

S E C T I O N

# III

## Manipulating Scale

**Lyle Dick**

*“People and Animals in the Arctic:  
Mediating between Indigenous and  
Western Knowledge”*

**Liza Piper**

*“Colloquial Meteorology”*

**R. W. Sandwell**

*“History as Experiment: Microhistory and  
Environmental History”*



# People and Animals in the Arctic: Mediating between Indigenous and Western Knowledge

LYLE DICK

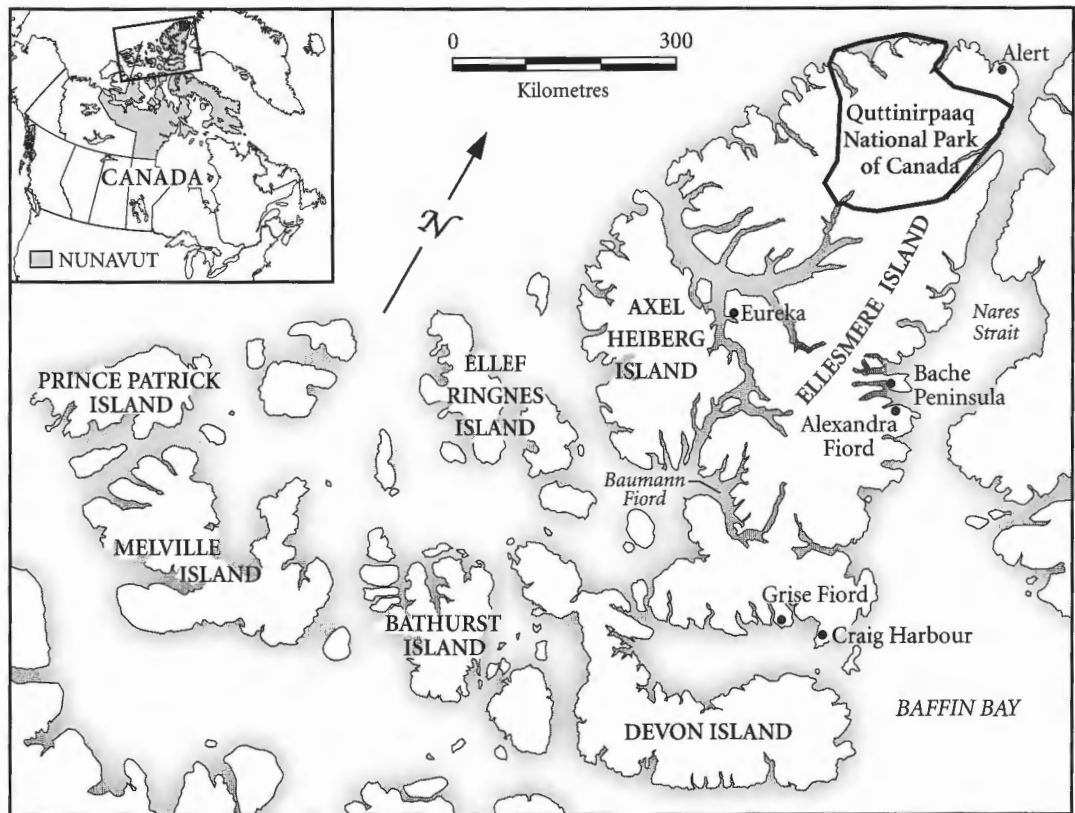
*Lyle Dick is the West Coast Historian with Parks Canada in Vancouver.*



From the earliest documented arrival of aboriginal peoples in the High Arctic more than 4,000 years ago, humans and animals have interacted. “High Arctic” refers to the Polar desert areas of Canada’s most northerly lands and adjacent waters, generally corresponding to the Arctic archipelago<sup>1</sup> (Figure 5.1). Throughout this region’s history, its resident hunting cultures have relied on animals for food, clothing, and tools. Animals were also an important part of these cultures’ belief systems and spirituality. The material and intellectual cultures of these peoples displayed innumerable adaptations to the ecosystems they inhabited, as successive cultures harvested marine and terrestrial mammals and occasionally fish and birds to enable occupation of this most challenging of Canada’s regions. All persisting groups necessarily acquired a thorough knowledge of the natural environment and developed strategies to adapt to its scarce opportunities and numerous privations. This story continues to unfold today, as Inuit of the High Arctic rely on country food (meaning, the food resources obtained from living on the land), which comprises an important part of their culture and identity. As in the past, Arctic animals are integral to the present and future of the Inuit.

This chapter will examine the history and ecology of human–animal interactions in this region over the millennia and especially in the last century, focusing on the relationships between humans, caribou, and muskoxen. For environmental history, as with other subfields of history, it is important to keep an eye on long-term trends, even when treating more specific, short-term developments. This discussion seeks to identify long-term continuities in human–animal interactions; medium-term changes arising from technological and social change, especially in the period 1875–1955; and short-term trends of the more recent past, governed by a new set of variables,

**Figure 5.1** MAP OF THE HIGH ARCTIC



This map of the High Arctic depicts the Queen Elizabeth Islands, part of the Arctic archipelago of Canada's Nunavut Territory. This region generally corresponds to the species range of the Peary caribou, which also inhabits Banks Island, parts of Victoria and King William islands, and the Boothia Peninsula. Muskoxen are found in all of these places as well as in a larger area of Canada's Arctic mainland, Alaska, and Greenland.

Source: Map adapted from one by Jennifer Keeney, Parks Canada, Western and Northern Service Centre, Winnipeg.

including shifting political contexts and knowledge frameworks. Both macro- and microhistorical analyses are relevant to the study of the major continuities and changes in environmental history, whether in Canada or other countries.<sup>2</sup> While addressing trends in human–animal relationships over the sweep of High Arctic history, this chapter will focus on the recent history of hunting and associated political developments at Grise Fiord, a small Inuit hamlet on the southern coast of Ellesmere Island and Canada's most northerly permanent community.

This history will necessarily involve dealing with two epistemologies, or ways of knowing the world: western science and Inuit indigenous knowledge. Data acquired under the western rubric includes historical sources such as explorers' reports and hunting diaries, ecological sources, and archaeological data. Alongside this research, concepts of Inuit indigenous knowledge will be elaborated.<sup>3</sup> Known specifically as Inuit *Qaujimajatuqangit*, it corresponds in some respects to what is referred to in recent conservation literature as Traditional Ecological Knowledge (TEK).<sup>4</sup> This

form of knowledge is rooted both in empirical observations and pragmatic problem solving, and informs the ethical relationships of Inuit to the environment in which they live. There are good grounds—political, ethical, and scientific—for asserting the importance of both western science and Inuit indigenous knowledge to addressing critical issues pertaining to humans and animals in the Arctic.<sup>5</sup> These two different but equally valid streams are of relevance, to not only science, but also the larger discipline of history. Writing history about the North today involves more than just telling stories; it means mediating between these different paradigms, and finding methodologies that facilitate ongoing inquiry and an open-endedness linking the past, present, and future.

## Two High Arctic Ruminants—the Muskox and the Peary Caribou

The muskox is the largest ungulate in the Arctic and in several historical eras was among the most important game animals in the High Arctic. These ruminants are naturally found exclusively in North American's Arctic regions and in Greenland, although they have been introduced in Quebec, Norway, Sweden, and Russia. Present population estimates for Canada are in the order of 85,000 animals, and they have recolonized most of their range since significant depletion of populations both on the mainland and Arctic islands in the early 20th century.<sup>6</sup> The important and documented declines of muskox on the mainland around 1900 played a key role in shaping policies and conservation efforts in the 20th century.<sup>7</sup> In the early 1960s, surveys estimated the presence of 8,500 muskoxen on the Arctic islands, with perhaps 4,000, or nearly half of these, living on Ellesmere Island.<sup>8</sup>

Typically, muskox herds consist of a bull and several cows and calves, but solitary bulls are also common, at least during the rutting season. They graze on grasses, sedges, lichen, and dwarf willow throughout the year. In winter, muskoxen are reportedly less mobile than in summer, as they stay in one place longer to more fully exploit less-abundant grazing opportunities and to conserve energy. The fact that they do not migrate in the winter and remain within limited grazing areas was probably of crucial importance to the Independence cultures, who largely relied on muskox meat for subsistence when they wintered in this region ca. 3,000 and 4,000 years ago. The tendency of muskoxen to retreat into a stationary defensive circle when confronted by attackers was historically a characteristic that made them easy prey for hunters in all historical periods.<sup>9</sup>

The other principal grazing species of the High Arctic is the Peary caribou, the most northerly subspecies of caribou, a medium-size ungulate found only on the Arctic islands and the adjacent Boothia Peninsula of the mainland. At least four distinct populations have been identified based on phenotypic and genotypic differences. A current estimate places the Peary caribou's overall population on the Arctic islands at about 7,000,<sup>10</sup> an apparently precipitous drop since a population estimate of 25,802 in 1961. However, precise figures are lacking, and the 1960 estimate may actually have underestimated the population by up to 50,000 animals.<sup>11</sup> The animals are found in small groups, consisting of adult females and their calves, which are born in early June. In summer, they forage on sedges, willows, grasses, and forbs, especially purple saxifrage (*Saxifraga oppositifolia*). In winter, caribou use more exposed sites with shallower snow cover and vegetated with dryas (*Dryas integrifolia*), purple saxifrage, Arctic willow, sedges, and lichens.<sup>12</sup> Caribou do

not migrate between summer and winter ranges per se, but long-range movements and their ability to shift ranges between islands in times of environmental stress have been documented.<sup>13</sup> While never as numerous as the muskox, the Peary caribou also played a role in the subsistence of the succession of cultures inhabiting the region.

## Inhabiting Human Cultures and Patterns of Natural Resource Use in the Arctic

The archaeological and historical record reveals that, from earliest times, aboriginal occupants of the region have been hunters dependent on animals for subsistence. All groups needed to adapt to the region's natural ecology and to adjust to its frequent and unpredictable privations, including a relative scarcity and scattered distribution of game animals. Adaptation, defined as the process by which organisms establish beneficial relationships with their environments,<sup>14</sup> has been the key to survival for all species, including humans, in this difficult natural region. An emerging consensus among students of human ecology is that diversity is the key to sustaining population levels.<sup>15</sup> One of the ways that animal species develop greater diversity is by increasing the range of their habitat. Human populations can be made more viable by extending their range of natural resource use, the number of organisms they utilize, or the efficiency and effectiveness of resource exploitation through improvements in technology or its application.<sup>16</sup>

Archaeological evidence has confirmed that, over 4,000 years, a succession of precontact cultures utilized both Peary caribou and muskoxen for subsistence, in addition to marine mammals, fish, and other resources such as birds. The earliest aboriginal residents of the High Arctic have been labelled the Independence I culture, one of a succession of cultures known collectively as the Arctic Small Tool Tradition. Employing a limited range of tools manufactured with chipped flint,<sup>17</sup> these cultures nevertheless managed to eke out a precarious existence by procuring a wide range of resources, including terrestrial and marine mammals and birds, but they particularly emphasized the procurement of grazing animals such as the muskox and Peary caribou. Members of their small, nomadic bands lived in skin tents even in the dark winters. They probably relied on muskox droppings for fuel for their central hearths, perhaps supplemented by driftwood. In interior areas, temperatures in this region have been recorded as low as  $-70^{\circ}\text{F}$  ( $-56^{\circ}\text{C}$ ).<sup>18</sup>

Human occupation of this challenging region has not always been feasible and has been significantly governed by overriding climatic trends and related changes in Arctic ecosystems. For the human occupation of the Arctic Islands, the critical climatic shift apparently occurred about 11,000 Before Present (BP), when a warming trend precipitated the retreat of the ice caps and the development of both terrestrial species clusters in nonglaciaded areas and favourable marine habitats in adjacent waterways. Ice-core analysis by climatologists situates the postglacial optimum in the High Arctic at 4,000 to 5,000 BP, followed by a general cooling trend.<sup>19</sup> Carbon dating of driftwood found at various locations in the High Arctic reveals the periodic breakup of the pack ice in the region's channels during the last 4,000 years. Driftwood was a vital source of fuel and materials for weapons and tent supports for the Independence cultures and their Thule-Inuit successors. For example, archaeologist Eigil Knuth carbon-dated driftwood charcoal found

**Figure 5.2** INUGHUIT HUNTER



An Inughuit man displays the technique of hunting with a bow and arrow, Etah, Northern Greenland. In the High Arctic, the Inughuit and other Inuit societies relied on projectile technologies for hundreds of years before the bow and arrow was superseded by rifles in the Peary era, 1890–1909.

*Source:* Photograph courtesy of the American Museum of Natural History (New York City), Donald B. MacMillan Collection, Crocker Land Expedition, 1913–1917, Negative no. 230920.

umiaks.<sup>22</sup> Hunting at these remote latitudes took place during summer excursions from Thule-Inuit base settlements in the Smith Sound regions of both Ellesmere and Greenland.<sup>23</sup>

A feature common to all aboriginal groups inhabiting the High Arctic in every era was their practice of nomadism: moving the entire community and its belongings over extended distances. For Arctic peoples, the sparse populations and perpetual movement of the region's animals demanded a high level of mobility, strategies of resource use closely attuned to the seasonal cycle, and close observation of the feeding characteristics and migration patterns of the major game animals. Arctic peoples needed to be constantly on the move, adjusting their areas of resource use according to the movements of the game species. Their nomadism required the transport of all materials necessary to sustain life—clothing, skins for tents and bedding, hunting, cutting, and scraping tools, and sufficient provisions to sustain the group in intervals between the successful procurement of game. It was the only viable response to an ecosystem in which game species were both broadly dispersed and inclined to roam over vast expanses.

Other essential adaptations included the development of flexible forms of social organization built around hunting, high levels of mobility, and limiting groups to small bands capable of developing sustainable strategies of natural resource use. Given the sparse distribution of the animals, it was essential that hunters be able to predict the best hunting locations in each of the seasons, to maximize their efforts.<sup>24</sup> Techniques such as the periodic alteration of hunting areas and modulation of the numbers and types of animals taken were characteristically practised. Since Arctic animal populations were observed to fluctuate dramatically over time, possibly due to climatic

at Independence Fiord off the north coast of Greenland to 3,600 to 4,700 BP, indicating its use by the Independence I culture. Knuth noted that occupation of this region at that time must have coincided with a warmer climatic interval, when reduced levels of pack ice in the Arctic Ocean enabled driftwood from Siberian rivers to reach the northern shores of Greenland.<sup>20</sup> More recently, climatic warming trends at ca. 1,000 BP enabled reoccupation of the High Arctic by the Thule-Inuit culture,<sup>21</sup> which applied a sophisticated array of projectile-point technologies, including spears and bow and arrow, in its procurement strategies (Figure 5.2). At this time, the waters between Ellesmere Island and Greenland were sufficiently free of ice to permit extensive summer hunting of marine mammals, including whales from kayaks or

fluctuations,<sup>25</sup> Inuit needed to be nimble and flexible in adjusting their resource procurement regimes quickly as circumstances dictated. Due to the lack of predictability of food resources, they harvested as wide a range of game animals as the region afforded, an important adaptive strategy.<sup>26</sup> As stocks of particular species diminished, aboriginal cultures needed to make rapid, pragmatic shifts to the utilization of alternative species. Such changes demanded an alertness to changing migration patterns of animals, expertise in adapting technology according to available materials, and an intimate environmental knowledge to enable successful exploitation of the region's resources.

We cannot be certain that the subsistence practices of all aboriginal groups were sustainable in all eras. That humans may have played a role in the extinctions of the Pleistocene era has been hypothesized but remains unproved. Regarding the High Arctic, a plausible hypothesis, proffered by anthropologist Robert Paine, is that precontact populations exploited local animal resources until yields were reduced to the level of diminishing returns. Hunters responded by moving on to other hunting grounds to repeat this pattern. While it may be difficult to verify Paine's hypothesis, the fact that aboriginal cultures utilized traditional projectile technologies suggests they were unlikely to have threatened the status of mammal populations of the region.<sup>27</sup>

While techniques have changed, the pattern of aboriginal hunting has persisted into the present day. Beyond issues of subsistence, observers of today's Inuit have also remarked on the importance of hunting and associated activities to its members' identity and well-being.<sup>28</sup> Country food is the focus of a range of social relations, values, and beliefs that define important aspects of Inuit identity. Beyond its social value, for the aboriginal peoples hunting has been of economic importance, enabling individuals and families to continue to live in small Inuit communities and maintain social networks without having to leave their homes or Nunavut. As the text of a recent Virtual Museum exhibit on Inuit culture states,

The food we obtain from hunting, or what we call country food, contributes to our health and it gives us a sense of wellness by providing us with a way to participate in our culture. It is while hunting and living on the land that our elders teach responsibility and the skills that give us confidence. . . . The time we spend on the land helps restore our inner harmony and balance. It also helps maintain our mental and physical well being. Much of the time we spend with our family and friends happens while we are out hunting, preparing the country foods, and taking part in meals. Eating land foods helps us to feel whole. It keeps us "in tune" with nature.<sup>29</sup>

For these and other reasons, Inuit in the High Arctic, including those who are engaged in western-oriented occupations, continue to derive a substantial portion of their subsistence from country food and hunting. Their subsistence-oriented economic systems are characterized by several features, including a mixed economy with mutually supporting market and subsistence aspects; a stable seasonal round of procurement activities, and significant noncommercial networks of sharing and exchange of food and materials; "traditional" or long-standing systems of land use and occupancy; and complex belief systems, knowledge, and values connected to resource use, which are passed on from one generation to the next.<sup>30</sup>

## Technological Changes of the Pre- and Postcontact Eras

Technological change has been a major factor affecting the nature and scale of resource procurement in the region. Prior to European contact, the principal technological shift occurred following the arrival of Thule-Inuit people about 900 years BP. This culture's advanced technological repertoire greatly exceeded its predecessor peoples of the Arctic Small Tool Tradition, enabling a more effective procurement of the range of wildlife. However, by emphasizing the hunting of marine mammals, the Thule-Inuit newcomers apparently placed no greater stress on the terrestrial animal populations than did their antecedents.

In the early contact era, the most significant technological change influencing the hunting of these animals entailed the introduction of firearms—specifically, rifles—by European parties during a series of wintering expeditions to or near Ellesmere Island. The Europeans initiated the hunting of terrestrial mammals and on a scale carrying the potential for major impacts on animal populations. Nevertheless, the earliest expeditions carried out only limited hunting of game animals, as these parties relied principally on imported provisions. All this changed with the North Polar expeditions of the American explorer Robert Peary, for whom hunting became the primary subsistence strategy, which he termed “living off the country.”<sup>31</sup> Peary also greatly increased the effectiveness of his hunting activities by employing experienced Inughuit, the aboriginal peoples of northern Greenland, as hunters. They procured for him all manner of animals, but especially the grazing animals, to support his parties (Figures 5.3 and 5.4).

**Figure 5.3** MUSKOX AT BAY



American big-game hunter Harry Whitney photographed a muskox being held at bay by Husky dogs during one of Whitney's hunting excursions to central Ellesmere Island in 1909. The combination of firearms technology and Inughuit environmental knowledge proved highly effective in the securing of game animals in this period.

Source: Harry Whitney, *Hunting with the Eskimos* (New York: The Century Company, 1910), p. 293. Photograph by the author, Ellesmere Island, spring 1909.

Between 1890 and 1909, Peary's comprehensive introduction of rifles radically altered procurement strategies of the Inughuit.<sup>32</sup> However proficient the Inughuit had been with bow and arrow and spear, these weapons were no match for the speed and sureness of a rifle. By the time of Peary's final voyage in 1909–10, guns had completely superseded the bow and arrow in northern Greenland in everyday use.<sup>33</sup> It was the combination of this new technology with aboriginal environmental knowledge that proved so devastating to the game animals in these hunts driven by the explorer's goal of maximizing the kill to stockpile meat for his assorted attempts on the North Pole. In northern Greenland, Peary's introduction of firearms and



commissioning of large-scale caribou kills has been cited as one of the major factors depleting and possibly extirpating the species from Inglefield Land. Another potentially contributing factor may have been the presence of mild, wet winters, producing snow conditions limiting access to forage, and precipitating population crashes.<sup>34</sup>

In the mid-1960s, further change was occasioned by the introduction of snowmobiles at Grise Fiord and other High Arctic communities. In 1966, Samwilly Elaijasialuk, who had worked for the Department of Public Works to maintain the first power-house and also worked in the local school, purchased the community's first Bombardier Ski-Doo from Montreal.<sup>35</sup> The same year, a RCMP special constable purchased a Bombardier Ski-Doo at Resolute Bay.<sup>36</sup> By December 1968, there were 16 snowmobiles in Grise Fiord, some of them owned by individuals and others by hunters pooling their resources to purchase a machine.<sup>37</sup> Reporting on the first year of general use, Constable Vitt of the Grise Fiord detachment noted that the snowmobiles enabled a caribou-hunting trip to Baumann Fiord in October, when 10 animals were killed. The hunters brought back half the carcasses on the first trip, and later returned by Ski-Doo to retrieve the remainder of the meat. According to Vitt, hunters also found the snowmobiles "ideal" for checking traplines during the dark winter months, as their headlamps made it much easier to follow the trail. Vitt noted, "What used to mean a week's trip by dogs to the end of the trapline and back now takes one day for the return trip."<sup>38</sup> Snowmobiles also enabled hunters to undertake some forms of hunting that previously were not feasible. Where, before 1967, Inuit hunters usually could not overtake caribou with dog teams, the snowmobile made it possible for them to harvest more of these animals. Snowmobiles also facilitated overland travel to caribou hunting grounds, enabling a higher harvest rate.<sup>39</sup> By 1968, use of snowmobiles enabled the hunters to increase the harvest of caribou in the Baumann Fiord area to 37 animals.<sup>40</sup>

**Figure 5.4** HAULING MUSKOX TO CAMP



A party of Inughuit hunters haul a muskox back to their temporary camp on Ellesmere Island. Harry Whitney employed these Inughuit as guides on his 1909 hunting excursions to the island.

Source: Harry Whitney, *Hunting with the Eskimos* (New York: The Century Company, 1910), p. 310. Photograph by the author, Ellesmere Island, spring 1909.

## Procurement Patterns of the Postcontact Era

For Ellesmere Island and adjacent land masses in the postcontact era, the major sources documenting hunting of muskoxen and Peary caribou are contained in the unpublished and published writings of European explorers or Royal Canadian Mounted Police officers between 1875 and

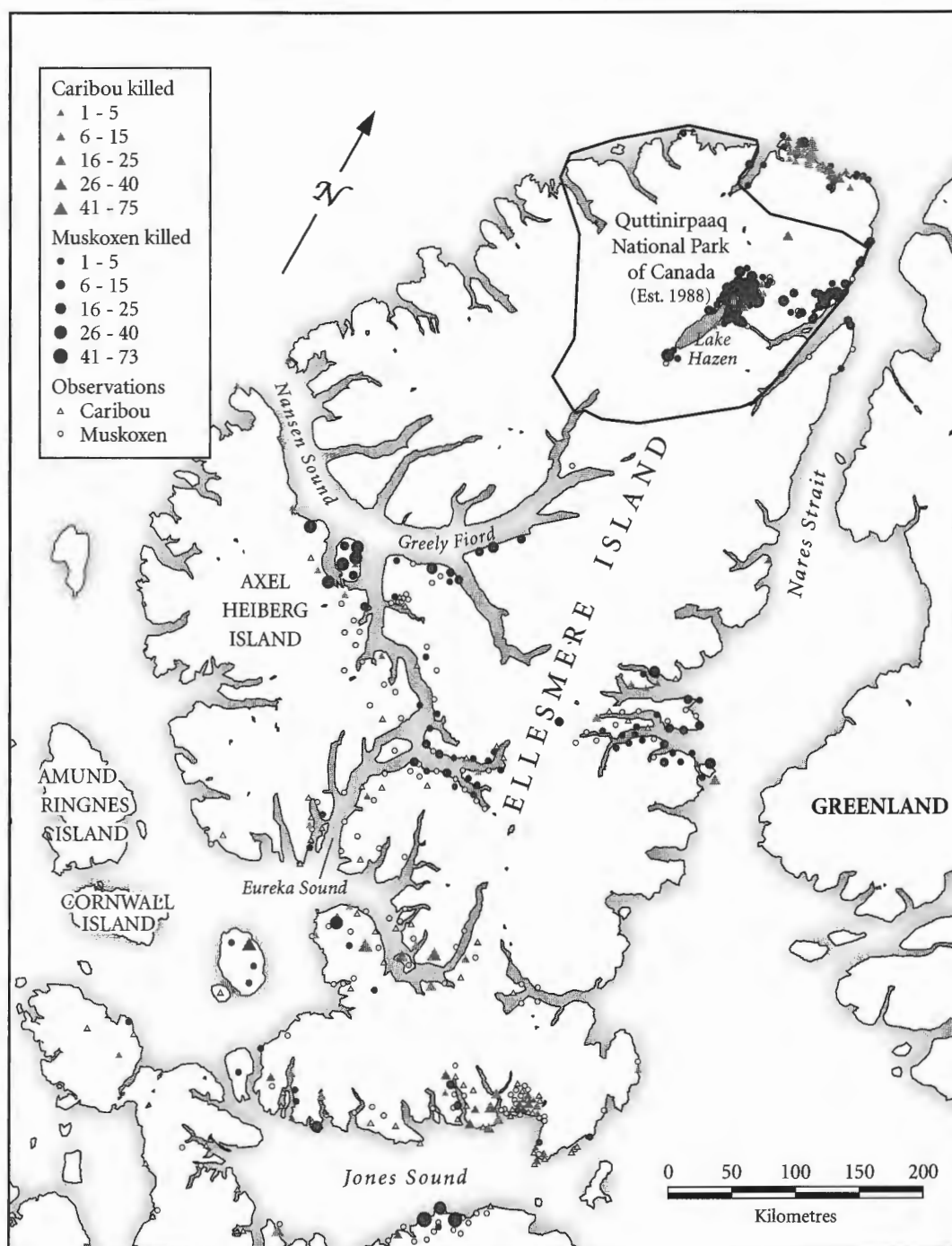
1975. Research in these records has generated more than 550 references to the presence of these animals in various areas of the island, especially the northern interior and coastal regions, the southern and southwestern coasts, and the east-central coastal areas. These observations provide suitable baseline data for several key areas of island habitat.

Preliminary analysis of the data confirmed that both Peary caribou and muskoxen were observed or killed in areas corresponding to current prime foraging grounds for both species. For the muskox, the historical evidence suggests that intensive hunting in northern Ellesmere Island in the late 19th and early 20th centuries placed a severe stress on its resident ruminant populations. During Peary's 1898–1902 expedition, his parties killed a minimum of 424 muskoxen on Ellesmere Island, and during his 1905–06 expedition they took 492 more, but in 1908–09, excepting the animals taken in northern Greenland, his parties were able to secure only 62 muskoxen on the island, mostly in the north. During his last expedition, Peary's parties hunted in the same areas as on previous forays, so it is highly probable that these hunters had significantly depleted the muskox population.

The records tell a similar story of increasing harvests of Peary caribou through the Peary exploration era. In 1898–1902, Peary's parties shot 30 caribou in the central region of Ellesmere Island. They increased the kill to 93 in 1905–06 in the northern part of the island, and—with the muskoxen population in decline—relied still more on caribou in Peary's last expedition, killing 150. After the Peary era, the only reported sightings or kills of caribou in northern Ellesmere Island occurred in 1935, when a member of the Oxford University Ellesmere Land expedition killed three near the Gilman Glacier to the north of Lake Hazen. The comparative absence of sightings on this and other expeditions to this area suggests that the population of Peary caribou in the northern part of the Island may have been seriously compromised by Peary's hunting activities of the early 20th century; it may still be recovering.<sup>41</sup>

Among Canada's responses to the situation of unauthorized hunting was to establish its first detachment of the RCMP on Ellesmere Island, at Craig Harbour near the southeastern end of the island, in 1922. Among other roles, the Mounties were charged with enforcing Canada's game laws, especially the muskox legislation. Evidence<sup>42</sup> suggests that members of the Police themselves occasionally shot muskox, despite its protected status. Nevertheless, the RCMP's presence on the island ensured that any large-scale decimation of herds would not recur. In 1923 and 1924, American explorer Donald MacMillan continued to ignore efforts by federal authorities to curtail his forays into Canadian territory, including unauthorized hunting of muskoxen, travel to Ellesmere Island without permission, and raising the stars and stripes at Camp Clay on Pim Island. His escapades precipitated the MacMillan-Byrd affair of 1925, an international diplomatic controversy leading to the establishment of a second RCMP station at Bache Peninsula on the central coast of Ellesmere Island. The RCMP hunted caribou intermittently during its occupations of the Ellesmere Island detachments at Craig Harbour (1922–25; 1933–40) and Bache Peninsula (1926–32). The numbers of animals taken was small but increased again in the 1950s following the reopening of the Craig Harbour detachment and the relocation of Inuit from Quebec and Baffin Island to Ellesmere Island. Overall, between 1875 and 1955, hunters of exploration parties killed a minimum of 420 caribou and 1,395 muskoxen on Ellesmere Island, mostly in the northern parts of the island (Figure 5.5, and Table 5.1).

**Figure 5.5** MAP OF MUSKOXEN AND CARIBOU HARVESTED ON ELLESMERE ISLAND AND ADJACENT LAND MASSES, 1875–1973



This map reveals the wide extent of muskox and caribou hunting on Ellesmere Island in the exploration era. The circles represent kills of muskoxen and the triangles kills of Peary caribou in this period.

Source: Map adapted from one by Jennifer Keeney, Parks Canada, Western and Northern Service Centre, Winnipeg.

**Table 5.1** MINIMUM NUMBERS OF PEARY CARIBOU AND MUSKOXEN HARVESTED ON ELLESMERE ISLAND AND ADJACENT LAND MASSES BETWEEN 1875 AND 1955

Expedition	Years	No. Peary Caribou Killed*		No. Muskoxen Killed	
		Northern Ellesmere	South/Central Ellesmere	Northern Ellesmere	South/Central Ellesmere
Nares	1875–76			62	
Greely	1881–84			91	
Sverdrup	1898–1902	2	1		77
Peary	1898–1902		30	327	97
Peary	1905–06	93		492	10
Peary	1908–09	150		62	
Cook	1907–08				6
Whitney	1909				27
MacMillan	1913–17			51	62
MacMillan	1924				15
RCMP, Bache Pen.	1926–32		35		8
Shackleton	1935	3	3		
RCMP, Craig Hbr.	1933–40		22		1
RCMP, Craig Hbr.	1953				5
Inuit, Craig Hbr.	1953–55		81		
TOTAL		248	172	1,085	308

\*Note: These are minimum numbers. Explorers also reported other kills, but numbers and specific locations were not provided so these references were not included in the tallies.

## Canada's Reoccupation of the High Arctic and Relocation of Inuit after 1951

Following the outbreak of the Second World War, the Ellesmere Island RCMP detachments were closed in 1940 and the island became officially uninhabited until the establishment of the High Arctic weather stations at Eureka and Alert between 1947 and 1950. Owing to heightened concerns arising from the extension of foreign influence in Canada's northern territories during the war, discussed in Chapter 14 of this volume by Matthew Evenden, the federal government also soon decided to re-establish a Mounted Police presence on the island. In 1951, the detachment at Craig Harbour was reopened and, two years later, the Mounties established another detachment at Alexandra Fiord in the area of Smith Sound, on Ellesmere Island's eastern coast. In 1953, the government relocated three Inuit families from Inukjuak, Quebec, and a family from Pond Inlet to Craig Harbour, and one family from each of the source communities to the new RCMP detachment at Alexandra Fiord. The concept was tied to notions of living off the land; indeed, the official rationale for the relocations was

to provide Inuit from Quebec with “new hunting grounds.” Samuel Arnakallak of Pond Inlet, head of one of the earliest families to be relocated, recalled that he and others had been told that game animals would be abundant at the new location. After their arrival, he found that it was true that marine mammals were more plentiful on Ellesmere Island than at Pond Inlet, but land mammals and other game were scarce.<sup>43</sup> A source of unhappiness for the relocated Inuit was the lack of variety in the diet available to them on Ellesmere Island, as they were obliged to eat seal meat almost exclusively in the first year.<sup>44</sup> Hunting in the initial period, especially during the long, dark winters, imposed heavy demands on hunters and their families. The Inuit discovered that animals were often few and far between or accessible only for brief periods. Owing to the scarcity of food, the men were obliged to hunt in all seasons.<sup>45</sup> Travelling was made difficult by variable sea-ice conditions. Due to ocean currents, leads opened in the ice of Jones Sound even during the winter and hunters were often thwarted from travelling, hampering food procurement.<sup>46</sup> The difficulties of hunting in the dark winters and the lack of hunting partners obliged men to take their spouses or children with them on hunting trips, a practice to which the Inuit from Quebec were unaccustomed.<sup>47</sup>

Between 1953 and 1955, Inuit at Craig Harbour harvested 83 caribou. They hunted these animals at various locations in the southern or southwestern areas of Ellesmere Island or adjacent land masses. Areas of particular focus included the Bjorne Peninsula and Graham Island, both comparatively abundant sites of caribou habitat, as well as sites adjacent to various fiords along the south coast. Muskox hunting continued to be off-limits, owing to the continuation of the 1917 ban on hunting this species. Larry Audlaluk, who moved to Craig Harbour from Quebec with his family in 1953, recalled that at that time federal authorities would not allow any hunting of muskoxen “unless in extreme circumstances like starvation.”<sup>48</sup> To Inuit who had been told that game was abundant on Ellesmere Island but were actually experiencing food shortages in the winter, these restrictions were difficult to accept.

## Changing Political Contexts, 1960s to Present

From the 1960s, at Grise Fiord as in other areas of the Arctic, Inuit resource use has been influenced by changing political contexts. In 1950, the federal franchise in Canada was extended to Inuit and by the following decade local resource users were beginning to become involved in the political process, often through grassroots initiatives. Much of this activity revolved around issues relating to wildlife procurement and its regulation, with hunters asserting their right to be involved in decisions affecting their subsistence and livelihood. In the 1960s, Inuit hunters began to challenge hunting restrictions drafted by faraway people who were not dependent on the country’s resources.<sup>49</sup>

One such example of imposed restrictions occurred shortly after the arrival of Inuit on Ellesmere Island in the relocations of the early 1950s (Figure 5.6). While accompanying Inuit hunting excursions in search of caribou, a RCMP officer insisted that the hunters harvest only male animals, not females and their young. Accordingly, the Inuit took only 20 percent of the caribou, culling the adult males from each herd they encountered.<sup>50</sup> Based on their own experience, Inuit believed that such an approach was unwise, as they believed members of caribou herds were interdependent and the death of the adult males would lead to the loss of the entire group. They wished to shoot all animals in a herd, rather than cull animals selectively. Ningiuk Killiktee, an Inuit special constable at Alexandra

**Figure 5.6** SAMWILLY ELAIJASIALUK WITH CARIBOU



This photograph of Samwilly Elaijasialuk handling a caribou carcass was one of a series of images of Inuit life at Grise Fiord taken by Robert Pilot when he was a constable at the local RCMP detachment. It shows the incorporation of caribou, among other mammal species, into the subsistence regime of Inuit there by the late 1950s.

*Source:* Photograph courtesy of Mr. Robert Pilot, Pembroke, Ontario.

shoot muskoxen. Samwilly related that, while a member of the settlement council, he spoke to a visiting federal representative: "You send us all the way here from our own settlement, Inukjuak, in the first place. Who do you think should live, Inuit or the animals? I want you to think about this."<sup>53</sup>

A further source of unhappiness was a series of proposed government experiments, such as the introduction of sport hunting into the region, developed without prior consultation with the aboriginal resource users. Previously, the restrictions had been inconsistently applied, as permits were occasionally issued to nonresidents to take muskoxen or other protected species. In May 1960, it was reported that a party from the Los Angeles Museum visited Eureka, on the west coast of Ellesmere Island, and shot four muskoxen on a permit.<sup>54</sup> The issue came to a head in 1967, when a series of federal actions relating to muskox and polar bear hunting spurred political action by Grise Fiord hunters to protect their interests. The proposed nonresident muskox kill had several components. Federal officials proposed that only male muskoxen would be harvested, as trophy animals were desired. Only

Fiord in this period, suggested that the partial hunting of only one or two members of a group would also make the others more wary, causing them to avoid feeding nearby. He stated, "The RCMP did not want us to finish off the caribou. They would tell us to leave some and I think they ran away."<sup>51</sup>

Anthropologist Milton Freeman later inferred that serious harm may have resulted from the selective culling of caribou groups. Noting the important social dynamics of caribou groups as interdependent units, Freeman suggested that the selective kill of bulls meant that the remaining animals were made more vulnerable to wolf predation and other risks. In consequence, caribou herds were severely curtailed in areas of southern Ellesmere Island and the northern coast of Devon Island after a period of only a few years.<sup>52</sup> Meanwhile, continued restrictions in muskox hunting coincided with winter food shortages in the community of Grise Fiord. In 1967, Samwilly Elaijasialuk reported that his brother and another hunter, Joalami, had been hunting for wolves in a blizzard and nearly starved because they could not

old solitary males should be killed, as they were assumed to be superfluous to reproduction. The muskoxen would need to be hunted in the vicinity of Grise Fiord, so that the community would benefit economically from the sport hunting. Meat generated by the kill would be given to the Inuit. A harvest of 12 animals per year was indicated, based on the assumption that this level would not affect muskox population levels. It was further asserted that the selective culling of muskoxen would enable the Peary caribou population to increase, as it was assumed that both animals fed on the same plant species.<sup>55</sup>

The Grise Fiord hunters argued that the government was mistaken in these assumptions. The Inuit pointed out that food was never a problem in the summer months, when it was proposed that the sport hunting would take place. Rather, they asserted their need to hunt muskoxen in the winter, when food shortages were most acute. As well, the meat of muskoxen shot in June or July was inedible.<sup>56</sup> More significantly, the Inuit stated that the scientific rationale for regulations requiring them to hunt only older bulls was faulty. They had observed empirically that older bulls, through their ability to sense and avert danger, were essential to protecting the young of the herds. Therefore, it would be better to hunt all the animals in a given herd, but to do so on a selective basis. In support of this position, the community submitted impressive documentation of 51 separate sightings of muskoxen as recorded by Grise Fiord hunters over the course of a year.<sup>57</sup> Simonie, representing the community, closed with a clear, simple statement:

This is what I want to say concerning muskox. We want to be allowed to hunt them right now with our reasons being: we do not get enough to eat during cold winters because during these times seals are very hard to get; yet muskox are plentiful. . . . The food that can be eaten by people is not always there; more often than not it is hard to get. Our land does not grow food like a garden. We are urging that we hunt muskox.<sup>58</sup>

In response to the protest, the Northwest Territories Council recommended to the federal government that the proposal for nonresident muskox hunting be withdrawn. Federal authorities acceded to this request. Subsequent biological research has apparently corroborated the Grise Fiord Inuit's interpretation of the implications of proposed sport hunting of muskox.<sup>59</sup>

Following the disputes of the 1960s, Inuit continued to hunt both species, as they incorporated the meat of both caribou and muskoxen in their diet, and used caribou antlers or muskox horns as materials for sculpture. Inuit women used caribou skins for various articles of clothing, and muskox hides for blankets and occasionally for clothing. For half a century, Inuit at Grise Fiord and other High Arctic communities have integrated caribou, and to a lesser extent muskoxen, into their way of life. As Peary caribou and muskoxen hunting were being reintegrated into their lifeways, however, new problems emerged to challenge their capacity to manage the ecosystem in which they operated. In 1979, following a series of biological studies on Peary caribou populations on western islands in the Arctic archipelago, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) recommended that Peary caribou be assigned the status of a threatened species. Applying various measures, COSEWIC defines a "threatened species" as "a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or

extinction,” while an “endangered species” is “a wildlife species that is facing imminent extirpation or extinction.”<sup>60</sup> The most recent COSEWIC report on Peary caribou, from 2005, gives all four distinct populations of them the status of “Endangered.”

A critical factor bearing on the management of this species includes the sociopolitical context, which has changed markedly since the 1960s. In addition to major shifts in social organization and material culture, demographic changes among Canada’s Inuit societies have been dramatic, with rapid increases in population far exceeding the Canadian average. Perhaps most pertinent for future environmental research are a series of constitutional changes obliging a completely different approach to wildlife management in the Arctic. The constitutional framework includes the land claims process involving the Tunngavik Federation of Nunavut and the federal government, leading to the Land Claim Settlement, the creation of the Territory of Nunavut, and the establishment of the Nunavut Wildlife Management Board (NWMB) and related institutions. Also connected to this process and part of the same negotiations was the establishment of the Quttinirpaaq National Park of Canada and a cooperative management regime for this and other national parks in Nunavut. A further legislative change bearing on Arctic wildlife management arrived with Parliament’s 2003 passage and the subsequent enactment of the *Species at Risk Act*, and its associated decision-making structures.

## The Role of Inuit Indigenous Knowledge and Western Science

Inuit indigenous knowledge in research and management activities is increasingly important in wildlife management, and supported by legally binding documents and agreements. According to the 2003 *Nunavut Wildlife Act*, all stewards of wildlife, including local hunters and trappers organizations, must be guided by Inuit *Qaujimaqatuqangit*, or “Inuit Knowledge of Old,” an aboriginal epistemology and worldview. In one recent definition, Inuit *Qaujimaqatuqangit* “is really about ‘healthy, sustainable communities’ regaining their rights to a say in the governance of their lives using principles and values they regard as integral to who and what they are.”<sup>61</sup> The *Nunavut Wildlife Act* also specifies that the local Hunters and Trappers Organizations (HTOs) “should play an important role in wildlife management.”<sup>62</sup> Specifically, the HTOs are empowered by the act to manage and regulate harvesting activities among their members, allocate and enforce basic needs levels within their communities, and assign any portion of their basic needs levels to nonmembers.<sup>63</sup> The act also obliges researchers to table their approaches with the HTOs, so that local resource users have an opportunity to comment on wildlife management strategies and techniques before they are implemented.

The new management structures give the Inuit greater control over the research questions that are being asked, the methods that are being used, and, most importantly, the interpretation of the results and the decisions that ensue. The Inuit are nevertheless still obliged to work in a cross-cultural environment and respond to ideas constructed according to different cultural paradigms, in a different geographical area and social–political context. A further layer of representation is the Nunavut Tunngavik Incorporated, the successor of the Tunngavik Federation of Nunavut, which is responsible for the management of all Inuit-owned lands in Nunavut.<sup>64</sup> Wildlife management



approaches are still highly constrained by western scientific approaches, but the recent political changes lay the groundwork for resource management decision making in the future.

In the specific case of the Peary caribou, when former Minister of the Environment Stéphane Dion in 2005 indicated his acceptance of the COSEWIC recommendation to list them as endangered in the High Arctic, the HTOs of the region voiced their opposition. Resolute Bay hunters asserted that the recommended listing was based on data from a limited part of the species range, which was largely true. For their part, Grise Fiord hunters argued that greater public education regarding the implications of hunting caribou was a better option than listing the species. The High Arctic communities were supported by both the Government of Nunavut and the Nunavut Wildlife Board, which asked the federal government to postpone listing the species “until such time as the residents of Nunavut have been adequately informed on how this particular listing might impact their lives and hunting rights.”<sup>65</sup> In response, the Minister postponed listing the species “in order to consult further with the Nunavut Wildlife Board,” although the Minister reserved the right to reconsider the matter after consultations on the Peary caribou have been completed.<sup>66</sup> Inuit are not the only Arctic aboriginal group to assert their right to be consulted in processes under the *Species at Risk Act*. Through the land-claims process, Inuvialuit co-management boards have also gained decision-making powers in the listing process.<sup>67</sup> Specifically, all species-listing reports must be reviewed by the relevant co-management board. How this process will work is not yet known, but it is assumed that the co-management boards will be the mechanism by which indigenous knowledge will be integrated into the decision-making process.<sup>68</sup>

Data collected under western rubrics continue to be relevant to this process, as in a recent Parks Canada Species at Risk project on the status of the Peary caribou in northern Ellesmere Island in the vicinity of Quttinirpaaq National Park.<sup>69</sup> Historical research in explorers’ records enables a reasonable inference that Peary’s harvests of the early 1900s may have exerted an enduring impact on Peary caribou in northern Ellesmere Island. Dramatic winter climatic events that have precipitated the large-scale winter mortality in western parts of the archipelago have not been recorded on the island, ruling out unusual sleet or snowfall levels as probable causes.<sup>70</sup> A plausible explanation is that hunting by explorers reduced the resident populations to very low numbers, which may have been further exacerbated by wolf predation.<sup>71</sup> Other possible explanations for the persisting low numbers in northern Ellesmere Island include changes in the productivity of the summer grazing ranges and a possible reduction in genetic diversity resulting from population losses, further impeding recovery. While these questions cannot be fully answered on the basis of current data, research on the genetic composition of caribou in northern Ellesmere Island is continuing, including DNA analysis of specimens brought back by Peary to the American Museum of Natural History in New York in the early 1900s, as well as recent samples of DNA extracted from caribou droppings in this area in 2004.

At a meeting dealing with the Peary caribou project in November 2003, members of the Hunters and Trappers Organizations of Grise Fiord and Resolute Bay indicated considerable interest in the historical data collected by Parks Canada, particularly the tabulations of numbers of caribou and muskoxen killed in the exploration era. However, the hunters also expressed the view that the species is not currently at risk in that region and that the numbers of caribou they have hunted have been within sustainable limits. Regarding specific research techniques then being considered by the Government of Nunavut, Inuit questioned the need for collaring of caribou to enable satellite

monitoring of their movements, citing evidence that stress induced by certain collaring techniques increases the risk of mortality for collared animals. Community members also expressed concern that the presence of researchers in their caribou hunting grounds might drive the animals away. They agreed with the potential value of continued research but requested that nonintrusive methods be followed. Further, the hunters expressed the view that Inuit knowledge should be integrated into the interpretation of scientific results obtained from studies relating to the northern part of the island.

At a second meeting with Parks Canada researchers, in March 2005, Inuit members of the Ivik Hunters and Trappers Organization at Grise Fiord elaborated on these perspectives. The hunters expressed the view that oscillations in the numbers of caribou were part of a natural cycle, and if in some years they were not numerous, the caribou would return in succeeding years. For example, Jarloo Kigugtak stated,

There are areas in which there are more caribou in some years, and other years in which there are less. If there is a temperature fluctuation in the fall, the ground freezes and it's hard for the animals to survive because the ground is frozen. I have read that lots of muskoxen starved and they would go to a different area after that happened but I think that they remembered what the grazing grounds were like and they would later return. People prematurely assumed that they had been depleted. Inuit would be blamed for that when in fact it was a natural occurrence.<sup>72</sup>

Larry Audlaluk, whose family was relocated to Craig Harbour in 1953, recalled hearing from elders that caribou came and went according to recurring natural cycles and suggested that this notion should be considered when structuring research studies in the High Arctic. Audlaluk asserted his belief that Peary caribou numbers were always limited in the region, so it was unclear whether the populations were in fact declining or were rather within the range of normal population sizes on Ellesmere Island.<sup>73</sup> While the empirical observations of Inuit regarding caribou on Ellesmere Island have yet to be corroborated by western science, it is interesting to note that caribou specialist Morton Melgaard identified recurrent fluctuations since the 18th century in six caribou populations covering the entire coast of West Greenland based on historical, ethnohistorical, and game statistical sources.<sup>74</sup>

In Canada, the status of Peary caribou as a prospective listed species remains unresolved. As of October 2006, the Government of Nunavut and Nunavut Tunngavik Incorporated could not agree on an approach to hunting of the species. Based on its assumption that High Arctic herds numbered about 1,000 animals, the territorial government proposed limiting the harvest to 66 animals, while the NTI asserted that more consultation was needed before setting limits.<sup>75</sup> To a significant degree, the issue of whether or to what degree hunting will change will ultimately turn on evidence. For either side to prevail in this debate will require presenting comprehensive data supporting their alternative interpretations of caribou numbers and the species' sustainability, as Inuit at Grise Fiord did during the muskox controversy of the 1960s. At the same time, ways will need to be found of navigating between the different forms of knowledge so that alternative ways of knowing can learn from and enrich one another.<sup>76</sup>

How this issue will play out is uncertain, but clearly Inuit knowledge will play an important role, not only in research about caribou and other Arctic species, but also in their future management. This discussion cannot extensively address the issue of how Inuit knowledge—or western knowledge—will be both legitimized and applied in addressing the conservation of northern wildlife. There is considerable diversity in the circumstances in which Inuit knowledge will apply, and the issue has emerged so recently that we lack general models or criteria for its application. Such models will necessarily emerge through collaborative research and management in localities and contexts. What can be stated with certainty is that new political requirements for participatory co-management will define not only the kinds of data that will be brought to bear on these matters, but also the ways in which local perspectives will be brought to bear in the interpretation of the data, and on wildlife management generally. Conservation specialists have argued that in this period of mutual learning, co-management will need to be flexible and experimental so that both local and government-level authorities can learn how to navigate between aboriginal and western knowledge.<sup>77</sup> How the western and aboriginal paradigms intersect in the future will have significant implications for both Inuit and the grazing animals of the High Arctic.

## Conclusion

Throughout Arctic history, animals have been central to the lifeways of all inhabiting groups, including the Inuit of today. In some regions, such as western Hudson Bay and northern Yukon, terrestrial grazing animals remain central to the subsistence of aboriginal peoples. In the High Arctic, caribou, while not the principal staple, is still incorporated into Inuit local subsistence and its procurement continues to be an important component of their identity as traditional resource users. In the current context of dwindling numbers of caribou in other areas and the desire of conservation groups and governmental authorities to restrict further hunting, it is an open question to what degree these animals will continue to play a role in Inuit subsistence strategies. These questions will likely turn on issues of sustainability, how it is defined, and whether it can be effectively implemented.

This matter is made more complex by different knowledge paradigms and the need for researchers to find ways of navigating between them. Over the last two decades, the knowledge of aboriginal peoples has emerged as a major issue in the research and management of northern wildlife. The possibilities of negotiating the intersections between Inuit indigenous knowledge and western ecological science offer exciting possibilities, although the lack of consistent models presents significant challenges to researchers. In some contexts, researchers have even questioned whether governments are truly committed to a dialogue on these issues or are more concerned with incorporating aboriginal knowledge within a western paradigm, wherein nation-states, under the rubric of Traditional Ecological Knowledge (TEK), seek to further extend state control of natural resource use at the expense of the interests of local communities and resource users.<sup>78</sup>

Whatever one's position in this debate, more is at stake than the fate of Arctic animals. The issue also bears on the future of the Inuit, who are continuing a tradition of occupation of the High Arctic by aboriginal hunting peoples stretching back more than 4,000 years. How Inuit indigenous knowledge will intersect with western science in terms of documenting and managing animal populations is not yet fully known, but clearly the resolution of these questions cannot be

separated from such political issues as local governance and principles of self-determination for aboriginal peoples—both given short shrift in earlier eras but increasingly important concepts within contemporary political discourse. If ways of navigating between these different but equally valid forms of knowledge are to be found, the answers will emerge through dialogue and relationship building between aboriginal people and scientists. The protection of High Arctic wildlife will require cooperation, sharing knowledge, and mutual learning between scientists and practitioners of Inuit indigenous knowledge.<sup>79</sup>

History, including environmental history, is not a hermetically sealed entity but rather a dynamic process extending from the past to the present and into the future. How the history discussed here will unfold will depend on finding answers to various questions. Can the Peary caribou be protected in ways that can enable continued hunting by resource users? Will ways be found to integrate indigenous knowledge and western ecology so that northern species at risk can be managed in a sustainable way for future generations? Will Canada's western societies respect the rights of aboriginal peoples to manage the resources on which they depend for subsistence and identity? The answers to these questions will clearly bear on the future status and lifeways of Inuit of the High Arctic and more generally aboriginal peoples across Canada's northern regions, as well as the natural environments in which they live.

## DISCUSSION QUESTIONS

1. What characteristics distinguish western science from Traditional Ecological Knowledge (or, in this case, Inuit indigenous knowledge)? In what ways are they similar? Why is it important to navigate between these different ways of knowing?
2. The author writes of “integrating,” “mediating,” and “navigating” the interfaces between western science and Traditional Ecological Knowledge. How are these terms different? How do they suggest different ways of dealing with cross-cultural matters?
3. Historically, what have been the goals of western science in undertaking endangered species research? What have been the goals of Inuit and other aboriginal communities in their observations of and interactions with these animals?
4. Can disputes be resolved when adherents of different ways of knowing see the environment in such different ways? How can the different ways of knowing be brought into a “both-and” rather than an “either-or” relation? What will adherents of these systems of knowledge each need to learn or do in order to move forward?
5. What obligations are implied or imposed by current political arrangements in the north?
6. What lessons of history, if any, can be learned from this historical case study?

## NOTES

1. Research for this chapter emerged from a series of projects carried out to document the human history of Ellesmere Island, and historical research components of Parks Canada's species-at-risk project on the Peary caribou, coordinated by Micheline Manseau. In addition to the valued collaboration and advice of

Dr. Manseau, I would like to thank the Iviq Hunters and Trappers Organizations of Grise Fiord, especially Jaypetee Akeagok, Jimmy Qappik, and Larry Audlaluk; the Hunters and Trappers Organization of Resolute Bay, especially Tabitha Mullin and Allie Salluviniq; Mayor Liza Ningiuk of Grise Fiord; and Mayor Susan Salluviniq of Resolute Bay. Much of this research was supported by the Western and Northern Service Centre of Parks Canada; the Nunavut Field Unit of Parks Canada; Quttinirpaaq National Park of Canada; the Polar Continental Shelf Project; and Parks Canada's Species at Risk Action and Education fund, a program supported by the National Strategy for the Protection of Species at Risk. The maps are adapted from the design of Jennifer Keeney, Parks Canada, Western and Northern Service Centre, Winnipeg. Earlier presentations of this research benefited from the review of Pippa Shepherd, Judy Toews, John McCormick, Barry Olsen, and Joanne Tuckwell. The comments and guidance of the editors, as well as two anonymous readers, were much appreciated. Thanks, as always, are due to Ron Frohwerk for his continued sound advice on matters of form and content.

The term "High Arctic" is generally used by scientists to refer to the Polar desert regions, corresponding to the "northern, most extreme portion of the Arctic tundra biome": Esther Lévesque and Josef Svoboda, "High Arctic," Mark Nuttall, ed., *Encyclopedia of the Arctic* (New York and London: Routledge, 2005), vol. II, "G–N," p. 863. A corresponding map of Arctic regions, based largely on vegetarian communities, includes most of the Arctic archipelago and adjacent areas of the mainland Arctic within the High Arctic zone: Mark Nuttall, ed., *Encyclopedia of the Arctic*, vol I, "A–F," p. 119. However, scientists acknowledge considerable diversity among ecosystems within the very broad regional classification: R. L. Jeffries, "Tundra, Arctic, and Subarctic," W. A. Nierenberg, ed., *Encyclopedia of Environmental Biology* (San Diego: Academic Press, 1995); and Arctic Monitoring and Assessment Program, *Arctic Pollution Issues: A State of the Arctic Environment Report* (Oslo: AMAP, 1997).

2. On "microhistory" as a subdiscipline in the field of history, readers are referred to Chapter 7 by Ruth Sandwell in this volume. See also Lyle Dick, "Microhistory: Does it Work?" Paper presented to the Canadian Historical Association, London, Ontario, June 1, 2005. Macrohistorical approaches are exemplified in the work of world historians, especially in such seminal works as Fernand Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II*, vols. I and II (Trans. Sian Reynolds) (New York: Harper Touchbooks, 1975).

3. Owing to problems inherent in the adjective "traditional," I have relied on another term in current usage—"Inuit indigenous knowledge"—to refer to the local knowledge of Inuit of their natural environment. Readers are referred to the discussion of the perspectives of Arctic aboriginal peoples on climate change in Henry Huntington and Shari Fox, "The Changing Arctic: Indigenous Perspectives," Carolyn Symon, Lelani Arris, and Bill Heal, eds., *Arctic Climate Impact Assessment* (Cambridge, UK: Cambridge University Press, 2005): pp. 64–65.

4. See, for example, Micheline Manseau, Branda Parlee, and G. Burton Ayles, "A Place for Traditional Ecological Knowledge in Resource Management," in Fikret Berkes, Rob Huebert, Helen Fast, Micheline Manseau, and Alan Diduck, eds., *Breaking Ice: Renewable Resource and Ocean Management in the Canadian North* (Calgary: Calgary, 2005): pp. 141–64.

5. The political issues arise from emerging contexts of governance and stewardship of animals in Nunavut. As discussed in this chapter, various principles of Inuit *Qaujimatuqangit* have been written into the *Nunavut Wildlife Act* and have also been integrated into a new governance structure, called Inuit *Qaujimajatuqangit* Katimajit, which is an external council providing advice to the government on the implementation of Inuit *Qaujimajatuqangit*. See [http://www.gov.nu.ca/cley/english/news/2003/sept08\\_03.pdf](http://www.gov.nu.ca/cley/english/news/2003/sept08_03.pdf). In terms of the scientific rationale, emerging studies are showing the value and

importance of Inuit *Qaujimagatuqangit* in documenting harvests, hunting intensity, consumption of country foods, and observed abnormalities in wildlife. See [http://www.wwf.ca/Documents/Arctic/nwha\\_eng\\_sp.pdf](http://www.wwf.ca/Documents/Arctic/nwha_eng_sp.pdf). Useful background on the ethical rationale for safeguarding the rights of aboriginal peoples in the context of developing conservation issues and policies is contained in several key documents produced for the World Conservation Union, such as Grazia Borrini-Feyerabend, Ashish Kothari, and Gonzalo Oviedo, *Indigenous and Local Communities and Protected Areas: Towards Equity and Enhanced Conservation—Guidance on Policy and Practice for Co-managed Protected Areas and Community Conserved Areas* (Cambridge, UK: IUCN Publications Services Unit, 2000), and Janvier Beltran, ed., *Indigenous and Traditional Peoples and Protected Areas: Principles, Guidelines, and Case Studies* (Cambridge, UK: IUCN Publications Services Unit, 2000).

Western science, as the still-dominant paradigm, apparently does not currently require a justification in official scientific circles in the manner of indigenous knowledge, although a blind adherence to any one way of knowing can be a major impediment to dialogue with practitioners or adherents of alternative epistemologies. My operative assumption here is that an optimal approach would acknowledge both aboriginal and western approaches to knowledge as essential to the study and management of Arctic ecosystems.

6. William Barr, *Back from the Brink: The Road to Muskox Conservation in the Northwest Territories* (Calgary: Arctic Institute, University of Calgary, 1991).

7. Elizabeth Hone, *The Present Status of the Muskox in Arctic North America and Greenland* (Cambridge, MA: American Committee for International Wildlife Protection, 1934); and William Barr, *Back from the Brink*, pp. 42–43.

8. J. S. Tener, *Muskoxen in Canada: A Biological and Taxonomic Review* (Ottawa: Canadian Wildlife Service, 1965).

9. See David R. Gray, *The Muskoxen of Polar Bear Pass* (Markham: Fitzhenry and Whiteside, 1987): pp. 107–11.

10. Lee E. Harding, “COSEWIC Assessment and Update Status Report on the Peary Caribou Rangifer tarandus pearyi and Barren Ground Caribou Rangifer tarandus groenlandicus Dolphin and Union Population in Canada,” prepared for Committee of the Status of Endangered Wildlife in Canada, 2004, <http://www.sararegistry.gc.ca> (accessed November 26, 2007).

11. J. S. Tener, *Queen Elizabeth Game Survey* (Ottawa: Canadian Wildlife Service Occasional Paper, no. 4, 1961) and the Environment Canada Species at Risk website at [http://www.speciesatrisk.gc.ca/search/speciesDetails\\_e.cfm?SpeciesID=823](http://www.speciesatrisk.gc.ca/search/speciesDetails_e.cfm?SpeciesID=823).

12. COSEWIC Assessment and Update Status Report on the Peary Caribou (Rangifer tarandus pearyi) and Barren-ground Caribou (Rangifer tarandus groenlandicus) (Ottawa: COSEWIC Secretariat, 2004): pp. 32–35.

13. Alexandra D. M. Taylor, “Inuit Qaujimagatuqangit about Population Changes and Ecology of Peary Caribou and Muskoxen on the High Arctic Islands of Nunavut,” M.A. Thesis in Geography, Queen’s University, 2005; M. A. D. Ferguson and F. Messier, “Mass Emigration of Arctic Tundra Caribou from a Traditional Winter Range: Population Dynamics and Physical Condition,” *Journal of Wildlife Management* 64 no. 1 (2000): pp. 168–78; M. A. D. Ferguson, L. Gauthier, and F. Messier, “Range Shift and Winter Foraging Ecology of a Population of Arctic Tundra Caribou,” *Canadian Journal of Zoology* 79 (2000): pp. 746–58; and J. P. Ouellet, D. C. Heard, and R. Mulders, “Population Ecology of Caribou Populations without Predators: Southampton and Coats Island Herds,” *Rangifer*, Special Issue 9 (1996): pp. 17–25.

14. Donald L. Hardesty, *Ecological Anthropology* (New York: John Wiley and Sons, 1977): pp. 21–46; John W. Bennett, *The Ecological Transition: Cultural Anthropology and Human Adaptation* (New York: Pergamon Press, 1975).
15. On this issue, see Donald L. Hardesty, *Ecological Anthropology*, pp. 43–44.
16. See the discussions in Karl W. Butzer, *Archaeology as Human Ecology: Method and Theory for a Contextual Approach* (Cambridge, UK: Cambridge, 1982): p. 290; and Lyle Dick, *Muskox Land: Ellesmere Island in the Age of Contact* (Calgary: University of Calgary, 2001): pp. 47–48. At the same time, as anthropologist Robin Ridington has argued, it is important not to reduce technology to a set of artifacts and tools, but rather, to view it more broadly as a complex of strategies encompassing knowledge of the environment (including topography, mineral resources, and seasonal changes), world views, and belief systems. While material items such as weapons, sleds, and boats are important artifacts of hunting cultures, an even more fundamental requirement is “the technique of being able to carry the world around in your head.” Robin Ridington, “Technology, World View, and Adaptive Strategy in a Northern Hunting Society,” *Canadian Review of Sociology* 19 no. 4 (1982): p. 471.
17. Robert McGhee, *Ancient People of the Arctic* (Vancouver: UBC, 1996): p. 48.
18. J. Lotz and R. B. Sagar, “Meteorological Work in Northern Ellesmere Island,” *Weather* 15 (1960): p. 398.
19. W. Dansgaard, S. J. Johnson, H. B. Clausen, and C. C. Langway, Jr., “Climatic Record Revealed by the Camp Century Ice Core,” Karl K. Turekian, ed., *The Late Cenozoic Glacial Ages* (New Haven and London: Yale, 1971): pp. 37–56. For a general reconstruction of the climatic history of Ellesmere Island as it bears on the human occupation and reoccupation of the High Arctic, see Lyle Dick, *Muskox Land*, pp. 26–30.
20. Eigil Knuth, *Archaeology of the Musk-Ox Way* (Contributions du Centre d’Etudes Arctiques et Finno-Scandinaves, no. 5) (Paris: École Pratique des Hautes Études, Sorbonne, Sixième Section, Sciences Économiques et Sociales, 1967): p. 17.
21. Thomas G. Stewart and John England, “Holocene Sea-ice Variations and Paleo-environmental Change, Northernmost Ellesmere Island, NWT, Canada,” *Arctic and Alpine Research* 15 no. 1 (1983): p. 12; see also R. G. Barry, Wendy H. Arundale, J. T. Andrews, Raymond S. Bradley, and Harvey Nichols, “Environmental Change and Cultural Change in the Eastern Canadian Arctic During the Last 5000 Years,” *Arctic and Alpine Research* 9 no. 2 (1977): p. 205.
22. Moreau S. Maxwell, *Prehistory of the Eastern Arctic* (Orlando: Academic Press, 1985): p. 305.
23. See Moreau S. Maxwell, *An Archaeological Analysis of Eastern Grant Land, Ellesmere Island, Northwest Territories* (Ottawa: Canada, Department of Northern Affairs and Natural Resources, Bulletin no. 170, 1960): pp. 75–76.
24. Milton M. R. Freeman, “Arctic Ecosystems,” David Damas, ed., *Handbook of North American Indians* (Washington, D.C.: Smithsonian Institution, 1984), vol. 5 “Arctic,” pp. 36–48.
25. Christian Vibe, “Arctic Animals in Relation to Climatic Fluctuations,” p. 13 ff.
26. See the discussion in Milton M. R. Freeman, Eleanor E. Wein, and Darren E. Keith, *Recovering Rights: Bowhead Whales and Inuvialuit Subsistence in the Western Canadian Arctic* (Edmonton: Canadian Circumpolar Institute and Fisheries Joint Management Committee, 1992): p. 47.
27. Guy Mary-Rousselière, *Qitdlarssuaq: l’histoire d’une migration polaire* (Montréal: Les Presses de l’Université de Montréal, 1980).
28. M. M. R. Freeman, “Effects of Petroleum Activities on the Ecology of Arctic Man,” F. R. Engelhardt, ed., *Petroleum Effects in the Arctic Environment* (London and New York: Elsevier Applied Science Publishers, 1985):

pp. 245–73; M. M. R. Freeman, “Renewable Resources, Economics, and Native Communities,” J. Green and J. Smith, eds., *Native People and Renewable Resource Management* (Edmonton: Alberta Society of Professional Biologists, 1986): pp. 29–37; and George Wenzel, *Animal Rights, Human Rights: Ecology, Economy, and Ideology in the Canadian Arctic* (London: Bellhaven Press, 1991).

29. Canada, Virtual Museum of Canada, “The Trail of Our Ancestors: Inuit Culture,” [http://www.daryl.chin.gc.ca/Inuit\\_Haida/inuit/English/Our\\_culture/country\\_foods/country\\_foods2/country\\_foods2.html](http://www.daryl.chin.gc.ca/Inuit_Haida/inuit/English/Our_culture/country_foods/country_foods2/country_foods2.html) (accessed November 4, 2007).

30. Robert J. Wolfe and Linda J. Ellianna, *Resource Use and Socioeconomic Systems: Case Studies of Fishing and Hunting in Alaskan Communities* (Alaska Department of Fish and Game, Division of Subsistence, Juneau, Technical Paper 61); cited in M. M. R. Freeman, “Effects of Petroleum Activities on the Ecology of Arctic Man,” p. 256.

31. Robert E. Peary, “Living Off the Country,” *Century Magazine* (October 1917): pp. 907–19.

32. Regarding Inughuit hunting technology, Peary’s Norwegian expedition colleague Eivind Astrup observed: “When we first arrived on these coasts in 1891, the chase [of caribou] was still carried on with the bow and arrow; at our departure in 1894 these were put away on the shelf; and the time is not far distant when they will be on view only in the glass cases of a few collectors.” Eivind Astrup, *With Peary Near the Pole* (London: C. Arthur Pearson, 1898): p. 135.

33. H. P. Steensby, “Contributions to the Ethnology and Anthropogeography of the Polar Eskimos,” *Meddelelser om Grønland*, 34, no. 7 (1910): p. 356.

34. Daniel D. Roby, Henning Thing, and Karen L. Brink, “History, Status, and Taxonomic Identity of Caribou (*Rangifer tarandus*) in Northwest Greenland,” *Arctic* 37 no. 1 (March 1984): pp. 23–30.

35. Larry Audlaluk, Unpublished notes on the text of the “Muskox Land” book manuscript, February/March 2001, p. 4.

36. Pertti J. Pelto, “Snowmobiles: Technological Revolution in the Arctic,” H. Russell Bernard and Pertti J. Pelto, eds., *Technology and Social Change* (New York: Macmillan, 1972): p. 185. This author’s discussion of snowmobiles at Grise Fiord was based on a report by Milton M. R. Freeman.

37. Corporal V. R. Vitt, Annual Report, Year Ending 31 December 1968, 6 January 1969, RG18, Accn. 85–86/048, vol. 55, File TA 500-8-1-5, Library and Archives Canada (LAC), p. 4.

38. Ibid, V. R. Vitt, Report re: Conditions Amongst the Eskimos Generally, Year Ending 31 December 1967, Grise Fiord Detachment, 15 January 1968, p. 5.

39. Roderick R. Riewe, Unpublished report entitled “Inuit Land Use and Occupancy in the Eastern High Arctic: Grise Fiord,” October 1974, RG85 M, Accn. 77803/16, File S17LR, “Grise Fiord,” LAC, p. 22.

40. Corporal V. R. Vitt, Annual Report, Year Ending 31 December 1968, 6 January 1969, RG18, Accn. 85–86/048, vol. 55, File TA 500-8-1-5, LAC, p. 4.

41. This inference bears further investigation. Hunting of both species on Ellesmere and adjacent islands continued during subsequent exploration forays by the explorers Frederick Cook (1907–08) and Donald MacMillan (1913–17; 1923; 1924).

42. See Lyle Dick, *Muskox Land*, Chapter 8, pp. 267–306.

43. Lyle Dick, *Muskox Land*, p. 435.

44. Interview with Anna Nungaq by Martha Flaherty, Inukjuak, PQ, 14 November 1989, Transcript of English translation by Martha Flaherty, Grise Fiord Oral History Project, Parks Canada (PC), WNSC (PC, WNSC) (Winnipeg), p. 8.



45. Interview with Tookilkee Kigugtak by Liza Ningiuk, Grise Fiord, Nunavut, 3 March 1991, Transcript of English Translation by Martha Flaherty, Grise Fiord Oral History Project, PC, WNSC (Winnipeg), p. 3.
46. "Anna Nungaq About Moving to Grise Fiord," *Inuktitut*, no. 49 (December 1981): p. 10.
47. Interview with Martha Flaherty by Lyle Dick, Ottawa, 27 February 1989, Grise Fiord Oral History Project, PC, WNSC (Winnipeg), Side. 1.
48. Larry Audlaluk, Unpublished notes on the text of the "Muskox Land" book manuscript, February/March 2001, PC, WNSC (Vancouver), p. 1.
49. For historical background on the process of settling of Inuit villages and associated social implications, see David Damas, *Arctic Migrants/Arctic Villagers: The Transformation of Inuit Settlement in the Central Arctic* (Montreal & Kingston: McGill-Queen's University Press, 2004).
50. Interview with Ningiuk Killiktee by Lucy Quasa, Pond Inlet, NWT, 18 May 1994, Transcript of English translation, Pond Inlet Oral History Project, PC, WNSC (Winnipeg), p. 12.
51. Ibid.
52. M. M. R. Freeman, "Traditional Land Users as a Legitimate Source of Environmental Expertise," in J. G. Nelson, R. D. Needham, S. H. Nelson, and R. C. Scace, eds., *The Canadian National Parks: Today and Tomorrow; Conference II: Ten Years Later* (Waterloo: University of Waterloo, 1979), vol. 1, Discussion, pp. 364–65.
53. Interview with Samwilly Elaijasialuk by Martha Flaherty, Inukjuak, PQ, Quebec, 15 November 1989, English translation by Martha Flaherty, Grise Fiord Oral History Project, PC, WNSC (Winnipeg), p. 2.
54. Constable P. Sims, Report "re: Game Conditions, July 1959–June 1960," Alexandra Fiord Detachment, 30 June 1960, RG18, Accn. 85-86/048, vol. 56, File TA-500-20-10-1, LAC, p. 4.
55. M. M. R. Freeman, "Traditional Land Users as a Legitimate Source of Environmental Expertise," pp. 356–57.
56. Northwest Territories Council, Debates, 34th Session, "Brief, Grise Fiord Hunters—Muskox Hunting," Tabled Document no. 13, (1967): p. 452.
57. Ibid, "Survey of Muskox Numbers in Jones Sound region, March 1966 to March 1967" [appended to Brief—Grise Fiord Hunters], pp. 461–62.
58. Ibid, p. 460.
59. M. M. R. Freeman, "Traditional Land Users as a Legitimate Source of Environmental Expertise," p. 357.
60. Government of Canada, Species at Risk Public Registry, "Glossary," [http://www.sararegistry.gc.ca/help/glossary\\_e.cfm](http://www.sararegistry.gc.ca/help/glossary_e.cfm) (accessed November 4, 2007).
61. Jaypetee Arnakak, "What is Inuit Qaujimagatuqangit? Using Inuit Family and Kinship Relationships to Apply Inuit Qaujimagatuqangit," *Canku Ota (Many Paths): An Online Newsletter Celebrating Native America*, Issue 27 (January 13, 2001), [http://www.turtletrack.org/Issues01/Co01132001/CO\\_01132001\\_Inuit.htm](http://www.turtletrack.org/Issues01/Co01132001/CO_01132001_Inuit.htm) (accessed November 4, 2007).
62. Nunavut, Sixth Session, First Legislative Assembly of Nunavut, Government Bill 35, *Wildlife Act*, Part I.1.n, p. 5.
63. Ibid, Section 167, p. 69.
64. See "About Nunavut Tunngavik Incorporated" in <http://www.tunngavik.ca/english/about.html> (accessed November 4, 2007).
65. *Canada Gazette*, 139, no. 15 (July 27, 2005), Registration SOR/2005-224 14 July 2005, "Species at Risk Act, Order Amending Schedules 1 to 3 to the *Species at Risk Act*," P.C. 2005-1342,

14 July 2005, <http://www.canadagazette.gc.ca/partII/2005/20050727/html/sor224-e.html> (accessed November 26, 2007).

66. *Canada Gazette*, 139, no. 15 (July 27, 2005), "Registration SI/2005-72," Species at Risk Act, "Order Giving Notice of Decisions not to add Certain Species to the List of Endangered Species," P.C. 2005-1343, 14 July 2005, Annex 2.

67. Inuvialuit are defined by Indian and Northern Affairs Canada as "Inuit who live in the Western Arctic." See [http://www.ainc-inac.gc.ca/pr/info/tln\\_e.html](http://www.ainc-inac.gc.ca/pr/info/tln_e.html) (accessed November 4, 2007). The role of co-management in implementing the Inuvialuit Final Agreement of 1984 is discussed in Fikret Berkes, Nigel Bankes, Melissa Marschke, Derek Armitage, and Douglas Clark, "Cross-Scale Institutions and Building Resilience in the Canadian North," *Breaking Ice*, pp. 227–29.

68. Micheline Manseau, Brenda Parlee, and G. Burton Ayles, "A Place for Traditional Ecological Knowledge in Resource Management," *Breaking Ice*, p. 155.

69. Parks Canada's Species at Risk project on the Peary caribou is a multiyear, multidisciplinary project to document the historical and current status of the Peary caribou on Ellesmere Island from pre-contact eras to the present. In addition to providing historical, archaeological, and ecological documentation and analysis of this species, a significant component of the project has been to engage Inuit resource users in developing both research strategies and in interpreting the results.

70. F. L. Miller, R. H. Russell, and A. Gunn, *Distributions, Movements and Numbers of Peary Caribou and Muskoxen of Western Queen Elizabeth Islands, Northwest Territories, 1972–74* (Edmonton: Canadian Wildlife Service Report Series no. 40, 1977); F. L. Miller, "Updated Status Report on the Peary Caribou—*Rangifer tarandus pearyi*," (Ottawa: Canada, COSEWIC, 1991); A. Gunn and J. Dragon, *Peary Caribou and Muskox Abundance and Distribution on the Western Queen Elizabeth Islands, Northwest Territories and Nunavut, June–July 1997* (Yellowknife: Department of Resources, Wildlife and Economic Development, File Report no. 130, 2000).

71. Micheline Manseau and Lyle Dick, "Peary Caribou and Muskoxen on Northern Ellesmere Island: Historical References for Assessing Modern Ecological Patterns and Processes," Unpublished research paper, Parks Canada, WNRC (Vancouver and Winnipeg, 2006).

72. Minutes of a Meeting of the Iviq Hunters and Trappers Organization with Parks Canada researcher regarding current studies on the Peary caribou, Grise Fiord, March 11, 2005. Parks Canada, WNRC (Vancouver).

73. Ibid.

74. See Morton Melgaard, "The Greenland Caribou: Zoogeography, Taxonomy, and Population Dynamics," *Meddelelser om Grønland, Bioscience*, 20 (1986): pp. 59–71.

75. "Peary Caribou: Endangered or Not?" *Siku News: Circumpolar News Service*, October 1, 2006, <http://www.sikunews.com/art.html?catid=5&artid=1994> (accessed November 4, 2007).

76. Fikret Berkes, *Sacred Ecology: Traditional Ecological Knowledge and Resource Management* (Philadelphia: Taylor and Francis, 1999).

77. See the discussion in Fikret Berkes, Nigel Bankes, Melissa Marschke, Derek Armitage, and Douglas Clark, "Cross-Scale Institutions and Building Resilience in the Canadian North," *Breaking Ice*, p. 228.

78. See, for example, Paul Nadasdy, *Hunters and Bureaucrats: Power, Knowledge, and Aboriginal—State Relations in the Southwest Yukon* (Vancouver: UBC, 2003).

79. As this publication went to press, the listing of the Peary caribou under the federal *Species at Risk Act* was still unresolved. On May 4, 2007, Environment Minister John Baird wrote to the Nunavut Wildlife Management Board to indicate his intention to take into account the COSEWIC assessment on the status of the Peary caribou and thereby initiate the process of having the Peary caribou listed as an endangered species. In response, Inuit hunters expressed serious concerns, and the matter of the status of the Peary caribou in the High Arctic was still unresolved in late 2007. See Stephanie McDonald, "Peary Not Endangered, Say Inuit Hunters," *Northern News Services* (Iqaluit), June 25, 2007. Meanwhile, representatives of the Department of the Environment and the Iviq Hunters and Trappers Association at Grise Fiord met several times to discuss a series of drafts of a High Arctic Peary Caribou Management Plan, which similarly had not enlisted the agreement of all parties and therefore remained unapproved as of late 2007. See [http://www.nwmb.com/english/events/ae/meeting12/DOE%20-%20Grise%20Fiord%20Peary%20Caribou%20Management%20Plan%206%20-%20latest%20-%20ENG\\_new.doc](http://www.nwmb.com/english/events/ae/meeting12/DOE%20-%20Grise%20Fiord%20Peary%20Caribou%20Management%20Plan%206%20-%20latest%20-%20ENG_new.doc) (accessed December 5, 2007).

## FURTHER READING

- Anderson, David G. and Mark Nuttall. *Cultivating Arctic Landscapes: Knowing and Managing Animals in the Circumpolar North*. Oxford and New York: Berghahn Books, 2004.
- Barr, William. *Back from the Brink: The Road to Muskox Conservation in the Northwest Territories*. Calgary: The Arctic Institute, 1991.
- Berkes, Fikret. *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Philadelphia, Pennsylvania: Taylor and Francis, 1999.
- Dick, Lyle. *Muskox Land: Ellesmere Island in the Age of Contact*. Calgary: University of Calgary Press, 2001.
- Freeman, Milton M. R. "Appeal to Tradition: Different Perspectives on Arctic Wildlife Management." Jens Brasted, et al., eds. *Native Power: The Quest for Autonomy and Nationhood of Indigenous Peoples*. Bergen: Universitetsforlaget, 1985, pp. 265–81.
- Manseau, Micheline, Lyle Dick, and Natasha Lyons. *People, Caribou, and Muskoxen on Northern Ellesmere Island: Historical Interactions and Population Ecology, ca. 4300 BP to Present*. Winnipeg: Parks Canada, Western Canada Service Centre, 2005.
- Nadasdy, Paul. *Hunters and Bureaucrats: Power, Knowledge, and Aboriginal–State Relations in the Southwest Yukon*. Vancouver: University of British Columbia Press, 2003.
- Preston, R. J. *Cree Narrative: Expressing the Personal Meaning of Events*. Montreal & Kingston: McGill-Queens University Press, 2002.
- Riewe, R. R. "The Utilization of Wildlife in the Jones Sound Region by the Grise Fiord Inuit." L.C. Bliss, ed. *Truelove Lowland, Devon Island, Canada: A High Arctic Ecosystem*. Edmonton: University of Alberta Press, 1977.