

Adult female muskox with calf, Bathurst Island, N.W.T., summer 1973. Photograph by David R. Gray, National Museum of Natural Sciences, Ottawa.

Muskox and Man in the Central Canadian Subarctic 1689-1974

ERNEST S. BURCH, JR.¹

INTRODUCTION

Muskoxen are thought to have played but a minor part in the lives of the aboriginal populations of southern Keewatin and northern Manitoba (Wilkinson 1975 pp. 27-31). Indeed, the species is scarcely even mentioned in ethnographic works on the area. The anthropological conception is consistent with the biologists' view that muskoxen "never have been very numerous" on the west coast of Hudson Bay (Allen 1913). Finally, the few muskoxen thought to have lived in the area are supposed to have been exterminated through the "combined effect of fur trading and firearms" (Tener 1958), that is, as a direct result of contact with Europeans. In the present paper the above views are challenged, and evidence presented in support of an alternative set of conclusions.

SOURCES

This study is based primarily on library and archival research, supplemented by field studies carried out by the author (Burch 1968) and by Thomas C. Correll (Correll 1970-71).

The sources referred to on muskox distribution and harvest in southern Keewatin and northern Manitoba for the period extending from 1689, when muskoxen were first observed in the study area by Europeans, to 1900, are the following (see References):

- 1689-1717 Davies 1965; Douglas and Wallace 1926; Doughty and Martin 1929; Tyrrell 1931.
- 1717-1792 Ellis 1748; Hearne 1795 pp. 4, 31, 135-9; HBC: B42/a/series; Swaine 1784; Williams 1969.
- 1792-1820 Franklin 1823; HBC: B42/a/series; Sabine 1823.
- 1820-1860 Anderson 1940, 1941; HBC: B42/a/series, B42/e/series; King 1836; Parry 1824; Rae 1866; Richardson 1829; West 1824.
- 1860-1900 Clifton 1933; Ferguson 1938 pp. 132, 136, 169, 174; Gilder 1881; Hanbury 1904 pp. 4, 6, 11-13; HBC: A12/Ft. Misc./258, B42/a/series, B42/b/series, B42/c/series, B239/d/1460, B239/h/series; McTavish 1963; PAC: RG 45; Preble 1902; Ross 1975 pp. 52, 66, 67, 69, 77, 78, 103, 109; Stackpole 1965; Tener 1958; Tuttle 1885; Tyrrell 1897; Tyrrell 1898.

¹Mechanicsburg, Pennsylvania, U.S.A.

The data from the late seventeenth, the entire eighteenth, and the early nineteenth, centuries are mostly of a general nature, but also include occasional specific items of information concerning muskoxen, people, or both. The quantity and the quality of the data improve considerably after 1820. Most of the information from the nineteenth century was obtained from the Hudson's Bay Company Archives.

The relevant sources, as indicated above are too numerous — consisting as they do of several hundred items — to be cited in detail. It is appropriate therefore to indicate something of the nature of the information contained in them. Most of it is to be found in lists of returns, journals, correspondence and district reports relating to the operations of the Churchill post, which was founded in 1717. These records include two basic types of information. One type is straightforward statistical data on the number of muskox hides traded to the Company; these have been partially summarized by Tener (1958). Much more valuable is anecdotal information contained in the journals and letter books, which never have been examined before with regard to this specific subject. A few examples of relevant journal entries are presented below for purposes of illustration, by permission of the Hudson's Bay Company.

[12 August 1762, regarding some Eskimos encountered at the outlet of Baker Lake] They had nothing to Trade but a great quantity of Stinking Bufalows [muskox] flesh, which was not fitt for us.

(HBC: B42/a/58 — folio 15d)

[17 March 1793] Two Northward Indians [Chipewyan] arrived with 117 lbs. of Buffalo [muskox] meat & two Beavers. They were of the party that left the Factory [Churchill] the 1st. of January & have been tenting within 4 days walk of here ever since. They say the Buffalo had been very plenty about them.

(HBC: B42/a/118 — folio 13)

[26 April 1824] Three more of our Homeguard Northd Indians [Chipewyan] arrived [at Churchill] brought 100 lbs. of green Musk ox meat and 5 Musk ox skins. They left their furs with their families about three days walk from hence when they fell in with a Herd of Musk oxen out of which they killed 18.

(HBC: B42/a/151 — page 29)

[26 November 1831] A party of 8 Chepaweyans arrived at 11:00 A.M. They have been 16 days on their route here and complain of the scarcity of deer. They have lately killed in all 40 musk oxen.

(HBC: B42/a/159 — folio 16d)

[7 April 1876] I had four sleds of Marble Island Esquimaux in this winter they brought over 300 white Foxes 31 Musk-ox Robes some wolves etc.

(HBC: B42/b/62 — folio 43d)

[21 May 1895] ... An Eskimo arived [at Churchill] from the north with seven Musk ox ...

(HBC: B42/a/196 — folio 8d)

The sources on muskox distribution and harvest in southern Keewatin and northern Manitoba since the beginning of the twentieth century are the following (see References):

1900-1917 Boas 1907; Borden 1903-04; Burch 1968; Comer 1913; Critchell-Bullock 1913; Hanbury 1904 pp. 11, 39-40, 86, 87; HBC: A12/Ft. Misc./207, B42/a/series, B401/a/series, B42/

b/series; Leden 1927; Low 1906; PAC: RG 18, RG85/vol. 1044 (file 540-3, Pt. 1); Ross 1975 pp. 68, 73, 109-10, 147; RCMP 1905, 1907, 1908, 1909, 1910; Stackpole 1969 p. 62; Tener 1958; Tyrrell and Fairchild 1902.

1917-1960 Anderson 1930; Birket-Smith 1929 pp. 112, 134; Birket-Smith 1933; Burch 1968; Clarke 1940; Correll 1970-71; Critchell-Bullock 1930 p. 188; Harper 1956, 1964; Hoare 1930; Hornby 1934; Kelsall 1953; PAC: RG85/vols. 786, 953, 1045 (files 540-3, Pts. 3 and 4), 1085, 1119, 1249; Rasmussen 1930b p. 157.

1960-1974 B.I.N.S. 1975; C.W.S. 1972.

Most of the information from this period was obtained either from native informants or from published and (particularly) unpublished records of the Royal Canadian Mounted Police and the (former) Northern Administration Branch of the Government of Canada. These sources contain a wide variety of data, ranging from annual reports on game conditions in particular districts to complaints against Eskimos illegally killing muskoxen. Combined with the standard published works, the Hudson's Bay Company material, and the reports from native informants, these data make it possible to construct a general picture of interaction between muskox and man in the central Canadian Subarctic over a period of nearly 300 years.

THE STUDY POPULATIONS

The area of concern in this paper comprises what is now the southern portion of the District of Keewatin, N.W.T., and the northern portion of the Province of Manitoba. The area is bounded by Hudson Bay on the east, the Churchill River drainage on the south, and the Thelon River system on the north and west (see Fig. 1). The human geography, physical geography, and history of this region have been summarized in Beals (1968).

The populations of concern in the present study include one prey species, the muskox, and one predator species, man. The latter, in turn, has been represented within historic times by three cultural groups — Chipewyan, Eskimo, and European. Since there has been comparatively little direct interaction between muskoxen and Europeans within the study area, the emphasis in the paper is on the Chipewyan and Eskimo populations.

Muskoxen

The muskox (*Ovibos moschatus* Zimmermann) is a short, stocky, hooped herbivore with a hump over its shoulders and massive, downward-deflected horns. Its thick coat consists of a short, fine underwool, and long, coarse guard hairs, which hang nearly to the ground. In colour it ranges from dark brown to black except for creamy white to pale brown areas around the muzzle and on the saddle and lower legs. Sexual dimorphism is characteristic of the species: adult males weigh between about 320-430 kilograms in the wild, while adult females weigh about

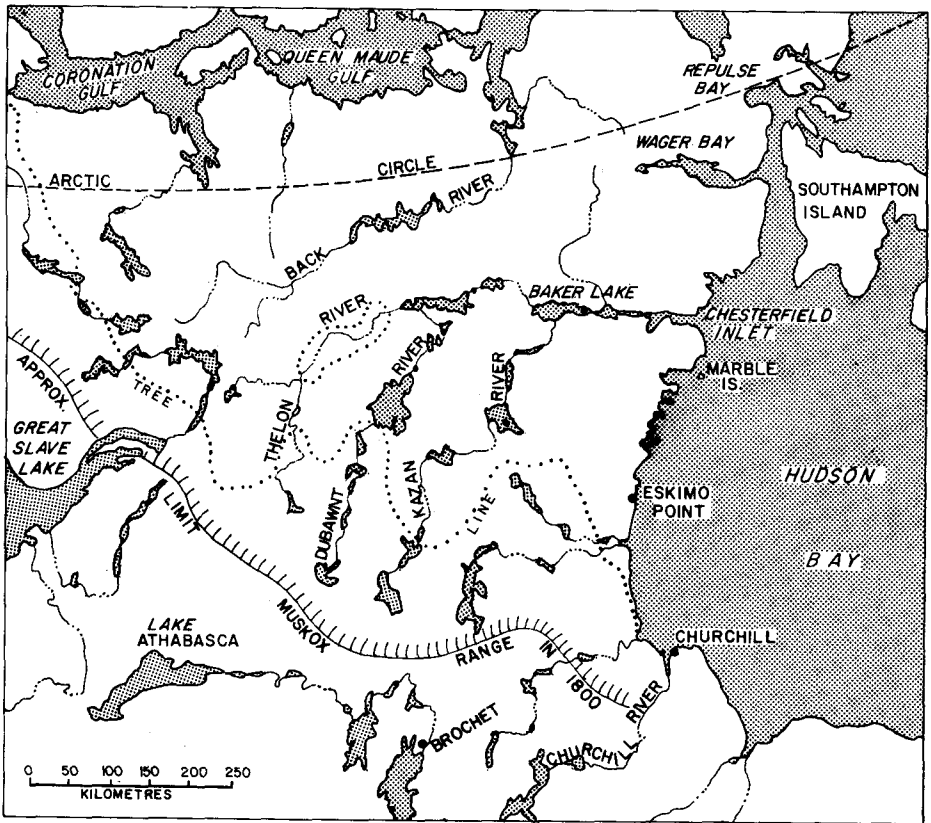


FIG. 1. The central Canadian Subarctic, showing areas mentioned in the text.

two-thirds as much. General information on the biology, behaviour, taxonomy and distribution of muskoxen is contained in Gray (1973), Hone (1934), Tener (1954, 1958, 1965) and Wilkinson (1975).

Muskoxen were relatively abundant on the Canadian mainland west of Hudson Bay in 1689, when they were first seen there by Europeans, and they remained so throughout the ensuing century. The southern and western boundaries of muskox country at that time seem to have been located about 150 kilometres south of the treeline (see Fig. 1) and generally parallel to it. Muskoxen were more abundant on the tundra than in the northern transitional forest, although they seem to have been more common south of the treeline than is generally assumed to have been the case. The area of greatest concentration seems to have been a 350-kilometre-wide band lying just north of the treeline. The numerical density of animals declined gradually towards the north of that band, and few herds were found north of a line extending (roughly) from the mouth of the Back River to Wager Bay (Fig. 1). Muskoxen were not distributed continuously over this large area, but there is little doubt that small herds were distributed widely, and possibly relatively evenly within the zone of their primary concentration. Also within that zone, population density evidently increased toward the northwest.

Muskox range within the study area specifically began to contract during the early decades of the nineteenth century, particularly toward the southeast. By 1860, muskoxen had become greatly reduced in numbers within the transitional forest zone (just south of the treeline), and the depopulation was beginning to affect herds on the tundra. The rate of decline increased dramatically during the ensuing decades. By the beginning of the twentieth century, the species had become virtually extinct in northern Manitoba, and nearly so in southern Keewatin. Numbers became stabilized in the early twentieth century, and a few small and widely separated populations managed to survive in the study area at least until 1974.

The Caribou-eater Chipewyan

The Chipewyan constituted the easternmost segment of the northern Athapaskan-language group which extended across the northern part of the continent from Hudson Bay to western Alaska. A people with roots extending back nearly 2000 years in the central Canadian Subarctic (Gordon 1976; Nash 1975), the Chipewyan numbered at the time of contact with Europeans 4,000-5,000 individuals (Smith 1976a) who were distributed along the forest-tundra ecotone from Hudson Bay on the southeast, to the Coppermine River on the northwest. About a quarter of the population resided in the area of present concern. The Chipewyan of the study area specifically have been described by Birket-Smith (1930), Hearne (1795) and Smith (1975, 1976a, 1976b, 1976c).

The traditional Chipewyan were a hunting-gathering people, largely dependent on the caribou for their subsistence, though they relied also on fish, small game, moose, muskoxen and various plant materials. In winter virtually all of them lived in the northern transitional forest, for the most part within 200 kilometres of the tundra. A few families may have wintered as far south as the edge of the main boreal forest, while others may have remained as far north as some of the forest "islands" situated on the tundra proper. In spring they migrated north to the barren grounds, which was where they spent the summer.

During the eighteenth century the Chipewyan became partially involved in the fur trade. At first they did so exclusively through the Hudson's Bay Company post at Churchill. During the seventeen-eighties, other posts were opened farther west, which gradually attracted many Chipewyan south and west to be closer to them (Gillespie 1976). A few families remained in their old country however, coming to be known as the "Caribou-eater Chipewyan" because of their continued reliance on the primary traditional Chipewyan resource. Many of these people continued the annual forest-tundra movements in northern Manitoba and southern Keewatin until the very end of the nineteenth century. Eventually, they too came to live south of the treeline at all seasons, making only occasional forays onto the barrens.

The Caribou Eskimos

The Caribou Eskimos were a population of Eskimo-speaking people who lived in the tundra portion of what is now southern Keewatin and extreme northern Manitoba. They have been described in classic studies by Birket-Smith (1929) and

Rasmussen (1930a, 1930b), but the present account is based primarily on the author's own (as yet unpublished) historical research.

At the beginning of the eighteenth century, the Caribou Eskimos occupied the coastal region between (roughly) Chesterfield Inlet and Eskimo Point (Fig. 1). They exploited a diverse resource base that included sea mammals, caribou, fish, muskoxen, birds, and small mammals. They spent most of the year on the coast, but ascended the lower sections of the rivers in August and September to hunt caribou. This general distribution and subsistence base continued to characterize the population throughout the rest of the eighteenth and the first part of the nineteenth centuries.

During the second and third decades of the nineteenth century, the Eskimos began to penetrate farther inland in their annual movements. During the eighteenth-forties, some began to live inland on a year-round basis and, by the late fifties, a resident sub-population had become established along the central portion of the Kazan River. By 1890, the Caribou Eskimos occupied practically all of the present study region lying to the north of the transitional forest zone, including a large area formerly inhabited by Chipewyan. As the territory they occupied expanded, the Eskimos modified their resource base from the diversified pattern described above to one highly specialized toward the pursuit of caribou and muskoxen.

Although the Caribou Eskimos continued to occupy most of the tundra portion of the study area until 1960, their numbers became drastically reduced after the beginning of the present century, as a result of a nearly-continuous series of famines and epidemics. (However, the Eskimo population of southern Keewatin actually grew after 1930, as a result of migration from areas farther north.) Between 1955 and 1965, the entire Eskimo population of the region became concentrated in just five locations, these being the present-day hamlets of Baker Lake and (from north to south along the Hudson Bay coast) Chesterfield Inlet, Rankin Inlet, Whale Cove, and Eskimo Point. In the process the study area became devoid of any resident human population, except along its extreme northern, eastern and southern margins.

MUSKOX AND MAN

Predator populations in general vary with regard to the frequency and the intensity with which they harvest specific prey species, and a given predator population may of course vary in these respects through time. In an effort to provide a useful means of characterizing this variation, Paul F. Wilkinson has distinguished four kinds of resource: staple, critical, emergency, and casual. A staple resource is one that is intensively and regularly (perhaps seasonally) exploited by a given predator population. A critical resource, on the other hand, is "one which is not exploited on a regular or seasonal basis, and which is not exploited intensively, but without which survival in certain areas or periods is difficult or impossible" (Wilkinson 1975 pp. 23-24). An emergency resource is similar to a critical resource except that, whereas the latter would be harvested regularly in extreme situations, the former would be exploited on an entirely ad hoc basis. Finally, a casual resource is one that is harvested primarily for diversion,

i.e., as something to bring variety into a situation in which it does not ordinarily play a part.

Muskoxen have certain physiological and behavioural characteristics which place intrinsic limits on the type of predation to which they can be subjected. Four of these characteristics are particularly important. The first is a low reproductive rate (Tener 1965 pp. 77 ff.), which restricts the ability of a population to recover from serious losses. A second factor is a general lack of wariness, which makes them comparatively easy to stalk (Gray 1973 pp. 26, 77; Whitney 1904 pp. 74-75). A third factor is the generally phlegmatic and sedentary nature of the animals, which makes them relatively easy to be located by people familiar with the area they inhabit (Gray 1973 pp. 76, 168; Tener 1965 pp. 92-93). The fourth and final factor is the tendency of muskoxen to stand their ground if closely pressed (Gray 1974; Russell 1970; Whitney 1904 pp. 60-74). Their nearly-immobile defence formations render them relatively safe from wolves or dogs, but extremely vulnerable to humans armed with guns, bows and arrows, or even spears. When muskoxen are held at bay by dogs, hunters can approach with safety to within a few metres of them for an easy shot.

Wilkinson (1974; 1975 p. 23) has pointed out that the above factors combine to make muskoxen highly susceptible to overhunting. They cannot serve as a *staple* resource over an extended period of time, since intensive predation will bring about their extermination. Therefore, for practical purposes, muskoxen can only be exploited as an emergency, critical or casual resource. But it is not to be expected that all human populations will either comprehend this restriction or that, if they do, they will act in accordance with their undersanding. To argue otherwise is to attribute to hunters a level of empirical knowledge and a capacity for rational action that exceeds the abilities of other human populations. As the following account shows, the Caribou-eater Chipewyan and the Caribou Eskimos fell well within the normal human range in both respects.

Muskox and Chipewyan

Direct evidence concerning Chipewyan utilization of muskoxen at the very beginning of the study period does not exist. However, knowledge of the general limits to predation on muskoxen plus reasonably accurate, albeit general, information on the relative abundance of the animals in Chipewyan territory at the time does permit some inferences to be drawn. Specifically, if muskoxen were as common in Chipewyan country as the early reports suggest, then they could not have been a staple resource in the Chipewyan economy. Furthermore, if somewhat later remarks (e.g., Back 1836; Hearne 1795 p. 138) about Chipewyan food preferences apply to the eighteenth century generally, then muskoxen must be excluded from the casual-resource category as well. The Chipewyan apparently were not very fond of muskox meat, particularly that of bulls.

Evidently the muskox was a critical resource for the Chipewyan soon after their contact with Europeans. It was an animal to be harvested when caribou and fish were not available, and only then. It was not an emergency resource, because it was too regularly hunted to belong in that category. A few muskoxen were

probably killed every year, both early in the summer, when the caribou often outdistanced the migrating Chipewyan, and again late in the winter, when the supply of caribou meat was frequently low.

As the volume of traffic between Chipewyan country and Churchill grew over the course of the eighteenth century, the Indians began to kill accidentally-encountered muskoxen as they drew near the post, hoping to sell the easily-acquired meat to the Hudson's Bay Company personnel, who were chronically short of fresh food (HBC: B42/a/118). They were not encouraged in this activity, however, for the Europeans also were not fond of the meat (Hearne 1795 p. 137 — note), and a muskox robe was worth almost nothing in the Company's standard of trade at the time (HBC: B42/a/78 — folio 5). The outcome was that the muskox became both a casual and a critical resource. It held the former status as a trade item (for hides), the latter as a subsistence item (for meat). This combination, which persisted throughout the second decade of the nineteenth century, gradually led to increased hunting pressure on muskoxen in the extreme southeastern portion of its range.

In 1820, the Hudson's Bay Company decided to market-test muskox robes in England, and began accepting hides as regular trade items (HBC: B42/a/149 — page 50, B42/e/3). Thus encouraged, the Chipewyan began to hunt the animals more systematically. Between 1822 and 1832, Chipewyan are known to have killed some 250 muskoxen in the study area, many of them for purposes of trade at the Churchill post. Virtually all of these animals were taken in what is now northern Manitoba.

During the eighteen-twenties, muskoxen became a staple resource for the Caribou-eater Chipewyan. The rise in their significance, which was a consequence of the fur trade, had a dual effect. Most obviously, it established a reliable market for hides, which stimulated the Chipewyan to kill muskoxen even when they were not required for food. It also increased the dependence of the Chipewyan on muskoxen for food since, because of the length of the journey to Churchill, they were often forced to cross regions temporarily devoid of caribou. Without the timely encounter of a few muskoxen, some of their trading parties might not have survived the trip.

The Chipewyan — with the help of Eskimo hunters along the eastern margin of the area — reduced the muskox population of northern Manitoba during the eighteen-twenties. In the process, the muskox gradually reverted to its former status as a critical resource, this time by default. Previously it had been worth the trouble to bring muskox hides to Churchill despite their low price, because the animals were abundant so near the post, and because they were so easily killed. During the eighteen-thirties, the price for hides remained low, but the supply of game became greatly reduced. Under such conditions it was no longer worth the effort to hunt muskoxen simply for purposes of trade. Subsistence remained a problem, however, and it became an increasingly severe one during a caribou decline between 1830 and 1850. During this period, the Chipewyan in the study area became dependent on muskoxen as an emergency resource. The emergency was sufficiently grave, and it lasted for such a long time, that most of the remaining animals in the Chipewyan portion of the study area were exterminated.

Muskox and Eskimo

The extent to which the Caribou Eskimos utilized muskoxen at the beginning of the study period is more difficult to determine than it was in the case of the Chipewyan. This is because, although the muskox population was relatively large in their area, the Eskimos themselves had only recently arrived there (Burch 1977). The indirect reasoning used above in the case of the Chipewyan thus cannot be applied to the Eskimos.

Three considerations lead to the conclusion that the muskox was a casual resource to the Caribou Eskimos during the eighteenth century. The first is the fact that the Eskimos then occupied the coastal zone, which was marginal muskox habitat. That suggests that muskox could not have been a staple resource, for otherwise the Eskimos would not have survived. The second is the fact that the few relevant references in journals and published accounts indicate that the Eskimos sometimes killed a muskox or two even when caribou were abundant; and they would not have done so had muskoxen constituted a critical or emergency resource in their economy. Finally, the Caribou Eskimos are known to have traded muskox hides to the crews of Hudson's Bay Company vessels in only two out of the fifty summers between 1717 and 1792 in which they sailed north from Churchill; if the Eskimos had been harvesting muskoxen as anything but a casual resource, they probably would have traded more hides.

Voyages along the western coast of Hudson Bay ceased in 1792. Subsequently it was necessary for the Eskimos to transport raw materials over distances of 200-600 kilometres to Churchill, if they wanted to exchange them for European goods. The price of hides remained too low, though, to make muskox hunting a profitable enterprise when undertaken simply for purposes of trade (HBC: B42/a/149 — page 50). However, by the eighteen-twenties, muskoxen had begun to shift from a casual to a staple resource in the Eskimo economy. One of the reasons for this development was overpopulation. For nearly a century and a half, the Eskimos had occupied essentially the same area, yet their numbers had grown considerably. They thus needed to increase their food supply. The other reason for the increasing importance of muskoxen to the Eskimos was their pronounced shift from a broadly-based economy to one narrowly focused on caribou and muskoxen.

When the Hudson's Bay Company started accepting hides in trade in the eighteen-twenties, it did not stimulate the Eskimos to kill more muskoxen. Rather, it provided them with an opportunity to sell for a concrete return something they already had, but which they normally had discarded. Now, when a hunter happened to kill some muskoxen in an area relatively close to Churchill he would keep some of the skins instead of throwing them away. In the spring, he would take them to the post, along with the more important items of his trade inventory. The arrangement was so profitable for the Eskimos that, despite the greater distance that most of them had to travel, they brought almost as many hides to Churchill between 1822 and 1832 as the Chipewyan did.

Toward 1840, the caribou population entered a period of decline, and the Eskimos, who were still increasing in numbers, began to range progressively farther from the coast in search of game. In doing so they reached better muskox habitat. As they penetrated inland, they became increasingly dependent on musk-

oxen, whose numbers were in consequence affected by their hunting. When, in the eighteen-fifties, the Eskimos settled permanently along the central Kazan River some 300 kilometres from the coast, they carried their muskox-hunting activities into regions still farther distant from their former coastal domain.

In the late eighteen-fifties, prices obtainable on the European market for muskox robes increased markedly, a fact which became known to the Caribou Eskimos during the winter of 1857-58 (HBC: B42/a/189a — folios 21, 35). The price for the robes at Churchill did not increase enough to justify the effort of transporting them there though, and the volume of trade in them increased only slightly over its level of the previous quarter century. The position of Hudson's Bay Company became complicated almost immediately by the arrival in 1860 of the first American whaling ships on the west coast of Hudson Bay (Ross 1975; Stackpole 1969). The Americans focused their attention exclusively on the whale fishery for a decade or so, but became involved in trading operations in the early eighteen-seventies. Caught between an expanding market on the one hand and direct competition on the other, the Hudson's Bay Company raised its prices. The result was an immediate increase in the number of muskox hides reaching Churchill. Whether or not there was a consequent increase in the number of animals actually harvested is uncertain. Previously, the hides of many animals slain for meat probably had been discarded whenever it was inconvenient to take them to Churchill. The higher price caused the extent of this practice to be reduced.

The Hudson's Bay Company resumed its northern trading voyages in 1882, in order to compete more effectively with the whalers. Then, in 1887, the whalers began to shift their operations further north, beyond the area of present concern. Whether or not these developments caused the number of muskox kills to be altered is again uncertain, but they did affect the percentage of hides reaching Churchill.

Despite the considerable scale of the trade in hides after 1870, the muskox remained a staple resource in the Eskimo economy — primarily as a source of food. Muskoxen complement caribou almost perfectly as a terrestrial food resource. Whereas the latter are highly migratory animals whose whereabouts are difficult to anticipate correctly from one month to the next, muskoxen are sedentary creatures whose distribution is relatively constant throughout the annual cycle (Gray 1973 p. 168; Tener 1965 pp. 92-93). The general locations of the muskox herds of southern Keewatin were well known to Eskimo hunters, who encountered them repeatedly in the course of their efforts to find caribou. In winter, when caribou were scarce and difficult to approach on the tundra, muskoxen were still present in previously determined localities. Winter was thus the Eskimos' primary muskox-hunting season.

The number of muskoxen in the study area declined sharply as a result of this large harvesting by the Eskimos. By 1900, they survived in only four small and isolated refugia. These were situated just west of Yathkyed Lake, west and north of Dubawnt Lake, in the Quoich River Uplands, and along the middle Thelon River, as shown in Fig. 2. Also indicated in the figure are the areas occupied in the early twentieth century by the five sub-populations of Caribou Eskimos, and the approximate southern boundary of muskox range as it had been in 1800. The

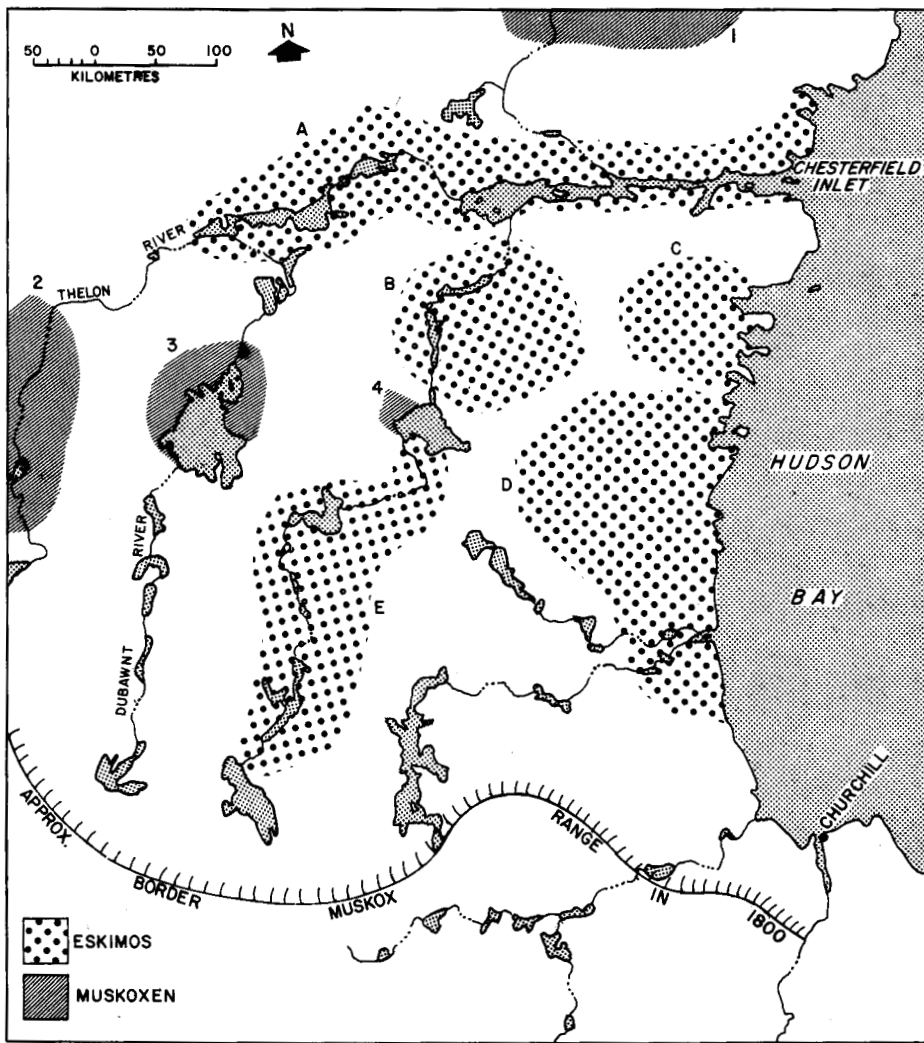


FIG. 2. Muskox and Eskimo populations in the study area, ca. 1900. Muskoxen: 1 — Quoich Uplands; 2 — Thelon River; 3 — Dubawnt Lake; 4 — Yathkyed Lake. Eskimos: A — Qairnirmiut; B — Sarvaqturmiut; C — Sauniqturmiut; D — Paatlirmiut; E — Asiarmiut.

map shows clearly the impact of Eskimo hunting on muskox numbers and distribution. Whereas in the eighteenth century all areas later occupied by Eskimos had been inhabited by resident muskox herds, by 1900 none of them were. Furthermore, by 1900, the closer a remnant muskox population was to an Eskimo population, the greater the toll that had been taken of it. The Yathkyed Lake population, which was the closest of the four, may have consisted of less than two dozen animals at the turn of the century.

By 1900, muskoxen had become an emergency resource for most of the Caribou Eskimos. A few parties of hunters continued to make the long trek to the hunting

grounds every spring, but it was an arduous enterprise that was undertaken primarily by just a few individuals who had become specialists in the fur trade. Only among the Qairnirmiut, on the extreme north, could muskox hunting remain an important activity for more than a small element of the Eskimo population. It was this particular group that was supplying most of the skins sold to the Hudson's Bay Company and the whalers at this time, although they were assisted in this regard by Netsilik and Iglulik Eskimos who had emigrated to the region in the latter part of the nineteenth century. Otherwise, Eskimos visited the muskox refugia only when they had no other food on which to live.

In 1917, the Government of Canada placed a complete ban on muskox hunting (Clarke 1940 p. 1). The new law did not completely stop the killing in the study area, but, enforced by the Royal Canadian Mounted Police, it greatly reduced it. It also terminated the trade in hides. Ironically, that same year marked the onset of a severe decline in the caribou population of the study area, a situation that persisted for several years. Muskoxen were too few and too far distant from the centres of Eskimo population by that time to serve as an effective emergency resource, and literally hundreds of people starved to death as a result. From then until the Caribou Eskimos had become established in small permanent settlements in the nineteen-sixties, muskoxen were inaccessible to most of them, and served only as an illegal emergency resource to the rest.

DISCUSSION

The Churchill journals and account books of the Hudson's Bay Company contain enough information to permit a rough estimate to be made of the number of muskoxen that were killed in the study area between 1820 and 1917. The data consist of records of the number of hides traded for sale on the European market, figures on the number of muskox tongues and hearts sold to the Churchill post for food, and native reports which were recorded in the post journal. The results are presented in Table 1, which shows the number of kills reported at Churchill by five-year periods, with brief comment.

The total of 4,566 kills must be considered an absolute minimum figure for the total harvest. There are several reasons for this assessment of which three are particularly important. The most obvious is that neither the Chipewyan nor the Eskimos ever reported to the Company the number of kills they made beyond a distance of three or four days' travel from Churchill. There is no reason to believe that the hide of every animal killed was brought in for sale, particularly prior to 1875. Indeed, in the few cases in which both the number of kills and the returns to the Company were recorded, less than a quarter of the hides ever reached the Churchill post.

After 1875, a much higher proportion of the hides of animals killed was probably traded to someone, but a considerable percentage of the trade went to the whalers instead of to the Hudson's Bay Company. The details of the trade in muskox robes by the whalers have never been compiled, but the available evidence indicates that the volume was substantial. In a single transaction in August 1879, for example, a whaling crew purchased about twenty hides from a party of Eskimos

TABLE 1. Muskox kills reported at the Churchill post of the Hudson's Bay Company, 1820-1917.

Period	Kills	Comment
1820-24	63	HBC begins market-testing hides
1825-29	293	Chipewyan account for more than half of kills
1830-34	94	Marketing of hides in Europe discontinued
1835-39	44	Eskimos account for most of reported kills
1840-44	70	Caribou population declining
1845-49	13	Caribou scarce; reason for low muskox returns not apparent
1850-54	99	Chipewyan starving; they account for more than half of kills
1855-59	64	Muskoxen greatly reduced in northern Manitoba
1860-64	46	Whalers arrive in 1860; fewer Eskimos visiting Churchill
1865-69	149	European market for robes expanding rapidly
1870-74	38	Whalers buying robes; HBC returns decline
1875-79	366	HBC raises price of robes to compete with whalers
1880-84	154	Whalers increase purchases; HBC coast voyages resumed (1882)
1885-89	578	Increased returns from coastal voyages
1890-94	1143	Whalers shift to north; HBC getting higher percentage of robes
1895-99	463	Muskox population greatly reduced in southern Keewatin
1900-04	343	Muskoxen almost extinct east of Dubawnt River
1905-09	63	Muskoxen almost extinct within reach of Churchill post
1910-14	406	Chesterfield post opened closer to muskox refugia (1912)
1915-17	77	Muskoxen legally protected in 1917; trade in hides abolished

near Rankin Inlet (Ferguson 1938 p. 174), yet during that entire year only fifty-two hides were traded at Churchill. In 1881, a whaling captain traded a boat to an Eskimo at Chesterfield Inlet for fifty muskox hides and ten wolf skins (Ross 1975 p. 91), again in a single transaction; yet the total number of hides traded at Churchill that year was only thirteen. It is conceivable that, between 1860 and 1889, the whalers received as many hides from the Caribou Eskimos as the Hudson's Bay Company did. This possibility is supported by the fact that, when the whalers shifted their operations to the north of the study area in the late eighties, the returns to the Churchill post immediately doubled.

The third reason why the total of 4,566 is an absolute minimum is that the information is biased in favour of kills from the central and eastern sectors of the study area. All the kills listed were recorded at the Churchill post, yet it is known that hides from the study area were also being sold at Brochet (Buchanan 1920; HBC: B296/e/2 — folio 6; MacFarlane 1905; Sachot 1943). Unfortunately, it is impossible to tell whether the hides received at Brochet were harvested in the study area or to the west of it, which is why they are not included in Table 1.

The number of muskoxen actually killed in northern Manitoba and southern Keewatin between 1820 and 1917 thus may have been twice that indicated in Table 1, and was probably even greater. Prior to about 1860, only a small per-

centage of the Eskimos' kills are likely to have been reported at Churchill, and the same is true of Chipewyan kills made on the tundra during the summer. Prior to 1875, less than half the hides of animals killed would have been traded, and between 1875 and 1895 less than half of those traded would have been sold at Churchill. After 1895, the declining figures probably represent the increasing difficulty of getting the hides from ever-more-remote locations to market rather than a drop in the actual number of kills. This possibility is supported by the fact that the returns increased suddenly and dramatically when the Chesterfield post was opened in 1912. If these conclusions are correct, then at least ten thousand muskoxen must have been killed in the study area between 1820 and 1917.

CONCLUSIONS

Previous investigators have failed to appreciate the significance of muskoxen in the lives of the native peoples of the central Canadian Subarctic. On the basis of archaeological research, Gordon (1975) and Harp (1959, 1961), for example, concluded that muskoxen were unimportant in the prehistoric Chipewyan and Eskimo economies. Their views fit well with the ethnographic findings of Birket-Smith (1929 p. 112) regarding the Caribou Eskimos, and of Birket-Smith (1930 pp. 23-26) and Smith (1975) regarding the Caribou-eater Chipewyan. Given such similar results from both the recent and the distant past, it would not be unreasonable to conclude first that muskoxen had always played a minor part in the Eskimo economy, and secondly that they had scarcely played any part at all in the life of the Chipewyan. Those conclusions are unwarranted, however, because of the biases evident in the research on which they are based.

The archaeological research was biased in that it was conducted almost exclusively at caribou crossings. Since caribou crossings are not places where muskoxen are likely to have been either killed or eaten, and since muskox hunting did not require any special weapons that would have constituted a distinctive element in the archaeological record, the archaeological studies provide virtually no information about the extent of human predation on muskoxen in the study area. The ethnographic research, of course, was conducted long after muskoxen had become extinct in the Chipewyan area, and a generation or more after they had been exterminated in Eskimo country. Since every Caribou-eater Chipewyan and every Caribou Eskimo alive today was born after the demise of the muskox population, even the natives can shed little light on the issue. The only way to deal with it is through historical research.

On the basis of historical research it is suggested above that muskoxen were a critical resource for the eighteenth-century Chipewyan. If that is true, then muskoxen were far from unimportant to the Chipewyan, since their survival in certain areas or periods would have been difficult or impossible without them. If it is also true, as has been argued above, that muskoxen were a staple resource of the Caribou Eskimos during the early and middle nineteenth century, then the Eskimos might not have survived at all into the twentieth, at least not as year-round residents of the interior barrens. These conclusions do not detract from the primacy of caribou in the economies of either people, but if life without muskoxen would

have been nasty, brutish, or short during any period of their histories, then that species deserves greater attention than it has received in the past.

The next question to be considered is the extent to which Europeans contributed to the demise of the muskox. The most obvious point to make with respect to this issue is that Europeans are known to have killed only a few animals within the study area during the entire historic period, and practically all of them were taken after 1890. Thus, in contrast to what was the case in some other parts of the Canadian North, Europeans were not directly involved in the decline in muskox numbers in the present study area. Whatever their influence may have been, it must necessarily have been more subtle.

A second matter that may be disposed of is the part that rifles played in the process. Both the Chipewyan and the Eskimos began to acquire firearms during the eighteenth century, but neither employed them to any great extent when hunting muskoxen. Instead they preferred to bring their quarry to bay with dogs and to dispatch them with traditional weapons, thus saving their ammunition for more difficult situations. Caribou Eskimo informants have told the present author that such was the situation right up to the 1917 ban on muskox hunting.

The question of European influence must focus, then, on the impact of the fur trade on native hunting practices. The problem is, did the fur trade serve to increase the number of kills, or merely to alter the disposition of hides? The evidence on the Chipewyan suggests that they, at least, did kill more muskoxen because of the fur trade than they would have otherwise. They did so partly in order to sell meat to the Churchill post, partly to provide food for themselves as they travelled to the post, and partly to obtain hides for sale. Overall, their harvest was insignificant compared to that of the Eskimos, however, and it is to a consideration of the Eskimos that one must turn in order to resolve the problem.

The first point to make about the Caribou Eskimos is that they did not become thoroughly involved in the fur trade until after the 1917 ban on killing muskox had taken effect. Before that, for fully two centuries, they had had a remarkably casual attitude toward the fur trade; in general they could afford either to take part in it or to ignore it. In particular circumstances, they often considered it a source of considerable revenue at little cost to themselves. This was true in particular of the trade in muskox robes which provided them with a concrete return from what was little more than refuse from their own point of view.

The Eskimos killed muskoxen for meat, not for hides, and, unlike the Chipewyan, they rarely killed any in order to sell the meat to the Hudson's Bay Company. They killed muskoxen primarily for their own use in their own country. It is not unreasonable to assume that they would have done so whether Europeans had been present in the area or not. Without Europeans they might not have killed as many in so short a time, but eventually they probably would have killed beyond the sustained-yield capacity of the muskox population of their territory anyway. Just what the Chipewyan and the Eskimos had in mind when they started on their destructive course is not known, nor is it likely to be discovered. One may suppose however that, being human, they focused their attention on immediate problems and rarely, if ever, considered the long-range implications of what they were doing.

The negative effects of extinction of muskoxen in the transitional forest zone were offset for the Chipewyan by the availability of other resources, and by their willingness to exploit those resources. The Eskimos had fewer alternatives available to them, and they were less willing than the Chipewyan to take advantage of such opportunities as they had. The effects of this course became starkly manifest during the famine of 1917-21, when hundreds of Eskimos died for want of food, and hundreds of others suffered greatly from hunger. This catastrophe proved once again that inefficient predation can be just as disastrous for humans as it is for any other predatory species — but that does not mean that people will not resort to it.

ACKNOWLEDGEMENTS

The field work by myself in 1968 and by Thomas C. Correll in 1970 and 1971, and a portion of the archival research, were funded by the Canada Council, whose support is gratefully acknowledged. I also wish to express my thanks to the Hudson's Bay Company for the privilege of doing research in its Archives, and to Shirlee Anne Smith, Archivist, and Garron Wells, Assistant Archivist, of the Company for their invaluable assistance. Finally, I am indebted to Janet Cosby, Milton M. R. Freeman, Beryl Gillespie, Clifford G. Hickey, Gerald R. Parker, Shirlee Anne Smith and Paul F. Wilkinson for criticisms and other assistance on earlier drafts of the paper.

REFERENCES

- ALLEN, J. A. 1913. *Ontogenetic and Other Variations in Musk Oxen, with a Systematic Review of the Musk Ox Group, Recent and Extinct*. New York: American Museum of Natural History. (Memoirs, new series, vol. 1, part 4). p. 163.
- ANDERSON, J. 1940. Chief Factor James Anderson's Back River journal of 1855. *Canadian Field-Naturalist*, 54: 125-6, 134-6.
- 1941. Chief Factor James Anderson's Back River journal of 1855. *Canadian Field-Naturalist*, 55: 21-26.
- ANDERSON, R. M. 1930. Notes on the musk-ox and caribou (numbers and status). Appendix B in: Hoare, W. H. B., *Conserving Canada's Musk Oxen; being an Account of an Investigation of Thelon Game Sanctuary, 1928-29*. Ottawa: King's Printer. pp. 49-50.
- BACK, G. 1836. *Narrative of the Arctic Land Expedition to the Mouth of the Great Fish River and along the Shores of the Arctic Ocean in the years 1833, 1834 and 1835*. London: John Murray. p. 302.
- BEALS, C. S. (ed.). 1868. *Science, History and Hudson Bay*. Ottawa: Queen's Printer.
- BIRKET-SMITH, K. 1929. *The Caribou Eskimos: Material and Social Life and their Cultural Position*. Copenhagen: Gyldendal. (Report of the Fifth Thule Expedition 1921-24, vol. 5, part 1.)
- 1930. *Contributions to Chipewyan Ethnology*. Copenhagen: Gyldendal. (Report of the Fifth Thule Expedition 1921-24, vol. 6, no. 3.)
- 1933. *Geographical Notes on the Barren Grounds*. Copenhagen: Gyldendal. (Report of the Fifth Thule Expedition 1921-24, vol. 1, no. 4.)
- BOAS, F. 1907. *The Eskimo of Baffin Land and Hudson Bay*. New York: American Museum of Natural History. (Bulletin 15, part 2). pp. 465-6.
- B.I.N.S. (Boreal Institute for Northern Studies). 1975. *Renewable Resources Project, Vol. 2: Canadian Arctic Renewable Resources Mapping Project*. Ottawa: Inuit Tapirisat of Canada. p. 138.
- BORDEN, L. E. 1903-04. *The lost expedition: being the diary of L. E. Borden, surgeon and botanist with the first Canadian expedition to Hudson's Bay and Arctic Islands, as recorded on board the D.G.S. Neptune, 1903-04*. (Unpublished manuscript in Public Archives of Canada, M.G. 30, C52, vol. 2). p. 83.
- BUCHANAN, A. M. C. 1920. *Wildlife in Canada*. Toronto: McClelland, Goodchild and Stewart. pp. 156-7.

- BURCH, E. S., JR. 1968. Field notes from Eskimo Point, N.W.T. (In possession of author.)
- 1977. The Thule-historic Eskimo transition on the west coast of Hudson Bay. In: McCartney, A. P. (ed.), *Thule Eskimo Culture: An Archaeological Retrospective; Canada, National Museum of Man, Archaeological Survey, Paper* (in press).
- C.W.S. 1972. *Arctic Ecology Map Series. Critical Wildlife Areas. Descriptive Reports*, 2nd ed. Ottawa: Canadian Wildlife Service, pp. 59, 237, 287 ff.
- CLARKE, C. H. D. 1940. A biological investigation of Thelon Game Sanctuary. *Canada, National Museum, Bulletin no. 96, Biological Series no. 25.*
- CLIFTON, V. 1933. *The Book of Talbot*. New York: Harcourt, Brace, pp. 56-59.
- COMER, G. 1913. Present range (of muskoxen) in the country bordering Hudson Bay. In: Allen, J. A., *Ontogenetic and Other Variations in Musk Oxen, with a Systematic Review of the Musk Oxen Group, Recent and Extinct*. New York: American Museum of Natural History. (Memoirs, new series, vol. 1, part 4). p. 191.
- CORRELL, T. C. 1970-71. Field notes, Eskimo Point, Rankin Inlet, Whale Cove. In possession of author at Department of Social Science, Bethel College, St. Paul, Minnesota, U.S.A.
- CRITCHELL-BULLOCK, J. C. 1930. An expedition to subarctic Canada, 1924-25. *Canadian Field-Naturalist*, 44: 187-96.
- DAVIES, K. G. (ed.). 1965. *Letters from Hudson Bay, 1703-1740*. London: Hudson's Bay Record Society. (Vol. 25). p. 67.
- DOUGLAS, R. and WALLACE, J. N. (eds.). 1926. *Twenty Years of York Factory, 1694-1714; Jérémie's Account of Hudson Strait and Bay*. Ottawa: Thorburn and Abbott. pp. 19-21.
- DOUGHTY, A. G. and MARTIN, C. (eds.). 1929. *The Kelsey Papers*. Ottawa: King's Printer. pp. 25-32.
- ELLIS, H. 1748. *A Voyage to Hudson's Bay by the Dobbs Galley and the California in the Years 1746 and 1747*. London: H. Whitridge. p. 249.
- FERGUSON, R. 1938. *Arctic Harpooner; a Voyage on the Schooner Abbie Bradford, 1878-79*. Philadelphia: University of Pennsylvania Press.
- FRANKLIN, SIR JOHN. 1823. *Narrative of a Journey to the Shores of the Polar Sea in the Years 1819, 20, 21 and 22*. London: John Murray. p. 263.
- GILDER, W. H. 1881. *Schwatka's Search; Sledging in the Arctic in Quest of the Franklin Records*. New York: Charles Scribner's Sons. pp. 271-2.
- GILLESPIE, B. C. 1976. Changes in territory and technology of the Chipewyan. *Arctic Anthropology*, 13 (1): 6-11.
- GORDON, B. H. C. 1975. Of men and herds in barrenland prehistory. *Canada, National Museum of Man, Archaeological Survey, Paper no. 28*. pp. 74-75.
- 1976. Chipewyan prehistory. Paper presented to the Conference on Northern Athapaskans, University of Calgary Archaeological Association, October, 1976. In possession of author at Archaeological Survey of Canada, National Museum of Man, Ottawa, Ontario.
- GRAY, D. R. 1973. Social organization and behaviour of muskoxen on Bathurst Island, N.W.T. (Unpublished Ph.D. dissertation, University of Alberta, Edmonton.)
- 1974. The defense formation of the musk-ox. *Musk-ox*, 14: 25-29.
- HANBURY, D. T. 1904. *Sport and Travel in the Northland of Canada*. London: Macmillan.
- HARP, E., JR. 1959. Ecological continuity on the barren grounds. *Polar Notes*: 1: 48-56.
- 1961. *The Archaeology of the Lower and Middle Thelon, Northwest Territories*. Montreal: Arctic Institute of North America (Technical Paper no. 8). pp. 47-48.
- HARPER, F. 1956. *The Mammals of Keewatin*. Lawrence: University of Kansas, Museum of Natural History (Miscellaneous Publication no. 12). pp. 78-79.
- 1964. *Caribou Eskimos of the Upper Kazan River, Keewatin*. Lawrence: University of Kansas, Museum of Natural History (Miscellaneous Publication no. 36). p. 14.
- HEARNE, S. 1795. *A Journey from Prince of Wales's Fort in Hudson's Bay to the Northern Ocean*. Edmonton: Hurtig, 1971.
- HOARE, W. H. B. 1930. *Conserving Canada's Musk Oxen; being an Account of an Investigation of Thelon Game Sanctuary, 1928-29*. Ottawa: King's Printer.
- HONE, E. 1934. *The Present Status of the Musk Ox*. New York: American Committee for International Wildlife Protection (Special Publication no. 5).
- HORNBY, J. 1934. Wild life in the Thelon River area, Northwest Territories, Canada. *Canadian Field-Naturalist*, 48: 105-11.

HBC (Hudson's Bay Company Archives):

- A12/Ft. Misc./207 Report of a trip to the timber on the Thelon River during the summer of 1913, by H. H. Hall.
- /258 London inward correspondence regarding Marble Island trade, 1893-95.
- B42/a/series Churchill journals.
- /58 A journal of a voyage by God's permission in the good sloop *Churchill* and the *Strivewell* cutter, 1762, by Moses Norton.
- /78 Journal on board the sloop *Churchill* to the Northwest, 1770, by Magnus Johnston.
- /118 Churchill post journal, 1792-93.
- /149 Churchill post journal, 1822-23.
- /151 Churchill post journal, 1823-24.
- /159 Churchill post journal, 1831-32.
- /189a Churchill post journal, 1857-59.
- /196 Churchill post journal, 1894-95.
- B42/b/series Churchill correspondence outwards.
- /62 Churchill official letterbook outward, 24 August 1867 to 23 September 1891.
- B42/c/series Churchill correspondence inwards.
- B42/e/series Churchill district reports.
- /3 Churchill Fort report, 1821-22, by Hugh Lesley.
- B239/d/1460 York Factory fur invoices, 1892-1900.
- B296/e/2 Cumberland district, Lac du Brochet post, inspection report, 1-8 January 1894.
- B401/a/series Chesterfield journals.

KELSALL, J. P. 1953. A biological investigation of the Thelon Game Sanctuary, 1951. *Arctic Circular*, 6 (1): 7-8.

KING, R. 1836. *Narrative of a Journey to the Shores of the Arctic Ocean in 1833, 1834 and 1835, under the Command of Captain Back, R.N.* London: Richard Bentley. vol. 1. pp. 132-3.

LEDEN, C. 1927. *Über Kivatins Eisfelder; drei Jahre unter kanadischen Eskimos.* Leipzig: Brockhaus. pp. 164, 248-9.

LOW, A. P. 1906. *Report on the Government Expedition to Hudson Bay and the Arctic Islands on Board the D.G.S. Neptune, 1903-04.* Ottawa: Government Printing Bureau.

MACFARLANE, R. 1905. Notes on mammals collected and observed in the northern Mackenzie River district, Northwest Territories of Canada. Washington, D.C.: National Museum (Proceedings, vol. 28). pp. 689-91.

MCTAVISH, G. S. 1963. *Behind the Palisades; an Autobiography.* Sidney, British Columbia: Gray's Publishing. p. 132.

NASH, R. J. 1975. *Archaeological Investigations in the Transitional Forest Zone: Northern Manitoba, Southern Keewatin, N.W.T.* Winnipeg: Manitoba Museum of Man and Nature.

PARRY, W. E. 1824. *Journal of a Second Voyage for the Discovery of a North-West Passage from the Atlantic to the Pacific.* New York: Duyckinck, Long, Collins. p. 420.

PREBLE, E. 1902. *A Biological Investigation of the Hudson Bay Region.* Washington, D.C.: Department of Agriculture, Division of Biological Survey (North American Fauna no. 22) p. 44.

PAC (Public Archives of Canada):

- RG (Record Group) 18 Records of the Royal Canadian Mounted Police:
vol. 2159, file 6. Report on the condition of natives of Baker Lake and Chesterfield Inlet districts, 1918.
vol. 2160, file 24. Miscellaneous file, 1815-16.
- RG 45 Records of the Geological Survey of Canada:
vol. 174. Exploration of the Dubawnt River. Original field notes of J. B. Tyrrell, 1893. Notebooks 1936 and 1938.
- RG 85 Records of the Northern Administration Branch:
vol. 786, file 5997D. Relief accounts, west coast, Hudson Bay.
vol. 953, file 13299. Musk ox killing, Dubawnt Lake, 1942.

- vol. 1044, file 540-3, Pt. 1. R.C.M.P. Patrols and posts. Police services, N.W.T., 1907-25.
- vol. 1045, file 540-3, Pt. 3. R.C.M.P. services, N.W.T., 1917-21.
- vol. 1045, file 540-3, Pt. 4. R.C.M.P. services, N.W.T., 1936-39.
- vol. 1085, file 401-3, Pt. 3. Musk ox general file, December 1945 to January 1951.
- vol. 1119, file 1000/159, Pt. 1. Baker Lake general file, 1953-56.
- vol. 1249, file 401-3, Pt. 4. Musk ox general file, 1951-53.
- vol. 1249, file 401-3, Pt. 4A. Illegal killing of musk oxen, Thelon Game Sanctuary, Ellesmere Island, etc., 1932-51.
- vol. 1249, file 401-3, Pt. 5. Musk oxen, general file, 1953-54.
- RAE, J. 1866. *On the Esquimaux*. London: Ethnological Society of London (Transactions, 1866, new series, vol. 4). p. 140.
- RASMUSSEN, K. J. v. 1930a. *Observations on the Intellectual Culture of the Caribou Eskimos*. Copenhagen: Gyldendal. (Report of the Fifth Thule Expedition 1921-24, vol. 7, no. 2.)
- 1930b. *Iglulik and Caribou Eskimo Texts*. Copenhagen: Gyldendal. (Report of the Fifth Thule Expedition 1921-24, vol. 7, no. 3.)
- RICHARDSON, J. 1829. *Fauna Boreali-Americana, vol. 1: the Quadrupeds*. London: John Murray. p. 275.
- ROSS, M. G. 1975. *Whaling and Eskimos: Hudson Bay 1860-1915*. Ottawa: National Museum of Man (Publications in Ethnology no. 10).
- RCMP (Royal Canadian Mounted Police) 1905. *Report of the Royal North-West Mounted Police for 1904, Part IV*. Report of Superintendent J. D. Moodie on service in Hudson Bay per S. S. Neptune, 1903-04. Ottawa: King's Printer (Sessional Paper no. 28-1905). p. 12.
- 1907. *Report of the Royal Northwest Mounted Police for 1906, Appendices L and M*. Ottawa: King's Printer (Sessional Paper no. 28-1907). p. 124.
- 1908. *Report of the Royal Northwest Mounted Police for 1907*. Ottawa: King's Printer (Sessional Paper no. 28-1908). p. 262.
- 1909. *Report of the Royal Northwest Mounted Police for 1909*. Ottawa: King's Printer (Sessional Paper no. 28-1910). pp. 153ff.
- 1910. *Report of the Royal Northwest Mounted Police for 1910*. Ottawa: King's Printer (Sessional Paper no. 28-1911). p. 275.
- RUSSELL, F. 1970. *Hunting Musk-Ox with the Dog Ribs*. Toronto: Canadiana House. pp. 16, 22-23.
- SABINE, J. 1823. Zoological appendix. In: Franklin, Sir John, *Narrative of a Journey to the Shores of the Polar Sea in the Years 1819, 21 and 22*. London: John Murray. p. 668.
- SACHOT, J. 1943. *Jusqu'au dernier "Mangeur-Decru"*. Paris: Spes. p. 79.
- SMITH, J. G. E. 1975. The ecological basis of Chipewyan socio-territorial organization. In: Clark, A. M. (ed.), *Proceedings: Northern Athapaskan Conference 1971*. Ottawa: National Museum of Man (Canadian Ethnology Service Paper no. 27). vol. 2, pp. 389-461.
- 1976a. Introduction: the historical and cultural position of the Chipewyan. *Arctic Anthropology*, 13 (1): 1-5.
- 1976b. Local band organization of the Caribou Eater Chipewyan. *Arctic Anthropology*, 13 (1): 12-24.
- 1976c. Local band organization of the Caribou Eater Chipewyan in the eighteenth and early nineteenth centuries. *Western Canadian Journal of Anthropology*, 6 (1): 72-90.
- STACKPOLE, E. A. (ed.). 1965. *The Long Arctic Search: The Narrative of Lieutenant Frederick Schwatka, U.S.A., 1878-1880, Seeking the Records of the Lost Franklin Expedition*. Mystic, Connecticut: Marine Historical Association. pp. 45, 53, 57.
- STACKPOLE, R. 1969. *American Whaling in Hudson Bay, 1861-1919*. Mystic, Connecticut: Marine Historical Association.
- SWAINE, C. 1784. *An Account of a Voyage for the Discovery of a Northwest Passage*. London: Jolliffe; Corbett; Clarke. vol. 2, pp. 260, 266.
- TENER, J. S. 1954. Facts about Canadian musk-oxen. *Transactions of the North American Wildlife Conference, Chicago, 1954*. Washington, D.C.: American Wildlife Institute. pp. 504-10.
- 1958. The distribution of musk-oxen in Canada. *Journal of Mammalogy*, 39 (3): 398-408.

- . 1965. *Muskoxen in Canada — A Biological and Taxonomic Review*. Ottawa: Queen's Printer.
- TUTTLE, C. R. 1885. *Our North Land*. Toronto: C. Blackett Robinson. p. 228.
- TYRRELL, J. B. 1897. Report on the Doobaunt, Kazan, and Ferguson Rivers, and on the north-west coast of Hudson Bay, and on two overland routes from Hudson Bay to Lake Winnipeg. *Canada, Geological Survey, Annual Report 1896*. p. 165.
- (ed.). 1931. *Documents Relating to the Early History of Hudson Bay*. Toronto: Champlain Society. p. 265.
- TYRRELL, J. W. 1898. *Across the Sub-Arctic of Canada*. London: T. F. Unwin. pp. 104, 107, 108.
- and FAIRCHILD, C. C. 1902. Report on an exploratory survey between Great Slave Lake and Hudson Bay, Districts of Mackenzie and Keewatin. *Canada, Department of the Interior, Annual Report 1901, part 3*. Appendix 26, p. 121.
- WEST, J. 1824. *The Substance of a Journal during a Residence at the Red River Colony*. London: L. B. Seeley and Son. pp. 171, 175.
- WHITNEY, C. 1904. The musk-ox. In: Whitney, C., Grinnell, G. B. and Wister, O., *Musk-Ox, Bison, Sheep and Goat*. New York: Macmillan.
- WILKINSON, P. F. 1974. The history of musk ox domestication. *Polar Record*, 17 (106): 13-22.
- . 1975. The relevance of musk ox exploitation to the study of prehistoric animal economies. In: Higgs, E. S. (ed.), *Palaeoeconomy*. London: Cambridge University Press.
- WILLIAMS, G. (ed.). 1969. *Andrew Graham's Observations on Hudson's Bay 1767-91*. London: Hudson's Bay Record Society (vol. 27). pp. 19, 34-36.