

Predicting and Controlling Caribou: Historic Indigenous Groups and Their Knowledge of the Beverly and Kaminuriak Caribou Herds in Northern Canada

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Abstract

Caribou herds in northern Canada supported historic Indigenous populations inhabiting the area, including Copper and Caribou Inuit and Dene and Chipewyan Caribou-Eater peoples. The ability of Indigenous groups to utilize caribou depended on comprehensive knowledge of caribou biology and behaviour. Successful hunters had answers to the following questions: When will caribou be within their seasonal ranges? Where might subherds be located within a given seasonal range? How many? What routes will they take migrating between ranges? What motivates migration to commence, and when? What motivates herd aggregation, and conversely splinter into subherds? How can natural land and climate features be utilized in trapping caribou? How can caribou's behaviour be utilized in the process of trapping them? How can humans interact with caribou to manipulate their behaviour? This paper examines two traditions of caribou hunting in northern Canada: herd-following by Dene and Chipewyan Caribou-Eaters, and herd-driving by Caribou and Copper Inuit. Knowledge of migration routes and caribou behaviour enabled a degree of predictability for Caribou-Eaters and Copper and Caribou Inuit, and herds were temporarily controlled through such strategies as caribou drives. Combined with multi-generational knowledge, this information may have provided enough data for these groups to have developed a conservation ethic that both met their physical needs and contributed to herd sustainability. Traditional knowledge is similarly being utilized in Aboriginal-led co-management strategies in the Canadian Arctic today.

Keywords: caribou; Nunavut; Beverly herd; Qamanirjuaq herd; Canadian Arctic; Indigenous; Copper Inuit; Caribou Inuit; Inuvialuit; Dene; Chipewyan; Caribou-Eaters; traditional ecological knowledge (TEK)

Introduction

The vast caribou herds ranging through northern Canada supported a number of historic Indigenous populations occupying the tundra and spruce forest tree line, including Copper and Caribou Inuit and Dene and Chipewyan Caribou-Eater peoples. Caribou provided immediate sustenance year-round for Caribou-Eaters who practiced herd-following, and during the spring, summer and fall seasons for Copper and Caribou Inuit who supplemented their winter food resources with caches of caribou meat. Caribou's utility as a material for clothing and shelter against the northern cold may have been even more important, a suggestion borne out by occasions on which Dene and Chipewyan Caribou-Eaters transgressed the ethical principle of using every part of an animal and not wasting --- observational accounts depict caribou being over-hunted and sometimes skinned and left to rot, once nutritional needs were met.(1-3)

The ability of Indigenous groups to utilize caribou depended on comprehensive knowledge of caribou biology and behaviour (4). Successful hunters had answers to the following questions: When will

caribou be within their seasonal ranges? Where might subherds be located within a given seasonal range? How many? What routes will they take migrating between ranges? What motivates migration to commence, and when? What motivates herd aggregation, and conversely splinter into subherds? How can natural land and climate features be utilized in trapping caribou? How can caribou's behaviour be utilized in the process of trapping them? How can humans interact with caribou to manipulate their behaviour?

This paper examines two traditions of caribou hunting in northern Canada: 1. herd-following by Dene and Chipewyan Caribou-Eaters, and 2. herd-driving by Caribou and Copper Inuit. Herd-following involves following herds throughout their entire annual range cycle, intersecting migration routes at different points and exploiting subherd groups occupying fringe areas of seasonal ranges. Herd-driving involves manipulating caribou behaviour and the environment to draw the animals into traps.

North American Caribou

Biologists differentiate three major caribou subspecies in Canada: Barren-ground (*Rangifer tarandus groenlandicus*), Woodland (*R. tarandus caribou*) and Peary (*R. tarandus pearyi*, classified as endangered). (5,6) Neither Woodland nor Peary subspecies are migratory, and will be excluded from discussion.¹

E.S. Burch (1991) identifies seven² migratory (Barren-ground) caribou herds ranging the latitudinal tree line from the west coast of Hudson Bay to Alaska: 1. Kaminuriak,³ 2. Beverly, 3. Bathurst, 4. Bluenose, 5. Porcupine, 6. Central Arctic, and 7. Western Arctic.(1) Historically, the Beverly and Kaminuriak herds supported Chipewyan and Dene Caribou-Eater peoples and Copper and Caribou Inuit.(1,3,4,7-9)

The Beverly and Kaminuriak caribou ranges encompass the eastern 'Barrenlands' south of the Arctic Circle, on a plateau comprising the Eastern Mackenzie and Keewatin Districts and northern Manitoba, Saskatchewan and Alberta (Figures 1 and 2). Tree line transects both ranges, separating tundra from boreal forest to the south. Tundra experiences cold climate, with mean monthly temperatures not exceeding 4°C except in July/August. Forest climate is milder, with more frost-free days. The forest receives more annual precipitation and snowfall than the tundra but experiences milder blizzards, and forest trees reduce wind speeds to 8-16 kms per hour. Ranging throughout the tundra during spring, summer and fall seasons, the Beverly and Kaminuriak herds retreat to the forest in winter for snow cover and insulation.(8) These herds have maintained the same ranges, migration routes and annual cycles from at least the 1400's.(1)

Figure 1. Map of the Beverly and Kaminuriak Caribou Ranges (showing tree line) (10, excerpted from)

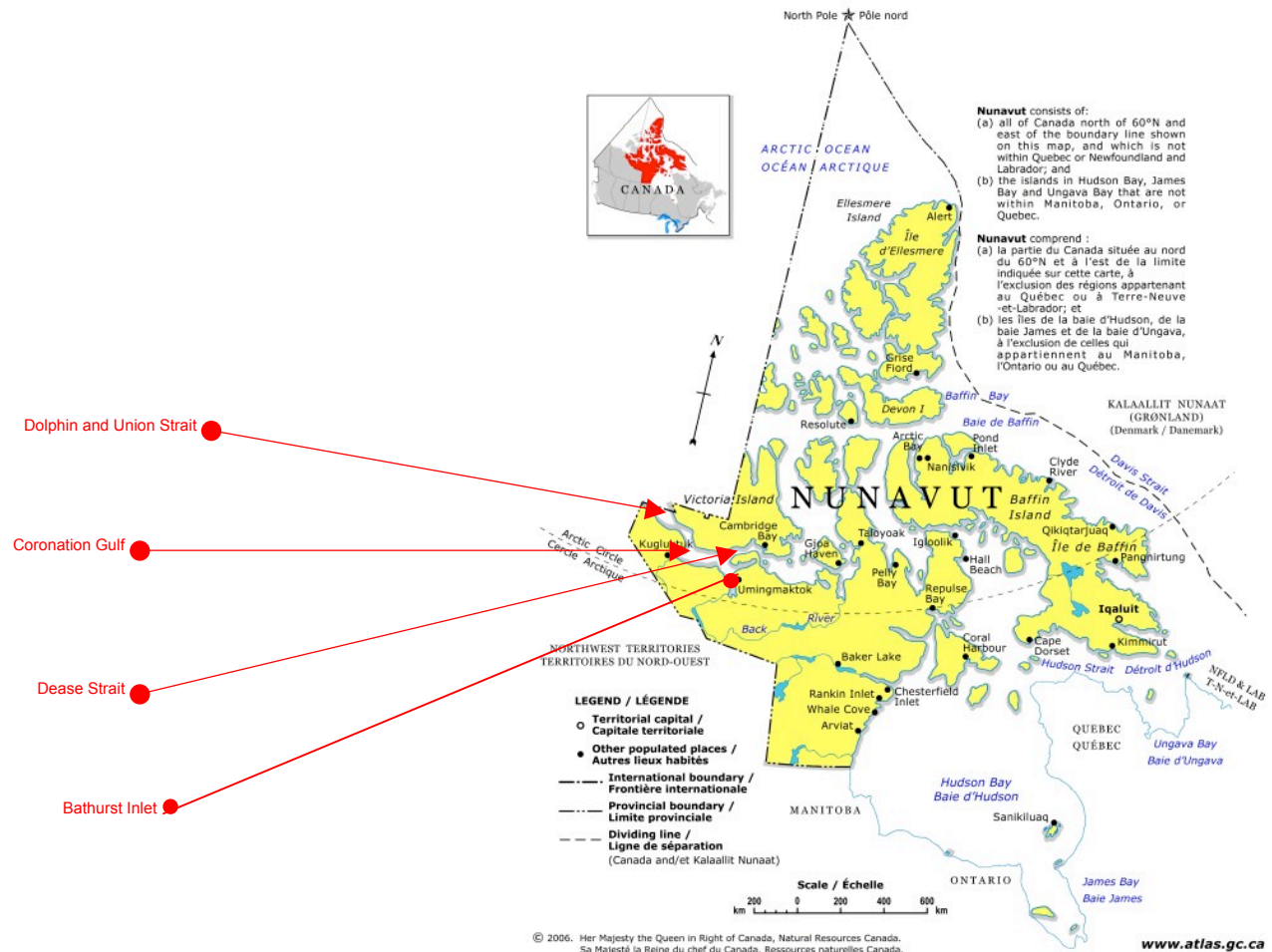


¹ The Dawson Caribou (*R. tarandus dawsoni*) is extinct. Traditionally they have been classified as Woodland Caribou, however genetic research suggests they are more closely related to Barren-ground Caribou. Although Peary Caribou are sometimes found in the northwest of Victoria Island, and conceivably were hunted by Copper Inuit, Peary Caribou were neither migratory nor did they form substantial herds (i.e. they are/were normally scattered through an area).(5)

² Some evidence supports another discrete herd - the Ahiak - though its range overlaps with the Beverly, Bathurst and Dolphin and Union (Peary) herds.(6)

³ Spelled 'Qamanirjuaq' by the Beverly and Qamanirjuaq Caribou Management Board, and Aboriginal-led co-management group.

Figure 2. Map of Nunavut (also showing Hudson Bay) (11, excerpted from)



Winter freeze-up begins in September, and by December 1st lake ice is two metres thick. Spring and early summer (April/May/June) bring ice break-up and more daylight.(8) This increased sunlight triggers hormonal changes in pregnant caribou cows (photoperiodism) that motivate herd migration to calving grounds (i.e. summer ranges) (Figure 1) by May or early June.(8) B.C. Gordon (1996) suggests the caribou's habitual return to calving grounds involves a homing capacity and phylogenetic imprinting compelling a herd past familiar landmarks.(8) However, Gordon also notes migration routes may alter somewhat over time, though specific calving grounds remain the constant destination,(8) perhaps indicating that the suggested homing capacity is more attuned to direction rather than to landmarks. During spring migration, herds splinter into subherds, some of which will come to occupy the southern edge of the summer range. Herds regroup in August and head back towards the tree line and their winter range. Near the tree line in September/October, they fragment into rutting subherds, which then proceed to the forest for winter.(8)

Summer ranges at one time extended north throughout Bathurst Inlet, north of Nunavut, which served as a major calving ground. Herds reached as far as Victoria Island, north of Bathurst Inlet, in the late spring, crossing Coronation Gulf, Dease Strait and Dolphin and Union Strait, which are frozen nine months of the year (Figure 2).(1,4) Today, caribou are scarce on Victoria Island and in Bathurst Inlet.(8)

Historic Herd-Dependent Populations

Victoria Island and the adjacent mainland proximal to Coronation Gulf form the region occupied by the historic Copper Inuit, the westernmost group of Central Inuit.(4,8) J.W. Brink (2005) identifies them as descendents of earlier Thule⁴ culture, giving the Copper Inuit a relatively recent place in the region, approximately the past 800 years.(4) Archaeological and ethnographic evidence supports caribou hunting on Victoria Island through the historic period back to at least the Thule era.(4) Copper found at archaeological sites north of the tree line, supported by historic accounts of Inuit camps in the interior, suggested to Gordon (1996) that some Copper Inuit people traveled south and transitioned into Caribou Inuit.⁵(8)

Caribou Inuit first settled along the west coast of Hudson Bay above the forest, living in seasonal camps on lakes and rivers in the interior to hunt caribou during summer and fall. A caribou shortage on the coast in the late 18th century motivated resettlement further inland, to hunt caribou and to subsist on muskoxen which were present year-round.(7)

The Caribou Inuit's move inland was facilitated by the Chipewyan and Dene Caribou-Eaters⁶ – traditional occupants of this region – retreating permanently to their winter forest grounds north of Manitoba due to the pressures of disease and the fur trade, as well as the growing impediment posed by Caribou Inuit occupying their summer ranges.(8,9) Archaeological evidence suggests the Chipewyan's retreat did not conclude until the 20th century.(1) For about 2000 years prior, Caribou Eaters followed herds throughout their entire annual ranges, providing them with year-round access to this animal resource.(8) The presence of Caribou-Eaters in the forest meant the herds' winter ranges were inaccessible to the Caribou Inuit, preventing year-round herd-following, which hindered them in becoming fully Arctic-adapted.⁷(8)

The Importance of Caribou Meat and Hides

Caribou was the primary food source for Chipewyan and Dene Caribou-Eaters and Caribou Inuit.(1,8,9) Caribou meat provides more calories than moose meat, for instance, and provides better quality nutrients because caribou eat lichen and grass, whereas moose, feed on willows; caribou tastes better, for the same reason.(14) For Caribou Inuit, muskox were available year-round on the tundra, but caribou provided the more substantial portion of the diet even in the winter when only cached caribou meat was available.(7)

For all groups discussed in this paper (particularly the Caribou and Copper Inuit), caribou was an essential source of material for clothing and shelter, to protect from the northern cold. Hides are at their optimal condition in late summer and fall, when holes from spring and summer insect larvae have healed.(4) N.D. Meeks and C.R. Cartwright (2005) analysed samples of hair from caribou clothing in the British Museum. Scanning electron microscopy showed hair round to oval in shape, with an outer surface of overlapping scales that allows for both rigidity and flexibility. Grooves and ridges formed by the scales trap air that provides insulation.(15) Transverse sectioning of the hair revealed a unique open cellular structure, which provides insulation and is impervious to water. Ultra-thin cell walls provide negligible heat conduction.(15) Caribou hair is lightweight, and is made from strong keratin which retains its form when processed by humans.(15) Caribou hides are thus ideal for the Canadian north. Traditional Inuit winter outfits consist of an inner and outer parka, with the inner layer turned inwards, and the outer layer turned outwards. Air trapped between the layers and the body provide very efficient insulation.(15)

⁴ Thule people arrived in Alaska around 500 A.D. and reached Nunavut around 1000 A.D. A subgroup continued east to Greenland. In the 13th-14th centuries, some Thule people migrated south from Nunavut, to the area currently and historically occupied by the Central Inuit.(12,13)

⁵ Gordon outlines several other theories put forth to explain the origin of the Caribou Inuit: The primitiveness of their tools suggest they had occupied the Barrenlands for centuries; they may have had a northern link with the Netsilik Inuit (nomadic seal hunters) occupying Boothia Peninsula and King William Island; or, eastern proximity and contemporaneous surface dwellings shared in common with Hudson Bay coastal Inuit suggest a possible connection.(8)

⁶ The Chipewyan Caribou-Eaters comprised the most eastern segment of the general Chipewyan population.(1)

⁷ Successful adaptation is only possible if a population has access to alternative food sources. After moving inland from the Hudson Bay coast, the Caribou Inuit lost access to marine resources; and since they did not have year-round access to the caribou herds, they had to rely on scarce muskox, which were present year-round on the tundra, and on caches of (rancid) caribou meat from previous seasonal kills.(3,8,9) This strategy proved unsuccessful, however, eventually leading to adaptive failure, starvation and eventual relocation back to coastal settlements in the 1950's.(9)

The Herd-Following Tradition

In 1972, Burch postulated that caribou herd-following was impossible for humans because, given the distances and speeds traveled by herds during migration, humans would not be able to keep up.(1,16) Burch highlighted that the Kaminuriak and Beverly herds travel 120-400 kms during spring migration, at speeds of 7-24 kms per day; during summer migration, speeds can reach 65 kms per day.(1) In comparison, Samuel Hearne and Father Alphonse Gasté⁸, who traveled with Chipewyan hunters (Hearne, through all seasons, 1769-1772; Gasté, through spring, summer and fall seasons, 1870), estimated maximum travel speeds of 13 kms per day for summer and 11 kms per day for winter for the hunters.(1,17,18)

In 1976, Burch restated his original postulation as referring to 'herd accompaniment', and defining 'herd-following' wherein 'herd' refers to breeding population.⁹(1) Burch describes:

"People who follow the herds do not attempt to keep up with a specific set of animals but move in a timely manner from the winter range of the breeding population in the [forest] to its summer range on the tundra (and vice versa)"... The idea is to get to the animals' ranges, and locate bands of animals that roam."(1: p 440)

Burch was describing hunters targeting those caribou occupying the periphery of seasonal ranges and migration routes (for instance, those descending the plateau to seek relief from summer heat and insects). Caribou-Eaters followed the annual cycle of herd movement, some following as far as Coronation Gulf.(1) Knowledge of climatic and biological catalysts for caribou migration, consistent herd migration routes (8) and ranges (1,8) enabled herd-followers to predict where herds and subherds would be at a given time, and knowledge of herd fragmentation patterns and behaviour (8) enabled hunters to predict where roaming subherds or individuals might appear at the edges of the seasonal range and migration routes.

During summer migration, Caribou-Eaters were unable to keep the herds in sight, but rather followed their tracks. Reaching the edge of the summer range, they spread out into smaller family groups to hunt. During migration south to the herds' winter ranges, hunters waited ahead of the animals, above the tree line, and ambushed them on-route.(1,9) No archaeological evidence exists suggesting Caribou-Eaters cached food. Rather, they utilized forest resources to survive the harsh winters, and after permanent settlement in these winter ranges in the late 1800's, ambush-hunting replaced herd-following entirely.(8)

The Herd-Driving Tradition

Victoria Island's (Figure 2) landscape consists of permafrost tundra and small ponds, lakes and rivers which are frozen nine months of the year. Seal meat comprised the most substantial component of Copper Inuit diet and was abundant year-round, supplemented by caribou, occasional muskox and seasonal fishing. The island's vegetation consists of reindeer moss, grass and flowers. Hills create natural channels in various parts of the island, which were a critical component in constructing caribou drive systems.(4) At the time caribou drive systems were used, large numbers of caribou could be predicted to cross from the mainland each year, as Victoria Island comprised a calving ground.(4) Herds remained on the island until fall, allowing Copper Inuit access while hides are at their optimal condition in late summer and fall.(4)

Brink (2005) reports on two archaeological sites – Eggington and POD – on the northwest side of Ferguson Lake, a 75km long inland lake 50 kms north of Cambridge Bay. Both sites contain evidence of caribou drive systems believed to have been used by the Copper Inuit, and which may date to the Thule era.(4) Stone cairns – inuksuit¹⁰ – at these sites consist of one or two rocks placed on top of high points of local bedrock; or of large single boulders not usually found locally, suggesting they were imported. Some are topped with moss, emulating a human head. Some have arm-like sticks that were draped with clothing, human hair or strings of bones or stones. Sticks placed between inuksuit were draped with seagull skins.(4) Draped clothing and skins fluttered in the wind, and strings of bones clattered against the stone. Poor

⁸ Hearne was a Hudson's Bay Company employee; Gasté was a Roman Catholic Missionary stationed at Brochet, Lac Caribou.(1,17,18)

⁹Breeding population: "... the members of a herd in this sense may aggregate from time to time, but usually they are dispersed in a variable manner over the herd's range for most of the year." (1:p 440)

¹⁰ 'Inukshuk', singular; 'Inuksuit', plural. Similar stone cairns resembling humans have been used by Arctic hunters in Greenland and Alaska.(4)

eyesight¹¹ combined with innate curiosity would have drawn caribou closer to investigate these movements, sounds and structures.(4)

The Eggington and POD drives were constructed downwind in seasonal prevailing winds from open areas where caribou grazed, or hidden below ridges where caribou sought relief from insects and summer heat.(4) Smell is caribou's main defense against predators, and so they tend to walk into prevailing winds. Locating drives downwind was advantageous as it concealed hunters and traps. Herd beaters (normally women, children and the elderly) moved behind (upwind from) grazing herds or intercepted caribou travelling on ridges; the smell and loud noises they made started the caribou towards the drives.(4)

Caribou coalesce when threatened by predators, and in response to natural barriers. The Eggington drive incorporated a funnel between a hillside and a line of inuksuit, through which hunters directed caribou towards spearing pits at the end and along the sides of the funnel (Figure 3). The POD drive consisted of two converging lines of inuksuit forming a funnel, similarly directing caribou towards spearing pits. The POD drive narrowed to an endpoint where closely placed inuksuit formed a solid rock wall (Figure 4).(4) Using inuksuit meant fewer hunters were needed to contain caribou as they were funneled through the drive, so that the number of hunters actually killing caribou could be maximized.(4)

Figure 3. Eggington drive(4)

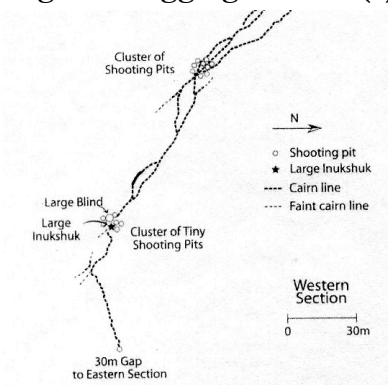
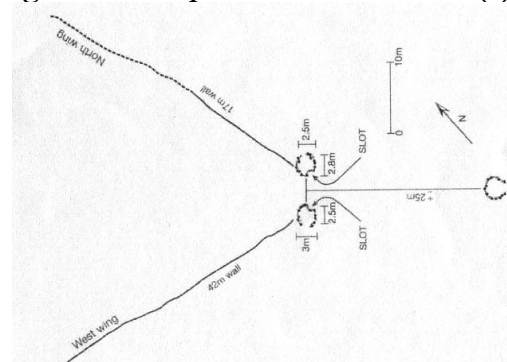


Figure 4. End portion of POD drive(4)



Both drives incorporated a lakeshore downslope, which functioned in two ways: 1. caribou innately flee to lakes and rivers when threatened by predators;¹² and, 2. caribou are top-heavy animals and have difficulty turning or stopping when running, particularly when galloping downhill.(4) Ferguson Lake would have served as a stimulus drawing frightened caribou towards the drive funnels; once running they would have had great difficulty changing direction. Additionally, fluttering clothing and clattering stones and bones on the inuksuit would have deterred the caribou from breaking through the funnel.(4)

Brink's (2005) excellent article (4) provides much greater detail, but the above description demonstrates how the Copper Inuit's comprehensive knowledge of caribou physiology, behaviour and migration patterns, and their use of natural features of land and seasonal prevailing winds, enabled them to predict, direct and control caribou herds to contain and kill them in large numbers.

Farther south, Caribou Inuit utilized stone cairns in a similar manner, constructing single lines along slopes to lead caribou to lakes and rivers, where hunters waited in kayaks with spears. Many drives were located at known river crossings along migratory paths.(5) Essential hunting activities involved spotting herds and signaling others so that kayaks could be in place. These tasks were carried out by men, while surrounding and driving the herd was the responsibility of women, children and the elderly.(3,7)

Fall was the most important hunting season as hides at their best and meat could be cached for winter. However, as previously noted, caching was not a sustainable strategy. By late winter/early spring,

¹¹ Though caribou can see for great distances, they cannot clearly distinguish details or sense danger from sight.(4)

¹² Caribou have large splayed hooves that make them excellent swimmers, and that provide good traction on ice.(4)

caches were depleted and caribou had not yet returned.(7) Although muskox were presence year-round, archaeological representation of muskox at sites suggests their availability was nonetheless limited.(7)

Conclusion

Hearne and Gasté reported Caribou-Eaters killed and skinned hundreds of caribou and left them to rot when the sole objective was collecting hides.(1,17,18) William Turner's account of his 1780 journey with the Labrador 'Eskimos' – who shared hunting and food caching practices in common with the Caribou Inuit – describes whole caribou carcasses being thrown into rivers, with only the skins preserved.(3) F. Berkes describes how the decline of caribou in the early 1900's was attributed by the Chisasibi Cree of James Bay¹³ to their own ethical transgression of overhunting.(2) The Gwich'in of the Northwest Territories¹⁴ similarly maintain an ethic against overhunting and wasting.(14) It is unclear whether Dene and Chipewyan Caribou-Eaters and Copper and Caribou Inuit generally operated with a similar ethic. R.K. Nelson (1982) hypothesized that *"a natural response is not to limit harvest intentionally, but the precise opposite – take as much as possible, whenever possible, and store the proceeds for later use."*(19:p 223)

F. Berkes (1999) describes caribou numbers as being unpredictable, and that caribou are not under the local control of Indigenous groups, factors which would hinder the development of a conservation ethic.(2) However, this hypothesis reminds us that scientific knowledge is lacking, since science has not yet obtained a complete dataset on caribou population cycles.(2) Knowledge of habitual migration routes and consistent caribou behaviour enabled a degree of predictability for Caribou-Eaters and Copper and Caribou Inuit, and herds were temporarily controlled through such strategies as caribou drives. Combined with multi-generational knowledge, this information may have provided enough data for these groups to have developed a conservation ethic that both met their physical needs and contributed to herd sustainability.

Co-management strategies today demonstrate the strength and value of Indigenous knowledge in the absence of complete scientific data. The Aboriginal-led Caribou Management Board (CMB) is a good example. In response to biologists' predictions of population declines amongst the Beverly and Kaminuriak herds in the early 1980's, the CMB undertook a census employing scientific strategies but from an Indigenous starting-point: Aerial photography, studies of herd recruitment, distribution, overlap, and mixing, and harvest studies were conducted by Indigenous communities.(21,22) This strategy enabled the CMB to utilize Indigenous groups' diachronic data that herd populations were sustainable sizes and increasing.(21) Integration of scientific methodology enabled the CMB to collect scientific data that supported Indigenous claims that low populations at the southern end of winter ranges were not indicative of total herd size.(21) Most importantly, this data allowed governments to make evidence-based decisions to refrain from imposing hunting restrictions.(21) The Porcupine Caribou Management Board similarly integrates scientific and Indigenous perspectives and methodology in its management strategies.(20)

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¹³ Berkes notes the Chisasibi Cree, though not caribou specialists, engaged in communal caribou hunting in the winter, targeted at individual caribou rather than at migratory herds. The Chisasibi Cree utilized fenced corrals constructed in a similar fashion as the drives used by the Dene Caribou-Eaters and the Inuit. Trees with human-like appearance in the landscape near the corral served a similar function as surrounding caribou, i.e. to direct them towards the corral.(2)

¹⁴ The Gwich'in were not herd-followers, but did have access to the Porcupine caribou herd.(20) Long ago, the Gwich'in hunted in similar fashion as the Caribou Inuit, intercepting migratory herds at river crossings. Today and in the past, the Gwich'in hunted using caribou 'surrounds' similar to the corrals used by the Chisasibi Cree.(14)

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