “bear experts” by community members, eventually expanding this to include the non-expert population as well. Miles and Huberman

(1994:34) note it is also important to talk to “people who are not central to the phenomenon,” so I did not limit my participants to only those people identified as bear “experts” by the community.

Research participants were identified using both snowball sampling and heterogeneity sampling techniques. Snowball sampling allows the researcher to identify “in whatever way one can, a few members of the phenomenal group one wishes to study. These members are used to identify others, and they in turn others” (Kuzel 1999:41). This kind of sampling, also known as sampling for saturation, allows the researcher to stop sampling when no more divergent evidence can be found (Kuzel 1999). Heterogeneity sampling involves sampling to include all opinions or views with no concern about representing these views proportionally. This method is otherwise known as sampling for diversity. The primary objective of this type of sampling is to get broad spectrum of ideas and doing so requires including a diverse range of participants. Sampling measures were not entirely predetermined and evolved throughout my fieldwork (Miles and Huberman 1994).

The majority of my participants had lived in Churchill for a minimum of five years (n= 31); however, I also interviewed some non-residents (people who did not live in the community year around, but visited the community for work that was either related to polar bear management or tourism)(n= 6). To date, the total number of people that have participated in this study is 61: (37 participants were interviewed, 12 participated in focus groups, and 12 participated in talking circles).

### **1.6.2 Semi-Structured Interviews**

My primary method of data collection was semi-structured interviews. I chose semi-



structured interviews because they have proven effective in documenting information about human-wildlife interactions in other settings, both with other wildlife (Huntington 1998) and with other bear species (Clark and Slocombe 2009). Semi-structured interviews tend to be informal, conversational, and have the flexibility to adjust to each unique interaction (Huntington 1998). This makes them an effective tool for collecting data in cross-cultural research settings such mine. They also allow the associations of the participant to guide the direction and the scope of the interview (Huntington 1998). This was particularly important for my research topic because it allowed themes about polar bear-human interactions and polar bear management to emerge naturally in the conversation. In addition, this data collection method adheres to the principles of respect, reciprocity and responsibility that guide this research process.

Semi-structured interviews have no fixed questions, however I prepared list of topics and probes (See Appendix A and B) to ensure that I covered important areas relevant to my research questions. Questions were designed to probe participant's experiences with polar bears, their perceptions and attitudes towards polar bears, the history of polar bear management in the community, perceived challenges to polar bear management, and their relationships with management institutions. Interviews were held in settings of the participant's choosing. As a result, I conducted interviews in places ranging from formal settings such as a participant's office at work, to informal settings such as inside people's homes, at the local coffee shop, on the land, and inside the participant's car as we drove around. All interviews were audio-recorded with participant's consent. Since my

interview guide evolved between my 2013 and 2014 field seasons, I conducted two follow-up interviews with key informants using the updated interview guide in 2014.

**Table 1.1 Description of Semi-Structured Interview Participants**

<b>Field Seasons</b>	<b>Male</b>	<b>Female</b>	<b>Aboriginal</b>	<b>Non-Aboriginal</b>	<b>Total</b>
<b>2013</b>	17	3	5	<b>15</b>	20
<b>2014</b>	14	3	3	<b>14</b>	17

### **1.6.3 Sharing Circles**

Another data collection method I used was sharing circles. Sharing circles (sometimes referred to as talking circles) are a method of data collection that facilitates discussion (Hart, 1996). Although they closely resemble focus groups sharing circles differ in that only one participant is allowed to speak at any given time: “when a person shares they are not interrupted” (Hart, 1996, p. 96). Sharing circles are also a culturally appropriate method for data collection as they have been used for many years by Indigenous peoples as a “format for communication, decision making, and support” (Hart, 1996:59; see also McGregor et al. 2010). Furthermore, Kovach (2009) points out that the open-ended nature of the method “invites story” and provides “space, time, and an environment for participants to share their story in a manner that they can direct” (p.124). The flexible and oral nature of the sharing circle process allows participants to progressively develop narratives over several iterations (Simmons et al. 2012).

I facilitated two sharing circles with twelve female participants. I limited participation in the sharing circles to female community members since the majority of my interview participants were male. By recruiting exclusively female participants in the sharing circles I hoped to gain a better understanding of gender-based differences in local perspectives of polar bear-human interactions. I recruited participants by word of mouth and by posting an invitation on the community Facebook page. Sharing circles were conducted in the Caribou Hall, a local community centre. I served refreshments and desserts to participants prior to

beginning data collection, which helped to create a relaxed and friendly atmosphere. Sharing circles were audiotaped and transcribed.

**Table 1.2 Description of Sharing Circle Participants**

Sharing Circle	# of Participants	Aboriginal
2013	7	3
2014	5	4

#### **1.6.4 Focus Groups**

In my 2014 field season, I added focus groups to my data collection methods to get a better understanding of what kinds of issues and concerns about polar bear-human interactions would arise in a group setting. While individual interviews had enabled me to get an in-depth understanding of what individuals perceived to be the important issues, the goal of the focus groups was to get a better sense of what issues, perspectives, and knowledge about polar bear-human interactions were pertinent in collective discussions among Churchill community members. Focus groups were an important addition to my study design since they allow for direct comparisons to be made between the diverse perceptions, knowledge, and experiences of different groups of participants (Morgan 1997). They also functioned as a tool to clarify findings from my interview data (Morgan 1997). Furthermore, the use of multiple methods to investigate my research questions will allow me to triangulate my research results once I begin data analysis (Creswell and Miller 2000).

Focus groups have been used successfully in other northern settings to elicit perceptions about wildlife (Smith and Cooley 2003), and have been used to investigate stakeholder perceptions of grizzly bear management in the Southwest Yukon (Clark 2007). Since Smith and Cooley (2003) recommend using experienced,

professional facilitators to conduct focus groups in northern communities, my supervisor, Dr. Douglas Clark facilitated the focus group sessions. Dr. Clark was a good choice to conduct these focus groups because he has professional experience as a facilitator and has a longstanding relationship with the Churchill community that dates back 22 years.

Focus group participants were purposefully selected (Morgan 1997). Care was taken to ensure that participants were homogenous in background. Participants with similar perspectives towards polar bears and who shared similar work experiences (e.g. tour guides) were grouped together. This allowed for more comfortable conversations and ensured that no major power differentials existed among the participants. Focus group members were invited in person. Informal discussion with the participants prior to the group sessions ensured that participants understood the purpose of the focus group and knew what to expect when they participated. I conducted a total of three focus groups, each with between 2-5 participants. Focus groups took an average of 90 minutes, and were followed by refreshments and informal discussion. Focus group questions were adapted from the revised interview guide, and questions were modified during the sessions based on input from the participants. Focus groups targeted what I identified as three distinct groups of stakeholders: tourism operators, managers, and long-time Churchill residents.

**Table 1.3 Description of Focus Group Participants**

<b>Focus Group</b>	<b># of Participants</b>	<b>Gender</b>	<b>Aboriginal</b>
<b>Group 1</b>	2	2 male	0
<b>Group 2</b>	5	1 female, 4 male	2

Group 3	3	3 male	0
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### 1.6.5 Problem Solving Workshop

Finally I organized and facilitated a problem-solving workshop (Edwards and Gibeau 2013) in Churchill in October 2015. This workshop had a dual purpose: first, to validate research findings, and second, to identify practical local opportunities to mobilize the knowledge I had documented. The workshop was made up of a series of facilitated exercises. The first exercise asked participants to individually reflect on the following questions: *Who are you? What influences how you see polar bear-human interactions and human responses to them?* Once individual perspectives were documented, participants worked in small groups to identify similarities and differences in group members' perspectives. The second exercise involved a presentation of my initial research findings and allowed participants to respond to any research interpretations they felt were inaccurate. In the third exercise, participants were asked to self-sort into three groups and focus on one area of common ground that had emerged out of the first exercise. Groups were asked to identify what improvements were needed in each area, and to think about the processes necessary to achieve these improvements. Participants were asked to consider the following questions: *What needs to happen? How should/could that be made to happen?* Finally, in the fourth exercise the group sorted the main ideas that had been identified in the preceding exercises and four concept clusters emerged. Participants were again asked to self-sort into small groups to address each concept. Each group was encouraged to think about concrete steps to move beyond discussion and into action. The following questions were posed: *What can and*

*should be done as the next steps? What skills/resources/knowledge can I realistically contribute, to help this move forward?*

A total of 12 people participated in the workshop. Most of these (n=11) were people who had previously participated in this research project. Participant represented a number of stakeholder groups including managers, tourism operators, and long-term residents.

### **1.7 Standpoint**

Ontology refers to what is believed to be possible to know about the world (Richie and Lewis 2003). I follow the ontological position laid out by Richie and Lewis (2003), who state that the social world is accessible only through the subjective interpretations of individuals. In this case, the social world is accessible through the subjective interpretations of my research participants, which are then further interpreted by myself - the researcher. However, my belief that reality is socially constructed does not negate the existence of an external, tangible reality. I believe that various interpretations of polar bear behaviour, and dissimilar definitions of the polar bear management “problem,” exemplify the diverse ways that my research participants experience external reality. This experience of external reality, and the ways in which it is spoken about, is constrained and enabled by available discourses. Documenting and understanding the perspectives of my participants is crucial to understanding how external reality can be interpreted and what issues are most pertinent for Churchill residents.

Epistemology can be understood as a person’s way of knowing and raises questions such as “how can we know about reality and what is the basis of our

knowledge?” (Snape and Spencer 2003:13). I believe that research cannot be value free and therefore I do not think of myself as a detached, objective observer. Since I cannot approach my research topic objectively, I understand the importance of clarifying my standpoint (Clark and Wallace 1999). Being aware of how my own premises and assumptions shape what I believe counts as knowledge (Lincoln 2010) allows me to make explicit how I took into account the multiple and contradictory perspectives I encountered in my research.

My role in this project was as an academic researcher trying to understand the dynamics of human relationships with polar bears. I approached this work first and foremost as a northerner. Growing up Atlin – a small community in north-western British Columbia – left me with an understanding of what life is like in a small northern community. Nevertheless, my research setting in Churchill, Manitoba was a very different context ecologically, socially, and politically from the one that I grew up in, so I also come to this work as an outsider. Furthermore, my role as a researcher further strengthened my role as an outsider since I came to Churchill with the clear intention of collecting data, and had no plans to live in the community long-term.

I approach this research with a deliberate tendency to question societal norms and values – an inclination I owe primarily to the influence of my parents. My parents emigrated from Germany to Canada before I was born. They brought with them a strong “back to the land” ethos and were quite critical of mainstream societal expectations. My parents’ tendency to think critically about society and to be skeptical of institutions continues to shape the way I view the world. Moreover, my

background in humanities allowed me to approach this topic largely free from the positivistic and reductionist assumptions (Wilkinson et al. 2007) that most researchers trained in the natural sciences might bring to a project such as this.

Finally, my interpretations of this research were greatly influenced by my experiences working as an assistant grizzly bear viewing guide. My professional experience with grizzly bears enabled me to bring a strong understanding of bear-human interactions (and the complex factors that influence them) to this project. As a result, I was able to delve more deeply into and understand more nuanced aspects of polar bear-human interactions. Furthermore, my knowledge of bear behaviour enabled me to be critical of accepted truths about polar bears and to question assumptions that shape understandings of polar bear-human interactions.

### **1.8 Thesis Structure**

This thesis contains three manuscripts following this chapter, as well as a concluding chapter. The first manuscript (Chapter Two) is titled: “Polar Bears and Boundaries: A Discourse Analysis.” This manuscript investigates how understandings of polar bear-human interactions in Churchill, Manitoba are shaped by discourse. I found that study participants used discourses to create and impose boundaries that dictated where polar bears (and humans) were permitted and defined the possible ways humans and polar bears could interact. Understanding discursive boundaries and the processes by which they are produced provides insights into why stakeholders often hold divergent opinions over how people should interact with polar bears.



The second manuscript (Chapter Three) is titled: “It’s just a matter of time: Agency and Community Responses to Polar Bear Inflicted Human Injury.” This chapter examined how local people and management agencies responded to a polar bear-inflicted human injury. My findings show that polar bear management agencies respond remarkably well to errors in procedure, but are often unable to address underlying systemic drivers of polar bear-human conflict. I also found that community members had fatalistic attitudes towards polar bears, which may make them less likely to respond to educational efforts to reduce risk-taking behaviour around polar bears.

The third manuscript (Chapter Four) is titled: “Local Experts’ Observations, Interpretations, and Responses to Polar Bear-Human Interactions in Churchill, Manitoba.” This study documented local knowledge of polar bear behaviour during interactions, clarified perceptions and interpretations of polar bears, and examined the linkage between local experts’ knowledge, perceptions, and actions. I found that differences in perspectives on the predictability of polar bear behaviour and in interpretations of the nature of bears significantly influenced strategies for responding to bears. I also found that there is a need to develop richer models for understanding what motivates and influences human behaviours and responses towards bears.

The concluding chapter highlights the main lessons learned from the study, outlines contributions to the greater field of research on bear-human interactions, and suggests areas for future research.

## 1.9 Copyright and Author Permissions

Chapters Two and Three of this thesis consist of manuscripts that have been submitted to peer-reviewed journals for publication. I am the first author on all of the papers. I collected and analysed all the data, and took the lead in conceptualizing and writing the manuscripts. Chapter Four is currently being prepared for submission to publication. Manuscript citations are provided below.

Chapter Two: Schmidt, A. L., Clark, D.A., and Barrett, M.J. Polar Bears and Boundaries: A discourse analysis. This manuscript is being prepared for submission.

Chapter Three: Schmidt, A. L., and Clark, D.A. "It's just a matter of time": Lessons for agency and community responses to polar bear-inflicted human injury. This manuscript has been accepted with revisions by *Conservation and Society*.

Chapter Four: Schmidt, A. L., Clark, D. A., and Loring, P. A. Local Experts' Observations, Interpretations, and Responses to Polar Bear-Human Interactions in Churchill Manitoba. The manuscript is being prepared for submission.

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## **PREFACE TO CHAPTER 2 - POLAR BEARS AND BOUNDARIES: A DISCOURSE ANALYSIS**

This paper addresses calls for the development of more nuanced understandings of the human dimensions of polar bear-human conflicts. In particular, the ways that human perceptions and attitudes influence the probability and consequences of polar bear-human conflicts remains relatively unknown (Clark et al 2012).

Identifying and interpreting discourses can reveal how northern residents and managers make sense of polar bear-human interactions.

This thesis has three objectives of which this chapter addresses one: to identify and describe discourses about polar bear –human interactions and their management in Churchill, Manitoba, Canada. We examine how the discourses people take up inform understandings of polar bear-human interactions in the Churchill community. This analysis focuses on how particular discourses shape understandings of and responses to polar bears – identifying discourses and their impacts, and recognizing that discourses play an integral role in managing bear-human interactions. Paying attention to how the creation and maintenance of discourses creates boundaries, and how these boundaries are embedded in power relations that define the possible ways humans and polar bears can interact, as well as, were they are allowed to be, provides important insights into how contentions over the management of polar bear-human interactions arise, as well as into how they might be reduced.

This chapter is being prepared for submission as Schmidt, A. L., Clark, D.A., and Barrett, M.J. Polar Bear and Boundaries: A discourse analysis. In this chapter,

ALS and DAC conceived the original idea, ALS collected all the field data and conducted the analysis. MJB provided insights into the theoretical framework. ALS wrote the first draft and DAC and MJB provided comments.

## **CHAPTER 2: POLAR BEARS AND BOUNDARIES: A DISCOURSE ANALYSIS**

**Abstract:** As polar bear-human conflicts continue to increase across the Arctic, better knowledge of the social factors that influence interactions between people and polar bears is needed. We used multiple qualitative research methods to investigate how understandings of polar bear-human interactions in Churchill, Manitoba, Canada are shaped by discourse. We found that study participants used discourses to create and impose boundaries onto the landscape that defined the possible ways humans and polar bears could interact, and dictated where polar bears (and humans) were permitted. Understanding these boundaries and the process by which they are produced provides insights into why stakeholders often hold vastly differing opinions over how people should interact with polar bears.

### **2.1 Introduction**

To date, most of the conservation attention towards polar bears has been focused on the impacts of climate change on their survival (Stirling and Parkinson 2006; Towns et al. 2009; Peacock et al. 2010); however, social factors influencing conflicts with polar bears also pose a proximate risk to management efforts and deserve attention (Clark et al. 2008; Peacock et al. 2011). This paper addresses calls for the development of more nuanced understandings of the human dimensions of polar bear-human conflicts (see Clark et al. 2012; Vongraven and Peacock 2011).

Research on polar bear-human conflicts has focused primarily on understanding the specifics of conflicts: such as the age and sex classes of problem bears, the presence of attractants, and the effectiveness of deterrents (Gjertz and Persen 1987; Fleck

and Herrero 1988; Stenhouse et al. 1988; Gjertz et al. 1993; Dyck 2006). Human behaviours contributing to these conflicts have also been assessed, particularly with regard to the activity of people prior to conflicts and human behaviour towards bears during interactions (Fleck and Herrero 1988; Herrero and Herrero 1997; Osvyanikov 1996). However, the ways that human perceptions and attitudes influence the probability and consequences of polar bear-human conflicts remains relatively unknown (Clark et al. 2012). The aim of this paper is to provide insights into how people understand and respond to polar bear-human interactions.

Identifying and interpreting discourses can reveal how northern residents and managers make sense of polar bear-human interactions. Here, we use the term discourse to refer to generally agreed upon norms, each of which represents a set of “specific assumptions, judgments, contentions, dispositions, and capabilities” that inform the way people think, speak, act, and interact (Dryzek and Niemeyer 2008:481). Discourses are more than just language or text; they embody particular versions of reality that shape the way humans define, interpret, and respond to social and physical phenomena, both individually and collectively (Dryzek 1997). At any given time, multiple discourses can exist in relation, dialogue, and opposition to each other (Mills 1997). As Vernon et al (2015) point out, social context, culture, and institutions significantly influence how discourses are created, and which discourses are upheld and circulated. Since they are often taken for granted or appear to state the obvious, the ways that discourses produce and reproduce meaning are not usually immediately evident to the people who subscribe to them (Hajer and Versteeg 2005). Hence, interpreting or making visible discourses and their

(re)production is important because it can help “us to better understand how and why an idea, social practice, or institution exists, operates, and perpetuates itself” (Lynn, 2010: 79).

Discourses are produced and reproduced through an identifiable set of practices (Hajer and Versteeg 2005). They are both produced and maintained through speech in day-to-day conversations, through actions (e.g. deterring bears), through regulation or enforcement, through physical appearances (e.g. uniforms), and through individual self-monitoring (Barrett 2005). Discourses guide how people construct, sort, and rationalize the world. In this way, they both reflect and bring into existence socially constructed versions of reality. Finally, discourses embody power because they recognize some knowledge, interests, and experiences as more valid than others (Dryzek and Neimeyer 2008) and thus render some forms of thought, speech, and action as acceptable while casting other as unacceptable.

In this paper, we identify and describe discourses about polar bear –human interactions and their management in Churchill, Manitoba, Canada. We examine how the discourses people take up inform understandings of polar bear-human interactions in the Churchill community. This research addresses the following questions:

1. What discourses exist with respect to polar bear-human interactions and their management in Churchill, Manitoba?
2. How do they create and maintain boundary processes with respect to polar bear-human interactions and their management in Churchill, Manitoba?

3. How are these discourses produced and maintained?
4. What are the effects of these boundary processes?

In this paper, our analysis focuses on how people take up particular discourses– that shape understandings of and responses to polar bears – rather than on the validity or “truth” of these discourses. Our analysis does not assert that any discourse is good, bad, right, or wrong (Dryzek 1997). Nor do we suggest that polar bear-human interactions do not have material or physical reality beyond discourse. Quite the contrary; it is evident that polar bears can pose a real threat to humans. When polar bears interact with people there can be physical consequences – for people, for bears, and sometimes for both (Fleck and Herrero 1988; Gjertz and Persen 1987; Gjertz et al. 1993; Stenhouse et al. 1988; Dyck 2006; Clark 2003). Likewise, our focus on discourse does not imply that local knowledge about polar bears or local experiences with polar bears are not important or relevant. Rather than examining the validity of particular discourses identified here, we show that discourses construct certain outcomes that have ramifications for both people and polar bears. Finally, it is important to note that the discourses we identify here are highly context-specific and are entirely unique to our study community. They may not be broadly applicable to other northern communities that experience polar bear-human interactions. Nevertheless, identifying discourses and their impacts, and recognizing that discourses play an integral role in managing bear-human interactions is likely transferable to other analogous situations, as well as to human-wildlife conflicts involving other species.



### **2.1.1 Polar Bear-Human Interactions in Churchill, Manitoba**

Situated at the mouth of the Churchill River and on the southwest coast of Hudson Bay, polar bears and humans have a long history of interaction in this region (Stirling et al. 1977; Kearney 1989; Struzik 2014). Each year for a six-week period between early October and mid-November, high densities of polar bears congregate along the shores of the Hudson Bay, awaiting the formation of sea ice in the Cape Churchill area (Lemelin 2006). This natural phenomenon draws between 6000-10,000 tourists to the Churchill community each year to view polar bears (Dawson et al. 2010).

Most bear-viewing activities take place in the Cape Churchill Wildlife Management Area (hereafter, the CWMA), located just 21km east of the Churchill town site (Lemelin 2006) (see Figure 2.1). Polar bear viewing also extends into Wapusk National Park (WNP), another protected area that immediately borders the CWMA. Within the CWMA and the Park, polar bear viewing is restricted to permit-holding, custom-designed tundra vehicles (Herrero and Herrero 1997). Polar bear viewing also occurs in the area between the CWMA and Churchill, primarily from passenger vans and buses operated by local tour operators, and also from private vehicles. These types of viewing activities are relatively unregulated and visitors frequently view bears from outside their vehicles (Herrero and Herrero 1997).



**Figure 2.1 Map of the Churchill Region**

Polar bear management in the Churchill community is the primary responsibility of the Manitoba Conservation (now Manitoba Sustainable Development) run Polar Bear Alert Program (hereafter referred to as the PBA Program). Since its establishment in 1969, the PBA Program has undergone numerous revisions and modifications but has maintained its mandate to protect people from polar bears and polar bears from people (Struzik 2014). Currently, from, the PBA Program consists of patrols that deter, capture, or, occasionally, destroy bears who venture near inhabited areas around Churchill (Manitoba Conservation and Water Stewardship 2014). Polar bears are not tolerated in close proximity to any inhabited areas and specific guidelines guide the PBA Program's response to polar bears within three predetermined areas known as Control Zones (Figure 2.2).



**Figure 2.2. Polar Bear Alert Program Control Zone Boundaries**

### **2.3 Methods**

Fieldwork was carried out in Churchill, Manitoba, over four field visits between 2013 and 2015, and involved spending more than 7 1/2 months in the community. Data collection methods included semi-structured interviews, focus groups, sharing circles, and participant observation (Table 2.1). The first author conducted 37 semi-structured interviews with long-term community members, managers, and tour operators, among others. Interview questions focused on participants' experiences with and perceptions of polar bears, the history of polar bear management in the community, and perceived challenges to polar bear management. Interview guides provided a list of topics and probes; however, interviews were informal, conversational, and adjusted to each unique interaction (Huntington 1998). Sharing circles were limited to female community members since the majority of interview and focus group participants were male (Hart 1996). Focus groups allowed direct

comparisons between the diverse perceptions, knowledge, and experiences of three distinct groups of stakeholders: tourism operators, managers, and long-time Churchill residents (Morgan 1997). Focus group questions were adapted from interview guides.

**Table 2.1 Data Collection Methods (for sharing circles and focus groups the unit of analysis is the group. The number of individual participants is shown in parenthesis)**

Field Seasons	Interviews	Sharing Circles	Focus Groups
2013	20	1 (7)	0
2014	17	1 (5)	3 (2; 5; 3)

Sampling measures for this study evolved throughout the fieldwork (Miles and Huberman 1994), but were based on a combination of snowball and heterogeneity sampling techniques. Initial research participants were identified using snowball sampling (Kuzel 1999) to identify locals who frequently interacted with bears, who in turn, suggested additional interview participants (Palinkas et al. 2013). Over time, the study parameters were expanded to include the non-expert population as well. Heterogeneity sampling involved sampling to include all opinions or views with no concern about representing these views proportionally in order to get a broad spectrum of opinions (Palinkas et al. 2013). The majority of the research participants had lived in Churchill for a minimum of five years ( $n=31$ ); however, some non-residents (people who visited the community for work related to polar bear management or tourism)( $n=6$ ) were also interviewed. To date, the total number of people that have participated in this study is 59.

The first author organized, processed, and coded data according to themes or categories (Braun and Clarke 2006) using NVIVO Mac v.10 as a data management tool. Data was inductively coded allowing themes and discourses to emerge from the data rather trying to fit it into an a priori coding scheme. Data were collected under the authorization of the University of Saskatchewan Behavioural Research Ethics Board, protocol number: BEH 13-143.

## 2.4 Results

Table 2.2 identifies different discourses that participants produced and reproduced about polar bear-human interactions. A detailed description of how each discourse is used follows.

**Table 2.2 Discourses about polar bear-human interactions in Churchill, Manitoba**

<b>Discourse</b>	<b>Description</b>
<b>Distance</b>	This discourse asserts that polar bear-human interactions were best mediated by distance. This was the most powerful discourse and all other discourses listed here support this one.
<b>Respect</b>	Respectful interactions with polar bears involved maintaining distance between people and bears while disrespectful interactions involved getting in close proximity of polar bears.
<b>Safety</b>	Close interactions with polar bears were defined as unsafe and polar bears that crossed into human spaces were defined as a threat to people.
<b>Lurking bears</b>	This discourses describes polar bears that are hiding, stalking, or lurking around the edges of human space and that appear suddenly to invade that invade this space
<b>Good/Bad Bears</b>	Polar bears who stayed outside human boundaries or fled human presence were often referred to as “good bears whereas those who ventured close to people or did not retreat where labelled as “bad.”
<b>Fear</b>	Within this discourse, fear was described as a tool for keeping people and polar bears apart.

### **2.4.1 Setting Boundaries**

The majority of research participants felt that polar bear-human relationships in the Churchill area were best mediated by distance. Within this discourse, being in close proximity to a polar bear was generally viewed as a negative or “dangerous” interaction. When asked to describe respectful behaviour towards polar bears, most participants associated being respectful with staying an “appropriate” distance away from polar bears while disrespectful behaviour was commonly described as invading or intruding into a polar bear’s space. According to some participants, invading the bears’ space involved directly approaching polar bears, usually in pursuit of getting a closer look or to get a better picture. For others, this intrusion involved crossing into areas designated “polar bear territory,” by walking on the beach or anywhere beyond the PBA warning signs. That said, most participants felt it was respectful to cross into polar bear territory if humans were properly prepared (e.g. had sufficient knowledge of bears), and/or had taken appropriate safety precautions (e.g. carrying a firearm).

Participants widely viewed maintaining distance between humans and polar bears as a necessary criterion for ensuring human safety – as well as the safety of the bears. Whether an interaction was defined as “safe” depended on where polar bears were located in relation to human boundaries. When polar bears crossed into human space (e.g. the town site) they were automatically perceived as a threat to humans. As one participant explained, a polar bear within the boundaries of the town must be removed immediately before it can attack people:

“You know there was a bear at Gypsy's [*the local bakery*] and we chased it through town and it ran away from town, if we had left that bear and nobody called us... maybe we just saved a life by chasing it out of town.” (B3, manager Focus Group 2)

Although participants unanimously agreed that polar bears should not be allowed to wander freely through human spaces there was little consensus about how much distance was needed to maintain safety. This lack of agreement was likely because participants often took up a variety of discourses, each of which informed what was considered “safe” differently. One major exception to the notion that distance correlated with safety was that many participants perceived interactions mediated by a physical barrier— Tundra vehicles or trucks – as “safe” despite that they facilitated close proximity with polar bears. One reason for this may be that the polar bear viewing industry in Churchill has normalized these types of vehicle mediated interactions. It is not uncommon to see polar bears walking right up to Tundra vehicles or buses filled with tourists, and at times even touching them.

Nevertheless, most participants reacted negatively to the idea of polar bears being in close proximity to humans in any other situation. This was evident in participants’ reactions to Churchill Wild, a polar bear tourism company that offers on-the-ground polar bear-viewing tours that occur at relatively close proximity. The style of polar bear viewing that occurs at Churchill Wild viewing sites differs significantly from that offered by most polar bear viewing companies in the Churchill region since interactions between tourists and polar bears take place on foot, unmediated by a vehicle or structure. Participants frequently referred to these tours as a “bad thing waiting to happen” and felt that this type of polar bear-human interaction could not be conducted safely:

“...what happens when a bear eats a tourist or Mike Reimer [*owner of Churchill Wild*] shoots a bear in front of all those tourists, you know? And why are you putting people and the bears in a dangerous situation like that?” (B9, long-term resident).

As reactions to Churchill Wild demonstrate, participants who took up this discourse were critical of polar bear-human interactions that contradicted the assumption that bear-human interactions are best mediated by distance. Within this discourse, distance was the primary variable by which an interaction was judged to be safe or dangerous and the knowledge or skill of the bear-viewing guide seemed to have little bearing on this assessment.

#### **2.4.2 Maintaining Boundaries**

Participants used discourses not only to set but also to maintain socially constructed boundaries between people and polar bears in Churchill. Discourses of “proximity” produced separate spaces for people and for polar bears, and operated in conjunction with discourses such as “the lurking bear,” “good/bad bears,” and “fear” to influence human understandings, attitudes, and actions towards bears.

Participants often expressed anxiety about polar bears who invaded human territory. This anxiety was simultaneously made evident and reproduced by the discourse of polar bears that are hiding, stalking, or “lurking” around the edges of human space. The ability of polar bears to appear suddenly in close proximity to humans was widely discussed by participants. As one manager put it: “it seems sometimes like they fall from the clouds” (B3). The “lurking bear” discourse was perpetuated by countless stories about humans unknowingly being close to polar bears. Although stories of close encounters were often told in a manner that was



light-hearted or humorous, the underlying message was that polar bears close to humans were dangerous. The notion that a polar bear might “appear out of nowhere” (B7, long-term resident) enforced the sense that participants must constantly be on guard and vigilant for polar bears: to avoid surprise encounters it was necessary to “always be aware” (B8, long term resident) and “never drop your guard” (A10, long term resident).

The discourse of “good/bad bears” also upheld boundaries between human spaces and bear spaces. Polar bears who stayed outside human boundaries or fled human presence were often referred to as “good bears.” In contrast, polar bears who were unafraid of humans or who deliberately ventured into human territory were described as “bad” or “rogue.” Here, we do not intend to imply that that these categorizations are inaccurate or that polar bears who enter human spaces do not pose a threat. We merely emphasize that the discursive practice of labelling bears as bad/dangerous legitimized their exclusion from human spaces. Participants had a low tolerance for these “bad bears.” As one manager stated: “I’ve seen polar bears like – this bear should be shot right in the head because this bear is bad!” (B15, manager).

Many participants took up the discourse of “fear” to enforce boundaries between people and bears. Within this discourse, polar bears who were afraid of humans were assumed to be less dangerous; hence, instilling a fear of humans into bears was seen as a good tactic for ensuring human safety. As one manager noted:

“we have to teach the bears to be scared of people, because on their own they are not. They are a top predator. I don't think they grow up scared of people; you have to put the fear into them.... If we can instil a little bit of fear of people [into bears], I think people would be a little safer overall.” (B3)

Similarly, many participants felt that a fear of polar bears kept humans from crossing into polar bear territory. One participant stated: “I like the fear that people have for bears, I dislike when that fear line gets blurred, I think that is atrocious...” (B20, long-term resident, 2014 Sharing Circle). Within this discourse, fear was thought to be viewed as an instrument for upholding human-polar bear boundaries because it motivated people to maintain an appropriate distance from bears. While some participants felt that being afraid of polar bears promoted safe and respectful interactions, others rejected this discourse, noting that fear could have adverse effects on both people and bears: “there are some people in Churchill that are terrified of polar bears, like physically terrified of polar bears. And I don't think that's a good attitude to have” (B4, manager). Some participants noted that fear had negative consequences for polar bear conservation because it promoted intolerance for bears. Others felt the fear of polar bears prevented residents from enjoying outdoor activities in around Churchill.

#### **2.4.3 Boundary Processes**

Discursively constructed boundaries were continuously challenged when polar bears crossed into “bear-free space,” and they required constant iteration and reiteration to uphold— a process we refer to as the “boundary process.” We define the boundary process as an attempt to understand (and control) interactions between people and polar bears through socially constructed boundaries. These boundaries are continuously created, re-created, and maintained through

discourses that define where polar bears should be spatially in relation to humans, and humans in relation to polar bears. The boundary process functions to normalize or make acceptable certain kinds of interactions between people and polar bears – in particular those that are mediated by distance – while criticizing others. Although all participants were engaged in the boundary process there was a great deal of variation between participants with regard to the geographical locations of boundaries and what these boundaries meant for bears. Here we identify three types of discursively constructed boundaries, each of which have their own unique boundary-making processes: institutional, social, and personal. It is important to note that these three discursive boundaries are more nuanced, complex, and interdependent than the apparently discrete categories might indicate.

#### ***2.4.3.1 Institutional Boundaries***

We define institutional boundaries as boundaries that were discursively constructed by institutions (in this context specifically by Parks Canada, Manitoba Conservation, the Town of Churchill, and the Port of Churchill) and are upheld by governance structures. These boundaries divide up the Churchill landscape into areas that are managed under federal, provincial, and municipal authorities. Institutional boundaries in the Churchill context include Wapusk National Park, the CWMA, the national historic sites Cape Merry and Prince of Wales Fort, the PBA control zones, the Town of Churchill, and the Port of Churchill. These boundaries are often delineated on maps and are recognized by all stakeholder groups. Although institutional boundaries exist on maps, they are primarily socially constructed and do not involve physical barriers on the landscape – with the notable exception of the

recently fenced Port of Churchill. Discourses of human “safety” were particularly prominent in constructing and upholding institutional boundaries and often functioned to reinforce and justify the authority of these boundaries.

#### **2.4.3.2 Social Boundaries**

We define these boundaries as geographical spaces in which the Churchill community accepts, expects, or anticipates certain polar bear-human interactions. Social boundaries tend to be more flexible/informal than institutional boundaries and either normalize or criticize polar bear-human interactions in the Churchill area. Although they are not necessarily as widely recognized as institutional boundaries, they do have a significant impact on shaping understandings of polar bear-human interactions in the Churchill context. Social boundaries are maintained through social norms and reflect local knowledge of polar bear behaviour. They have a temporal quality in that they shift according to the time of year and depending on whether polar bears are perceived to be present or not. For example, most locals will walk to Cape Merry early in the year; however, later in the season most locals view walking in this area as an inappropriate, dangerous activity. Hence, depending on the time of year, the road to Cape Merry shifts – discursively – from a human area to polar bear area.

Another example of a social boundary is Brian Ladoon’s dog yard: the only place in Churchill where polar bears are still intentionally fed. Brian Ladoon, who owns and breeds the dogs, systematically and regularly feeds polar bears that enter his dog yard, and has done so for more than 30 years (Herrero and Herrero 1997). The dog yard is a popular polar bear viewing site for local tour operators and

independent tourists and Ladoon charges a fee for visitors to access the site to view his dogs or the polar bears. Visitors frequently leave their vehicles to view or photograph polar bears from ground level and there is generally a laissez-faire attitude regarding human safety in this area (see Herrero and Herrero 1997).

The dog yard is unique because Ladoon's boundary process is markedly contrary to that of most other Churchill residents'. A rock wall and gate demarcate a zone around Ladoon's dog yard and allows Ladoon to regulate human entry. Rather than attempting to keep polar bears outside of this boundary, Ladoon actually invites polar bears into his dog yard by feeding them. Furthermore, within the dog yard, Ladoon interacts with polar bears on a social basis (letting good bears get close and deterring bad bears) rather than mediating interactions by distance. Hence, Brian Ladoon engages in the boundary process but creates his own rules for doing so. Mr. Ladoon's practices are widely known and residents vary from being openly critical to supportive of his dog yard. Despite these differences in opinion, community members have come to expect – and largely to accept – the polar bear-human interactions that occur there. One reason for this is that as polar bear viewing has become increasingly regulated, Ladoon's dog yard is one of the few remaining places that locals – who are admitted into the yard free of charge – can reliably see polar bears.

#### ***2.3.4.3 Personal Boundaries***

Finally, the third kind of boundary that participants discursively constructed was personal. Participants, particularly those who worked with polar bears, or frequently engaged in on-the-land activities, often defined “bear-free” boundaries as

a kind of personal space: “we draw lines in the sand. Ok, and depending on the bear's actions, attitude, body language, when it hits that line...” (A8, tourism operator). The size of these “personal” boundaries varied according to situations and the presence or absence of guns and/or vehicles. When polar bears crossed personal boundaries participants felt justified taking defensive action to rectify the transgression – many saw this behaviour as justification to shoot approaching bears. These boundary processes varied according to personal experience, comfort level with polar bears, and the context of an encounter. For example, some participants reproduced discourses of accountability, noting that they were more likely to let polar bears get “close” to them when they were not responsible for others’ safety. Personal boundaries were highly subjective and differed from institutional and social boundaries in that they are meaningful to individuals only. Although personal boundaries were informed by social and institutional boundaries, they did not necessarily adhere to the conventions set by institutional or social discourses (see Ladoon, discussed above).

## **2.4 Discussion**

As results demonstrate, participants used discourses to construct and maintain boundaries between people and polar bears. This was not surprising, since excluding wildlife from human space is a widely accepted premise for responding to human-wildlife conflicts in a variety of contexts and for a variety of species (Treves and Karanth 2003; Woodroffe et al. 2005). Furthermore, the discourses that participants produced and reproduced about polar bear-human interactions in Churchill reflected dominant assumptions about proper spatial relations between

humans and animals (Philo and Wilbert 2000; Wolch and Emel 1998; Yeo and Neo 2010).

#### **2.4.1 The Trouble with Boundaries**

Boundary processes varied significantly between stakeholders and this was often a point of contention between Churchill residents. Institutional, social, and personal boundaries all functioned to exclude polar bears from human spaces, yet the precise geographical locations of these boundaries tended to be highly variable and subjective. Furthermore, participants held diverse expectations over what should happen and what was considered right or appropriate behaviour towards polar bears within a given boundary. When the boundary processes enacted by other community members or by management institutions did not match up with their own, participants often felt threatened and responded by becoming defensive or frustrated.

Disputes over the PBA Program control zone boundaries illustrate disagreements over incongruent boundary-processes particularly well. The institutional boundaries enforced by Manitoba Conservation personnel did not always match up with the personal boundaries of community members. When this happened, participants expressed concerns that the control zone boundaries and their corresponding management practices were too rigid and did not adapt to individual bears. Yet, when Manitoba Conservation personnel were flexible in their enforcement of control zone boundaries, the same participants became frustrated because they felt that agency personnel were not sticking to the guidelines associated with each control zone.

As Madden and McQuinn (2014) point out, conflicts over wildlife often stem from deeper conflicts between people and groups, and may not actually be conflicts about wildlife after all. Disputes over PBA control zone boundaries seemed to be rooted in deeper social conflicts between some Churchill residents and management institutions. When participants did not understand the rationale for management actions within each PBA control zone or were not aware of the flexibility of the control zone borders they interpreted inconsistencies in management responses as deliberate displays of authority by Manitoba Conservation. These participants felt that their personal boundary processes were not recognized within the PBA control zones, and were rendered invalid by institutional boundaries. As Vernon et al (2016) note, discourses taken up and reproduced by institutions have more authority and are more likely to dictate which wildlife management actions are deemed appropriate or inappropriate. Since many participants took great personal pride in their knowledge of polar bears, and in their ability to interact safely with them, this perceived disregard for their personal boundaries was viewed as an affront by Manitoba Conservation personnel.

Disagreements over boundary processes associated with the PBA control zones highlighted underlying governance problems that included a lack of trust in authorities and disputes over meaningful participation in decision-making processes. These findings are consistent with results from Lankshear's (2013) investigation of local perspectives on natural resource management that showed that Churchill has a long history of top-down management decisions. Consequently Churchill residents have extremely low trust in management institutions. Social



conflicts over human-wildlife interactions are often the product of divergent expectations and disputes over who should have the authority to make management decisions (Cromley 2000; Clark and Rutherford 2005) and this was no exception in Churchill. The exclusion of locals from wildlife management decisions is a problem that has been well documented elsewhere with polar bears, as well as with other bear species (Cromley 2000; Clark et al. 2008; Clark and Rutherford 2005; Clark and Rutherford 2014).

Currently, the boundary process for the PBA control zones is neither particularly participatory nor transparent despite attempts by Manitoba Conservation to make it so. Efforts include yearly meetings with tourism operators to go over PBA procedural guidelines, a local advisory committee (formed in 2015), an annual open house about the PBA program, an annual survey of community satisfaction with the PBA program, and weekly postings of their activity reports. However, these efforts remain at the tokenistic level of Arnstein's (1969) ladder for citizen participation. Although Manitoba Conservation creates opportunities for Churchill residents to be heard, residents continue to lack the power to actually influence decision-making about the PBA program. Furthermore, these examples notwithstanding, decision-making about the PBA control zones remains a relatively closed internal boundary process that is open to Manitoba Conservation personnel alone. Hence, conflicts over these boundaries are rooted in frustrations over the lack of meaningful participation in the PBA program and the lack of transparency over how control zones boundaries are established and enforced.

#### **2.4.2 The Power of Boundaries**

Boundary processes functioned to empower certain actors and make acceptable certain kinds polar bear-human interactions while disempowering and making unacceptable others. Hence, boundary processes did more than discursively situate polar bears outside of human space; they produced expectations and demands that fuelled conflicts between different groups of people. The power of boundary processes was particularly evident in disputes between small-scale tourism operators and managers. Many participants expressed a tension between wanting to see polar bears around the community and also wanting to feel safe within their community. This tension was amplified by the demands of the polar bear viewing industry – specifically by the demands of small-scale tour operators. Since small-scale tour operators cannot operate within the CWMA, these businesses depend on being able to see polar bears in the 21km stretch of coastline between the CWMA and the town. As a result, many small-scale tourism operators adhere to different boundary processes than those enacted by institutions or by the community because they want to see polar bears in close proximity to human inhabited areas. On the other hand, managers and many other locals view the presence of polar bears in the same areas as a potential threat to human safety. Conflicting interpretations over what kinds of polar bear-human interactions were acceptable in the areas immediately surrounding the Churchill community often resulted in bitterness and resentment between these two parties.

Harrison and Loring (2014) noted that similar stereotypes and generalizations were used in fishing communities to dehumanize opposing user groups during conflicts over fisheries. In its more extreme forms dehumanization

refers to when people are treated non-human or as sub-human (Haslam 2006). However, dehumanization can also take lesser forms and refer to when people are de-individualized and their needs, values, and rights delegitimized (Stephenson 2011). Here, we follow Harrison and Loring's (2014) use of the term in which dehumanization occurs when one party perpetuates inaccurate information about the other party, and appeals to arguments that bolster their own standing while devaluing the position of others. Similar to Harrison and Loring's (2014) observations, dehumanization in Churchill tended to take the form of generalizations which cast specific people as having more rights to interact with polar bear than others.

In Churchill, discourses of human safety were a particularly powerful tool for validating the role of managers while casting the demands of small-scale tour operators as self-serving. For example, managers often described tour operators' desire to see polar bears near the community as greedy or selfish. As one manager pointed out:

“some tour operators would wish that we (the PBA program) didn't even exist and to the point where if someone got mauled every once in a while it's probably an attractant to get more tourists up here” (B2).

By describing small-scale tour operators as unconcerned with human safety, managers portrayed themselves as morally superior in their commitment to keeping the community safe. Hence, small-scale tour operators (and others who did not adhere to institutional boundaries) often become scapegoats when their actions or demands did not align with those produced by institutional boundary processes. Similarly, highlighting the outsider status of Manitoba Conservation personnel was a

common form of dehumanization that small-scale tour operators employed. Tour operators devalued the expertise of agency personnel by stating that PBA officers are outsiders to the community, and therefore do not understand the nuances of interacting with polar bears in the way locals do. The following exchange between two focus group participants illustrates how the dehumanization of Manitoba

Conservation personnel occurs:

A8: It's Cowboys and Indians out there. They blocked the road off to prevent me from going home because there's a bear on the beach.

B18: You've been here your first year – I have been here 40 years!

A8: But they've got the badge... (2014, Focus Group 1)

Although this analysis focused on instances of dehumanization between agency personnel and small-scale tour operators, we also frequently documented examples of dehumanization between different groups of Churchill residents as well. In this way, divergent boundary process produced categories of insiders and outsiders that fuelled discord between community members as well as between community members and management institutions. As Peterson et al. (2002) note, dehumanization is not merely a by-product of conflict but can actually function to escalate conflict between opposing parties. Therefore, as long as dehumanization remains a commonplace practice in Churchill, disputes over boundary-processes are unlikely to abate, and may even get worse in the future.

## **2.5 Conclusion**

Paying attention to how discourses create boundaries, and what expectations and demands discursive boundaries produce can help us to better understand how people make sense of polar bear-human interactions. In Churchill, participants discursively constructed boundaries between people and polar bears and this

boundary making had ramifications. Divergent boundary processes caused participants to hold different opinions about what polar bear-human interactions are considered appropriate or not appropriate in specific places. Hence, boundary processes did more than discursively situate polar bears outside of human space; they produced expectations and demands that fuelled conflicts between different groups of people. Further research is required to determine exactly how boundary processes affect social conflict over polar bears in different contexts, and it would be useful to explore whether such processes are consistent across wildlife species.

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## **PREFACE TO CHAPTER 3 – “IT’S JUST A MATTER OF TIME:” AGENCY AND COMMUNITY RESPONSES TO POLAR BEAR INFLICTED HUMAN INJURY**

Bear-inflicted human injuries or deaths are often widely publicized, highly controversial, and can evoke substantial social responses that articulate public expectations about management responses. Bear-human conflicts are often focal points for social conflict over bear management because different people have diverse views on what caused the problem and on how it should be solved. Historically, bear-human conflicts have served as catalysts for significant changes in institutional behaviour and policies. However, how agencies (such as Manitoba Conservation, Parks Canada, and the Town of Churchill) and communities respond to such conflicts requires further investigation. This research provides a deeper understanding of how communities and management agencies react to polar bear-inflicted human injuries, and lends important insights into what is working and what is not working in current polar bear management responses.

Whereas the previous chapter examined how discourses about polar bear-human interactions create boundaries that define the possible ways humans and polar bears can interact, this chapter examines what happens when a polar bear crosses these boundaries and attacks a human. This chapter uses incident analysis to reveal trends in agency and community responses to polar bear-inflicted human injury and to examine which solutions were implemented following the incident. This chapter addressed the second objective of this thesis: to document community

and agency responses to bear-related crisis in Churchill: describing what is said (about polar bears, about people, about the incidents) and what is done (changes in behaviours, changes in policies/practices).

This chapter was submitted to *Conservation and Society* (as Schmidt, A. L., and Clark, D.A. It's just a matter of time: Lessons for agency and community responses to polar bear-inflicted human injury). This article has been accepted with revisions. In this chapter, ALS and DAC conceived the original idea. ALS collected all the field data and conducted the analysis. ALS wrote the first draft and DAC provided comments.

## **CHAPTER 3: “IT’S JUST A MATTER OF TIME:” AGENCY AND COMMUNITY RESPONSES TO POLAR BEAR INFLICTED HUMAN INJURY**

**Abstract:** Bear-inflicted human injuries or deaths are often widely publicized, highly controversial, and evoke substantial social responses that articulate public expectations about bear management. In this paper, we examined how local people and management agencies responded to polar bear-inflicted human injury in Churchill, Manitoba, Canada. On November 1<sup>st</sup>, 2013, two people in Churchill were badly mauled by a polar bear. The incident shocked the community, highlighted problems such as a lack of bear safety education, and led to reviews of institutional policies of preventing polar bear-human conflicts. We used multiple methods to describe what is said (about polar bears, about people, and about management) and what is done (changes in behaviours and changes in policies/practices) when someone is attacked by a polar bear in Churchill. Results show that polar bear management agencies in Churchill respond remarkably well to errors in procedure, but are often unable to address the many underlying systematic drivers of polar bear-human conflict. Hence, managerial reactions to bear-human conflicts are successful at addressing the proximate cause of the problem, but offer few long-term solutions.

### **3.1 Introduction**

Polar bear-human interactions and conflicts are increasing throughout the Arctic (Dowsley and Wenzel 2008; Tyrell 2009, Lemelin et al. 2010; WWF 2013). Although the exact impacts of climate change on polar bears remain disputed, temporal trends in sea ice decline suggest increasing overlap with people so conflict with

humans will continue to occur (Stirling and Parkinson 2006; Peacock et al. 2011; Stirling and Derocher 2012). In 2013, Canada experienced a record number of polar bear-inflicted human injuries – with three out of four of these attacks occurring in Churchill, Manitoba. Nevertheless, polar bear-inflicted human injuries or fatalities remain relatively rare (Fleck and Herrero 1988; Clark et al. 2012). Herrero and Fleck (1990) found that polar bears were responsible for only 6% of human injuries or deaths by all bear species across North America. However, published studies of trends in polar bear-human conflicts are dated (e.g. Gjertz 1987; Fleck and Herrero 1988; Clark 2003). Furthermore, many of these conflicts have not been well documented making it difficult to draw conclusions from these trends.

That said, bear-inflicted human injuries or deaths are often widely publicized, highly controversial, and evoke substantial social responses that articulate public expectations about management responses (Don Carlos et al. 2009; Clark and Slocombe 2011). Bear-human conflicts are often focal points for social conflict over bear management since different groups of people have diverse views on what caused the problem and on how it should be solved (Cromley 2000; Wilson and Clark 2007). Historically, bear-human conflicts have served as catalysts for significant changes in institutional behaviour and policies (Mattson and Craighead 1994; Herrero and Herrero 1997; Wondrack-Biel 2006; Clark and Slocombe 2011).

At 5:00 am on November 1<sup>st</sup> 2013, transient resident<sup>1</sup> Erin Greene was walking home from a Halloween party in Churchill, Manitoba, accompanied by three other people. The group took a short-cut, down an alley between two apartment buildings, and Greene was attacked by a polar bear. The attack occurred outside the residence of Billy Ayotte, a long-term Churchill resident. Ayotte, who was awakened by Greene's screams, came to her aid, attempting to distract the polar bear by hitting it with a shovel. However, the polar bear turned on Ayotte and began to maul him instead. Other residents attempted to scare the bear off by firing shots and shouting but it wasn't until a local man rammed the bear with his truck, that the bear was deterred. Both Greene and Ayotte suffered severe lacerations but survived. Conservation officers tracked down and shot the bear. However, a female bear in the general vicinity was mistakenly killed as well and her orphaned cub was later sent to a zoo.

In this manuscript, we examine events leading to the November 1<sup>st</sup> incident, and the reactions that followed, to understand better how involved agencies and community members respond when someone is attacked by a polar bear in Churchill, MB. We document community and agency responses to bear-related crisis in Churchill: describing what is said (about polar bears, about people, about the incidents) and what is done (changes in behaviours, changes in policies/practices). Our research addressed the following questions:

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<sup>1</sup> Here, we define transient resident as anyone who has lived in the community for less than two years and is not employed in a permanent position.

- 1) How do agencies respond to polar bear-human conflicts? How do they respond to polar bear-inflicted human injury?
- 2) How do Churchill residents respond to bear-human conflicts? How do they respond to polar bear-inflicted human injury?
- 3) What patterns or trends exist in responses to polar bear-inflicted human injuries? What are the implications of these trends for preventing future conflicts?

Although our study is place- and species-specific, these questions, and the answers we found, are globally applicable. Conflicts between people and large carnivores are a worldwide issue with real impacts on human lives, livelihoods, and animal conservation efforts across a wide range of social and ecological contexts and in both developing and developed nations (Treves and Karanth 2003; Thirgood et al. 2005; Packer et al. 2011; Barua et al. 2013; Penteriani et al. 2016). However, investigations of how agencies respond to such conflicts are sparse (Clark and Rutherford 2005) and very few of those compare agency and community responses to the same incidents (Cromley 2000; Clark and Slocombe 2011; Clark et al. 2014). This knowledge gap is an important one because the field of wildlife-human conflict management is rapidly evolving and sharing best practices - particularly regarding institutions and governance - remains an urgent need (Treves and Karanth 2003; Dickman 2010; Clark et al. 2016). Our paper aims to make a specific contribution to meeting that need by exploring the differences between agency and community responses both before and after a specific high-profile incident.

The theoretical framework we used to understand responses to the November 1<sup>st</sup> mauling of Erin Greene and Billy Ayotte was incident analysis (Reisman 1988). Incidents are important phenomena that can shape responses to highly political wildlife management issues (Cromley 2000; Mattson and Clark 2012; Vernon et al. 2015). Incident analysis involves examining normative expectations articulated in response to a specific event, to understand how they shape management actions and policy outcomes (Reisman and Willard 1988). Incident analysis is a meta-approach that focuses on a specific situation and has scope for the application of a variety of qualitative methods including interviews (see Cromley, 2000; Vernon et al. 2015) and content analysis of media (see Mattson and Clark 2012). Incidents function to clarify people's perspectives and expectations about management actions and have the power to shape management policy and practice (Reisman 1984; Clark and Rutherford 2005; Mattson and Clark 2012). Incidents can be identified by changes in the frequency of references to focal issues made by stakeholders, and are characterized by an amplified attention to defining problems, and promoting specific solutions (Birkland 1998; Reisman 1988). As Mattson and Clark (2012: 333) point out, "incidents became opportunities for redefining problems and debating and contesting the merits of management methods, decision-making processes, and other status quo arrangements."

### ***3.1.1 Social, Ecological, and Institutional Context***

Situated at the mouth of the Churchill River and on the southwest coast of the Hudson Bay, Churchill, Manitoba is home to approximately 810 people (Statistics Canada 2013). The resident population of Churchill is comprised of a mixture of

long-term residents (some of whom have lived in the community for generations) and transient residents who are usually employed in temporary or seasonal positions. Churchill experiences high rates of polar bear-human interactions since polar bear aggregate along the shores of the Hudson Bay near the community during the ice-free period (Lemelin 2006). Polar bear-viewing has made Churchill an international tourism destination with between 6000-10,000 tourists travelling to the community each year to see polar bears (Dawson et al. 2010).

Since 1965, twelve people have been injured and two people have been fatally mauled by polar bears in the Churchill region (Table 3.1)(Jonkel 1970; Stirling et al. 1977; Kearney 1989; Lemelin 2007; Herrero and Herrero 1997; Struzik 2014). In addition, research participants reported countless other close encounters that remain largely undocumented, in part because they did not result in a significant injury, or in human death.

**Table 3.1 Polar bear inflicted human injury or death in Churchill, M.B., 1965-2016**

Year	Injury/ Fatality	Source
1966	Tim Hawkins (injured)	Kearney (1989); Herrero and Herrero (1997); Struzik (2014)
1967	Adolphe Thorassie and Adel Nagle (injured)	Herrero and Herrero (1997 ) mention only Thorassie; Struzik (2014); Jonkel (1970); and interview participants mentioned both Thorassie and Nagle.
1968	Pauloosie Meeko (killed)	Kearney (1989); Stirling et al. (1977); Herrero and Herrero (1997); Struzik (2014)
1969	Jimmy Spence (injured) Bradley White (injured)	Herrero and Herrero (1997) mention only Bradley White;



		Struzik (2014) mentions only Jimmy Spence;
<b>1983</b>	Tommy Mutanen (killed) Fred Truel (injured)	Herrero and Herrero (1997); Struzik (2014); Interview participants
<b>1984</b>	Sonny Voisey (injured)	Herrero and Herrero (1997); Struzik (2014); Interview participants
<b>2004</b>	Gillian Eckhardt (injured)	Lemelin (2007); Interview participants; CBC News
<b>2009</b>	René Preteau (injured)	Winnipeg Free Press; Interview participants
<b>2013</b>	Garett Kolsun (injured) Erin Greene/Billy Ayotte (injured)	Struzik (2014); CBC News; Interview participants

In the past, polar bear-human conflicts resulting in human injury or death have triggered significant changes to management strategies and policies in Churchill (Kearney 1989; Struzik 2014). In particular, polar bear-inflicted human fatalities have triggered the most notable revisions to policy and procedures. For example, the 1968 death of a teenage boy prompted a collaborative effort between the local, provincial, and federal government that led to development of the provincially-run Polar Bear Alert (PBA) Program (Kearney 1989). Similarly, the death of Tommy Mutanen, in 1983 led to significant reviews of the PBA program’s operating procedures – largely in response to widespread public dissatisfaction.

In its present form, the PBA Program consists of patrols that seek to deter, capture, or, occasionally kill polar bears who venture near inhabited areas around Churchill (Manitoba Conservation and Water Stewardship 2014). In addition to the PBA program, several other institutions contribute to the management of polar bear-human conflicts in the Churchill area. The Town of Churchill is the municipal governing body responsible for garbage disposal and attractant management. Safety

measures that require changes to town infrastructure (e.g. better lighting in the streets, removal of brush or rocks, or bear proof garbage containers) must be approved and implemented by the Town of Churchill. Neither, Manitoba Conservation (now Manitoba Sustainable Development) nor the Town of Churchill have authority to deter polar bears, or manage attractants on OmniTrax property – despite its proximity to the community. Nevertheless, OmniTrax cooperates with Manitoba Conservation by allowing PBAP officers to deter bears on Port of Churchill property – a strip of privately owned land immediately adjacent to the town site. Finally, Parks Canada manages polar bear-human interactions in the nearby Wapusk National Park and at various national historical sites in the Churchill vicinity (Cape Merry and Prince of Wales Fort). Due to the significant overlap between jurisdictions the management of polar bear-human conflicts in Churchill requires constant negotiation and cooperation between agencies.

## **3.2 Methods**

### **3.2.1 Data Collection**

#### **3.2.1.1. Interviews**

Over two field seasons, 37 semi-structured interviews were conducted (Table 3.2).

Interviews were informal, conversational, and adjusted to each unique interaction (Huntington 1998). Interview guides provided a list of topics and probes that allowed interviewees to guide the direction and scope. Interviews lasted on average one hour and covered a range of topics including participants' experiences with and perceptions of polar bears, the history of polar bear management in the community, and perceived challenges to polar bear management. Sampling measures for

interviews involved a combination of snowball and heterogeneity sampling techniques (Palinkas et al. 2013). Data were collected under the authorization of the University of Saskatchewan Behavioural Research Ethics Board, protocol number: BEH 13-143.

**Table 3.2 Interview participants 2013-2014**

Description	2013 Interviews	2014 Interviews
<b>Field personnel (Manitoba Conservation, Parks Canada)</b>	3	4
<b>Managers (Manitoba Conservation, Parks Canada, the Town of Churchill)</b>	1	6
<b>Residents</b>	16	12
<b>Total:</b>	20	17

### ***3.2.1.2 Focus groups***

In 2014, three focus groups were carried out with three different stakeholders: tourism operators, managers, and long-time Churchill residents. Focus groups allowed for direct comparison between the perceptions and knowledge of polar bears held by different groups of stakeholders and helped to clarify findings from the interview data (Morgan 1997). Homogeneity sampling ensured that participants who shared similar perspectives and experiences were grouped together (Palinkas et al. 2013). Each focus group lasted an average of 90 minutes and consisted of between two and five participants; a total of 10 people participated.

### ***3.2.1.3 Problem solving workshop***

Finally, we organised and facilitated a problem-solving workshop (Edwards and Gibeau 2013) in Churchill in October 2015. Problem-solving workshops have been used to build trust and establish common ground between stakeholders in other

contexts involving bear-human conflicts (Mattson et al. 2006; Rutherford et al. 2009; Clark et al. 2010). This workshop was similar in method to the Clark et al. (2010) workshop in which participants focused on defining problems and identifying corresponding solutions. Twelve participants attended (five managers and seven residents), including representatives of Manitoba Conservation, Parks Canada, and the Town of Churchill. The workshop consisted of a series of facilitated exercises that encouraged participants to identify common ground about polar bear-human conflicts in Churchill. Workshop participants worked together to describe what they thought needed to be done to address the problems and how to reach these goals. In addition, since eight out of the 12 workshop participants had participated in prior data collection activities (interviews and focus groups), the workshop included a validation of results component. Validation is an important step in qualitative research that allows participants to provide feedback on study findings and ensures that perspectives have been accurately documented (Creswell and Miller 2000; Miles and Huberman 1994).

### **3.2.2 Data Analysis**

The use of multiple methods enabled triangulation for the corroboration and synthesis of data (Creswell and Miller 2000). The first author organised, processed, and coded data according to themes or categories that emerged from the data (Braun and Clarke 2006) using NVIVO Mac v.10. An initial round of inductive coding revealed patterns consistent with the categories identified by Mattson and Clark (2012). A second round of deductive coding organised statements according to problems (discrepancies between actual and desired states of affairs) and solutions

(alternatives to address an identified problem). Each statement of a problem was then organised into distinct categories and the number of participants who made these statements was counted (Table 3.4).

### 3.3 Results

To document events leading up to the November 1st incident, and the managerial responses that followed, we constructed the following timeline (Table 3.3). This timeline draws on information from a variety of sources (interviews, focus groups, informal discussions with participants and other community members, and newspaper articles).

**Table 3.3 Incident Events Timeline**

Date	Events
<b>2013 (July 29)</b>	A transient resident walking with his dog and two children on the Complex Beach is confronted by a subadult polar bear. He uses the dog leash to keep the bear at bay, and calls Manitoba Conservation, who deter the bear.
<b>2013 (9 September)</b>	Garett Kolsun, a transient resident who is walking home from bar at about 1:30 am is bitten by a subadult polar bear near the local bakery. The polar bear is later captured by Manitoba Conservation and sent to the Assibonine Park and Zoo in Winnipeg.
<b>2013 (1 November)</b>	Transient worker Erin Greene, and long-term resident Billy Ayotte are attacked by a subadult <sup>2</sup> polar bear. Two polar bears are shot and an orphaned cub is sent to the zoo.
<b>2013 (November)</b>	The Polar Bear Safety and Awareness Committee is formed, involving Parks Canada, Manitoba Conservation, Chamber of Commerce, the Town of Churchill; the Churchill Emergency Measures Organisation. The focus of this committee is to increase polar bear safety messaging in the community.

<b>2014 (February)</b>	The Local Advisory Committee is formed, made up of 4 long term Churchill residents. The goal of this organisation is greater transparency of PBA decisions. Meets for the first time on 14 May 2014.
<b>2014 (July)</b>	<i>Safety in Polar Bear Country</i> information sessions that are co-hosted by Parks Canada and Manitoba Conservation begin. Overall attendance was poor and did not match up with anticipated interest. <i>Safety in Polar Bear Country</i> pamphlets are printed and distributed around the community
<b>2014 (August)</b>	Manitoba Conservation widens the perimeter in which polar bears are not tolerated and begins hazing more polar bears. Early morning and late evening PBA patrols are increased.
<b>2014 (31 October)</b>	Manitoba Conservation implements the first 24-hour PBA patrol on Halloween night.

### 3.3.1 Defining Problems

This analysis focused how participants defined problems that caused polar bear-human conflicts (Table 3.4). Problem statements were defined as “discrepancies between the actual and desired states of affairs” (Vernon, et al. 2015: 68).

**Table 3.4 Summary of problem statement categories made by 2013-2014 interview participants**

Category of problem statements	Mentioned by # of participants in 2013	Mentioned by # of participants in 2014
<b>Improper garbage/attractant management</b>	1	9
<b>Risk-taking by outsiders</b>	8	9
<b>Risk-taking by locals</b>	2	6
<b>Risk-taking due to alcohol consumption</b>	0	5
<b>Lack of bear safety education</b>	2	8
<b>Bear behaviours</b>	5	7
<b>Shortcomings of the PBA program</b>	0	5
<b>Too many bears</b>	1	1
<b>Problem bears not removed</b>	0	4

<b>from the population</b>		
<b>Deferral of responsibility by management agencies</b>	0	3

**3.3.1.1 Improper garbage/attractant management**

Improper garbage or attractant management was identified as a problem once in 2013, and nine times (by four managers and five residents) after the attack, in 2014. This problem focused primarily on the practice of creating attractants by setting garbage on the street the night before pick up. Participants also highlighted the lack of bear-proof garbage containers, noting that bears frequently broke into wooden or wire mesh garbage containers widely used around the community at that time. Restaurants were seen as a chief source of attraction and participants noted that the proper disposal of garbage did not appear to be a priority for most restaurants or businesses. Finally, one manager noted that the Port of Churchill had begun disposing of wheat screenings closer to the Churchill community, creating a polar bear attractant.

**3.3.1.2 Risk-taking by outsiders**

Risk taking by outsiders (specifically by tourists or transient workers) was the most frequently identified problem both before and after the incident (by four managers, four field personnel, eight residents). Both managers and residents pointed out that outsiders often get dangerously close to polar bears or fail to take precautions against encountering them. As one participant, in 2013 predicted: “there will be another incident in Churchill with a bear and a person. It's just a matter of time. Might be this year, might be in 20 years but it's inevitable. It will happen. And I would say it's likely going to be a tourist”(A6, field personnel). Several participants

noted the pressure on tourism operators by film crews and photographers to facilitate close interactions with polar bears. Two managers also cited their inability to legally prevent outsiders from engaging in this risk-taking behaviour due to a lack of regulations.

### ***3.3.1.3 Risk-taking by locals***

Participants who identified this as a problem highlighted that local people seemed to have a complacent attitude towards the potential risks posed by polar bears. Two managers attributed this to a larger culture of risk-taking in the Churchill community: “I think complacency isn't just about polar bears, it's about jumping in the boat with no life jackets, it's about RCMP enforcing seat belt rules, it just seems like it's a different mentality in Churchill” (B5, manager). Two other participants attributed complacency among locals to the fact that there has not been a polar bear-inflicted human death in Churchill since 1983: “When things kind of go along status quo.... you tend to get a bit lazy, I mean that's just human nature” (B4, manager). Other participants pointed out that the presence of the PBA program created a false sense of security for people, as did efforts to develop beach areas (by putting fire pits and picnic tables into them) that are subject to frequent polar bear visitation. Finally, children playing outside unsupervised after dark were also identified as a problem.

### ***3.3.1.4 Risk-taking due to alcohol consumption***

Participants who articulated risk-taking as a problem also emphasised poor decision-making by people under the influence of alcohol – specifically choosing to walk home after dark while intoxicated. Unlike the two previous problem



statements about risk-taking this one did not distinguish between insiders or outsiders to the community. Alcohol consumption was one of the only problems not discussed by managers in the interviews (identified by five residents), although it was briefly touched on in the managerial focus group. Most participants who identified this problem noted that they had engaged in this type of behaviour themselves at some point in the past: “I know, people shouldn't be walking home at that time of night but, you know, everyone who judges Erin for that night, did it themselves” (B15, resident).

#### ***3.3.1.5 Lack of bear safety education***

This problem was noted by two participants prior to the incident and gained considerable traction after the incident. In addition to eight interview participants who cited the lack of education as a problem in 2014, this problem was also prevalent in two focus groups, and was the dominant problem definition in the 2015 problem-solving workshop. Participants felt that there was a need for more education to increase people’s awareness of the danger posed by polar bears, and to teach people how to avoid polar bear-human conflicts. Participants who identified this solution felt that education should be geared towards outsiders, noting that local people were already sufficiently bear aware: “as of late most of the incidences are happening with the tourism people that aren't educated among the bears and... the local people they.... are probably a little more educated than the average person that comes up from the city” (B10, resident).

### **3.3.1.6 Bear behaviours**

This category of problem statements focused on the habituation of polar bears (to people or to cracker shells) and on an increase in aggressive behaviours by polar bears. Here, we use the term habituation after Herrero et al. (2005) to refer to bears that show little or no overt reaction to humans. When discussing habituation, several participants noted that bears were increasingly losing their fear of humans. One agency staff member pointed out, “they banned the hunt, now all these people take pictures of bears, the bears aren't scared of nothing. They are not scared of man at all” (B16). Several participants noted that increasing habituation to cracker shells made bears more difficult to deter during interactions and therefore more dangerous. In 2014, four participants (two residents, one field personnel, one manager) identified “rogue bears” as the problem. This problem statement highlighted the infrequency of bear attacks while also underscoring the unpredictable and potentially unavoidable nature of such incidents.

### **3.3.1.7 Too many bears**

This problem statement focused on the perception that the polar bear population in the Churchill region was increasing, which in turn, increased the likelihood of polar bear-human conflicts.

### **3.3.1.8 Problem bears are not removed from the population**

This problem statement highlighted that PBA Program officers no longer routinely remove polar bears that have a history of conflict with humans from the population. Articulated by two managers, one field personnel (all employed by Manitoba Conservation), and one resident in the interviews, this problem statement was also reiterated in one focus group by a resident: “Let's face it, some bears need to get

dead.” (A8, resident, 2014 Focus Group). Exactly what information or event compelled this problem statement was unclear since all the polar bears involved in the 2013 incidents (Table 3) were sub-adults and none had a history of prior conflicts with humans. This problem statement may have been motivated by a desire for retribution against polar bears because it was not present in the 2013 data set (prior to the incident) and was the only problem statement that openly supported lethal action against bears.

#### ***3.3.1.9 Deferral of responsibility by management agencies***

Two managers and one resident identified this as a problem. Both managers highlighted difficulties in implementing change when agencies failed to follow through on their responsibilities, noting a tendency to “pass of the buck” when it came to determining who was responsibility for a specific task. The resident felt that one agency in particular (the Town of Churchill) was not doing its part in working together with other management agencies to reduce polar bear-human conflicts – specifically with regard to effective garbage management.

#### ***3.3.1.10 Shortcomings of PBA program***

This category of problem statements identified shortcomings of the PBA program that were perceived to have contributed to the incident in 2013. Two separate problems were identified: the lack of a 24 hour patrol by PBA officers (by two residents) and that PBA officers had become too tolerant of polar bears in the vicinity of the community (by two managers, one field personnel, one resident). Although not present prior to the 2013 incident, overall relatively few residents articulated this problem statement. This indicates that satisfaction with the PBA

program was still relatively high among Churchill residents even after the 2013 bear attack.

### 3.3.2 Implemented Solutions

In this section, we describe which problem definitions apparently gained traction and resulted in the implementation of specific solutions by management agencies, and which did not (Table 3.5).

**Table 3.5 Problem definitions and corresponding solutions implemented by management agencies**

<b>Problem</b>	<b>Implemented solution</b>
<b>Improper garbage/ attractant management</b>	New garbage bins
<b>Risk-taking by outsiders</b>	Education
<b>Risk taking by locals</b>	None
<b>Risk taking due to alcohol consumption</b>	None
<b>Lack of bear safety education</b>	Education
<b>Bear Behaviours</b>	Increased hazing/patrols
<b>Too many bears</b>	None
<b>Shortcomings of the PBA program</b>	Increased hazing/patrols
<b>Deferral of responsibility by management agencies</b>	None
<b>Problem bears are not removed from the population</b>	None

#### 3.3.2.1 *New garbage bins*

In the fall of 2014, the Town of Churchill (the agency primarily responsible for garbage and attractant management in Churchill) installed five bear-proof garbage containers around the community. These bins replaced older wooden and wire mesh garbage containers located behind restaurants, hotels, and the Town Complex building. It is worth noting that the Town of Churchill had already started implementing this solution prior to the incident; two garbage bins had been installed in 2013, and the rest were slated for installation in the fall of 2014 (Town

of Churchill representative, pers.com). This solution addressed some of the long-standing issues with polar bears breaking into garbage bins and having access to restaurant scraps and other trash. Nevertheless, this was only a partial solution given that only a few bear-proof containers were installed, and numerous smaller garbage cans that are not bear-proof remain scattered around the community. Furthermore, although participants identified the existing garbage pick-up system as a problem, to our knowledge no steps have been taken to revise or improve the current system.

### ***3.3.2.2 Education***

Not surprisingly, perhaps, people who raised education as a solution are also those who define the problems as being risk-taking by outsiders and a lack of bear safety education. The need for better polar bear safety education was identified as a solution almost immediately following the incident. The Polar Bear Safety and Awareness Committee was formed within a week of the incident and focused on efforts to increase the availability of polar bear safety messaging in Churchill (Table 3). Educational efforts specifically targeted outsiders to the community, and were designed to reach seasonal workers in particular. One manager involved in the formation of the committee described the rationale for focusing on seasonal workers: “what we found was that long term residents of Churchill have good knowledge, are bear aware, and you really don't need to worry about them too much, the tourists are very well informed, well managed, you don't have to worry about them too much, it's the seasonal worker, they were falling between the cracks” (B17). The committee also implemented polar bear safety information

sessions (co-hosted by Manitoba Conservation and Parks Canada) that are now held bi-weekly from July to October. Five sessions were held in 2014, and six in 2015.

Finally the Polar Bear Safety and Awareness Committee also revamped an existing brochure on polar bear safety and distributed it around the community.

### ***3.3.2.3 Increased Hazing and Patrols***

In 2014, Manitoba Conservation made several changes to the PBA program's operating procedures. These included: more frequent hazing and handling of polar bears that were staging near the community; the implementation of more patrols in the mornings and evenings; and increasing the number of additional field personnel available to assist existing PBA officers during the bear season. These solutions corresponded to problem definitions that blamed polar bear behaviours and identified shortcomings in the PBA program. Increased hazing of polar bears was the solution that was most promoted by Manitoba Conservation employees – with three out of four participants who identified this as a problem working in the PBA program. One manager described the changes to hazing procedures: “we are going to be more assertive or quicker to immobilise and lodge bears that are hanging around... whereas last year and a few previous years we would tolerate them longer until we were sure that bear was one of the bears that was coming into town” (B2). Manitoba Conservation also increased PBA patrols (adding a 7 am patrol, and a 9 pm and 10 pm patrol), and commenced a 24-hour patrol on Halloween night (the night of the 2013 incident). However, Manitoba Conservation did not begin to conduct 24-hour patrols on a nightly basis throughout polar bear season – a solution that was advocated for by a number of Churchill residents.

#### ***3.3.2.4 Solutions that were not implemented***

Interview, focus group, and workshop participants also identified other solutions that were not acted upon by management agencies. These included: reinstating hunting of polar bears to make bears more afraid of humans; installing a bait station to divert polar bears away from the community; fining people who engaged in risk-taking behaviour around polar bears; implementing an all night taxi or bus system to prevent people from walking home from bars; implementing a 24-hour PBA patrol during bear season; and taxing visitors to the community to fund improvements to garbage management.

#### **3.4 Discussion**

The increase in how frequently participants discuss problem statements from 2013 to 2014 is consistent with finding from other incident analysis research (Mattson and Clark 2012; Vernon et al. 2015; see also Birkland 1998). Following an incident, participants spent more of their interview time defining the problems and proposing potential solutions to prevent future attacks. No clear distinction was found between how managers and residents talked about problems, although this may be due to limitations in the data set since only one manager was interviewed in 2013 vs. six in 2014. Although stakeholders put forth multiple problem definitions (ten) only a select array of problem definitions had corresponding solutions that were implemented by management (five) following the Nov 1<sup>st</sup> incident. In his research on how problems are defined, Dery (1984) found that the most prominent problem definitions tend to dictate which solutions are enacted (see also Weiss 1989). This trend was evident in our findings since problem definitions with the highest incidence before the incident (i.e. risk-taking by outsiders and bear

behaviours) seemed to have a particular influence on what actions were taken and what solutions were implemented afterwards: educational efforts deliberately targeted outsiders, and increases in hazing/patrols were directed at problematic polar bear behaviours.

### **3.4.1 Managerial Responses**

Trends in managerial responses to the incident reflected a number of documented behavioural biases that characterize decision-making processes in North American natural resource management agencies (Yaffee 1997; Ascher 2001; Clark et al. 2014). These include a focus on short-term results that have immediate rewards but fail to resolve the actual problem; a tendency to oversimplify problems or to favour responses that fit within existing modes of operation; and fragmented responsibility between agencies that allowed important decisions to fall through the cracks (Yaffee 1997; Ascher 2001). Overall, managerial responses favored status quo arrangements and defended the legitimacy and structure of existing agency arrangements in a manner that indicates problems with the underlying constitutive decision-making process (Clark et al. 2014; Oppenheimer and Richie 2014). As Clark et al. (2014) note, the constitutive process is the collective set of higher-order decisions in an institution that determine how ordinary 'technical' decisions should be made, and who should be involved. Although not widely acknowledged, and not always visible from the outside, constitutive process plays a fundamental role in carnivore conservation decisions and have real consequences for both the people and the wildlife involved.



### **3.4.2 Education**

Within one week of the incident, management agencies had identified the lack of polar bear safety education as a problem, and formed a Polar Bear Safety and Awareness Committee specifically to resolve this problem (Table 3). One reason education gained traction as the appropriate solution so quickly was at least partly because the incident reinforced pre-existing problem definitions about the problematic behaviours of outsiders to the community. Over time, both agencies and community members came to view increased polar bear safety education as the preferred solution. This was particularly evident in the 2015 problem-solving workshop, in which workshop participants were adamant that more education was the best way to resolve wide array of human risk-taking behaviours. The workshop demonstrated the extent to which education had been accepted as the most logical and desirable solution to prevent future bear attacks.

Education was dominantly the favoured solution in the workshop because it was the solution over which participants found the most common ground. The predominant focus on this particular solution may have been a by-product of the pervasive low trust Churchill residents have towards management agencies. Lankshear (2013) found that many Churchill residents felt excluded from decision-making about natural resources and frustrated with the inability of management agencies to address their concerns. Because increased education was a common goal of both agencies and residents, managers may have been motivated to advance this solution in hopes of leveraging support for their respective institutions from all concerned stakeholders. Furthermore, educating the public may have been a particularly attractive solution to managers because it was low-risk to implement

and it appeared to address the entire array of problem definitions that related to human behaviour around polar bears (including risk-taking by outsiders, risk-taking by locals, risk-taking due to alcohol, and of course the lack of bear safety education). By supporting education as the solution, agencies achieved a short-term goal (the recognition that managers were working to prevent future incidents) while also protecting on-going organisational procedures from disruption (Yaffee 1997; Ascher 2001). That said, securing public support for management actions is a perfectly valid goal, particularly since public backlash can have significant negative consequences for both the agency and its individual employees.

However, there are a number of reasons why education did not adequately address all the problem definitions that interviewees raised as being related to risk-taking by humans. First, the educational efforts that resulted from the 2013 incident focused on transient residents and outsiders. They did not explicitly target the behaviour of locals despite that a number of participants (including both residents and managers) identified the complacency of long-term residents as an issue. One manager voiced his concern over the effectiveness of the educational efforts implemented in 2014: "I don't think that we have really hit the nail on the head and really gone all the way because you still do see, not only tourists, but local people doing some questionable things and it makes you wonder if we are actually effective, the way that we are getting the message out?" (B5). Participants in the managerial focus group also acknowledged that more targeted education was needed to modify the behaviour of long-term residents, but, to date, we are not aware that any such efforts have been made.

Second, educational efforts also did not directly address or overtly seek to resolve risk-taking behaviours that occurred as a result of alcohol consumption. Although this problem definition was raised by a number of residents, it was not widely discussed among managers despite that the 2013 incident could be directly attributed to alcohol consumption. This is likely because substance abuse in northern communities is both a socially sensitive issue and a systemic one (Canadian Centre on Substance Abuse 2005). While residents felt comfortable openly discussing the issue of alcohol consumption, the controversial nature of alcohol abuse likely prevented managers from discussing this risk factor in more detail. Furthermore, solutions aimed at preventing people from walking after dark while intoxicated – such as a 24-hour PBA patrol or taxi that ran all night – would have required significant buy-in by multiple agencies, not to mention resource allocation. The failure to address the risk-taking due to alcohol consumptions was very likely a by-product of fragmented responsibility between agencies – no single agency was accountable for resolving this issue thus making it easy to dismiss or ignore (Yaffee 1997).

The prominence of education as the preferred management solution is not unique to the Churchill polar bear management context. In their global survey of bear-human conflicts and management, Can et al. (2014) found that education and awareness was the most commonly emphasized tool for conflict prevention by managers (see also Gore et al. 2006). Faith in education as a panacea for a variety of problems is apparent in broader literature on the management of environmental risks (Thompson et al. 2003; Amick et al. 2015). However, not all educational efforts

produce the desired results (Gore et al. 2006; Gore et al. 2008; Baruch-Mordo et al. 2011). Several studies have highlighted the need to monitor outcomes and evaluate the effectiveness of bear education programs (Spencer et al. 2007; Gore et al. 2008; Baruch-Mordo et al. 2011). Evaluation of the effectiveness of bear safety education in Churchill is particularly pertinent given that the 2015 workshop showed that there had been few changes in human behaviour since the efforts to increase education were undertaken. This is further underscored by the fact that the Polar Bear Safety and Awareness sessions – the most decisive educational efforts– have had chronically poor attendance, which suggests that these sessions are likely falling short of their intended goals.

#### **3.4.3 Increased hazing and patrols**

Wildlife management agencies often choose to implement management actions that are the least politically costly (Mattson and Craighead 1994; Clark and Slocombe 2011; Clark et al. 2014). For Manitoba Conservation, increased hazing and patrols were the least controversial and the easiest solution to enact within the existing management system. Intercepting polar bears through patrols involved merely changing the intensity of routine procedures since both hazing and patrols were already standard practice within the daily operations of the PBA program. This solution was convenient, required minimal amounts of energy to implement, and maximized agency control over the situation (Yaffee 1997). Moreover, these management actions had already proven effective in the past. Because this solution did not involve taking action against people or require the cooperation of other

management agencies, it was easy for Manitoba Conservation to implement quickly and with minimal effort.

Manitoba Conservations' decision to increase hazing and patrols also served to reinforce the legitimacy of the PBA program. Since Manitoba Conservation is responsible for keeping the community safe from polar bears, it was necessary to demonstrate a decisive management response to the incident. A response that targeted polar bears rather than humans was the least likely to be controversial. In the managerial focus group, participants noted the pressure they felt to "get ahead of the rumours" in order to meet what managers perceived to be public expectations. Mattson and Clark (2012) found that solutions that promoted increased agency control also supported the premise of agency authority and responsibility, a finding that appears to be true in this situation as well. Hence, the decision to increase hazing and patrols was as much driven by a desire to actually prevent future incidents as it was about saving face and maintaining the credibility of the PBA program.

With this analysis, we do not intend to imply that increased hazing and patrols were not an effective management solution. One manager described the rationale for increased hazing: "I had observed for the last couple years that we are getting as many – or more calls – in town as we ever have, yet we are handling fewer bears" (B2). Managers felt that because they had been deterring fewer polar bears on the outskirts of town, more bears were able to enter the community. Ultimately increased efforts to keep people and polar bears apart are likely to help reduce the risk of future incidents, especially because PBA personnel are highly committed to

their jobs and take the PBA mandate –to keep people safe from polar bears – very seriously. However, the highly control focused and reactive nature of this management response offers few long-term solutions to polar bear-human conflicts. Furthermore, because it is reliant on the availability of funding and dependent on supervisors that view it as a necessary management action, this solution is likely a short-term action vulnerable to institutional pressures and constraints, no matter the intentions of local personnel (Yaffee 1997; Ascher 2001). Overall, it remains to be seen if this management response is the outcome of what Ascher (2001) describes as “perverse learning” that occurs when management actions are more convenient than valid.

#### **3.4.4 High-risk solutions**

A number of solutions suggested by participants did not translate into managerial responses. All of these solutions had one thing in common – they all involved topics that were controversial, or that would be difficult to carry out due to jurisdictional barriers and/or a lack of resources. For example, although improper garbage management was a prominent problem definition (identified by nine interview participants in 2014), there were no changes to garbage management in response to the incident. One reason for this may be that garbage management is primarily the responsibility of the Town of Churchill. Therefore, criticisms of the existing garbage management system by other agencies had the potential to jeopardize working relationships between managers. As one manager noted, garbage management was clearly a sensitive issue: “when it comes to garbage there's more finger pointing than there is action on the ground and that's frustrating” (B5). Similarly, problems

such as fragmented management responsibilities (i.e. lack of coordination between agencies) would have required significant changes in existing management arrangements to address.

### **3.4.5 Community Responses**

Although responses by community members varied, risk-taking by outsiders was the most widely accepted problem definition. The focus on outsiders as the problem was consistent with the strong insider/outsider dynamic that characterizes social relationships in the Churchill community and remote northern communities in general. Attributing polar bear-human conflicts to outsiders functioned to affirm local knowledge about and savvy for coping with polar bears. At the same time, blaming outsiders also disassociated locals from the problem and thus allowed them to continue to behave as they had prior to the incident. Participants in the 2015 workshop noted that residents' risk perceptions seem to have been only temporarily heightened following the incident, and two years after the incident, most residents had reverted back to their routine behaviours. This cyclical pattern of heightened risk follow by a complacent attitude is not new in Churchill (Kearney 1989; Struzik 2014). As Kearney (1989: 85), a provincial manager with extensive polar bear experience, pointed out: "unfortunately it seems to require a serious incident for residents to recognize or remember the dangers of polar bears..."

Overall, most community members showed a relatively high level of support for management responses – particularly with regard to efforts to implement better polar bear safety education. This suggests that swift responses by management agencies had successfully reaffirmed stakeholders' trust in agency responsiveness

(Siemer et al. 2010). Despite overall satisfaction with the efforts of the PBA program, some participants were critical of what they felt to be the reactive nature of management solutions. One long-term resident pointed out that solutions such as increased hazing focused on dealing with polar bears who had already entered the community rather than on preventing polar bears from entering the community in the first place: “Well I just laugh at Resources [Manitoba Conservation], because they are.... running around with their heads cut off but they are not doing anything to implement anything to make it safer!” (B9).

Many participants felt that future bear attacks were inevitable regardless of preventative efforts. While discussing the 2013 mauling one resident noted: “Shit happens, no matter what in our life, shit happens. I can walk right outside our door right here and I can get hit by a vehicle.... unfortunately things happen in our lives. People die, bears die, people get injured, bears get injured – we just have to accept what it is” (A1). This statement is indicative of the fatalistic attitude shared by many Churchill residents – and also by some managers – with regard to polar bear-human conflicts. Interestingly, fatalistic comments about the inevitability of a polar bear attack predated the incident – they are equally prominent in both the 2013 and 2014 data sets. This suggests that fatalism was likely not the result of scepticism over the effectiveness of management responses to the incident, but rather was symptomatic of a larger sense of powerlessness felt by Churchill residents. Kouabenan (1998) found that such fatalistic beliefs could incite increases in risk-taking behaviour, which may explain why many Churchill residents seemed unconcerned about the risks posed by polar bears and neglected taking precautions.



It is worth noting that fatalistic attitudes are not indicative of a social climate that is proactive about preventing risks (Kouabenan 1998). Hence, management solutions such as bear safety education – which require people to take responsibility for their own safety – might not be effective in the Churchill community.

This observation reveals something important about our assumptions as researchers in this study. In our analysis of this incident, we assume that Churchill residents would want to see the systemic drivers of polar bear-human conflicts addressed. However, what we as researchers interpret as fatalistic attitudes – and therefore as potentially problematic – may be understood very differently by Churchill residents. As Kouabenan (1998) points out, cultural values, beliefs and worldviews influence risk perceptions, and Churchill residents may well frame fatalistic responses more positively – as indicative of their ability to accept the risks associated with living around polar bears or as their ability to recognize that some problems are simply unsolvable. Within this framing, Churchill residents may be quite satisfied with existing efforts by management agencies to prevent future polar bear-related incidents. Conversely, Churchill residents may want to see improvements to management actions and fatalistic attitudes may arise from the belief that the magnitude of systemic problems is such that nothing could possibly be done to resolve them.

### **3.5 Conclusions**

This research revealed trends in agency and community responses to polar bear-inflicted human injury and examined which solutions were implemented following an incident of human-wildlife conflict. The Polar Bear Alert Program is often

considered the most intensive and effective program for preventing and mitigating polar bear-human conflicts in the Arctic (Derocher et al. 2013). However, even with such a well-developed bear-human conflict management system the underlying drivers of polar bear-human conflicts in Churchill remained difficult to address – let alone ameliorate. One reason for this is that agency responses to the 2013 incident focused as much on appeasing public expectations and asserting managerial authority and control as they did on actually solving the problem. The problem definitions that gained traction among both residents and managers shaped what management actions were considered acceptable and necessary. Solutions that were implemented addressed proximate drivers of conflicts, focused on immediate concerns, were uncontroversial, and were relatively easy to implement –because they did not require any changes to the existing management system.

Our findings also highlight some barriers to implementing effective solutions to systemic problems that drive conflicts with large carnivores. Specifically, we suggest that agency responses to wildlife related incidents, regardless of whether they align with public expectations, should be carefully evaluated to determine if they actually offer “adequate” solutions. Although other studies have focused on evaluating agency responses to specific human wildlife conflicts (see Cromley 2000; Clark and Rutherford 2005; Mattson and Clark 2014; Clark et al. 2014; Vernon et al. 2015) this study differs in its attempt to evaluate whether responses can actually prevent future polar bear-human conflicts from occurring. Although our analysis is highly context specific, many of the systemic drivers of polar bear-human conflicts (particularly those related to human behaviour), and responses to them discussed

here, are widely applicable to the management of human-wildlife conflicts across the globe. For example, risk-taking due to alcohol consumption appeared to be a factor in a highly publicized polar bear attack caught on video in Chukotka, Russia in 2011 ([http://www.huffingtonpost.com/2011/09/09/polar-bear-attack\\_n\\_955728.html](http://www.huffingtonpost.com/2011/09/09/polar-bear-attack_n_955728.html)). Similarly, in their analysis of community tolerance for tigers in Bangladesh, Inskip et al. (2016) found that community members also failed to take precautions against tigers because they held fatalistic beliefs about the risk of being attacked.

Further research is required to determine exactly how adequate solutions for polar bear-human conflicts are defined by the Churchill community – whether this means addressing substantive systemic problems or merely continuing with short-term, proximate responses. Ultimately, Churchill community members are the ones who must be allowed to determine if solutions are deemed adequate/ sufficient or if more needs to be done. That said, it is easy for us as researchers to analyse management responses and identify shortcoming in existing approaches. We wish to be very clear that we are neither critiquing for its' own sake, nor making moral judgments about any individual or institutional actions. We are both acutely aware of the challenges of coexisting with bears in remote locales and taking responsibility for others' safety in such circumstances: the first author has worked for seven seasons as a grizzly bear viewing guide, and the second author was formerly a national park warden who served for three years in Churchill. Given this collective standpoint we offer our findings and conclusions with the explicit intent of assisting

the on-going efforts of managers and community members in our study area and elsewhere to improve human safety and conservation outcomes in their daily lives.

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## **PREFACE TO CHAPTER 4 – LOCAL EXPERTS’ OBSERVATIONS, INTERPRETATIONS, AND RESPONSES TO POLAR BEAR-HUMAN INTERACTIONS IN CHURCHILL, MANITOBA**

A great deal of knowledge about what strategies work for preventing or mitigating polar bear-human conflicts lies with local experts, yet this knowledge remains relatively undocumented. This research attempted to understand how a person’s knowledge and perceptions of bears shapes their responses during on-the-ground interactions. This chapter increases understandings of human-related factors that shape the outcomes of bear-human interactions and demonstrates the need to develop more complex models for understanding what motivates and influences human behaviours and responses towards bears.

Whereas the previous chapter examined agency and community responses to polar bear-human conflicts, this chapter examines the knowledge and perceptions that inform individual strategies for responding to polar bears during an interaction. This chapter addresses the third objective of this thesis: to document local knowledge of polar bear behaviour; clarify perceptions and interpretations of polar bears; and examine the linkage between knowledge, perceptions, and actions.

This chapter will be submitted to *Arctic* as Schmidt, A. L., Clark, D. A., and Loring, P. A. Local Experts’ Observations, Interpretations, and Responses to Polar Bear-Human Interactions in Churchill Manitoba. In this chapter, ALS, DAC and PAL conceived the original idea. ALS collected all the field data and conducted the analysis. PAL assisted with development of the theoretical framework. ALS wrote the first draft and DAC and PAL provided comments.

## **CHAPTER 4 – LOCAL EXPERTS' OBSERVATIONS, INTERPRETATIONS, AND RESPONSES TO POLAR BEAR-HUMAN INTERACTIONS IN CHURCHILL, MANITOBA**

**Abstract:** As communities across the Arctic have reported increases in polar bear-human interactions and conflicts there is a pressing need to develop better understandings of how to mitigate and prevent these conflicts. A great deal of knowledge about what strategies work for preventing or mitigating polar bear-human conflicts lies with local experts, yet this knowledge remains relatively inaccessible and largely ignored by contemporary resource managers. This study had three main aims: to document and synthesize local knowledge of polar bear behaviour; to characterize perceptions and interpretations of polar bears; and to examine the linkage between local experts' knowledge, perceptions, and actions. We found human interpretations of polar bear behaviour in this study were generally consistent with those documented in other settings. Our findings also demonstrate that differences in perspectives on the predictability of polar bear behaviour and in interpretations of the nature of bears significantly influence strategies for responding to bears. Human-related factors are extraordinarily complex and there is a need to develop richer models for understanding what motivates and influences human behaviours and responses towards bears.

### **4.1 Introduction**

Communities across the Canadian Arctic have reported increases in polar bear-human interactions and conflicts (Jonkel 1970; Dowsley and Wenzel 2008; Tyrell 2009; Lemelin et al. 2010; Boisen 2014; Ewins et al. 2016). As polar bear-human

interactions have increased, so too has the need to identify best practices for reducing and mitigating polar bear-human conflicts (Boisen 2014; Ewins et al. 2016; Matt 2009; Clark et al. 2012). Existing literature on polar bear-human conflicts has emphasized bear behavior and biological context, but significant knowledge gaps remain regarding how humans perceive and respond to these interactions (Clark, et al. 2012; Vongraven and Peacock 2011; Clark 2003; Ovsyanikov 1996). In 2009, the IUCN's Polar Bear Specialist Group passed a resolution resolving, "all Signatory Nations to the Agreement on Conservation of Polar Bears should make immediate use of all available information, methods and means, in order to minimize detrimental interactions between polar bears and humans" (Res#5-2009).

A great deal of knowledge about what strategies work for preventing or mitigating polar bear-human conflicts lies with local experts. Northern residents are able to observe polar bear behaviour for extended periods of time and have rich "front-line" knowledge of interacting with polar bears (Voorhees et al. 2014; Inuvialuit Joint Secretariat 2015; Keith et al. 2005; Ewins et al. 2016). Yet, this knowledge is rarely synthesized and communicated to broader audiences.

Polar bear-human interactions are a complex challenge that encompasses diverse social, cultural, emotional, physical, and behavioural factors, many of which are difficult to quantify. Qualitative research provides an important opportunity to gain deeper insights into northerner's strategies for responding to and avoiding conflict with bears, as well as, the practical interpretations of bear behaviour that inform these strategies (Clark and Slocombe 2009; Lemelin et al. 2010; Voorhees et

al. 2014).

This study had three main aims: 1) to document local knowledge of polar bear behaviour, 2) to clarify local perceptions and interpretations of polar bears, and 3) to examine the linkage between what people know about bears, how they perceive them as agents, and how they craft their own responses. Specific research questions are:

Question 1: What do local people know (or claim to know) about polar bears and their interactions with humans in Churchill, Manitoba?

Question 2: What are individual strategies for responding to and avoiding conflicts with polar bears? What interpretations of polar bear behaviour inform these strategies?

The term 'local' is contested and has been used in many different ways (Taylor and de Loë 2012). Here, we use the term broadly to include both long-term residents of Churchill, and people who do not live in Churchill year-round but have considerable seasonal experience working with polar bears. We recognize that our definition of local is not consistent with the way most Churchill residents would use the term. For Churchill residents, the term local tends to be used only to refer to long-term residents. Furthermore, being local there is associated with a specific social standing that is often— but not always— attained by demonstrating prowess in on-the-land settings.

This study differs from most other local and traditional ecological knowledge studies about polar bears in its exclusive focus on what participants know about how polar bears interact with people and how that knowledge guides their actions in real situations. Unlike other such studies of polar bears we did not seek to chronicle observations of distribution and abundance, or on polar bear feeding and denning behaviour, nor did we seek to understand how these may be affected by climate change. Those topics are dealt with extensively by other authors (e.g. Voorhees et al. 2014; Inuvialuit Joint Secretariat. 2015; Lemelin et al. 2010; Tyrrell 2006; Dowsley 2007; Dowsley and Wenzel 2008; Keith et al. 2005; Henri et al. 2010). Vanderwilde et al

## **4.2 Methods**

### **4.2.1 Study Area**

Churchill, Manitoba is located approximately 1500km north of Winnipeg, on the southwest coast of the Hudson Bay, and has a population of approximately 899 people (Statistics Canada 2017). Compared to most other communities that routinely experience polar bear-human interactions in northern Canada, Churchill quite culturally heterogeneous. The community is made up of both non-Indigenous and Indigenous peoples including members of the Caribou Inuit, Sayisi-Dene, Swampy Cree, and Métis (Brandson 2012). The Churchill region is also home to the Western Hudson Bay polar bear population that annually spends approximately 4-5 months (typically between early July and early December) on shore (Stirling et al. 1977). During this time, polar bears are regularly seen in and around the

community, and various types of polar bear-human interactions are commonplace (Stirling et al. 1977; Struzik 2014).

For several reasons polar bear-human interactions in the Churchill area are unique. Polar bear hunting for sport or by indigenous people has been prohibited in Manitoba since 1954, and Churchill has a broadly developed polar bear-viewing industry (Struzik 2014). Dawson et al. (2010) estimated that between 6000-10,000 tourists travel to the community each year to view polar bears. As a result, a significant number of people in Churchill have developed their knowledge of polar bears through their experiences as polar bear viewing guides and polar bear safety monitors. While some polar bear viewing guides are long-term residents of Churchill, increasingly guides come to the region only seasonally for the busy part of the polar bear season (in the late fall and early winter). Seasonal guides vary in levels of expertise and training, with some having little specific prior experience with polar bears, and others having significant experience working with polar bears in other contexts (e.g. Svalbard) or with working with grizzly bears. Currently, most polar bear viewing in the Churchill area takes place from Tundra vehicles, although some on-the-ground interactions do occur (Herrero and Herrero 1997).

The Polar Bear Alert Program manages polar bear-human interactions in and around the community (Struzik 2014; Towns et al. 2009). Established in 1969 and coordinated by Manitoba Conservation, the Polar Bear Alert Program (hereafter referred to as the PBA Program) has a mandate to protect Churchill residents from polar bears and polar bears from people. The PBA Program consists of patrols that deter, capture, or destroy polar bears that venture into the town and many problem



bears are detected through a telephone hotline (Kearney 1989). Although conservation officers and resource management technicians are responsible for the daily operation of the PBA program, levels of experience with polar bears has varied significantly across personnel.

#### **4.2.2 Research Design**

This research process focused on building relationships and trust with the Churchill community. The first author (ALS) spent approximately 7 1/2 months in the community over four field visits, between 2013 and 2015. During these visits, ALS lived in town and was actively engaged in community activities and events. This enabled ALS to develop a strong rapport with research participants, many of whom expressed their support for this research topic and its methods. The second author (DAC) lived in Churchill from 1997-2000 and first began research there in 1992. Our research design was iterative and evolved over the course of the data collection based on input from participants. Data were collected under the authorization of the University of Saskatchewan Behavioural Research Ethics Board, protocol number: BEH 13-143.

#### **4.2.3 Data Collection**

Data collection methods for this study included 37 semi-structured interviews, three focus groups, (n = 12) and two talking circles (n =12). . However, the interview questions covered a broad range of topics and not all participants discussed bear behaviour. As a result, only data from a specific subset of interviews that contained explicit descriptions of bear behaviour are discussed here. Semi-structured interviews were chosen because they are informal, conversational, and have

effectively documented information about bear-human interactions in other settings (Huntington 1998; Clark and Slocombe 2009; Voorhees et al. 2014). Interviews were held in settings of the participant's choosing and ranged between 30 minutes to two hours (with the average being about 1 hour). All interviews were audio-recorded with participant's consent. Interview questions covered a board range of topics including participants' experiences with and perceptions of polar bears, the history of polar bear management in the community, and perceived challenges to polar bear management. Interview questions were refined based on a pilot-test and consultations with interview participants.

In this study, we sought to elicit the knowledge of a specific group of people who have extensive experience working with polar bears. Participants in this study included both traditional knowledge holders and local knowledge holders. We recognize that as differentiated by many authors, local knowledge lacks the cultural and historical continuity of traditional knowledge (Olsson and Folke 2001). However, our intent was not to compare, contrast, or even necessarily distinguish these different types of knowledge. Instead, we focus on expert understandings of polar bears and knowledge of how to respond to bears that traditional and local knowledge holders alike have developed over extended periods of observation and experience (Fazey et al. 2006). Expert knowledge is developed when individuals receive direct feedback from their actions (Fazey et al. 2006). Northern residents regularly put into practice their knowledge of polar bear behaviour to inform and guide their responses to bears during interactions. Hence, local experts receive

direct feedback from polar bears based on their ability to accurately and effectively understand and respond to certain behaviours.

#### **4.2.4 Analysis and Validation**

We analysed the text of the transcripts of all interviews using NVIVO Mac v.10 qualitative data analysis software. We used an inductive thematic coding approach that produced the conceptual framework by which we answered the research questions (Braun and Clarke 2006). In-depth observations and interpretations of polar bear behaviour were an unanticipated finding in this study and not one the authors initially set out identify. Hence, observations and interpretations of bear behaviour were categories that became apparent as the data were coded to answer other research questions. Interview transcripts were returned to participants for their records. Interviews were conducted over several years, and some local experts were interviewed more than once. This iteration created multiple opportunities to refine and validate interviewee's contributions. In addition, a workshop and a public presentation to community members in October 2015 allowed participants to respond to interpretations and to clarify any unexplained details in the findings. Furthermore, themes identified in the analysis were discussed with participants to ensure that they accurately reflected the participants' knowledge and intent (Wilson 2008).

#### **4.3 Results**

The results discussed in this section emerged during the thematic analysis of the larger data set obtained through the various methods noted above. Our analysis was guided by a particular subset of research questions and focused only a specific

subset of interviewees who discussed polar bear behaviour in detail. Interviews with participants who had not worked closely with polar bears did not provide the same level of detail in observations of polar bear behaviour and were thus not included in the study. As we expected, we found that interview data were the most detailed amongst people who had multi-decadal experience working with polar bears. Most of these participants had diverse experiences with polar bears that had been gained through multiple different roles as conservation officers, polar bear viewing guides, polar bear monitors, or in other on-the-land settings (e.g. photographer, researcher). The majority of the subset of interviewees (n =13 out of 17) were long-term residents who had lived in Churchill for more than 20 years. The remaining participants (n =4) either worked in management agencies or were seasonal polar bear viewing guides.

#### **4.3.1 Observed Polar Bear Behaviours during Interactions with Humans**

Participants gave detailed observations of specific behaviours that polar bears displayed during interactions with humans. Predominantly these observations focused on specific polar bear movements and body language that participants interpreted as aggressive behaviour. These included various head movements, changes in the position of the ears, changes in the orientation of the body, as well as, changes in gait, shifts in eye contact, and vocalizations (see Table 4.1 and Figure 4.1).

**Table 4.1 Aggressive polar bear behaviours observed during interactions with humans, as described by study participants in Churchill, Manitoba (2013-2014).**

Observed behaviours	Supporting quotations
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**Head position**

"I let them come, get to be that close, but I watch the behaviour, if they start to duck their head down; they're coming into tackle mode." (A1)

"Is his head coming down, are his ears going back, are his shoulders humping up? (A8)

"But if you are with them and they are walking around you or sniffing the air and then they are walking and they got their head down, that's not a good sign - head down. That means that they're looking do some predating or are ready for some kind of action.... I mean you know, there are many postures that are danger." (A20)

"And it's like they are coming, and it's head low and he's stalking." (A2)

"The next one is the mouthing and the head swaying. They do head sway. You know, low head. I always call that "the bull", because now the bulls' got his head down. And guess what the next step is? He's going to come at you. Unless someone changes his behaviour." (A7)

"More so their head behaviour, if they've got their head really down that's kind of more of a charging behaviour, you can pick that out." (A9)

"If you see a bear come forward with one of its front feet and drop its head. That means that it's coming. It may be a bluff charge, but it's coming" (A3)

**Posture and gait**

"I always look at the bear's posture, are his back legs coiled and ready to push, and go.... and then you get the head low or that stiff legged gait were they start walking sideways and they are looking at you, like you know (raising middle figure gesture)" (A8)

"And then he's coming, from that plodding along the coast to like - it's hard to describe, but they position every foot" (A2)

**Vocalizations**

Interviewer: "Do polar bears bluff charge?" Participant: "Oh yeah, yeah, yeah. They start snapping their jaws and they come, you can tell that. You can tell that." (B16)

"I heard this, I thought is was Teals [ducks], this sort of jet light sound, and I thought it was these small ducks, they make a noise when they fly....that sound was a warning, he had hissed at me." (B11)

"He will stomp his feet, he will hiss, he'll jaw pop and stuff like that." (A8)

"He had his both front paws facing me, he turned his head sideways and shook his head back and forth and then (making a hissing sound), and I just went, oh shit!" (A1)

"A lot of times they will sway their head, their lips will flare, they will lick their lips, they'll clack their jaws, those are all signs that they are displaced, agitated, you're too close" (A3)

**Ear movements**

"As soon as he rolls those ears back and he's coming after you" (B16)

"When the ears go back, it's time to look out, you know, something bad is about to happen" (B3)

"I touched of a shot and that shattered rock blew back and it hit him in the

	face and he stopped and he took a couple steps back, and his ears went right flat like it pissed him off" (A2)
<b>Eye movements</b>	"I kept saying NO, and he'd lift his head, he'd look at me, he'd turn sideways and he'd look out the side of his eye" (A1)
	"And then, like BOOM! His head comes up and he's just staring at me. And then he's coming" (A2)

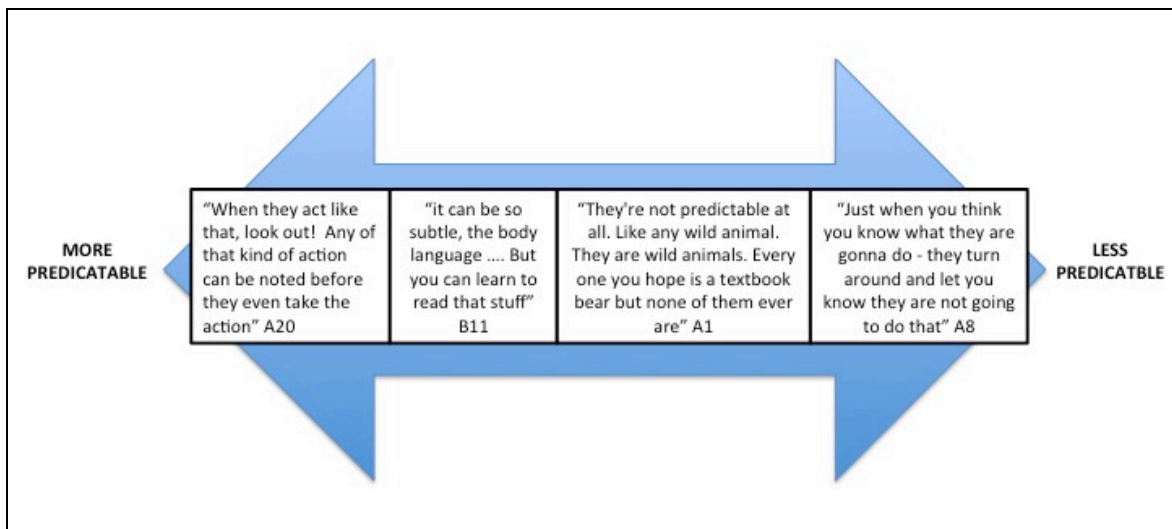
As Table 4.1 shows, there was a high level of consistency in the behaviours that participants identified, as well as in their interpretations of what these behaviours meant. When participants gave detailed descriptions of body language they almost always did so in the context of a story about a specific encounter. This indicates that participants recognized that polar bear behaviours are highly dynamic and interpretations of their meaning are extremely context dependent. Participants were also quick to point out that a specific behaviour could not be accurately interpreted by itself. As one participant noted: "I don't think it's something [where] you can just say: 'oh yeah, if the bear's ears go back it means that he's going to attack you.' Because it doesn't always mean he's gonna attack you" (B11). Furthermore, several participants noted that the complex and nuanced nature of polar bear behaviour was difficult to describe accurately.



**Figure 4.1** These two remote camera photos illustrate the transition to the low head and ears back behaviour described by study participants in Table 4.1.

### 4.3.2 Polar Bear Behaviour as a Spectrum of Predictability

Participants discussed their ability to recognize specific polar bear behaviours and to make inferences about how a polar bear was going to respond to them during an interaction. However, the level of certainty with which participants' felt they could understand polar bear body language and subsequently predict their behaviour varied significantly between participants. Some participants were confident that polar bear behaviour was recognizable and therefore predictable: "you can communicate with bears, bears can communicate with you, even with two different languages, they can read you, and you can read them" (B1). On the other hand, other participants were adamant that polar bear behaviour could never be fully anticipated. We found that interpretations of the predictability of polar bear behaviour seemed to exist along a continuum (Figure 4.2).



**Figure 4.2. The range of perspectives from study participants on whether polar bear behaviour is predictable or not predictable in Churchill, Manitoba (2013-2014)**

None of the participants suggested that polar bear behaviour as completely predictable or impossible to predict; rather, interpretations of predictability existed



along a gradient between extremes, ranging from more predictable to less predictable (Figure 4.2). For example, participants who were confident in their ability to predict polar bear behaviour noted that they would not be as precise at anticipating the behaviour of young bears or of bears that were unknown to them. Similarly, participants on other end of the spectrum still made inferences about how polar bears were going to behave based on interpretations of their body language.

Participants who viewed polar bears as unpredictable were often critical of people whose interpretations fell at the opposite end of the continuum. As one long-term bear-viewing guide noted: “You get a lot of people and their dogs [that] say: yeah I know bears, and yeah, I can tell what a bear is going to do. And I say to that: bullshit. I still don't know. I still have a lot to learn” (A1). Similarly, participants who considered polar bear behaviour to be predictable often suggested that people who did not share this interpretation had not been observant enough to properly learn polar bear behaviour. As one participant explained, “all you have to do is pay attention to the bears and you could be doing something like this” (A3).

#### **4.3.3 The Abilities of Polar Bears**

In addition to making observations about polar bear behaviour, participants also spoke about the abilities of polar bears. Participants most frequently commented on the intelligence of polar bears. As one participant noted, “they don't miss a trick... they know everything that is going on”(A1). Several participants pointed out that polar bears have the ability to recognize specific individuals (and situations) and to learn from their prior experiences: “they don't forget, they learn from their mistakes” (A13). Some participants noted that polar bears in the Churchill area have

come to associate PBA personnel and their trucks with negative stimuli such as cracker shells and to avoid them as a result. One participant noted that the practice of hazing bears who entered the Churchill community taught bears to avoid specific people rather than to develop negative associations with this particular behaviour:

“they [PBA personnel] do not create a negative association with what the bear is doing - they create a negative association with the people managing the situation. So then bears just run away because a certain person shows up or they recognize a truck. So then they just avoid the truck “(A12).

Participants also pointed out that most polar bears were quick to learn from negative experiences with polar bear traps or electric fences, and that they rarely made the same mistake twice. The capacity to plan was another ability identified by participants who noted that polar bears tend to think about and be deliberate in their actions. Participants observed that polar bears are aware of and attentive to patterns in human behaviour and make “calculated” decisions when responding to humans: “I think they are methodical in what they do. They plan things out, I think, before they launch into things” (A8). Finally, two participants also described polar bears as having the ability to read human emotions and intentions: “They feel the fear or the aggressivity that a person has.” (B1).

#### **4.3.4 Strategies for Interacting with Polar Bears**

Participants often described their individual strategies for responding to polar bears during on-the-ground interactions (Table 2). Some participants emphasized that avoiding on-the-ground encounters was the most effective way to prevent conflicts with polar bears. However, others felt that face-to-face encounters could be safe as long as humans responded to polar bears in the correct ways.

For some participants, this meant not showing fear and not retreating from a polar bear during an encounter. These participants gave detailed descriptions of how they used displays of confidence to deter polar bears who were approaching them. One participant described running towards the bear: “I ran between the people and the bear, in which case, just that show of confidence and the bear deflected and ran” (A2). Another pointed out that standing your ground and making aggressive movements towards the bear were effective tactics to make a bear reconsider its course of action: “I knew that he was trying to get me to turn around because they know that if they can get an animal to turn around it is much easier to take it down.... So I didn't turn around” (B11). Several participants also described discharging their firearms into the ground at the bear’s feet, although perspectives differed on whether this was an effective strategy or merely served to aggravate the bear.

Participants who felt that bear behaviour had a high degree of predictability were more likely to suggest that displays of confidence were an effective tool for averting conflicts with polar bears. As one participant, who spoke at length about his ability to read bear behaviour and subsequently anticipate how a bear was going to react, pointed out: “I don’t like backing down from bears, you just train them to be dominant” (A12). On the other hand, participants who perceived bear behaviour to be less predictable were much more likely to suggest avoidance as the best tactic for responding to polar bears. One such participant noted, “absolutely, I'll do anything to get out of the bear's way if I can” (A8). All participants emphasized the need to

stay vigilant, to anticipate where encounters with polar bears might take place, and to have a plan for how they should behave towards the bear during an interaction.

**Table 4.2 Strategies for responding to polar bears during an interaction**

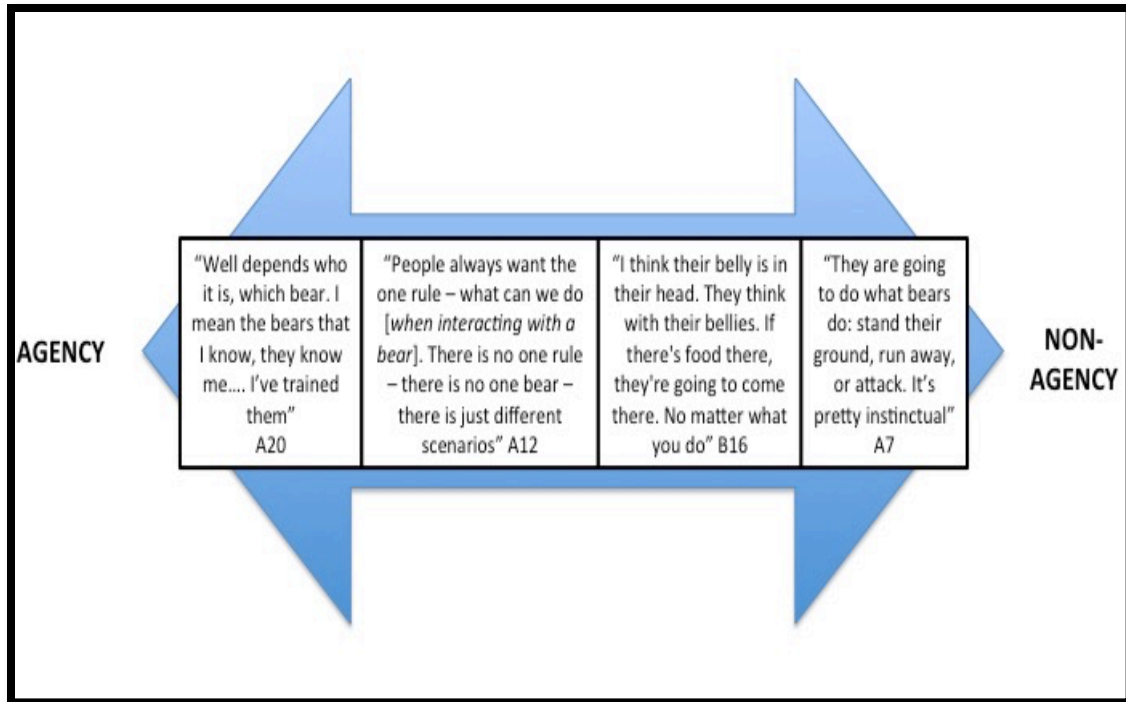
<i>Strategies for responding to polar bears</i>	<i>Supporting quotations</i>
<i>Barriers</i>	<p>“You use what is in your environment. And I do it with polar bears, with rocks. You just, you use these kind of blockages, that are not really any physical barriers but they are emotional barriers or psychological barriers for the bear “ (A12)</p> <p>“From the start don’t put yourself in a situation that is hugely disadvantageous. Being on top [high] is always a position of dominance so you don’t want to walk just below a hill where a bear could just pop up” (A12)</p>
<i>Scenario Planning</i>	<p>“It’s the reaction. And people have to think that through in terms of how you do it. It all depends on where you’re at: the distance level, the charging bear or whatever. How do I go around this rock quickly? How do I navigate through this? Or as you’re walking, what if I see a bear? What am I going to do?” (A18)</p> <p>“We have a plan that if I say ‘there’s a bear’ we are going to make for that vehicle over there, or we’re gonna get together as a group.” (A2)</p>
<i>Human behaviour</i>	<p>Participant: “Backing away is one of the things you shouldn’t do.” Interviewer: “Why not?” Participant: “Because you never know if they are going to keep coming towards you, because some bears are like that...Don’t turn your back on them.” (A17)</p> <p>“If you see them first then you can react and if you are in a close situation and you aren’t armed and you’ve got nothing to save your ass, basically drop jackets, hats, gloves...” (A1)</p> <p>“The safest thing to do is to let THE bear decide what is happening” (A7)</p> <p>“Give the bear a chance! If you are stuck in a spot where you have to scare the bear, or if he is approaching you, yeah. But if you can let him walk by, just let him walk by” (A9)</p> <p>“If I am in a situation where I have a group of people around what I do is, I become the aggressor and say it’s time for you [the bear] to move on” (A1)</p>

#### **4.3.5 Interpretations of Polar Bear Agency**

Finally, participants seemed to have differing interpretations of who or what polar bears are. Although not discussed explicitly in the interviews, these understandings were apparent in how participants talked about polar bears. We found that some participants emphasised the social role of polar bears in interactions with humans, while others spoke about them in more mechanistic terms. A range of interpretations of the nature of polar bears existed with some participants ascribing agency to polar bears while others did not (Figure 4.2).

Although most participants acknowledged that individual polar bears behave differently based on their unique personalities, those that spoke about polar bears as agents were critical of generalizations that depicted polar bears simply as predators: “They have a great intelligence, power – emotional power. They are not only a machine that can kill, that is a TV example” (B1). These participants felt that the “nature” of polar bears is often misunderstood or misrepresented. These participants were quick to point out that polar bears are generally highly tolerant of humans: “I think they are incredibly tolerant animals, I don't think that they are running around hunting people” (B11). Furthermore, these participants described polar bear-human interactions as social relationships between individual bears and individual people: “I know them and I have my own bears and they know my voice” (A20). These participants emphasised the need for people to tailor responses to each individual polar bear based on feedback they received from the bear. Participants also described polar bears as capable of making decisions about how to interact with humans, and emphasized that polar bears’ actions were based on the type of relationships they had developed with humans.

In contrast, other participants' spoke about polar bears primarily in biological and mechanistic terms, frequently describing bear behaviour as driven entirely by instinct. These participants highlighted that polar bears are predators by nature and are motivated by their impulses to hunt: "they are a predator, you always have to remember that" (B3). As one participant noted, polar bears make decisions during interactions with humans that are based on their instinct to survive: "whatever they are going to do is going to benefit them.... their survival instinct is so much stronger than ours" (A7). When participants spoke about polar bears in this manner, they often downplayed the social relationship between humans and polar bears: "I think a bear is just going to do what it wants to do. If we shoot a cracker shell into the air, are we making it go that way because it's scared of the cracker shell? Or is it going that way anyway?"(A13). This group of participants did not discuss their role in shaping polar bear behaviour, nor were they as likely to explicitly acknowledge that polar bears are capable of learning from their experiences with people. Finally, participants who spoke about polar bears as non-agents were more likely to make generalizations about them as a species, often making broad statements about how polar bears should or should not behave towards people: "Bears should not want to be around people. Period" (A7).



**Figure 4.3 The range of descriptions of polar bears as having agency or not having agency in their interactions with humans. As with interpretations of predictability, this figure is not intended to imply that any participant used the language of agency exclusively to describe polar bears or visa versa.**

Although observations of polar bear behaviour were highly consistent between participants, perspectives on the predictability of polar bear behaviour and on the nature of polar bears were not. As Figures 4.1 and 4.2 demonstrate, participants held a range of perspectives on whether polar bear behaviour is predictable and whether polar bears are agents in their interactions with humans. Although we found that participants who viewed bear behaviour as more predictable were also more likely to talk about them as agents, this correlation was not always clear. Furthermore, participants who viewed polar bear behaviour as less predictable were not more likely to describe polar bears as non-agents. Hence, we found that it was more accurate to present predictability and agency as separate continuums, rather than attempting to map these perspectives in a four-fold

typology. Finally, we also found that participants often held multiple different frames of reference depending on the circumstances they were describing. As a result, interpretations of the nature of polar bears did not appear to be fixed, with some participants describing them in mechanistic terms in some parts of the interview but as agents in others.

#### **4.4 Discussion**

Observations of polar bear behaviour towards people have been well-documented in other contexts (Fleck and Herrero 1988; Lemelin et al. 2010; Keith et al. 2005; Osnyanikov 1996; Voorhees et al. 2014; Schmidt and Dowsley 2010; Joint Secretariat 2015). We found that observations about aggressive behaviours made by participants in this study were remarkably consistent with those documented in previous studies (Fleck and Herrero 1988; Keith et al. 2005; Osnyanikov 1996). For example, in their analysis of polar bear-human conflicts, Fleck and Herrero (1988: 47) discuss a range of aggressive behaviours. These behaviours included huffing, jaw snapping, direct eye contact, a lowered head, ears back, and head swaying and are almost identical to the behaviours described by participants in this study (Table 4.1). To some degree this may have been because participants were aware of past works such as those by Fleck and Herrero; however, the extent to which earlier interpretations of bear behaviour informed those made by participants would be very difficult to determine. Furthermore, signs of aggression described by participants in this study— many of whom were non-Indigenous — were also consistent with those identified by Indigenous traditional knowledge holders. For example, Inuit hunters and elders in Gjoa Haven identified certain heads movements



displayed by polar bears during interactions with humans as threatening (see Keith et al 2005: 88). For the purposes of this paper we do not differentiate between TK and *Inuit Qaujimagatuqangit* (IQ), though we recognize this distinction (Wenzel 2004). The consistency between interpretations of polar bear behaviour in this study and previous ones both corroborates those TK-based observations about bear behaviour and demonstrates the significant knowledge of polar bear behaviour held by people in the Churchill region. It also suggests there is a relatively high degree of consistency in polar bears' responses to people across a large geographic area and multiple polar bear sub-populations.

Observations about polar bears' cognitive abilities have also been documented in traditional knowledge studies (Schmidt and Dowsley 2010; Joint Secretariat 2015; Voorhees et al. 2014; Keith et al. 2005). Much like participants in this study, Inuit and Inuvialuit acknowledge polar bears to be extremely intelligent and as having the capacity to plan (Schmidt and Dowsley 2010; Inuvialuit Joint Secretariat 2015). Furthermore, many TK holders believe that polar bears are able to read human thoughts, actions, and intentions (Voorhees et al. 2014; Schmidt and Dowsley 2010). This perspective seemed to be shared, at least in part, by some participants in our study. Strategies for responding to polar bears that focused on human body language during interactions indicated that some participants believed that polar bears could read human actions. Although none of the participants in this study described polar bears as being able to read human thoughts, two participants did make explicit references to polar bears as having the ability to understand not only human body language but also human emotions and intentions. The

observation that polar bears can “read” human emotions and intentions is often thought to be grounded in Indigenous worldviews (Voorhees et al. 2014; Schmidt and Dowsley 2010); however, both participants who commented on this ability in our study were non-Indigenous. Clark et al (2014) also found strong similarities between the perspectives of First Nations and non-Indigenous resources users with regard to the practical considerations of co-existing with grizzly bears. This suggests that to some extent experiential learning about bear behaviour may transcend cultural differences. That said, is it worth noting that knowledge about polar bears behaviour may also be acquired through verbal information (such as stories, conversations, etc.). Hence, the non-Indigenous participants who chose to use this particular interpretation of polar bear behaviour may be reproducing language used by their Indigenous colleagues or family members. More research is required to determine exactly how observations about polar bear’s abilities to read human emotions and intentions might translate across different knowledge systems.

#### **4.4.1 Implications for Practice**

Consistency in observations of polar bear behaviour indicates that northern residents have significant knowledge of polar bears and of how to interact with them. However, as Schmidt and Clark (Chapter two) identified, there is a tendency for local experts to disregard or demonize each other when their strategies for responding to polar bears do not match up. As a result, social conflict between different groups of people who work with polar bears may be a barrier to effective knowledge sharing about polar bear behaviour and about identifying effective strategies for preventing polar bear-human conflicts. This presents a significant loss

of opportunity for increasing understandings of polar bear-human interactions at a time when there is a pressing need for these insights. As our findings suggest, local experts have much accurate information about polar bear behaviour and about how to respond to polar bears during interactions. However, the effective and collaborative sharing of this information may be hindered by a lack of common ground between different groups of people who work with polar bears. Hence, one of the greatest challenges to gaining deeper understandings of polar bear-human interactions may lie in creating a forum in which the potential merit of all approaches are considered, even if they appear unorthodox or unconventional.

Furthermore, among both managers and Churchill residents there is a tendency to consider polar bear-human interactions in Churchill as unique from those in other communities. As one manager noted, “a lot of people say the bears here are very different, you know, they are not the same as other bears, so what works in Iqaluit isn't going to work here” (B4). As a result, there is generally a sense that polar bear-human interactions in Churchill require different responses (i.e. different strategies of mitigating conflicts, different educational materials, etc.) from those applied in other communities. Yet, our study shows that observations of polar bear behaviour made by Churchill experts are consistent with those documented elsewhere. This suggests that specific polar bear behaviours towards people may not vary from place to place as much as managers and Churchill residents think, although their prevalence in different populations or regions may well differ (Clark et al. 2012). For example, in a subpopulation with extensive exposure to humans and anthropogenic foods over time, such as western Hudson Bay, a greater

proportion of the individual bears may exhibit habituation and food conditioning than elsewhere (Watts and Ratson 1989). As a result, insights into polar bear behaviour from the Churchill context are more applicable to other contexts than originally thought, and visa-versa. Currently, there is a great deal of variation between communities regarding conflict responses (Ewins et al. 2016). While it is important that responses are tailored to reflect specific community needs and expectations, exactly how polar bear behaviour varies between contexts – and why – should be a high priority for further study.

#### **4.4.2 Implications for Polar Bear Safety Training**

People in Churchill and elsewhere recognize the need for more training opportunities to better understand behavioural cues and to learn how to respond to polar bears during interactions (Matt 2010; Boisen 2014; Schmidt and Clark 2015, unpublished workshop proceedings). At the October 2015 problem-solving workshop in Churchill, participants proposed the development of standardized training for polar bear viewing guides and bear guards in the region (Schmidt and Clark 2015 unpublished workshop proceedings). They felt that training should draw on the substantial expertise of the people who work with polar bears in the Churchill area to ensure local relevance. In 2016, BearWise, the World Wildlife Fund, the Government of Nunavut, and the Nunavut Field Unit (Parks Canada) collaboratively developed The Polar Bear Guard Program. This two-day course has been run on two separate occasions in Churchill (in May and September, 2016). The course was designed specifically to address demands for more training in polar bear

behaviour for people working with bears in the Churchill area (Brady Highway, Parks Canada, pers. comm. 2016.).

Yet, exactly how people can be safely and effectively trained to understand and interpret polar bear behaviour remains relatively unclear. As our results demonstrate, people differ in perspectives on how to effectively understand and mitigate interactions. This makes both developing and implementing effective training programs challenging since people have very different ideas about what should be taught. Currently most training tends to concentrate more on teaching people to be competent with firearms and deterrents than on learning to identify specific behavioural cues given by polar bears and to react accordingly.

Furthermore, most training in behaviour (including the Polar Bear Guard Program) tends to take place in a classroom setting and uses photographs, videos, or stories to impart information about polar bear body language. As Zinn et al. (2008) noted, one of the shortcomings of this style of teaching is that learning takes place in a very different setting from where it will be applied. This is problematic since people who lack prior hands-on experience are more likely to have a reflexive response during a stressful situation than to respond based on what they have learned about wildlife behaviour from a classroom setting (Zinn et al. 2008). Hence, experience-based learning likely remains the most effective way to teach people to understand and respond to bear behaviour.

However, creating opportunities for people to learn about polar bear behaviour in a hands-on manner remains a challenge for a number of reasons. Logistical and liability concerns make it difficult to find places to observe and

interact with polar bears in on-the-ground settings. Despite these barriers, a number of potential venues for training have been identified. Boisen (2014) suggested using research compounds in Wapusk National Park to observe polar bear behaviour and facilitate knowledge sharing between circumpolar experts on polar bear behaviour. Similarly, polar bear viewing operations may be useful venues for training people to effectively identify and respond to bear behaviour since they consistently experience high numbers of bear-human interactions. Another potential method to facilitate safe and effective hands-on training in polar bear behaviour was suggested by participants in the October 2015 workshop in Churchill (Schmidt and Clark 2015 unpublished workshop proceedings). Workshop participants proposed a mentorship program that would pair mentors who have significant experience working with polar bears with less-experienced trainees. Although such a program would likely be effective, it would also be time consuming, costly, and would require buy-in from potential mentors and trainees as well as businesses and institutions. Given our results, this approach would also result in considerable variation in how the trainees learn and respond so there would be relatively low overall consistency among participants.

Furthermore, there is currently no broadly accepted method for evaluating who has the ability to effectively interpret polar bear behaviour, something that could make good mentors difficult to identify. As Fazey et al. (2006) note, recognizing people who have expert knowledge can be difficult since this kind of knowledge is built from a unique set of experiences and may only become apparent in particular practical or social situations. Currently long-term experience with

polar bears is accepted as the best indicator of expertise. However, an individual's capacity to develop expertise hinges on their ability to be effective learners just as much as it does on years of practice and observation (Fazey et al. 2006).

Furthermore, the divergent assumptions about bear predictability and agency, described earlier in the paper, also make it challenging to identify mentors. It is not clear which assumptions about bear predictability and agency makes people more effective at interpreting and responding to polar bear behaviour. This may explain why there was no strong sense of consensus among participants with regard to who the very top experts in Churchill are.

#### **4.4.3 Advancing Understandings of Bear-Human Interactions**

Currently the most comprehensive model for understanding the complex interplay of factors that influence bear-human interactions is Herrero et al.'s (2005), in which the outcomes of bear-human interactions are determined by situation-specific combinations of: 1. environmental factors, 2. bear-related factors, and 3. human behaviors/responses. To date, much of the research on bear-human interactions has focused on the first two of these elements to understand why bears react to humans in specific ways (e.g. Fleck and Herrero 1988; Herrero 1985; Jope 1983; Dyck 2006; Mattson, Blanchard, and Knight 1992; Gilbert 1989; Stenhouse, Lee, and Poole 1988; Gjertz and Persen 1987). That research has produced important insights into the difference between defensive and predatory behavior, and the role of habituation and food-conditioning in bear-human conflicts (Herrero 1985; Elfström et al. 2014; Herrero and Fleck 1990; Herrero et al. 2005; Smith et al. 2005). Habituation and food conditioning are particularly important in shaping how bears behave towards

humans. Hopkins et al. (2010: 157) define a food-conditioned bear as: “a bear that has learned to associate people (or the smell of people), human activities, human-use areas, or food storage receptacles with anthropogenic food.” Similarly, habituation is considered to be a learned behaviour: through repeated exposure to anthropocentric stimuli bears learn not to be wary of people (Hopkins et al. 2010). The concept of habituation was particularly central to the development of Herrero et al.’s (2005) model based on the observation that habituation identifies only one factor that influences how a bear responds to humans and that many other variables much be considered.

Human behaviours contributing to bear-human conflicts have also been assessed, particularly with regard to human activities leading to conflicts, the use of deterrents, and the person’s proximate behaviour towards the bear (e.g. acting non-submissive, playing dead, fighting back) (Fleck and Herrero 1988; Herrero and Herrero 1997; Osvyanikov 1996; Penteriani et al. 2016). It is important to note that assumptions about the agency of polar bears have driven research on bear-human interactions. These assumptions have significant implications for the findings of this research, yet they have rarely been made explicit.

People’s strategies for avoiding conflict with bears and the practical interpretations of bear behaviour that inform these strategies have received relatively little attention and have not been incorporated into management plans. As our results demonstrate, human- related factors are extraordinarily complex and there is a need to develop more complex models for understanding what motivates and influences human behaviours and responses towards bears. It is also important



that those who conduct the studies are explicit about their underlying assumptions about the agency of bears, and how this impacts study design, data collection and interpretation. Herrero et al.'s (2006) model for understanding bear-human interactions has provided good information about the proximate human factors that influence the outcomes of bear human interactions. While baseline information such as group size, human activities prior to conflicts, and the use deterrents, etc. is important; our findings demonstrate that a deeper understanding of what motivates people to behave in certain ways towards bears, and of what informs people's decision-making during interactions is necessary. Human behaviours and responses to bear-human interactions are influenced by multiple, inter-related factors, some of which include: 1) assumptions about who or what bears are; 2) perspectives on the knowability and predictability of bear behaviour; 3) individual understandings of specific situations; 4) role and identity, and the expectations that accompany these (Figure 4.3).

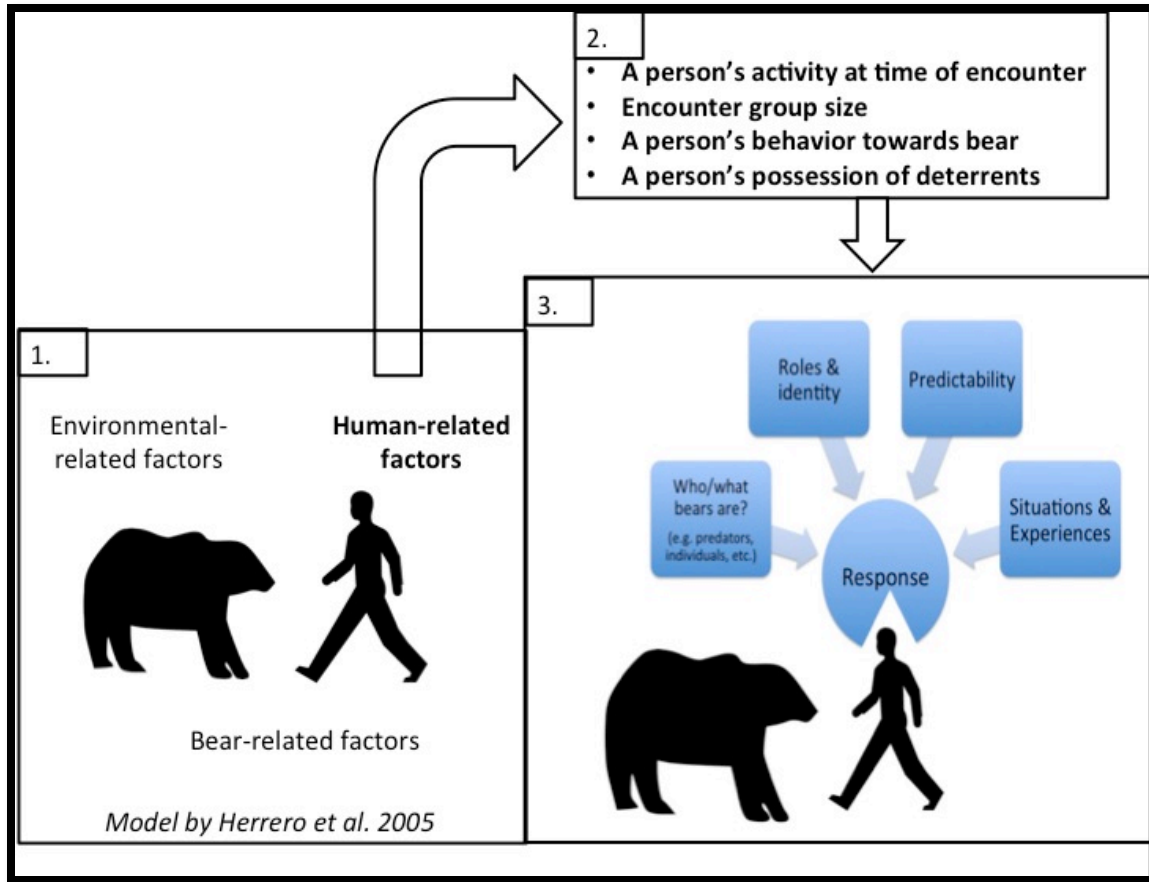


Figure 4.4 Section 1 shows the existing model for understanding human responses to bear-human interactions (Herrero et al. 2005). Section 2 shows the variables shaping human responses identified by Herrero et al. 2005. Section 3 shows the additional variables that influence human behaviours and responses identified in our research.

More research into the diverse drivers that influence human behaviours and responses is necessary if more comprehensive models of human response are to be built. Furthermore, future research on bear-human interactions will need to consider the contributions of the model presented here. As the field of bear-human interactions continues to evolve there needs to be a shift in focus from research that seeks to understand primarily bear-related factors (e.g. food conditioning, habituation, sex and gender, etc.) to more study of the human-related drivers. While Herrero et al.'s (2005) model provides a good basis for our understanding of bear-

human conflicts it does not capture the complexity of human responses. Future research on bear-human interactions should involve diverse methodological toolboxes that include both qualitative and quantitative methods and focus on human responses. Human responses to bear-human interactions encompass diverse social, cultural, emotional, physical, and behavioural factors that we have only begun to understand. A focus on advancing understandings of human responses to bear-human interactions will likely provide the greatest inroads in increasing knowledge of how to prevent or mitigate bear-human conflicts. This research is necessary and urgent as it has the potential to save the lives of both bears and people.

Our findings showed that differences in perspectives on the predictability of polar bear behaviour and on the nature of polar bears provide important insights into why people's strategies for interacting with polar bears can vary significantly. What participants believe to be predictable (and hence knowable) about polar bear behaviour shapes what they perceive to be 'best practices' for responding to bears. For example, participants who felt that polar bear behaviour was unpredictable were more likely to suggest avoiding or retreating from bears, whereas, those who felt polar bear behaviour was predictable spoke about using displays of confidence to deter bears. Participants' situation-specific expectations may explain differences in opinions on the predictability of polar bear behaviour. As Zinn et al. (2008) point out, individuals form expectations about their ability to behave effectively during an interaction as well as about the consequences of their behaviours towards wildlife. A person's level of confidence in their knowledge of polar behaviour and in their

ability to engineer positive outcomes during interactions can have a profound impact on how they respond to polar bears (Zinn et al. 2008). Hence, people with higher levels of confidence in their ability to respond to bears may view polar behaviour as more predictable compared to those with lower levels of confidence.

Our study shows that interpretations of polar bear behaviour and strategies for responding to them are grounded in broader ontological assumptions about who or what people think polar bears are. Those assumptions shape the kinds of relations (thoughts, actions, feelings) that people believe are possible to have with polar bears. Yet, exactly what informs these assumptions (i.e. peoples' worldviews, discourses, prior experiences, or learned behaviours) requires further study. Differences between Indigenous and non-Indigenous perspectives on bear-human relationships have been well-documented (Tyrrell 2009; Dowsley and Wenzel 2008; Schmidt and Dowsley 2010; van Daele et al. 2001; Clark and Slocombe 2009). Indigenous understandings of bear-human relationships tend to view bears as intelligent, sentient beings, capable of actively engaging in social relationships with humans (Brightman 1993; Dowsely and Wenzel, 2008; Schmidt and Dowsley, 2010). On the other hand, non-Indigenous understandings of bear-human relationships often characterize bears as purely biological animals, whose relationships with humans are not reciprocal. However, our findings suggest that differences in perspectives on polar bear-human relationships may vary significantly not only between cultural groups, as those authors found, but also within these groups. As other researchers have noted, knowledge and perspectives are not monolithic

within communities or cultural groups and can vary significantly from individual to individual (Davis and Wagner 2003).

#### **4.5 Conclusions**

The consistency between observations of polar bear behaviour identified in this study and other studies reinforces the substantial utility of documenting local knowledge of polar bear behaviour. The knowledge and expertise of people who regularly interact with polar bears is substantial, and documenting local strategies for responding to polar bears will likely be critical for ameliorating future polar-bear human conflicts.

As the Arctic continues to undergo rapid ecological and social change, scientific studies, including those on polar bear-human interactions, may well be unable to provide answers quickly enough to inform management responses (Derocher et al. 2013). Local experts already have well developed knowledge of polar bear behaviour and effective strategies of interacting with bears and this pragmatic knowledge can contribute significantly to informing effective management responses to polar bear-human interactions. Yet, as our results demonstrate, understandings of what the best strategies for responding to polar bears during an interaction are can vary significantly – even among people who work with polar bears routinely. This raises important questions such as: what is actually knowable and unknowable about polar bears and their interactions with people? What constitutes valuable knowledge about polar bear behaviour? And how can this knowledge be acquired? What implications does this have for the ways that we study and interpret the results from research on polar bears?

The need for better training and education for people on how to respond to and prevent conflicts with polar bears has been identified as a priority (Boisen 2014, Ewins et al. 2016). Yet exactly what strategies for responding to polar bears should inform this training needs to be clarified. As our results demonstrate local experts can have radically different strategies for responding to polar bears. Furthermore interpretations of what constitutes “safe” or “effective” responses to polar bears are may differ significantly between individuals and institutions (Chapter two).

Finally, our findings show that existing models for understanding bear-human interactions fail to adequately account for what motivates and influences human responses. As our findings demonstrate, differences in perspectives on the predictability of polar bear behaviour and in interpretations of who/what bears are may significantly influence strategies for responding to bears. Factors influencing human responses to polar bears are extremely complex and likely extend well beyond those identified here. Investigating those responses and the knowledge they are built upon may well provide the greatest return on research investment into this complex and increasingly urgent topic.

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## **CHAPTER 5: CONCLUSIONS: ADVANCING UNDERSTANDINGS OF HUMAN RESPONSES TO POLAR BEAR-HUMAN INTERACTIONS**

### **5.1 Dissertation Summary**

This dissertation examines how Churchill residents and managers make sense of polar bear-human interactions, and how they respond to them (as a community, as institutions, and as individuals). My dissertation research was guided by the following objectives: (1) identify and describe discourses about polar bear –human interactions and their management in Churchill, Manitoba; 2) examine how discourses inform understandings of polar bear-human interactions in the Churchill community; (3) document community and agency responses to bear-related crises in Churchill: describing what is said (about polar bears, about people, about the incidents) and what is done (changes in behaviours, changes in policies/practices); and (4) document local knowledge of polar bear behaviour; clarify perceptions and interpretations of polar bears; and examine the linkage between knowledge, perceptions, and actions.

The second chapter (first manuscript) documented how discourses informed people’s understandings of polar bear-human interactions in Churchill, Manitoba. This chapter used discourse analysis to show how study participants discursively create and impose boundaries onto the landscape that position people and polar bears into separate spaces. These boundaries and the processes by which they are produced can lead to social conflict when stakeholders disagree about the kinds of polar bear-human interactions that should occur within them. This chapter suggests that the discursive construction of boundaries empowers certain actors and

marginalizes others, and leads to violated expectations that drive social conflict over polar bear management. This is an important finding because it provides insights into how controversies over the management of polar bear-human interactions arise and how they may be reduced.

The third chapter (second manuscript) provided an opportunity to examine how the Churchill community and agencies respond when polar bears cross boundaries and come into conflict with humans. This chapter used incident analysis to examine trends in community and agency responses, and to evaluate their effectiveness. The findings in this chapter showed that management agencies responded well to errors in procedure but were unable to address more complex drivers of polar bear-human conflicts. For example, efforts to prevent future attacks tended to focus on the solutions that were easiest to implement (such as increased patrols and more public education) and did not address more complicated problems such as risk-taking due to alcohol consumption. The third chapter also revealed that community members had fatalistic attitudes towards polar bears, which may make them less likely to respond to educational efforts to reduce risk-taking behaviour around polar bears. This paper contributes to a greater understanding of many of the systemic drivers of bear-human conflicts (particularly those related to human behaviour). It also contributes to a deeper understanding of how agency responses tend to be overly reactive and oversimplified and are therefore limited in effectiveness.

The fourth chapter (third manuscript) examined what influences individual people's decisions about how to respond to polar bears during interactions. This

chapter had three main aims: 1) to document and synthesize local knowledge of polar bear behaviour; 2) to clarify local perceptions and interpretations of polar bears; and 3) to examine the linkage between what people know about bears, how they perceive them, and how they craft their own responses. I found interpretations of polar bear behaviour in this study were consistent with those documented in other settings. This suggests that there is a relatively high degree of consistency in polar bears' responses to people across a large geographic area. These findings also demonstrate that differences in perspectives on the predictability of polar bear behaviour and in interpretations of the nature of bears influence strategies for responding to bears. This chapter increases understandings of human-related factors that shape the outcomes of bear-human interactions and demonstrates the need to develop more complex models for understanding what motivates and influences human behaviours and responses towards bears.

## **5.2 Challenges**

Although the research objectives of this thesis were addressed, a number of challenges arose during the study. First, since this research is very context specific some of the findings may not easily be generalized to bear-human interactions in other or with other bear species. Churchill represents a unique context in several ways. Unlike many other communities in the Canadian north that experience polar bear-human interactions, Churchill is a culturally heterogeneous place. Community members with diverse cultural backgrounds are likely to understand polar bear-human interactions in much more varied ways than they would in a homogenous community. As Meek et al. (2011) point out, the nature of community-bear

relationships affects not only social organization within the community, but also influences how communities interact with governmental agencies. In Churchill, the primary community-bear relationship is polar bear-related tourism. As a result, what people in Churchill want from polar bears – and consequently how they interact with polar bears – is very different from the kinds of relationships and interactions that exist within communities that hunt polar bears.

Second, while research participants did represent a range of demographic backgrounds and experiences, I was not able to interview an equal number of Indigenous and non-Indigenous participants. Given that Churchill is made up of approximately 56% Indigenous and 44% non-Indigenous community members, the data I collected may not be fully representative of Indigenous perspectives on polar bear-human interactions in Churchill (Statistics Canada 2017). There are a number of reasons that made it difficult to get a more representative sample. As documented in other settings, Indigenous peoples often avoid talking about bears for cultural reasons (Clark and Slocombe 2009; Schmidt and Dowsley 2010). As a result, Indigenous participants may have been less likely to discuss their experiences with polar bears and this may have made them more difficult to identify as potential participants in this study. Furthermore, Churchill has a long history of colonialism so being non-Indigenous and an outsider in this context may have made it more difficult for me to establish trust with Indigenous participants.

Third, as with any qualitative research process the ways I identified my research questions, and how I interpreted the research findings, was influenced by my background, experiences, and ways of knowing the world. I came to this

research with my own preconceived ideas about polar bears, bear-human relationships, and bear management, and this significantly shaped how I interpreted my research findings. This limitation was mitigated to some extent by eliciting input from my research participants throughout the data collection and analysis phases. Despite the potential limitations inherent in my standpoint, my professional and personal background also enabled me to draw conclusions and understand aspects of this research in a manner that is unique. My background growing up in a small northern community helped me to build relationships with research participants in a substantive way. This in turn helped to collect rich qualitative data. Similarly, my knowledge of bear behaviour enabled me to engage with participants on these topics at an advanced but shared level, and to compare their perspectives and knowledge with my own experiences. In this way, I was able to see nuances in my data that other researchers might not have been aware of.

### **5.3 Significance of the Study**

Research on polar bear-human interactions is much less well developed than it is for other North American bear species (Clark et al. 2012). The most recent studies of trends in polar bear-human conflicts have focused exclusively on polar bear activities and characteristics, and do not address how human behaviours influence these conflicts (see Dyck 2006; Towns et al. 2009; Laforge et al. 2017). Although biological and scientific literature on polar bears is voluminous, the diverse human perspectives, values, and knowledge that influence the outcomes of polar bear-human interactions remain poorly understood (Clark et al. 2012). This study is the first and, to date, only doctoral-level research project focused specifically on polar

bear-human interactions. Furthermore, it is the first systematic study to use qualitative methods to examine the human dimensions of polar bear-human interactions. As a result, this dissertation is a unique and globally significant work.

Many of the findings of this study are applicable to the field of wildlife-human conflicts more broadly. This study provides insights into the underlying social mechanisms (such as discourses, fatalistic attitudes, interpretations of agency) that inform human responses to conflicts with polar bears. These underlying social mechanisms likely also inform human understandings and responses towards other wildlife species and therefore require further study. This research also provides insights into how accepted truths about polar bears are developed, and demonstrates that strategies for interacting with bears are not value-free. In doing so, this work raises broader questions about how perceptions and interpretations of specific wildlife species influence responses to human-wildlife conflicts. This study is important because it highlights the need to question how we reach conclusions about what constitutes the correct or best ways for interacting with and managing wildlife. Furthermore, this work demonstrates the need for researchers and managers to be more transparent with regard to what their assumptions about wildlife are, and to be cognizant of the potential on-the-ground implications of these assumptions. The specific contributions of each manuscript are described in detail below.

Manuscript one (Chapter Two) is unique in its use of discourse analysis to better understand how people make sense of polar bear-human interactions.

Although other researchers have studied the role of discourses in wildlife



management issues, most have focused on content analyses of media and documents (Bhatia et al. 2013; Decker et al. 2012; Gore et al. 2011; Peterson et al. 2010). Discourse analysis of primary qualitative data (e.g. interviews, focus groups, etc.) remains underutilized as a method of analysis for understanding human-wildlife conflicts – especially in northern contexts. This study contributes to understandings of bear-human interactions by revealing how people use discourses to create boundaries that situate polar bears outside of human space. These boundaries and the discursive processes by which they are established produce expectations and demands that can lead to conflict among different groups of stakeholders. This research provides insights into why people have different ideas about how to interact with polar bears and about how polar bear-human interactions should be managed.

Manuscript two (Chapter Three) adds to a growing body of literature that uses incident analysis to evaluate responses to human-wildlife conflicts (Mattson and Clark 2012; Vernon et al. 2015; Cromley 2000). Since data in this study were collected both prior to and following the November 1<sup>st</sup> mauling, this study was able to compare how participants defined problems that caused polar bear-human conflicts before and after the incident. Few other studies of bear-human conflicts have provided such a comparative analysis (for an exception see Gore et al. 2005). This study is significant because it provides important insights into some of the systemic drivers of conflicts with large carnivores (such as risk-taking behaviour by humans), and identifies barriers to implementing effective solutions to these systemic problems. Although this analysis was highly context specific, many of the

drivers of polar bear-human conflicts (particularly those related to human behaviour), and responses to them discussed here, are widely applicable to the management of human-wildlife conflicts across the globe. Findings from this study suggest that agency responses to wildlife-related incidents should be carefully evaluated to determine if they offer adequate solutions. Other studies have evaluated agency responses to specific human-wildlife conflicts (see Cromley 2000; Clark and Rutherford 2005; Mattson and Clark 2014; Clark et al. 2014; Vernon et al. 2015). However, this study is unique in its attempt to evaluate whether responses were actually effective at preventing polar bear-human conflicts from occurring in the future.

Manuscript three (Chapter Four) makes a significant contribution to advancing theoretical understandings of human responses to bear-human interactions. Currently, the most comprehensive model for understanding the factors leading to bear-human interactions is Herrero et al.'s (2005), in which the outcomes of bear-human interactions are determined by situation-specific combinations of: 1. environmental factors; 2. bear-related factors; and 3. human behaviors/responses. By advancing Herrero's model this study shows that qualitative research can make important contributions to biological models. Results from this study show that human behaviours and responses to bear-human interactions are influenced by assumptions about who or what bears are, and by perspectives on the predictability of bear behaviour. These findings contribute to a deeper understanding of what motivates people to behave in certain ways towards bears, and of what informs people's decision-making during interactions with bears.

This study also adds to a body of literature documenting local observations of polar bear behaviour in other northern contexts (Fleck and Herrero 1988; Lemelin et al. 2010; Keith et al. 2005; Osvyanikov 1996; Voorhees et al. 2014; Schmidt and Dowsley 2010; Inuvialuit Joint Secretariat 2015). Unlike other observational studies of polar bears, this research focuses on polar bear behaviour towards humans rather than on observations of distribution and abundance, or on polar bear ecology. This study is also the first study of polar bear behaviour to examine the link between observational knowledge of behaviour and perceptions of polar bears. Finally, this study is also unique among broader research on bear-human conflicts because it links observations of bear behavior not only with perceptions but also with actions. No other research on bear-human interactions has attempted to understand how people's knowledge and perceptions of bears shapes their responses during on-the-ground interactions.

#### **5.4 Conclusions and Suggestions for Further Research**

Overall, this research makes significant contributions to knowledge of human understandings and responses to polar bear-human interactions. Better knowledge of the human dimensions of polar bear-human interactions is important because it can illuminate the basis for social conflicts over polar bears, and can help managers to design more socially acceptable management practices. As findings from this dissertation demonstrate, how people define the problems leading to polar bear-human conflicts and their preferred solutions shapes responses to bear-human interactions on individual, community, and agency levels. This research increases understandings of why certain responses are more easily accepted and

implemented than others. Furthermore, human dimensions research sheds light onto what influences and motivates human behaviours towards polar bear-human interactions. Understanding why people respond the way they do to polar bear-human interactions is key to developing management strategies that effectively target the human-related factors influencing the probability and consequences of interactions with polar bears. Overall, this dissertation makes a significant contribution not only to how people understand polar bear-human interactions but also to how these understandings translate to specific on-the-ground practices. Many of the findings from this study are widely applicable to human responses to conflicts with carnivores across the globe.

By using a variety of qualitative methods, this dissertation contributes to deeper understandings of the underlying factors that influence responses to polar bear-human interactions. The first manuscript examines how people make sense of polar bear-human interactions by taking up discourses that create boundaries between people and polar bears. The second manuscript examines what is said and what is done when polar bears cross these boundaries and come into conflict with humans. The third manuscript examines what knowledge and perceptions inform individual people's decisions about how to respond to polar bears during interactions.

In manuscript one (Chapter Two) I found that discourses of fear played a significant role in enforcing boundaries between people and polar bears. However, the role of fear in shaping both people's understandings of and responses to polar bear-human interactions requires further investigation. I found that the language of

security, policing, and discipline was routinely used to describe the process of keeping polar bears away from the Churchill community. A more in-depth analysis of discourses of fear and their ramifications for both people and for polar bears would be insightful. One potential avenue may be to examine discourses of fear and safety about polar bear-human conflicts and to explore how they relate to other societal discourses of security and terrorism. The concept of biosecurity may lend a useful starting point for framing such as inquiry (see Buller 2008; Collard 2012; Bingham et al. 2008).

Another important avenue of research would be to examine how fear influences on-the-ground human responses to large carnivores. Whether or not people are afraid of polar bears, and how they process this fear, can have implications for the outcomes of polar bear-human interactions. In manuscript three (Chapter four), I show that there is a need to develop a deeper understanding of what motivates and informs how people behave during interactions with polar bears. Fear as a driver in human responses to wildlife has not been well researched; however, Johansson and Karlsson (2011) found that fear of wildlife was linked to the perceived uncontrollability of a person's response when interacting with an animal. There are a number of challenges in attempting to evaluate the role of fear in shaping people's responses to bear-human interactions. Perhaps the greatest is that many people who work with bears may be uncomfortable admitting that they feel fear during interactions with bears. Since emotions can be difficult to measure I suggest using a combination of phenomenological qualitative research that explores

how people think fear influences their responses to bears, with quantitative studies of human stress responses during interactions with bears.

Further research is also needed to better understand the potential consequences of fatalistic attitudes about the risk of bear-human conflicts. When I examined community responses to the November 1<sup>st</sup> mauling, I found that many Churchill residents and managers held fatalistic attitudes about the inevitability of future polar bear attacks. I also found that fatalistic attitudes were equally prevalent in both data sets, suggesting that they did not develop as a reaction to the November 1<sup>st</sup> mauling. Fatalism about wildlife-related risks is not unique to the Churchill context since Inskip et al. (2016) also found similar fatalistic attitudes towards the risk of tiger attacks in Bangladesh. More research is needed to determine if fatalistic attitudes lead to increased risk-taking behaviours around large carnivores. Furthermore, the implications of fatalistic attitudes on management solutions that target human behaviour towards wildlife (such as bear safety education) also require further research.

Education was the preferred solution identified by both community members and agency personnel to prevent future polar bear-human conflicts in Churchill. However, more research is needed to clarify exactly what research participants meant by education. By definition education involves providing individuals with information about a topic to promote understanding and to contribute to informed decision-making (Plough and Krimpsky 1990). Education focuses on increasing knowledge and lacks a persuasive element. In this way, education differs from persuasive risk communication that provides information in

a manner that actively seeks to motivate responsible behavior change (Cho 2003). Risk communication can be defined as communication with the specific intent of informing individuals about the existence and nature of a risk, and attempting to use this information to alter their behavior (Gore et al. 2007). Based on this definition, attempts to “educate” people in Churchill about bear safety are perhaps better defined as attempts to communicate risk about polar bears to people. Most managers and community members are likely unaware of the distinction between education and communication and more research is needed to determine what people actually want when they identify education as a solution. Further research is also needed to distinguish between the effectiveness of programs that provide bear safety education and those that engage in risk communication.

Much literature has focused on differences between Western and Indigenous understandings of polar bear-human relationships (Schmidt and Dowsley 2010; Dowsley and Wenzel 2008; Tyrrell 2006). However, findings in manuscript three (Chapter four) demonstrated strong similarities between interpretations of polar bear behaviour by Indigenous and non-Indigenous participants, suggesting that to some extent experiential learning about bear behaviour may transcend cultural differences. More research is required to determine exactly how observations about polar bear’s abilities to read human emotions and intentions might translate across different knowledge systems. Furthermore, manuscript three also demonstrated that interpretations of polar bear behaviour and strategies for responding to them are grounded in broader ontological assumptions about who or what people think polar bears are. Yet exactly what informs these assumptions (e.g. peoples’

worldviews, discourses, prior experiences, or learned behaviours) is not well understood and requires further investigation. Similarly, this manuscript also raised a number of epistemological questions such as: what is actually knowable and unknowable about polar bears and their interactions with people? What constitutes valid<sup>3</sup> knowledge about polar bear behaviour? And how can this knowledge be acquired? Finally, exactly how polar bear behaviour varies between contexts – and why – requires further study.

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<sup>3</sup> Here, the term valid does not mean to imply that we believe some forms of knowledge are more right than others. Instead, it is meant to reflect assumptions among participants that some people's knowledge of polar bear behavior is more correct than the knowledge of others.



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## Appendix A: 2013 Interview Guide

### INTERVIEW QUESTION GUIDE

#### 1. Biographical Questions:

- How long have you lived in Churchill?
- Where's your family from? (*Probes: culture, time in Churchill*)
- What do/did you do for a living?
- What is your experience with polar bears?

#### 2. Stories

- Can you tell me a story about a personal experience you've had with a polar bear (*Probes: Who/When/Where/What happened / How did you feel?*)
- Can you tell me a story about an experience someone you know has had with a polar bear? (*Probes: Who/When/Where/What happened?*)
- Do you know any other bear stories? (*Probes: Who/When/Where/What happened?*)
- Do you know any traditional bear stories?  
(*Probes: Where did that story come from? Who told you that story?*)

#### 3. Other Questions

- How do you act when you are around bears? (*Probes: Why do you behave this way? Who taught you to behave this way?*)
- How often do you encounter polar bears? (*Probes: Why do you think you encounter them more/ less than in the past?*)

#### 4. Concluding

- Do you have any other observations or opinions about polar bears that you would like to share with me?

**Thank the participant and ask if they have any further questions about the research. Tell them you'll be back in August and hope to see them again.**

## **Appendix B: 2014 Interview Guide**

### **INTERVIEW TOPIC GUIDE**

#### **Re-telling the Polar Bear Story: Local Perspectives of Polar Bear-Human Interactions**

##### **Questions about liability/responsibility**

*For participant affiliated with an organization:*

1. What does liability mean to you?
2. Are there protocols or documents in your organization that shape what liability means to you?
3. What would liability mean to you if a polar bear attacked someone you were responsible for?
4. Would you behave differently during these interactions if you weren't concerned about liability?
5. In your opinion, what is the difference between being liable for human safety vs. being responsible for human safety?

*For participant not affiliated with an organization:*

1. What does responsibility for human safety mean to you?
2. Does responsibility for human safety affect how you behave during an interaction with a polar bear?
3. How would you feel if someone you were responsible for was attacked by a polar bear?
4. In your opinion, how important is human safety when it comes to making decisions about polar bear management?
5. Are there any limitations to considering human safety? If so, what might they be?

##### **Knowledge and Management Questions**

1. Who makes decisions about how polar bears are managed in Churchill?
2. Is local knowledge included/not included in current polar bear management decisions in Churchill? Should it be? Why?
3. Do locals respond differently to polar bears than managers? If so, in what ways?
4. What changes (if any) would you like to see made to current bear management practices?
5. Are there alternatives to current practices for responding to polar bears? If so, what might they be?

6. What are the main challenges that polar bear management in Churchill faces? What are some possible solutions to these challenges?

### **Other Questions**

1. What kinds of relationships do you think are possible between people and polar bears?
2. How would you define coexistence with polar bears?
3. Would you describe the current polar bear management system as a type of coexistence? If so, what are the characteristics of the system that facilitate this coexistence? If not, what would coexisting with polar bears look like to you?
4. Most people would agree that polar bears are highly intelligent animals. Do polar bear management practices reflect this statement? If so, how? If not, how might they?
5. Do you think it is possible to control polar bear behavior? Why/why not?
6. Do you respond differently to polar bears in different places (e.g. in town vs. out of town)?
7. Who decides where polar bears are allowed to be / not allowed to be? Do you agree with these decisions?
8. Is it important to consider human intention during interactions with polar bears? Why/why not?
9. Is there anything about the relationship between people and polar bears that is never talked about? If so, why is this left unsaid?
10. Who makes decisions about what is possible/not possible to say about polar bears?

**Thank the participant and ask if they have any further questions about the research. Tell them you'll be back next year and hope to see them again.**

## Appendix C: 2014 Focus Group Question Guide

### FOCUS GROUP QUESTION GUIDE

- 1) How has Churchill's relationship with bears changed over the years?
  - a) Do you think these changes are positive or negative?
  - b) What direction are we headed in?
  - c) What kind of bear management would you like to see in the Churchill area?
  - d) What won't you like to see?
  
- 2) Who is involved in decisions about how polar bears are managed in the Churchill area?
  - a) Is everyone involved who should be involved?
  - b) What are these decision makers trying to accomplish? How is it working?
  - c) What are the goals of current polar bear management (e.g. human safety, bear safety etc.)?
  - d) Are these goals adequate/sufficient?
  
- 3) What role should the Town of Churchill/Manitoba Conservation/ Parks Canada/ local people have in polar bear management?
  - a) What is the relationship between local people and these management institutions?
  - b) Do you agree with the decisions these institutions are making?
  - c) If you were put in charge how would you do things?
  
- 4) What factors need to be considered when making decisions about polar bear management in the Churchill area? (e.g. human safety, bears migratory route etc.)
  - a) Do some factors take priority over others? Which ones and why?
  - b) What underlying pressures/influences exist?
  
- 5) Should *ethics* be considered in decisions about how polar bears are handled? For example, do bears have a right to be here?
  - a) If so, what does this mean for how bears are managed?
  - b) Can the bear's right to be here be infringed on under certain conditions?
  
- 6) Should bears be treated with respect?
  - a) What does respect look like?
  - b) What does it mean to you?
  - c) Does respect mean different things to different people?