When the Caribou Do Not Come

Indigenous Knowledge and Adaptive Management in the Western Arctic

EDITED BY BRENDA L. PARLEE
AND KEN J. CAINE

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Introduction

Brenda Parlee and Ken Caine

The daily news headlines suggest we are witness to a surge in ecological crises around the world, many of which are having dramatic socio-economic and human health implications. In Canada alone, the loss of the Atlantic cod stocks, drought on the Prairies, flash flooding, and dramatic forest fire events have been triggers for rethinking our treatment of the environment as a pool of limitless resources. Many of these resource crises have been blamed, to some extent, on the failures of centralized, top-down, and rigid resource management approaches that have ignored the complexity and dynamics of ecosystems (Berkes, 2010; Holling, 2001; Holling & Meffe, 1996; Ludwig, Hilborn, & Walters, 1993). Essentially, "mother nature" has proven to be far more unpredictable and environmental problems far more intractable than anticipated. How can we cope with such unpredictability and ensure the sustainability of natural resources for future generations? Communities whose members have lived over many generations with ecological complexity and uncertainty may have some answers (Berkes, 2012; Howitt, 2001; Uphoff, 1998). In such communities, including Indigenous communities of northern Canada, well-developed systems of traditional knowledge have ensured the sustainability of natural resources and the well-being of communities over many generations (Berkes, Mathias, Kislalioglu, & Fast, 2001; Condon, Collings, & Wenzel, 1995; Freeman, Hudson, & Foote, 2005; Nuttall et al., 2005).

Northern Indigenous peoples who have had to deal with the ups and downs of barren-ground caribou populations are arguably among those with the greatest insights about how to cope with ecological complexity

and uncertainty. Once numbering over 1.5 million in the Northwest Territories alone, barren-ground caribou have declined significantly over the past decade (Gunn, Russell, White, & Kofinas, 2009; Vors & Boyce, 2009). Why? Ecological data from the scientific community as well as traditional knowledge from many circumpolar nations detail historical oscillations in barren-ground caribou numbers on a cycle of forty to seventy years (Gunn, Russell, & Eamer, 2011; Gunn, Johnson, et al. 2011; Vors & Boyce, 2009). Despite such evidence, rapid declines in such an iconic and socio-economically important species have led to much tension and conflict in many parts of the Yukon, the Northwest Territories, Nunavut, and elsewhere in northern Canada. Many factors, such as expansive forest fires, weather events like the freezing-over of food sources, overgrazing on slow to regenerate tundra habitats, and climate change, are considered big picture drivers of population dynamics, with human disturbance, including resource development, being a critical concern to scientists and communities alike (Gunn, Johnson, et al., 2011; Johnson et al., 2005; Post & Forchhammer, 2002). However, it is subsistence harvesting by Indigenous peoples in the North that has been the preoccupation of many governments and publics. Why, despite little evidence of its impact, has Indigenous harvesting become almost the sole focus of wildlife management institutions in northern Canada in the past decade?

Those familiar with debates on the harvest of seals, whales, and polar bears might be quick to blame the animal rights movement. Seeking the protection of caribou and other iconic and charismatic species, environmental organizations have been prominent actors in the North and have arguably shaped a great deal of policy and debate related to wildlife conservation in recent years. Protecting the right to harvest amidst the interference of southern-based animal rights activists and organizations has been a challenge for Arctic Indigenous peoples since the beginning of the animal rights movement (Harter, 2004; Wenzel, 1991; Young, 1989).

But the answer is not that simple – there is much more going on within the North on questions of conservation than may be perceived from the outside. Indeed, from a social science perspective, the situation is also far more interesting than elsewhere – the devil is always in the details. Whereas some see the answer as more centralized governance and control (over Indigenous peoples), this position is in direct contrast to the perspectives of many northern Indigenous peoples, who perceive the problem to be too much centralized control.

Northern Indigenous peoples have been described and theorized as the original northern conservationists (Nadasdy, 2005). Since reports

of declines in caribou populations, harvesters and communities have articulated much interest in engaging in discussion and creating voluntary harvest limits in order to do their part to ensure caribou populations are sustained for future generations (BCMPWG, 2011; PCMB, 2010). But for those with a clear eye on the past, including historians and Indigenous elders, the *imposition* of harvest limits may seem like history repeating itself. As early as 1894, which saw the creation of the Unorganized Territories Game Preservation Act, centralized governments started imposing harvest limits and criminalized many aspects of caribou-harvesting practices despite any evidence that harvesting was a factor in population declines, which occurred at the turn of the century and later in the 1950s (Campbell, 2004; Kulchyski & Tester, 2007; Ruttan, 2012; Sandlos, 2007; Usher, 2004). These limits, which seemingly had little ecological basis, were the cause of great social, economic, and cultural stress for communities already suffering from limited food resources and other impacts of colonialism, including the spread of European infectious diseases, residential school programs, and forced resettlement (Nadasdy, 1999, 2003; Piper & Sandlos, 2007; Regan, 2010).

On the whole, however, the drivers of population cycles, including the role of human disturbance, are still little understood, even for very well-studied subpopulations (Bergerud, 1996; Johnson & Russell, 2014). The quick assumption may be that more data are needed in order to better predict the timing and extent of population cycles. But barren-ground caribou systems are not linear or predictable; there are inherent uncertainties that are not entirely solvable or knowable. The critical issue according to many elders and leaders with a voice in this volume is not to predict or to "manage" the caribou but to respect them and deal with population dynamics in ways that ensure the sustainability of caribou and northern communities.

There are rich oral histories from many northern communities about the years of "so many caribou" and the years "when caribou did not come" – about what caribou meant for local cultures and identities, economies, the food on the table, as well as other aspects of their way of life. These oral histories, coupled with contemporary observations and experiences of decline and renewal, are the subject of this book. However, the research and narratives shared here are unique in voice and in temporal and spatial scale. Research underlying these chapters was carried out in collaboration with leaders and communities during a period of caribou population decline in a large area of northwestern Canada.

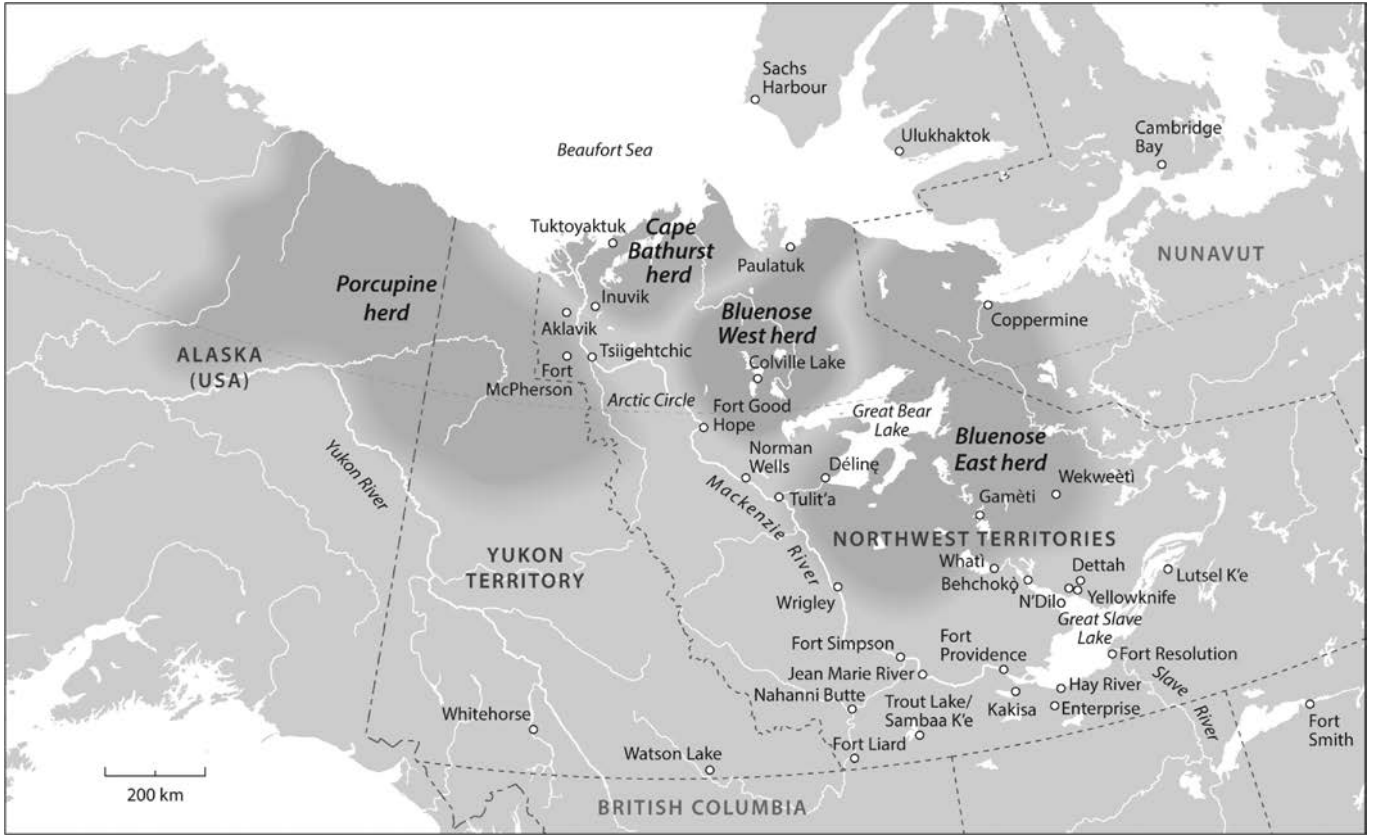

FIGURE I.1 Ranges of the Porcupine, Cape Bathurst, Bluenose East, and Bluenose West barren-ground caribou herds

Much of the knowledge presented in this book may challenge readers more used to the conventional but negative stereotypes of northern Indigenous peoples as indiscriminate predators of caribou who have abandoned their traditional bow and arrow in favour of a more modern lifestyle (Collings, 1997; Sherry and Myers, 2002). This romanticized and rigid notion – that the cultures of Indigenous peoples should be frozen in time, circa 1899 – is highly problematic, if not racist, in its assumptions (Beavon, Voyageur, & Newhouse, 2005).

Although the livelihoods of northern Indigenous peoples have indeed changed over the past century, the core ways of life continue to mirror key aspects of the seasonal and year-to-year rhythms and cycles of their physical and spiritual worlds (Anderson & Nuttall, 2004; Ingold, 2000). This reality is very different from the one imaginable to the vast majority of Canadians. Although the North is part of our national identity, only a small number of Canadians have ever travelled north of the 60th parallel (Grace, 2002). Even fewer have experienced or seen a caribou, other than on the back of the Canadian twenty-five-cent coin.

Barren-ground caribou are known regionally as *tuktu* (Inuvialuitun), *ʔekwę* (Sahtú), and *vadzaih* (Teetł'it Gwich'in). Biologists refer to the barren-ground caribou (*Rangifer tarandus groenlandicus* and *Rangifer tarandus granti*) of this region (the Tuktoyaktuk Peninsula being of limited discussion in this book) in terms of four main herds: Bluenose East, Bluenose West, Cape Bathurst, and Porcupine. These herds migrate thousands of kilometres through the taiga and boreal regions each year. Numbering over 500,000 in the 1990s, the population of these herds is now estimated to have fallen to half of that, a declining trend that parallels the declines in the other caribou herds in the Northwest Territories and elsewhere in northern Canada (Environment and Natural Resources, 2015; Vors & Boyce, 2009).

Given the symbolic importance of caribou to our national identity and the fundamental place of this species in the cultures and economies of northern Indigenous peoples, this book is likely to be of interest to northerners and the broader public alike. Although the work implicitly and explicitly tackles some complex theoretical problems of governance and stewardship, food security, and cultural continuity, not to mention the messy problem of caribou population dynamics, there is also something here for those simply interested in the mystique of the Arctic or alternative perspectives on wildlife management. There is no linear or prescriptive argument made by any of the authors; discussions about caribou population dynamics are complicated, as are the stories about how people deal with the dynamics of this iconic species.

Inuvialuit, Gwich'in, and Sahtú peoples, who have long histories of dependence and connection with caribou, recognize the inherent ecological variability associated with this species and have developed ways of understanding and coping with its socio-economic and cultural implications. These insights are not anecdotal opinions but are part of a system of knowledge, defined as traditional knowledge, that has developed over many generations. Traditional knowledge is the "cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment" (Berkes, Colding, & Folke, 2000, p. 1252).

The concept of traditional knowledge (also referred to as traditional ecological knowledge and Indigenous knowledge in this volume) is often framed or defined in the academic literature in relation to its potential integration with, or its contrast to, knowledge derived from Western science. Some scholars are quick to point out the synergies between the two knowledge systems – both of which rely heavily on systematic and empirical observation (Agrawal, 1995, 2002; Berkes, 2012; Roots, 1998). Although there is a deep spiritual dimension to the way that knowledge is generated and shared in many Indigenous cultures, there is also a tremendous empiricism that mirrors the rigour and systematic nature of the "scientific method."

Gwich'in, Sahtú, and Inuvialuit knowledge, like that of many other Indigenous cultures, is passed on through oral traditions, through shared observations, narratives, and songs (Blondin, 1990; Cruikshank, 1991), as well as through experiential practices of living on the land. Those traditional practices of common use include various kinds of ecological monitoring (systematic observation), temporally or spatially related harvest taboos of core species at different life stages, and habitat protection, to name a few (Berkes, 2012; Berkes, Colding, & Folke, 2000; Berkes & Turner, 2006; Gadgil, Berkes, & Folke, 1993; Moller et al., 2004; Parlee, Manseau, & Łutsël K'e Dene First Nation, 2005; Parlee et al., 2014).

The process of recognition and inclusion of traditional knowledge as a system of knowledge, practices, beliefs, and institutions (i.e., rules-in-use) is increasingly understood as a precursor or critical element of success in many resource management contexts, including forestry, agriculture, and coastal fisheries, as well as wildlife management (Berkes et al., 2001; Houde, 2007). Efforts to document traditional knowledge in northern Canada in ways that can influence or simply fit with existing decision-making processes are also growing; the methodology, technologies,

and associated outcomes are diverse and include the documentation of detailed ethnographies, identification of archaeological sites, species inventories, ecological and cultural atlases, as well as knowledge archive systems, dictionaries, and geographic information systems (Auld & Kershaw, 2005; GRRB, 1997, 2001; Heine et al., 2001; Hennessy et al., 2013; Kritsch & Andre, 1997).

Within this emerging body of work are a growing number of new insights about northern ecosystems, including caribou ecology. Over the past several decades, regional government, co-management boards, academics, and research networks such as those funded by the International Polar Year have led to various kinds of initiatives featuring traditional knowledge in their research programs. Most notable is the work of the Arctic Borderlands Ecological Knowledge Co-op and related partner networks, such as the CircumArctic Rangifer Monitoring and Assessment Network, which has aimed to develop systematic and shared approaches to documenting both quantitative and qualitative observations about changes in the Porcupine caribou range (Eamer, 2006).

Although use of the term "traditional" may not be ideal to describe a knowledge system that is as contemporary as it is historical, in the Northwest Territories "traditional knowledge" is well integrated and accepted in legislation and land claim agreements, as well as used in myriad territorial and regional processes (e.g., environmental assessment and land-use planning) (Parlee, 2012). Co-management boards in the western Arctic have taken a lead role in facilitating the documentation and use of traditional knowledge in many forums, including wildlife co-management (Kendrick, 2003). However, the extent to which these efforts are valued and meaningful to scientists, community members, and policy makers varies significantly (Ellis, 2005; Nadasdy, 2003). Although there are numerous barriers and challenges, the requirement to include traditional knowledge in decision making presents unique and powerful opportunities (not yet realities) for many communities to be heard – opportunities enjoyed in few other jurisdictions in Canada and globally (Parlee, 2012).

A major challenge to meaningful inclusion of traditional knowledge is the recognition of "knowledge" as much more than anecdote, opinion, or simple data. Scholars and Indigenous community leaders involved in this volume offer a much deeper and broader understanding of knowledge as a system of learning that is well integrated with local beliefs and practices, as well as decision making at the individual, household, and community levels.

Acceptance of the notion that Indigenous peoples (also identified in other chapters as Aboriginal peoples) have both the knowledge and the

capacity to manage their own resources, including wildlife, is difficult for some individuals and governments, particularly where old processes of decision making that privilege other values and uses of northern resources (e.g., mining) persist. These social and political processes of colonialism have been decades in the making and may take many decades more to reshape. In most parts of Canada, including the Northwest Territories, the legacy of more than a hundred years of colonization and a top-down governance system bent on transforming the North into a managed space (Piper & Sandlos, 2007) while "eradicating the Indian problem" (Scott, 1920) is still part of living memory and shapes identities and relationships of governance in the North, as it does elsewhere in Canada (Coulthard, 2007; Irlbacher-Fox, 2010). Understanding caribou management and the broader enterprise of natural resource management within this social and political landscape is crucial for understanding the issues and finding a meaningful way forward.

Does the current wildlife management landscape so mirror the past? Arguably, the devolution of power from federal centres to northern co-management boards has created tremendous positive change, with greater opportunities for community-based resource management than in many other places in Canada (Spaeder & Feit, 2005; Usher, 1995). Technology has also changed the knowledge being created and how it is used in decision making. The business of caribou management has become much more technical over the past fifty years as a result of the use of satellite data, aerial surveys, and computer modelling. For those involved in the development and use of such technology, there is increased precision and objectivity in the knowledge used in decision making; or has this technology simply obscured the value of lived experience and hidden the biases and subjectivities of data collection processes and management decisions in graphs and spreadsheets?

Using surveillance to predict the number of caribou in the four overlapping ranges of the Porcupine, Bluenose East, Bluenose West, and Cape Bathurst herds has not been without error and controversy. Early scholarship has told us that arithmetic counting of caribou is only one way of understanding population dynamics (Ruttan, 1966). Inuvialuit, Gwich'in, and Sahtú elders, leaders, and youth offer other kinds of accounting and explanations of when and why the "caribou do not come," presenting alternatives to the scientific models on calf recruitment and predation. Indigenous leaders and youth, including the authors in this book, remind us that the comings and goings of caribou are not fully knowable and that caribou have their own mind. As phrased by the ancient Dene in the

saying that Fikret Berkes quotes in the Foreword to this book, "No one knows the way of the winds and the caribou" (Munsterhjelm, 1953, p. 97).

Given the extent of uncertainty and complexity associated with human-caribou relations, one might classify the task of caribou management as a "wicked problem" (Ludwig, 2001, p. 759). As noted by Chapin et al. (2008, p. 531), wicked problems are ones that "people disagree about how to define and solve ... in addition, efforts to solve the focal problem can create other secondary problems or unintended consequences."

To an outsider looking in or for those looking for simplistic answers, the situation may seem quite wicked or messy. But to those directly involved in caribou management over the past decade, the situation probably reads much differently. From either perspective, there may be cause for worry. A key concern emerging from this research is whether the tensions and conflicts over managing caribou that occurred within and between Indigenous communities, within the scientific community, and within government may have eroded the decades of trust building that have been at the core of the success of co-management institutions in the North (Kendrick, 2003). Or perhaps the conflicts that have surfaced over caribou management reveal some of the inequities of voice and power in the co-management processes that have been highlighted in other northern research (Howitt, 2001; Nadasdy, 2005).

The situation, however, is not entirely bleak and without solutions. According to oral traditions in some communities, if caribou are respected, they will come back to the people. Indeed, caribou numbers are beginning to recover in some areas (Environment and Natural Resources, 2015). At the outset of the research for this book in 2007, there was fear of a "collapse" of some herds, including the Porcupine herd, at the hands of Indigenous people, but that has turned out to be unfounded. For example, the Porcupine herd fell in numbers from a peak of 180,000 to 123,000 animals in 2001. At that time, Yukon newspaper headlines shrieked of immanent extirpation (Mostyn, 2010) and "orchestrated slaughters" by local Indigenous people who were hunting for their community (Thompson, 2008). However, in 2014 the population was reported to be at a new record high of nearly 200,000 animals, leading many to question how the scientists got it wrong. Equally concerning to Inuvialuit elder Frank Pokiak (pers. comm., 2015) was the fact that biologists did not address the error in any meaningful way or apologize to elders and the communities whose knowledge of herd dynamics had been ignored in previous debates and whose harvesting activities had been publicly critiqued as unsustainable.

Now is the perfect time to reflect on this period when the caribou did not come, while drawing on Indigenous knowledge to open a new conversation on this complex topic. Despite the complexity, there are guideposts for moving us forward. Caribou science has advanced significantly in recent years; although there are questions about the efficacy of some caribou counts, there is ever-greater awareness of the kinds of ecological variabilities characteristic of this species. There is also greater recognition of traditional knowledge in caribou management decision making.

We can look to the large body of previous traditional knowledge research to learn more about the depth and breadth of northern Indigenous peoples' knowledge of caribou ecology (Beaulieu, 2012; Ferguson & Messier, 1997; Gunn, Arlooktoo, & Kaomayok, 1988; Kendrick & Manseau, 2008; Kofinas, 2005; Kofinas et al., 2004; Legat, Chocolate, & Chocolate, 2008; Legat, Chocolate, Chocolate, et al., 2001; Legat, Chocolate, Gon, et al., 2001; Lyver, 2005; Parlee et al., 2014; Polfus et al., 2016; Thorpe, 1998; Zalatan, Gunn, & Henry, 2006; Zoe, 2012). There is also a corresponding and well-developed body of literature on the significance of caribou to cultural identities, economies, and health, which can be found in disciplines such as anthropology, cultural ecology, geography, political science, environmental history, and Indigenous/Native studies. More importantly, to learn more about the issues at hand, we can look to northern communities themselves and consider the new relationships that need to be forged and the lived experience that can be shared.

When the Caribou Do Not Come presents contributions and reflections from Aboriginal leaders, elders, and youth alongside the research of scholars in a range of social and natural science disciplines, including anthropology, rural sociology, political science, resource economics, history, environmental management, geography, and ecology. Together, we offer new perspectives on four key themes: counting caribou, understanding caribou, food security, and governance and management. The studies are primarily drawn from case study research in the Inuvialuit, Gwich'in, and Sahtú regions from 2007 to 2014, but they also draw on research across borders in the Yukon and Alaska. This body of work points to critical lessons about caribou and people as well as more theoretical and practical insights about how to deal with ecological complexity and uncertainty. Readers will find remarkable the extent to which communities have had to cope with a reported 70 percent decrease in a resource so fundamental to their culture, economies, and diets. Other scholars have explored such a capacity to deal with the dynamics of Arctic ecosystems in the fields of anthropology, geography, economics, and ecology (Anderson & Nuttall,

2004; Berkes, Colding, & Folke, 2000; Berman & Kofinas, 2004; Condon, Collings, & Wenzel, 1995; Forbes, 2008; Nuttall et al., 2005; Smith, 1978; Winterhalder, 1981). However, this capacity to cope with variability is increasingly complicated by the position of Indigenous people and the North within a growing global political economy; competing interests in natural resource development and natural resource conservation are altering the ways that caribou are valued and managed at the regional and national levels (Hummel & Ray, 2008). Climate change is also creating new kinds of patterns that are outside the scope of natural variability (Brotton & Wall, 1997; Krupnik & Jolly, 2002).

Communities in the Inuvialuit, Gwich'in, and Sahtú regions of the Northwest Territories have experienced previous periods of caribou population decline and have unique perspectives on the effects and appropriate responses to such dramatic ecological variability. Their experiences can provide useful lessons for those living within other dynamic ecosystems or for communities facing unprecedented changes in valued resources due to new pressures from resource development or climate change. Most importantly, they draw attention to the significance of community resilience.

Setting the Stage

Northern Aboriginal peoples, including the Inuvialuit, Gwich'in, and Sahtú, have a cumulative body of knowledge, practice, belief, and institutions that has ensured the sustainability of northern resources for many generations. Such traditional knowledge is recognized in many kinds of legislation, notably three settled land claim agreements:

(1) Inuvialuit Final Agreement, 1984. This agreement created the Inuvialuit Settlement Region, which spans 906,430 square kilometres and includes several subregions: the Beaufort Sea, the Mackenzie River Delta, the northern portion of the Yukon (North Slope), the northwest portion of the Northwest Territories, and the western Canadian Arctic Islands. As part of the agreement, the Inuvialuit, territorial, and federal governments established the Joint Secretariat, a co-management arrangement that ensures representation of Inuvialuit in all aspects of wildlife, fisheries, and land and water management. The Inuvialuit Game Council oversees the management of game resources, including Bluenose West, Cape Bathurst, and Porcupine caribou.

(2) Gwich'in Comprehensive Land Claim Agreement, 1992. This agreement created the Gwich'in Settlement Area, which spans 56,935 square

kilometres and includes the communities of Aklavik, Fort McPherson, Inuvik, and Tsiigehtchic. As part of the agreement, the Gwich'in established the Gwich'in Renewable Resources Board as the main instrument of wildlife, fish, and forest management in the Gwich'in Settlement Area.

(3) Sahtú Dene and Métis Comprehensive Land Claim Agreement, 1994. This agreement created the Sahtú Settlement Area, which spans over 283,000 square kilometres and includes the communities in the Hare (K'asho Got'ı̨nę), Great Bear Lake (Délı̨nę), and Mountain (Tulit'a) Districts. The Sahtú Renewable Resources Board, like its neighbouring board to the north, is the main instrument of wildlife and forestry management in the region. The aim is to assist communities with the management of wildlife and habitat for the benefit of the people of the Sahtú Settlement Area.

Among the land claim institutions with key roles in caribou management processes are the Inuvialuit Game Council, Gwich'in Renewable Resources Board, and Sahtú Renewable Resources Board. These organizations, in conjunction with local-level hunters and trappers associations and renewable resource councils, have played important roles in the research carried out for this book. The voices of their members are explicit and implicit in many aspects of the work presented here. Key leaders of each of these regional organizations are also authors of their own separate contributions, adding to the conversation on the book's major themes.

Counting Caribou

Much of the research for this book began with questions about reported declines in caribou numbers and the long-term sustainability of caribou herds in many parts of northern Canada. Among the most fundamental questions was "how are caribou declines defined?" Tensions in public hearings between communities and governments suggest that scientists and Indigenous peoples have different ways of accounting for population change. In Part 1, readers are challenged to consider the value of Inuvialuit, Gwich'in, and Sahtú oral histories as records of population decline, to discover how the historical experiences of northern peoples in more colonial periods of caribou management still matter, and to think about the subjectivities involved in different process of "counting caribou," including those associated with more technical methods. We present these alternative perspectives to stimulate discussion about the issues underlying the simplistic news headlines and discourse of a contemporary caribou crisis.

Much Indigenous knowledge about the comings and goings of caribou is grounded in systematic place-based observation of known caribou migration routes. Such observations are not recorded on digital spreadsheets but are chronicled in localized oral histories and passed on between harvesters and communities from generation to generation. Chapter 1, "From Tuktoyaktuk – Place of Caribou," provides a small glimpse into this unique place-based cultural record with Frank Pokiak's story about his first caribou hunt – the year the caribou came back to Tuktoyaktuk.

Indigenous oral histories, which are now considered valid legal evidence by Canadian supreme courts, have not been well respected in wildlife management decision making in previous years. In Chapter 2, "The Past Facing Forward," environmental historian John Sandlos uses archival records of the federal and territorial governments to explain more about the historical costs of ignoring such oral histories and the context for contemporary tensions in wildlife management. According to Sandlos, the present "caribou crisis" is not unlike previous periods of caribou population decline when Indigenous peoples and subsistence livelihoods were unjustly criminalized. Although much has changed since the settlement of comprehensive land claims, the contemporary period of caribou population decline suggests that deference still falls to scientists and scientific methods of counting caribou. Chapter 3, "Recounting Caribou," reveals some of the chinks in the armour of conventional scientific methods of counting caribou and tracking caribou movements. The chapter provides detail and examples that help to explain the dichotomy between science and traditional knowledge so often referenced in wildlife management and critiques of co-management. The term "recounting" has a double meaning here. It not only refers to the need for reflexivity in the production and use of population count data; it also refers to the need to recount, in the narrative and normative sense, how different worldviews, scales, and methods of observation can lead to very different outcomes and perspectives on Arctic ecosystem change.

Traditional knowledge is often limited in definition to a narrative and qualitative format, but there are other more quantitative methods in use by northern communities and governments that factor into knowledge systems, including those relevant to barren-ground caribou. In Chapter 4, "Beyond the Harvest Study," Brenda Parlee and colleagues discuss data collected through wildlife harvest studies in the Inuvialuit and Gwich'in regions. The reasons for wildlife harvest studies have been multifaceted; the Gwich'in and Inuvialuit harvest studies, like others in the Northwest Territories, Nunavut, and northern Quebec, were intended to establish

a "minimum needs level" for the traditional harvest of country food. The data produced by counting harvests, including data on yield, location, and harvest effort, are also increasingly valued by biologists for the insights they can provide about wildlife ecology (Boyce, Baxter, & Possingham, 2012). Guided by theory and previous research on harvest as a proxy of population dynamics, the authors examine the Inuvialuit and Gwich'in harvest data, as well as reported caribou population estimates from the same period, to better understand how northern harvesters respond or adapt to changing ecological conditions, including the availability of barren-ground caribou. Whereas much discourse on northern harvesters assumes northern Indigenous peoples are opportunistic and indiscriminate predators, the analysis in Chapter 4 demonstrates a close synergy between resource availability and harvest.

Understanding Caribou

The relationship of people to caribou is deeply spiritual. Many community elders in the Sahtú region, for example, describe themselves as ʔekwęgotʼıné, or "caribou people." This belief and sense of identity have been described and shared in previously documented oral histories by George Blondin and others (Blondin and Blondin, 2009). In Chapter 5, "We Are the People of the Caribou," photographer Morris Neyelle offers a photo essay through which readers can visually learn more about the practice of caribou hunting as well as the power of the caribou drum. His images and personal stories offer readers another way of understanding barren-ground caribou in the way of life of the community of Délıné. In Chapter 6, "Harvesting in Dene Territory," Leon Andrew talks more about how these cultural identities and connections to caribou are important to the research process. As a Sahtú elder involved in various kinds of research initiatives over many years, he documents traditional knowledge about how to honour the caribou and his culture, providing insights for those interested in research outcomes and in respectful research relationships. But it is not only elders who have knowledge that is relevant to our understanding of the issues. In Chapter 7, "Dene Youth Perspectives," Roger McMillan discusses the issues facing Dene youth, specifically those of Fort Good Hope. How are they making sense of the changes occurring with caribou while coping with the many other kinds of environmental, socio-economic, and cultural changes they face in their personal lives and communities?

Food Security

Caribou are an iconic species in many parts of the circumpolar North; in addition to having significant social, economic, and cultural significance, caribou meat is a major source of food in northern diets (Lambden, Receveur, & Kuhnlein, 2007; Usher, Duhaime, & Searles, 2003). The Government of the Northwest Territories has estimated the replacement value of caribou meat within community diets and economies to be in the millions of dollars per year. It is amidst this context of cultural and food security that we ask, "How do communities cope with declines in the availability of caribou?" In Chapter 8, "Time, Effort, Practice, and Patience," Anne Marie Jackson speaks to the importance of caribou as food for her family and community. As she is a young Sahtú Dene woman from Fort Good Hope, it is the teachings of her parents that provide a continuity or security through tough times when caribou are not around. She advises other youth to be patient and willing to learn and relearn the stories of previous generations and the associated practices; these stories will ensure that the Sahtú way of life is passed on to future generations. In Chapter 9, "The Wage Economy and Caribou Harvesting," the notion of food security is further discussed by Zoe Todd and Brenda Parlee, who explore the interconnected problems of caribou population decline, wage employment, and the regulation of caribou hunting. They ask how these problems factor into the food security of residents of Paulatuk in the Inuvailuit Settlement Region. The chapter challenges readers to consider how the dynamics of caribou population are not isolated from other aspects of environmental change (e.g., climate and impacts of mining) and socio-economic change in the community. The stress created for the household by the decrease in caribou meat availability can be compounded or offset by many other factors and influences, including industry actions and government decision making at the regional, territorial, and federal levels. The voices in this chapter remind us of the importance of managing food security, as Paulatukmiut do on a day-to-day basis, rather than taking a narrow or singular approach to coping with highly dynamic environmental and socio-economic stresses of life.

Among the most well-developed strategies for coping with variability in the availability of food resources has been food-sharing networks. Although many studies have focused on village-level food-sharing practices, in Chapter 10, "Caribou and the Politics of Sharing," Tobi Jeans Maracle and colleagues reveal how food sharing operates across

both ecological and political boundaries. Their research, based in Old Crow, Yukon, tells the stories of those whose families, although living across the Northwest Territories and Alaska borders, are still part of the food-sharing networks that historically existed prior to the construction of such jurisdictions. In reading this chapter, we are challenged to think about the unique geographies of food security that exist in northern Canada and how those matter in the context of caribou management.

Governance and Management

A critical concern underlying this book is that the overemphasis on managing, if not controlling, Indigenous harvesting of caribou is a misdirected area of caribou management. History tells us that the "caribou crises" that are often misperceived during periods of population decline become social crises as a result of government efforts to limit or criminalize subsistence practices. The kinds of power that are exerted over caribou and over the caribou people are in fact due to conflicts over the value of the land and caribou to Indigenous cultures and economies as well as over their value to the public and others who view this charismatic species in a much more symbolic or Disney-like fashion. Although most people believe in the central notion of conservation, the role of hunting in conservation is less understood and accepted by governments and the public at large (Freeman, Hudson, & Foote, 2005; Nadasdy, 2007). A key problem seems to be the scope of conservation interest. Although many national and regional environmental organizations have typically been singular in their campaigns to "save the whale" (and more recently, the polar bear) or to "protect the old growth forests," these agendas have been exclusive of, and in some cases contrary to, the socio-economic and cultural dimensions of local livelihoods (Nadasdy, 2003). Conversely, notions of conservation among Indigenous communities are more complex; in addition to demonstrating an interest in conserving the environment and resources for future use, they stress the importance of the cultural and economic sustainability of their communities.

The systems of co-management currently in place in the North have made efforts to reconcile these disparate notions of conservation in their decision-making processes. As pointed out in earlier work on this theme, great strides have been made in addressing the disconnects of power and

voice in decision making over wildlife through co-management, but there are still many gaps and challenges (Kendrick, 2003; Nadasdy, 2003).

What do northerners themselves think about this history and governance process? This book presents the voices of elders and leaders from three co-management boards, including Frank Pokiak of the Inuvialuit Game Council, Leon Andrew of the Sahtú Renewable Resources Board, and Robert Charlie of the Gwich'in Renewable Resources Board. These authors as well as the chapters by elder Morris Neyell and youth Anne Marie Jackson offer personal accounts of their own histories of caribou harvesting and some of the traditions of caribou management in their communities. In Chapter 11, "Recollections of Caribou Use and Management," Charlie provides this valuable perspective. Not only do readers catch a glimpse of the significance of caribou harvesting for Charlie and the harvesters of the Teetł'it Gwich'in, but they are also asked to think about management in a much different way. More than a formal boardroom process or set of guidelines and regulations enforced by outsiders, management is about the values and decisions of individual harvesters and their families. But how different are these "traditional rules" for managing caribou from those that are defined and legislated by co-management boards? In Chapter 12, "Ways We Respect Caribou," Kristine Wray explores this question based on research with the Teetł'it Gwich'in. In Chapter 13, "'Letting the Leaders Pass,'" Elisabeth Padilla and Gary P. Kofinas also highlight the ways that local rules for managing caribou matter by exploring some of the challenges in using traditional knowledge as the basis for formal regulations. In Chapter 14, "Linking the Kitchen Table and Boardroom Table," Brenda Parlee and colleagues offer ideas about the ways that decisions about caribou hunting made at the kitchen table matter at the boardroom table, reminding readers that formal governance systems, although largely comprised of men, need to be more considerate of women's perspectives. As the late Teetł'it Gwich'in elder Elizabeth Colin said, "Women have voice for the caribou too."

Community Resilience

Previous research has tackled the question of how individuals and societies cope with ecological variability and change; investigations have used different concepts and theories from social psychology, economic geography, cultural anthropology, and cultural ecology (Kofinas et al., 2010; Nuttall

et al., 2005; Smith, 1978; Winterhalder, 2001). The concept of resilience is offered here as the lens through which we can explore the social dimensions of caribou population change. It recognizes the dynamic interrelationships between people and the environments in which they live.

The concept of resilience, although academic in nature and subject to critique (Davidson, 2010; Fabinyi, Evans, & Foale, 2014; Hornborg, 2009), is seen by some scholars as synergistic with the knowledge, practices, and worldviews of many Indigenous peoples, including those of northern Canada (Berkes, 2012). Theories on resilience that have emerged from the science of complex systems challenge conventional thinking about social responses to ecological change (Chapin, Folke, & Kofinas, 2009; Chapin et al., 2009; Ludwig, Hilborn, & Walters, 1993; Walker et al., 2004). Rather than attempting to control ecological complexities and uncertainties using linear, predictive, and disciplinary models, resilience thinkers focus on the importance of multiple ways of knowing and learning as the basis for adapting to ecosystem dynamics (Berkes et al., 2001; Chapin et al., 2006; Gunderson & Holling, 2002; Pahl-Wostl, 2009).

Resilience thinkers argue we must think and respond to ecological ups and downs in novel ways – being proactive and adaptive on an ongoing basis, not simply reactive to extreme situations. Within the context of a social-ecological system, the notion of resilience also directs us to explore the influence of the social, cultural, ecological, and political situation of institutions while paying attention to the unique social positions and ecological contexts of the various stakeholders involved (Angelstam et al., 2013). Doing so also requires thinking about the unique histories of particular regions and institutions rather than taking an ahistorical position and potentially repeating the mistakes of the past (Folke et al., 2007).

What do the chapters in this book tell us about resilience? What makes some communities and caribou systems more resilient than others? More research is needed to analyze multiple case studies in order to determine what core elements or conditions matter most and whether these vary across social, cultural, political, and ecological boundaries. Some preliminary insights based on the seven case studies in the Inuvialuit, Gwich'in, and Sahtú regions are offered here and may be generalizable, in some fashion, to other regions dealing with new kinds of ecological variability and change.

Accounts of previous exposure to, experiences with, and traditional knowledge about the ecological problem – caribou population dynamics – are among the fundamental offerings of *When the Caribou Do Not Come*. Those elders with oral histories about the population cycles of

barren-ground caribou have much to teach us about how to cope with the most recent decline. But not all individuals and communities have the same kinds of oral histories due to differing cultural practices and norms for sharing traditional knowledge, different geographic locations within a caribou range, or other socio-cultural factors. The protection of intellectual property rights has been a pervasive concern for many Indigenous communities in northern Canada and elsewhere. Rules for dealing with the question of intellectual property rights in ways that enable communities to continue building, using, and sharing their knowledge seem more well developed where land and resource rights are clearly protected, as they are in the Inuvialuit, Gwich'in, and Sahtú regions. For example, the Gwich'in Tribal Council through the Gwich'in Social and Cultural Institute has its own traditional knowledge policy, which dictates how, where, and to whom knowledge can be reported. The security offered through this institution has enabled great strides to be made in the documentation and use of Gwich'in knowledge in this region. In other jurisdictions, where such security does not exist, the sharing and use of traditional knowledge can be more challenging both inside and outside communities.

The fostering of diverse livelihood options enables communities to better ride out periods when the caribou do not come; some communities have less access to other kinds of food resources, including traditional/country foods, which makes diversification difficult. Sudden or abrupt efforts to substitute one food resource for another or to make livelihood shifts during times of stress are more difficult than in communities where livelihood diversification has been nurtured over time. Part of that story hinges on the availability of knowledge and on the capacity to access these diverse resources or to engage in more diverse kinds of livelihood practices. For communities whose cultural traditions, including traditional knowledge, have been lost or eroded due to internal or external cultural pressures (e.g., residential school programs), the rediscovery of oral histories about the past and the reinterpretation or recasting of that knowledge in new contexts can contribute to the capacity to cope with new challenges (Napoleon, 2013).

In addition to oral histories, there also appears to be a necessity for ongoing tracking and communication between harvesters and harvester communities in the range. This idea of tracking or monitoring is not new to Indigenous communities in the Inuvialuit, Gwich'in, and Sahtú regions. Initiatives such as the Arctic Ecological Borderlands Knowledge Co-op and other processes of community-based monitoring that honour community

observations and community-generated "data" about changing ecosystems can also support resilience. But sharing is the key; collecting data about ecological conditions for spreadsheets alone does not contribute to the social learning considered to be so important to resilience.

The role of the community in formal governance, including co-management systems, also matters significantly. In situations where Indigenous harvesters have power in the decision-making process, there is much more opportunity for ensuring tight feedbacks (or strong links) between the traditional knowledge that is being generated and management outcomes. However, the key issue is flexibility; institutions that are rigid in using a one-size-fits-all and top-down approach have served to undermine rather than empower communities in dealing with the day-to-day realities of caribou management that go beyond the boardroom table. A case in point is the situation of the Yukon government, which made efforts to override a co-managed process of caribou harvest management being developed for the Porcupine caribou herd and was met with much resistance, including legal action (CBC, 2010). This government intervention seemed to be a step backward in the harvest management planning process. What does this example tell us? Perhaps that the imposition of top-down regulations across communities that have their own set of rules for caribou management based on generations of traditional knowledge (as discussed in Chapters 12 and 13) serves only to weaken the relationships and learning among various stakeholders considered necessary for the resilience of communities.

The continued generation and use of traditional knowledge are also an underlying thread in our understanding of resilience; as suggested by Jackson in Chapter 8, the stories and teachings of the elders provide the support or continuity for the community to go through hard times. The continued ability of youth and others to live and sustain their families on the land is the fundamental issue that should be of concern in caribou management, as discussed by the late Elizabeth Colin (see Chapter 14). Other kinds of stresses also factor into the equation of resilience. Readers are challenged to think about whether climate change, resource development, and the imposition of centralized rules and regulations decrease the capacity of communities to learn, cope, and adapt or whether these influences support and foster resilience.

Resilience is also about relationships and ongoing dialogue. The editors of this volume, although previous residents of the Northwest Territories, no longer live north of the 60th parallel. We are aware of how southerners (including academics) are perceived by northerners, so we are persistently

reflexive in our interpretation of the value of the volume. Too often, those from southern Canada are convinced they must bring ideas, technologies, and resources north to address northern problems. We are hopeful that the chapters in this volume will stimulate discussion and conversation but mostly that readers will be compelled to listen to those who have other stories to tell about "when the caribou do not come."

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