

Inter-island Movements of Peary Caribou South of Viscount Melville Sound, Northwest Territories

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Locations, directions, and destinations of Peary Caribou (*Rangifer tarandus pearyi*) trails across sea-ice of Peel Sound and Baring Channel between Somerset and Prince of Wales and Prince of Wales and Russell islands, respectively, were obtained during helicopter searches in June 1977. We also searched and counted Caribou on small islands in Peel and Viscount Melville sounds, which further indicated movements of Caribou from Somerset to Prince of Wales and Russell islands and probably north towards Bathurst Island. On sea-ice 158 trails were found and an additional 31 trails were seen on land adjacent to sea-ice crossings, which indicated inter-island movements had taken place. Those movements may be critical in restocking Bathurst Island, an important Inuit hunting area, and in rejuvenating the gene pool. The inter-island movements would likely be vulnerable to the potential disturbance of an all-year open-water tanker route to ship liquid natural gas from Melville Island to southern markets.

Key Words: Peary Caribou, inter-island movements, Northwest Territories, sea-ice trails, tanker route, wildlife disturbance, Arctic.

The possible need for free inter-island movements by Peary Caribou for the maintenance of the species on the Canadian Arctic Archipelago is now a matter of concern, as an all-year tanker route through the waters of Lancaster and Viscount Melville sounds has been proposed. An open sea lane for transporting liquid natural gas from eastern Melville Island to southern markets during the ice-bound period of the year has the potential for disrupting and possibly halting the free flow of Peary Caribou across Viscount Melville Sound. Unimpeded movements could eventually result in the recolonization of declining Caribou populations on islands north of Viscount Melville Sound, especially Bathurst Island (Viscount Melville Sound in this paper includes the water of Barrow Strait east to 95°00'W).

During June 1977 we documented the existence of trails of Peary Caribou, which indicated ice crossings by Caribou from Somerset Island to Prince of Wales Island, and north onto small islands of Viscount Melville Sound. Field time consisted of 11.7 h of searching coastal areas of Somerset, Prescott, Vivian, Lock, Prince of Wales, Mecham, and Russell islands by Bell-206 turbo-helicopter. Greater effort was not possible because of other commitments. The aerial searches were carried out on 12, 13, 17, and 18 June. Subsequent surveys by helicopter were

made over Hamilton Island and Young Island on 15 August, Russell Island on 16 and 17 August, and Lowther Island on 25 August 1977. Hamilton and Young islands received full coverage, Russell and Lowther islands each about 50% coverage by flying coastlines and major drainages. The aerial searches were carried out under favorable light conditions which allowed us to see the cast of the trails for several hundred metres from the helicopter. We flew at low speeds (about 96 km/h) and 10-25 m above sea-level to search for trails. When we encountered a trail we hovered and/or landed to ascertain from the hoof imprints the direction of travel. We often flew along the trail for several kilometres to confirm the heading of the trail.

Observations and Discussion

In total 158 Caribou trails were found on sea-ice, which confirmed inter-island movements by Peary Caribou (Table 1 and Figure 1). An additional 31 trails were seen on land adjacent to sea-ice crossings, which indicated such movements had taken place (Table 1). The magnitude of the inter-island movements could not be ascertained, as we were not sure of the number of Caribou each trail represented. The trail that was backtracked across Peel Sound from Prince of Wales Island to Somerset Island divided into as many as 10 different trails during the crossing.

TABLE 1—Distribution of Peary Caribou trails on sea-ice demonstrating inter-island movements of Caribou on islands south of Viscount Melville Sound, Northwest Territories, June 1977

Islands		No. trails ¹
Origin	Destination	
June 12, 73° 30'N, 73° 00'N ²	(Zone 3, Fig. 1)	
Prescott	Prince of Wales	(9) 6
June 13, 73° 30'N, 73° 00'N	(Zone 3, Fig. 1)	
Somerset ³	Prince of Wales	(7) 2
Somerset ³	Prescott	10
Vivian	Prince of Wales	2
Lock	Prince of Wales	1
June 17, 73° 30'N, 73° 00'N	(Zone 3, Fig. 1)	
Somerset	Prince of Wales	1
Somerset ³	Prince of Wales	3
Somerset ³	Prescott	7
Prescott ³	Prince of Wales	6
Prescott	Vivian	11
Vivian	Lock	3
Lock	Prince of Wales	9
June 17, 73° 00'N, 72° 30'N	(Zone 4, Fig. 1)	
Somerset ³	Prince of Wales	6
Somerset ³	Prescott	4
June 17, 72° 30'N, 72° 00'N	(Zone 5, Fig. 1)	
Somerset ³	Prince of Wales	24
June 18, 97° 30'W, 98° 30'W	(Zone 2, Fig. 1)	
Prince of Wales	Russell	11
June 18, 98° 30'W, 99° 30'W	(Zone 1, Fig. 1)	
Prince of Wales	Russell	(15) 17
Prince of Wales	Mecham	11
Mecham	Russell	21
Russell	Prince of Wales	3

¹Values in parentheses are numbers of trails that were seen on inner bays and coastal areas that indicated inter-island movements but could not be traced to sea-ice for verification.

²Latitudinal zones (30') are about 56 km wide, north to south; longitudinal zones (1°) are about 30 km wide, east to west.

³The origin for each of these trails was assumed, based on direction of travel and course on the sea-ice in relation to adjacent islands. All other embarkations and all landings were verified, see text.

As it is common behavior for Caribou to travel in single file during movements impeded by snow cover, it is likely that the 95 observed trails on Peel Sound could have been made by at least several hundred Caribou.

On 12 June we noted trails in the Back Bay area of Prince of Wales Island, which indicated a movement of Caribou into this area. On the chance that the Caribou had come off the ice of Peel Sound we searched the snow-covered ice of Back Bay and Browne Bay between 73° 30'N and 73° 00'N for evidence of ice crossings by Caribou (Table 1). We repeated our aerial search on 13 June and extended the area to include the satellite islands of Lock, Vivian, and Prescott (Table 1).

The weather deteriorated on 14 June and forced a halt to aerial work until 17 June when our search included the area along the east coast of Prince of Wales Island from 73° 30'N south to about 72° 00'N (Cape Eyre) (Table 1). Observations indicated that a major movement of Peary Caribou from Somerset Island to Prince of Wales Island had taken place between 11 and 17 June.

Cow-calf pairs did not show up on the north coast of Prince of Wales Island until 23 June. Numbers of all sex and age groups increased in this area throughout the remainder of June. Therefore, it is likely that across-ice movements, especially of cows and newborn calves, continued after 17 June.

On 18 June we searched the north coast of Prince of Wales Island, the snow-covered ice of Baring Channel, and the coast of Mecham Island and Russell Island between longitudes 97° 30'W and 99° 30'W (Table 1 and Figure 1). Our findings indicated that Caribou had moved north off Prince of Wales Island several days prior to our search, most likely sometime around 13–16 June.

Trails on the north coast of Russell Island led onto the sea-ice of Viscount Melville Sound in the general direction of Young, Lowther, and Bathurst islands. Deteriorated ice condition did not allow us to follow the Caribou tracks northward on Viscount Melville Sound.

One set of trails was followed from Prince of Wales Island for about 50 km across Peel Sound to Somerset Island on 17 June (Table 1). The six trails from Prescott Island were followed to Prince of Wales Island on 12 June (Table 1). The six trails seen coming off Prescott Island on 17 June (Table 1) were not followed, but they left the island in the same area as the trails seen on 12 June and coursed across the sea-ice in the same

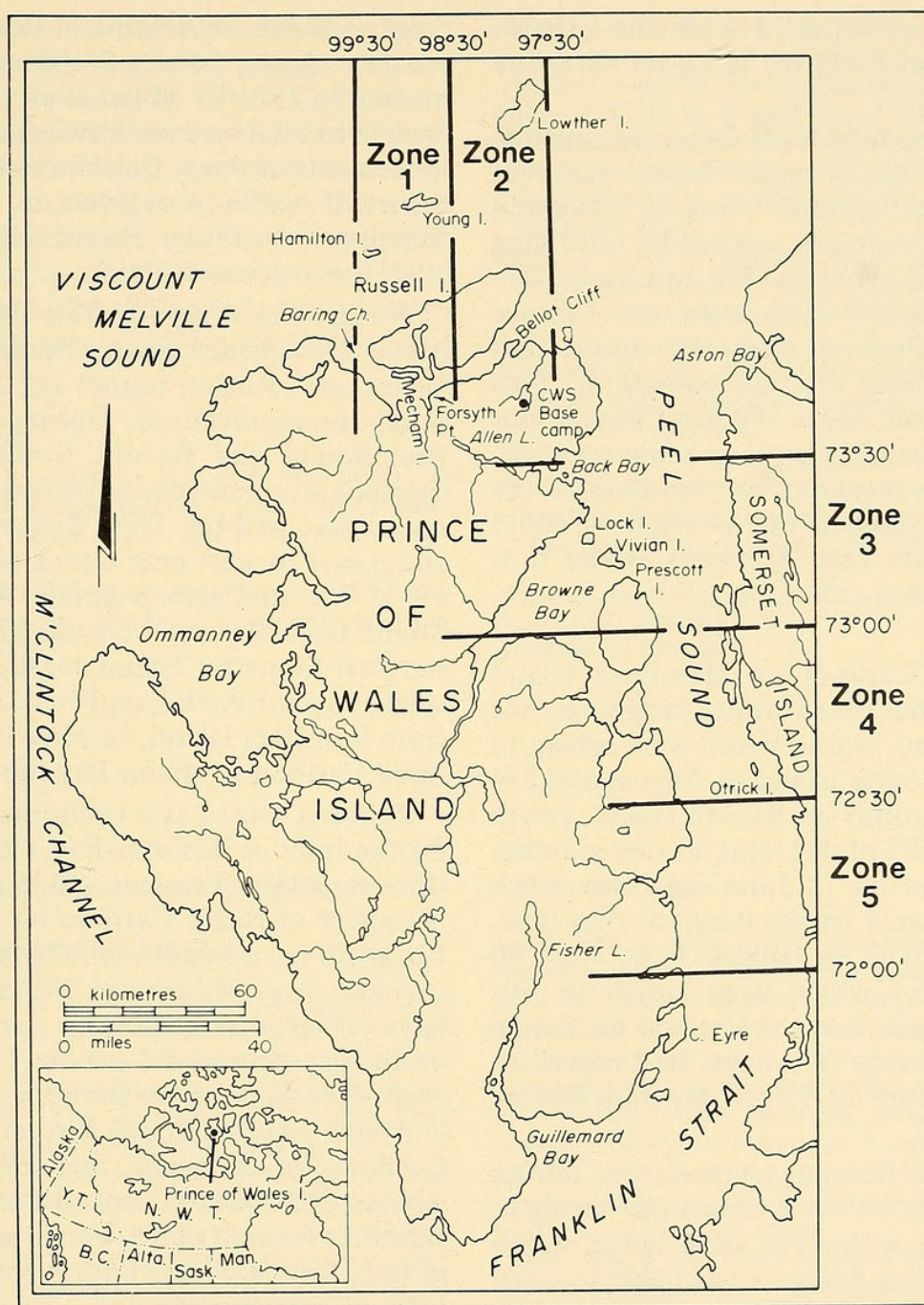


FIGURE 1. Latitudinal and longitudinal locations of Peary Caribou trails on sea-ice demonstrating inter-island movements of Caribou on islands south of Viscount Melville Sound, Northwest Territories, June 1977 (distributions of trails are given by zone in Table 1).

direction as the previous trails. As there were no trails seen going onto Prescott on that occasion, there was no reason to believe that those animals had not also moved to Prince of Wales. All trails were followed from Prescott to Vivian, from Vivian to Prince of Wales and/or Lock, and from Lock to Prince of Wales (Table 1).

Inter-island movements from Prince of Wales to Russell and/or Mecham islands (Table 1)

were verified by flying along the north coast of Prince of Wales and determining where trails left the coast and their course on Baring Channel, then flying along the south coasts of Russell and Mecham to determine the course of trails coming off the sea-ice. The points of departures and arrivals onto the land for trails from Mecham to Russell Island (Table 1) were located by flying along the north coast of Mecham and

the south coast of Russell Island (the narrowness of the channel allowed us to see the entire length of the trails).

Only the origins of 56 trails that we assumed to have originated on Somerset Island and that were located coming onto Prince of Wales and Prescott islands were not verified by our flying along their entire courses. We first flew 300–500 m off and parallel to the east coast of Prince of Wales and Prescott islands to locate and determine directions of trails coming off Peel Sound; during our return flight we were about 10 km off and parallel to those same coasts to confirm the persistence of the headings of the trails. As there is no land east of where we could last see the trails until Somerset Island it is reasonable to believe the trails left from Somerset.

We saw no Caribou on Hamilton Island during August, but found winter droppings. We found 22 Caribou, two of which were calves, in six groups on Young Island in August and 334 Caribou in 85 groups on Russell Island, calves representing 21.8% of this total. Earlier searches of Russell Island on 18 June suggested much fewer Caribou were on the island at that time. On Lowther Island in August there were 20 Caribou, four of which were calves in five groups. We suggest that the Caribou on Young and Lowther islands in August had moved to those islands in June 1977 probably from Russell Island.

Recurrence of freezing temperatures during the earlier stages of the spring thaw result in formation of ice within the snow cover, which makes low-growing forage unavailable to Caribou. Thus, during the spring period of icing, feeding on snow-covered areas remains either nearly impossible or is accomplished with high energy costs which probably often exceed energy intake. Perhaps this difficulty in obtaining forage may trigger long-range movements or migrations of Peary Caribou. Pruitt (1959) reported that heavy crusting on deep snow, which hindered or prevented foraging, served as a stimulus for springtime migrations of Barren-ground Caribou on the Canadian mainland. Heavy crusting of deep snow (>60 cm) over soft snow also provided a strong bearing surface which allows Caribou to travel with relative ease.

Inter-island movements of Peary Caribou on western Queen Elizabeth Islands were documented in 1974 by Miller et al. (1977b). Earlier evidence based on Inuit knowledge of inter-island movements of Peary Caribou among the islands reported herein are given in Manning and Macpherson (1961), Bissett (1968), Freeman (1975), and Riewe (1976).

We also heard reports from the Inuit of inter-island movements among Somerset, Prince of Wales, and Russell islands (G. Eckalook, personal communication). During seal surveys in Peel Sound and Barrow Strait, T. G. Smith (personal communication) noted Caribou tracks on sea-ice. In May 1975, Smith saw one track going east to west near Otrick Island ($72^{\circ}37'N$, $95^{\circ}35'W$), 10 Caribou going west across Peel Sound from Somerset Island, 30 Caribou along the west Somerset Island coast, and at least six tracks toward Back Bay, Prince of Wales Island from Somerset Island. In May 1976, Smith saw three Caribou in Aston Bay moving west.

Bathurst Island is a traditional hunting area for the Inuit of Resolute Bay, Cornwallis Island (Bissett 1968; Freeman 1975; Riewe 1976). Numbers of Peary Caribou on western Queen Elizabeth Islands, especially Bathurst Island, are currently low (Miller et al. 1977a), and the Inuit have already voiced their concern over the declining number of Caribou. They voluntarily suspended hunting on Bathurst Island in 1974, and now have to travel further afield to hunt Caribou on Somerset and Prince of Wales islands. Re-establishment of Peary Caribou on Bathurst Island (which would satisfy the needs of Inuit from Resolute Bay) at recently estimated rates of reproduction and survival (Miller et al. 1977a) would probably require recolonization from other islands. Recolonization of Bathurst by Peary Caribou is most likely to occur by movements of Caribou from Somerset and Prince of Wales islands across Viscount Melville Sound. An influx of Caribou to Bathurst Island from the west is unlikely as their numbers are also currently low on both Melville and Prince Patrick islands (Miller et al. 1977a).

The apparent existence of traditional migrations and environmentally forced seasonal movements by Peary Caribou to maintain themselves as a species on the Canadian Arctic Archipelago require that the phenomenon of

inter-island movements be studied further. Such an investigation would provide insight into the potential for restocking of Peary Caribou on Bathurst Island by recolonization from Somerset and Prince of Wales islands, a matter of concern to the Inuit of Resolute Bay. The work would also provide an evaluation of the possible detrimental effects of an all-year tanker route through Viscount Melville Sound on recolonization movements across sea-ice by Peary Caribou.

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Supplementary Information and Viewpoints

What Causes Inter-island Movements

An example of the complexity of evaluating data in isolation is seemingly given by a comparison between Freeman's (1975) report of Caribou movements from Bathurst Island and our own observations of the same events (Miller and Russell 1976). Freeman (1975) reports that distributional changes occurred among Caribou on Bathurst Island starting in 1973 and culminated in spring 1974 with movements from the island. He infers that the intra-island movements and exodus of Caribou were unexpected and were caused by seismic and associated exploratory activity. We (Miller and Russell 1976) also detected the movements of Caribou (some Muskoxen also made the move) from Bathurst to Little Cornwallis then to Cornwallis Island in the spring of 1974. The distribution of Caribou on Bathurst in late winter 1973 (Miller and Russell 1975, 1976) was as expected, that is, as described for that season of the year by Inuit from Resolute Bay (Bissett 1968), so that the unexpected movements reported to Freeman must have occurred in the winter of 1973-1974, which was a particularly severe winter. Snows came early and accumulated rapidly in early winter 1973-1974, and deep snow cover persisted into late June and early July in some areas. Also, groundfast ice put down by freezing rains in September and October most likely occurred over extensive areas (Miller and Russell 1975; Parker et al. 1975).

Subsequently, mortality among Caribou on the easterly islands of the western Queen Elizabeth Group was high and movements were varied (Miller and Russell 1975, 1976; Parker et al. 1975). We do not dismiss Freeman's (1975)

supposition as being totally untenable, but we do suggest that movements of Caribou from Bathurst in the spring of 1974 and possibly earlier intra-island movements in 1973 were caused by restricted and unavailable forage supplies, a condition that was nearly universal on many western Queen Elizabeth Islands at that time (Parker et al. 1975; Miller and Russell 1976). The possibility exists that exploratory activities could have intensified the situation on Bathurst, but the data for the western Queen Elizabeth Islands complex supports more the argument for natural catastrophe as the causative agent.

Both Bissett (1968) and Freeman (1974. Environmental report, Bathurst Island, N.W.T. Part 1, Caribou. Inuit Land use and occupancy Project, typescript Ms. 12 pp.) have documented Inuit reports of Peary Caribou seasonally occupying small islands off Bathurst. We contend that the movements of Caribou from Bathurst to Little Cornwallis to Cornwallis and to other islands have existed for aeons, but that their existence was masked by the relatively high numbers of Caribou present on Bathurst Island in the late 1950s until the mid 1970s. Peary Caribou numbers were declining throughout the 1960s on western Queen Elizabeth Islands; therefore, the magnitude of many movements would have been decreasing unless reinforced by severe environmental conditions, which was the case in 1974.

Although Freeman (1975, Table 3) shows that more Caribou were taken on Cornwallis in 1973-1974 than during the 3 yr before, he also shows that the number of hunts had increased considerably on Cornwallis (supposedly out of necessity, owing to lack of Caribou on Bathurst, but possibly also because of an awareness of Caribou on Cornwallis in

1974). The average number of Caribou taken per hunt during all years on all islands, however, is not very dissimilar. In fact, average success per hunt on eastern Bathurst was higher in 1971–1972 than in later years when the dependency supposedly shifted to that area of Bathurst. There is no doubt that the Caribou declined drastically on southern Bathurst during 1973–1974 and that the Caribou movement to Cornwallis was marked in the spring of 1974, but the causes remain debatable as does the stability of the dynamics associated with the situation.

This discussion serves mainly to stress the need for more baseline data. We concur with Freeman (1975) that the Inuit possess "a considerable stock of basic, empirical knowledge" that should not be overlooked. But we also suggest that the 17 yr when Inuit of Resolute Bay have hunted on Bathurst Island is not enough time for them to possess a full knowledge of the long-term dynamics of the Caribou there. We think this supposition is sound because existing data (Macpherson 1961; Tener 1963; Miller and Russell 1976) indicate that (1) Peary Caribou were in high numbers and possibly peaked about the time Inuit from Resolute Bay began hunting on Bathurst; and (2) that condition was followed by an apparently continuous, general decline (unrelated to hunting or exploratory activities) in Caribou numbers on Bathurst and all other islands, at least, of the western Queen Elizabeth Group, since that time until present (Miller and Russell 1976).

Evidence for Inter-island Movements of Caribou

Most descriptions of Peary Caribou movements across sea-ice between islands of the Arctic Archipelago are based on circumstantial evidence rather than direct observations. The earliest mention of movements between islands was by Parry (1821, p. 110). From his observations of an increase in Caribou numbers near Winter Harbour, Melville Island, in October and when he subsequently saw only one or two during the winter, Parry assumed that the Caribou migrated south and returned in May. Parry's conclusion was refuted by Bernier (1910, p. 98) who also overwintered at Winter Harbour. He failed to observe tracks on the ice within 60 km east and 90 km west of Winter Harbour. Although Bernier commented on the increase in numbers in September and October in the vicinity of the ship he saw Caribou in the winter and suggested that there was no migration. But the geologist for the expedition, McMillan (*in* Bernier 1910, p. 475) noted that Caribou "tracks are frequently seen upon the ice and herds have been seen crossing from one island to another," but gave no further details. McDougall (1857, p. 398) noted "... a party of 5 deer ..." travelling to the east across McDougall Sound between Bathurst and Cornwallis islands on 25 May 1854. Peary (1907) hunted Caribou on both sides of Nansen Sound, between Axel Heiburg and Ellesmere islands, which led Allen (1908, p. 491) to suggest that Nansen Sound must be passable for Caribou for most of the year.

In reporting on his explorations of the western islands of the Queen Elizabeth Group, Stefansson (1921) described inter-island movements of Caribou. He noted (p. 399) "... that many caribou do leave the island [Banks] most falls, if not every fall, going south to the mainland." The observation in September 1915 of Caribou tracks 5 km south of Jenness Island, a small island off south Borden Island is

one of the few instances in the literature of direct evidence of inter-island movements.

Inter-island movements of Peary Caribou between the Queen Elizabeth Islands have been assumed in description of taxonomy and changes in population size. Manning (1960, p. 43) thought that the available specimens of Peary Caribou from the Queen Elizabeth Islands suggested a fairly homogenous population. Homogeneity would be expected, if, as Manning suggested, Caribou crossed between islands with no difficulty. Macpherson (1961, p. 12) suggested that inter-island movements were the explanation of changes of numbers of Caribou on Borden, Brock, and Mackenzie King islands observed by Stefansson (1921) and geologists in 1958–1959. Tener (1963) found tracks leading from Mackenzie King to Borden Island in August 1961. He suggested the high density on Borden might be partly the result of immigration.

More has been documented on movements of Caribou among and between the larger islands south of McClure Strait, Viscount Melville Sound, and Barrow Strait, and the mainland. Manning (1960) had collected and described evidence of inter-island movements across the ice between the mainland and Banks Island and Victoria Island in fall and spring. He suggested that it is unlikely that McClure Strait between Banks and Melville and Prince Patrick islands is crossed because the ice freezes late and is probably rough. Manning and Macpherson (1958, pp. 66–67) and Manning (1960) thought the crossing between Banks Island and the mainland was not a regular movement. McEwan (1955) described a movement from Banks Island to the mainland and west coast to Victoria Island in 1952; he also noted that Caribou moved onto the sea-ice in October. They remained on the ice for a "considerable length of time," and few returned to Banks. Armstrong (1857), while overwintering on the *Investigator* in Prince of Wales Strait, 1850–1851, saw Caribou cross between Banks and Victoria islands. McClure (1856, p. 156) described one of the instances of movement: a seaman was out walking from the *Investigator* in January 1851, "And pass close to him a small herd of reindeer trotting quickly towards the Princess Royal Islands." The movement between Victoria Island and the mainland was an extensive migration. Reference to it was made by Franklin (1823, p. 395) and Sabine (*in* Franklin 1823, p. 665) while they were exploring Bathurst Inlet. Later descriptions by Rae (1850), Collinson (1889), and Hoare (1927) were brought together by Manning (1960). He described the timing, numbers involved, and eventual destruction of the migrating herds by firearms in 1919. Manning (1960, p. 47) considered Caribou of the so-called Dolphin and Union herd that migrated between Victoria Island and the mainland were more closely related to Barren-ground than to Peary Caribou. Movements between Prince of Wales and Somerset islands across Peel Sound are known by Eskimos (Manning and Macpherson 1961, p. 219; Bissett 1968, p. 125). Manning and Macpherson (1961, p. 219) saw Caribou tracks crossing Browne Bay on the east side of Prince of Wales Island.

Movements across the ice are known for other populations of *Rangifer*. Vibe (1967) cites a Greenland Eskimo who encountered far out on the sea-ice. Caribou which looked different from the Greenland Caribou and were assumed to have come from Baffin Island. Banfield (1961) indicated that the Peary Caribou of northwestern Greenland could have

colonized from Ellesmere Island across the frozen Kennedy Channel. Banfield (1961, p. 105) suggests movements across ice to explain the distribution of other subspecies after glacial periods.

Some of the most extensive movements of *Rangifer* across sea-ice have been documented in the Soviet Arctic (Nasimovich 1955; Banfield 1954, 1961). Nasimovich (1955, pp. 176–181) gives examples of movements of wild reindeer between the northern and southern islands of Novaya Zemlya, and wild reindeer moving out onto the Kara Sea even to Yamal on the mainland, about 300 km away. Wollebaek (1926) reported that reindeer marked on Novaya Zemlya were shot on Spitzbergen, a minimum distance of about 770 km. Nasimovich (1955) described seasonal movements of wild reindeer between the mainland and Belyi and other small islands; they summer on the islands and return to the mainland in the fall.

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