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CARIBOU WINTER RANGE STUDY, 1951-52

Alan G. Loughrey

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Introduction

A caribou winter range study was carried out by Mr. J.P.Kelsall, of the Canadian Wildlife Service, in the MacKenzie District of the North West Territories during the winter of 1950 - 51. This study was for economic and temporal reasons limited to an intensive study of four major herds of caribou during the winter months. The four herds under consideration were the Rae, Radium, Great Bear Lake and the Yellowknife (Banfield 1950). These herds were chosen because of the relative proximity to Yellowknife of their normal winter ranges.

The Rae herd because of its size was to receive the most attention.

Primary objectives of this survey were to gather data pertinent to an ecological study of the caribou in their winter range and to evolve and standardize research techniques. Major purposes of the ecological study of these herds as outlined by Mr. Kelsall were :

(1) A census of each herd was desirable in order to ascertain the actual numbers of these herds.

(2) The calf ratio within the herd was to be determined as a very desirable bit of comparative knowledge.

(3) Predation by wolves was to be studied whenever and wherever possible.

In addition to the major purposes listed above there were a number of minor purposes of varying importance in conducting the winter range studies. Among these the winter range itself was to be studied both from botanical and topographical aspects. Winter movements of herds and actions of caribou herds and individuals were to be studied and embryological matter was to be collected. (Kelsall 1951)

It is hoped that over a period of years that standardized research techniques would yield accurate data for each herd, pertaining to: total population, calf production, and calf survival. From comparative analysis of these data, gathered over a period of years, valuable knowledge of the caribou life history could be obtained which would be essential to the formation of biologically sound management procedures with regard to the individual herds and ultimately useful in evaluating the barren ground caribou potential as a whole.

The present investigation was a continuation of the caribou winter range study and was conducted during the winter months of 1951 - 52.

For the purpose of continuity, objectives and methods conformed with those employed during the previous study.

Itinerary

The writer arrived in Yellowknife on November 10, 1951, to carry out the caribou winter range study. The study involved the following phases; location of the caribou herds under consideration and the determination of their fall migration routes, this was accomplished chiefly by interviewing pilots, wardens and Indians; preliminary aerial surveying of the herds; ground survey of the herds; extensive aerial surveying of the herds.

During the course of the investigation, the following field trips were made :[x]

(1) December 10, 1951 : Yellowknife to Ft. Rae to Yellowknife (aerial).

(2) December 13 to 17, 1951: Yellowknife to Port Radium - Norman Wells - Yellowknife. Surveys of the Rae, Radium, and Great Bear Lake herds of caribou (aerial).

(3) January 10 to 16, 1952: Yellowknife to Blanchet Island, ground patrol among the Great Slave Lake caribou (200 miles dogteam).

(4) January 21, 1952 : Yellowknife to Blackwater Lake, a preliminary survey of the Rae herd (aerial).

(5) January 28, 1952 : Yellowknife to O'Connor Lake to Yellowknife, preliminary survey of the Great Slave Lake caribou (aerial).

(6) January 29 to February 5, 1952: Yellowknife to Blackwater Lake, a ground patrol among the Rae herd (aerial and dogteam).

(7) February 13 to 14, 1952: Caribou-musk-ox survey, survey of the Great Slave Lake caribou (aerial).

(8)February 16, 1952: Yellowknife to Wilson Island, ground patrol to the Great Slave Lake caribou (snowmobile).

(9) March 5 to 6, 1952: Extensive survey of the Great Slave Lake caribou (aerial).

(10) March 12 to 19, 1952: Musk-ox survey, Yellowknife to Fort Reliance to barrens north-east of Ft. Reliance to Yellowknife. Elements of the Great Slave Lake caribou surveyed (aerial).

x See maps 1 and 3 for the tracks of the major flights.

(11) March 25 to 31, 1952: Extensive survey of the Rae, Great Bear Lake, and Radium caribou herds (aerial).

(12) April 1 to 2, 1952 : Yellowknife to Ft. Simpson to Ft. Providence to Yellowknife, survey of the Rae herd (aerial).

Winter Movements of the Rae Herd

Fall Migration:

Elements of the Rae herd were first reported in the vicinity of Winter Lake on the 2nd of September. On the 8th of September, at Indin Lake, the main herd passed by on its way to Ghost Lake, heading in a south-westerly direction. According to report, it took four days for this herd to pass. Although these caribou were following their typical fall migration route, it would seem likely that the movement represented the midsummer migration. The rut normally occurs in October and takes place on the barrens. Therefore it is probable that these caribou reversed their direction and returned to the barrens for the rut.

The fall migration route followed in 1951 by this herd, appears to be their normal one. They moved in a south-westerly direction along the Snare River drainage system. The main movement of caribou passed between the north end of Marion Lake and the south end of Shott Lake by the end of October. Bands of stragglers passed through Russel Lake and James Lake. Occasional stragglers appear to have split off and turned south along the east shore of the north arm of Great Slave Lake. This is evidenced by the fact that small bands of caribou wintered around Prosperous, Duncan and Gordon Lake. Several bands of caribou moved west between the south end of Hottah Lake and the north end of Hardisty Lake. These are thought to be elements of the Rae herd.

The main herd moved west to the south-eastern end of Lac La Martre; here they apparently split and moved in several directions to their wintering grounds. One portion turned north-west and migrated between Bartlett Lake and Lac La Martre. This movement continued north-west along the west shore of Lac Taché. From here, caribou do not appear to have moved in any definite direction but spread out, some wintering in the vicinity of Lac Taché and Grandin Lake, while others moved westward toward the Johnny Ho River and Keller Lake. (See map 2)

Another large group of caribou moved in a south-westerly direction, passing Windflower Lake, crossing the Horn River and wintering in the Horn Mountains and the country east of Willow Lake. Another group of caribou wintered in the vicinity of Bulmer Lake on the Willowlake River.

A considerable number of caribou wintered in the foothills of the Franklin Mountains, from Greasy Lake to Blackwater Lake. I have not been able

to ascertain whether these caribou moved into this area from the north-east or the south-east. It was not possible to determine the northern limit of the winter range of the Rae herd as the northern movement of this herd overlapped the southern movement of the Radium herd, particularly in the vicinity of the Johnny Ho River.

Spring Migration:

At the time of writing the greatest portion of the Rae herd had not crossed the chain of lakes north of Marion Lake on its way to the barrens. The caribou as a whole, however, seemed to be constantly on the move while in the winter range. In the Blackwater Lake region, caribou were moving north and east out of the area o the last week in January and the first week in February. This movement continued with some caribou passing south of Keller Lake towards the Johnny Ho River and others moving north of Keller Lake. By the last week of March, caribou in the Lac Taché region were moving south-east, following the chain of frozen lakes. Bands of cows and calves were separate from the bulls and were ahead of them. The spring migration of bulls was reported to be crossing Lac La Martre in the vicinity of Big Island during the latter part of April.

Winter Movements of the Radium Herd

On the basis of several reports, it was learned that the Radium herd moved down the Sloan River from the Big Bend region of the Coppermine River. They reached the McTavish Arm of Great Bear Lake at Hunter Bay. They moved south-east toward Port Radium and passed around Glacier Lake (four miles east of Port Radium) on an eight mile front. The main portion of the herd passed through this area from the 10th of September to the 7th of October.

They congregated around Conjuror Bay and some crossed to Richardson Island. Others probably moved to the Leith Peninsula. On December 17, small bands of caribou were observed around Lac Saint Thérese and numerous tracks were seen along the Johnny Ho River south of Lac Saint Thérese. These tracks were heading south-east. Scattered bands of caribou wintered on the peninsula between the Keith Arm and McVicar Arm. In the middle of January, small numbers are reported to have crossed from the top of the peninsula to the Leith Peninsula. (See Map 2)

Caribou wintered as far west as the Great Bear River and around the south-western end of McVicar Arm. As the winter ranges of the Radium and Rae herds overlapped in the vicinity of the Johnny Ho River, it is difficult to say whether the caribou that reached the Great Bear River were western elements of the Radium herd or northern elements of the Rae herd.

The caribou of the Radium herd seem to have been widely distributed over a large winter range. The heavy utilization of the range south of the McVicar Arm indicated that the caribou had wintered there in considerable numbers.

The migration towards the barrens was in progress near the end of March. The caribou that had wintered around Conjuror Bay moved east along the Tilchuse and Calder river systems. There were still numbers of caribou around Lac Saint Therese. Indians from Great Bear Lake reported that 700 cows moved east between Fishtrap and Hottah lakes during the first week of April.

A large number of caribou wintered on the peninsula between the Dease and McTavish Arms of Great Bear Lake. On the 15th of December, a survey flight indicated that they were occupying an area of roughly 1,000 square miles. From a point about 37 miles east of the Takaatcho River, they were present in a density of approximately 11 caribou per square mile. By late March these caribou had moved out of this peninsula, travelled up the Dease River and were heading towards the Dismal Lakes. They were reported to have reached the Dismal Lakes region by the first week in April.

The size of this herd was calculated as approximately 11,000 individuals (see section on statistics). Mr. Kelsall placed the number of caribou wintering in the area at a minimum of 10,000 animals. In both years the Dease River was the route followed by these caribou and their summer range appears to be in the vicinity of the Dismal Lakes or September mountains. Mr. Kelsall suggested that in view of the fact that the other elements of the Radium herd, that normally winter around the southern shore of Great Bear Lake, occupy a different summer range (i.e. east of the Big Bend of the Coppermine River) that those on the peninsula south of the Dease Arm are probably a more or less distinct herd. The similarity in the size and migration route of this herd during the past two years tends to confirm this supposition. It is possible that these caribou are apt to be elements of the Great Bear Lake herd, although perhaps a distinct unit. Ensuing studies will undoubtedly yield further information concerning this matter.

Winter Movements of the Yellowknife Herd

This herd was not recognized as a separate entity during the present winter range study. The actual numbers, movements, winter range and other vital statistics of this herd were not obscured by the movements of the large Hanbury herd, which wintered over a large area from the north shore of the east arm of Great Slave Lake south to Alberta and Saskatchewan.

A few small bands of caribou wintered around Gordon Lake, but no more than a few hundred. These animals might be elements of the Yellowknife herd or more probably, were stragglers from the Rae herd.

Winter Movements of the Great Bear Lake Herd

Two survey flights were flown around the north shore of Great Bear Lake. The first on December 15, the second on March 26 and 27.

On the first flight, caribou were found in two areas of concentration. The first concentration was in the vicinity of the Haldane River, both on the east and west side of it. The second was in the area around Kilekale Lake and to the east of this lake. These two groups of caribou were separated by an area of barren rolling hills. This area varies in width from 15 to 25 miles and occurs roughly twenty miles west of the Haldane River and twenty miles east of the Katseyedie River. The general conformation of these hills is a series of rounded ridges rising 5 to 10 miles inland from the shore of Great Bear Lake and running north-northwest and gradually increasing in altitude. They merge with a higher chain of rugged hills which extend in an east-west direction about 30 miles inland from the shore.

During the December flight, a few small bands of caribou were noted on the eastern edges of the barren hills. They were moving south-east towards the wooded region. At this time, no tracks were observed west of a line running north of Good Hope Bay. It was not known how far north of Kilekale Lake the caribou were at this time. Strip counts made over the two areas of concentration indicated a density of 5.6 animals per square mile. However, since this area is quite heavily forested, accurate counts are impossible and the actual density was probably much higher than indicated by this figure.

On the second flight (March 26, 27), tracks indicated that the caribou had spread as far south and west as Mahony Lake. Caribou were first contacted around the southern end of Lac des Bois. The majority of these caribou were moving south-east toward the Katseyedie River. No caribou were noted on the barren hills, previously described, but small bands were noted moving east along the shore of Great Bear Lake towards the Haldane River.

Along the course of the Haldane River and its headwaters, some 10 to 30 miles inland from the lake shore, there is a series of long narrow lakes which are oriented in a north-west, south-east direction. Bands of caribou were noted travelling south-east along these lakes, lying down on the lakes or moving through the woods. We camped over-night on one of these lakes. Caribou were passing in bands of 20 to 50 along the length of the lake and it was possible to segregate about 230 from the ground and obtain a calf ratio.

Caribou had been feeding extensively in the area and an investigation was made. The following day a circuit was made around the limits of the moving caribou and strip counts were made along transects flown at right angles over the caribou. These yielded ratios of 17.5 and 27.8 caribou per square mile. A large herd of caribou was occupying an area of some 70 square miles directly east of the Haldane River. This herd was more or less stationery at the time and they were feeding or resting, but not migrating. No caribou were noted more than 10 miles east of the Haldane River.

From the evidence gathered on these two flights, it would appear that these caribou move in from the east in the early winter around the eastern end of the Dease Arm and gradually move westward parallel to the shoreline. Apparently small bands split off from the main herd and winter in the vicinity of the Haldane River. It seems probable that they avoid the barren hills between the Haldane and Katseyedie Rivers and migrate fairly close to the shore in this area until they reach the forested region east of the Katseyedie River. From here they continued westward, some apparently turned north and wintered in the Lac des Bois region, while others continued west and south around Smith Arm and wintered as far south as Mahoney Lake. They retraced their routes in the late winter and early spring. The western element moved north-east around the Smith Arm and those wintering in the Lac des Bois region moving south-east towards the mouth of the Katseyedie River. These caribou probably joined or followed those caribou that were moving down the Haldane and congregating east of it. (See map 2)

Winter Movements of the Hanbury Herd

The migration routes of this herd seem to be somewhat variable and its winter range covers a considerable area. Banfield (1950) gives a description of the alternative routes and the winter ranges used by this herd. During the winter of 1950 - 51, considerable numbers of this herd wintered in Wood Buffalo Park and crossed the Slave River. This winter, it did not winter as far south or west.

Caribou moved into their winter ranges over a wide front and following a number of different routes, taking advantage of several natural drainage systems. One group estimated at several thousand animals moved in from the east down the Snowdrift River and thence out onto the islands in the east arm of Great Slave Lake. They had reached Simpson Island by the first week in December. Another group of several thousand animals moved down Nonacho and Talston lakes crossing south of Rutledge lake to Thubun and O'Connor lakes. What was probably the main body of the herd passed south of Pilot Lake. Mr. W.A.Fuller reported that in late November, caribou passed on a 30-mile front south from Pilot Lake to just south of the North West Territories' boundary. These caribou turned north at the Slave River and moved up and spread out along the Talston River reaching Rocher River about the middle of December. From here they spread east and west with some crossing to the islands. (See map 3)

By the middle of January, caribou were widely distributed over an area of some 20,000 square miles. They ranged from the Caribou Islands to Fort Reliance to Tazin Lake and Fort Smith. The five main areas of concentration were :

(1) The islands in the east arm of Great Slave Lake
(2) Around Thubun Lake
(3) South-east of O'Connor Lake
(4) Around Hill Island Lake
(5) North-west of Tazin Lake.

During January and February, caribou wintering in the islands crossed to the north shore. Small numbers crossed in the vicinity of the Beaulieu and Francois Rivers. They continued their northward movement along these drainage systems. Others crossed to the north shore from Blanchet, Wilson and Simpson Islands; these turned east along the north shore and were noted in large numbers in the vicinity of Taltheilei Narrows. At this point some crossed to the Pethei Peninsula and moved along the Douglas and Kahochella peninsulas towards Snowdrift and Fort Reliance. The remainder continued north-east along the shore and moving inland, reached Lac du Mort by the end of February . By the end of the first week in March, caribou in the Lac du Mort region were moving in diverse directions. Some continued inland north of Lac du Mort, others reversed their direction and moved south towards the lake and crossed to the peninsulas; a few continued east along the north shore of McLeod Bay towards Reliance. A few may have ascended the Hoarfrost River; the majority moved south-east along McLeod Bay passing between Fort Reliance and Old Fort Reliance at the mouth of the Lockhart River. They were joined by other caribou that had moved east along the south shore. The Lockhart River was not ascended, but these caribou headed south-east towards the Snowdrift River.

By the middle of February, there was a marked movement eastward from the Thubun Lakes north of Rutledge Lake and towards Nonacho Lake. Caribou were still in the vicinity of the Talston River near Tsu Lake by the first week in March, but were migrating east at the time. At the same time, there was a general eastward movement of caribou over a wide front from Hill Island, Thekulthili, Talston and Nonacho lakes. By the middle of March, caribou near Reliance were less than 40 miles from the barrens, but there was no evidence of any caribou moving onto the barrens at this time.

It is possible that the caribou that descended the Snowdrift River and moved onto the islands from the east were elements of the Yellowknife herd. It is known that only a few thousand animals were involved in this movement and that they moved onto the islands almost a month sooner than did those that crossed from the vicinity of Rocher River.

An estimated 9, 600 caribou wintered in the islands (see section on statistics) and probably several thousand more passed through to the north shore. At the time the surveys were flown in late January and February it was noted that caribou had crossed and were crossing to the islands from the south shore and that caribou were also crossing from the islands to the north shore. If the postulation that the Yellowknife herd wintered on the islands is correct it cannot be stated to what degree they became intermingled with elements of the Hanbury herd. However, in view of the past history of the migration routes chosen by the Yellowknife herd, it seems likely that those caribou that crossed to the north shore and ascended the Beaulieu and Francois Rivers and migrated inland north of Lac du Mort were elements of the Yellowknife herd. Those caribou that crossed to the north shore and eventually headed east towards Snowdrift and Fort Reliance were probably elements of the Hanbury herd.

Caribou Wintering on the Arctic Coast and on the barrens

No aerial surveys were flown to the arctic coast by this observer. However, information concerning the occurrence and numbers of caribou wintering on coastal areas was obtained from pilots, the R.C.M.P. and members of religious organizations.

No major herds of caribou were reported as wintering along the arctic coast. It is reported that natives and residents experienced some hardships on this account. Caribou were reported as occurring along the coast of Kent peninsula west of the Ellice River and on the northern part of Bathurst Inlet. The number of caribou involved in each of these cases is not known. Small bands were reported in the vicinity of the Kugaryuak River east of Coppermine.

An isolated band of caribou wintered on the edge of the barrens near Winter Lake; these were probably stragglers from the Rae herd. While on the musk-ox survey a band of nine caribou was observed at the confluence of the Baillie and Back Rivers.

On the basis of information presently available, it appears that small scattered bands of caribou wintered on the barrens and along the arctic coast, east of Coronation Gulf. It is apparent that the number of caribou involved is small, possibly only a few thousand animals.

General Description of the Winter Range

On the basis of observations of the utilization by caribou on the winter ranges of the several caribou herds under consideration, the following generalized observations may be made. It was apparent that mature white spruce (Picea glauca) forest cover was preferred. This is probably related

to the occurrence of lichens as a ground cover in this type of area. It was noted that areas of of spruce forest with numerous small lakes and streams were more extensively utilized than were unbroken stretches of forest. Factors influencing a choice of this nature probably are : the numerous streams and lakes offer easy routes of travel for the caribou, the edges of streams and lakes usually support sedges which are utilized as food, and because caribou rest and sleep on the open lakes.

Lower lying areas of predominantly black spruce (Picea mariana) with extensive muskegs were utilized quite heavily in some areas. In general, areas of open muskeg (willow - alder - sedge association) showed only partial utilization. In this case sedges were the food chiefly utilized.

It was strikingly apparent that migrating caribou usually avoided large burned areas. In many instances the main body of migrating caribou would swing around an extensive burn in order to avoid it. This was noted in the region between the north-west corner of Lac La Martre and the Cartridge mountains while surveying the fall migration route of the Rae herd. When caribou trails crossed burned areas, they usually headed straight across them and only scattered feeding craters were noted.

Winter Range of the Rae Herd :

Since the winter range of the Rae herd was quite extensive it showed considerable variation in its specific topography and to a lesser extent vegetation.

From the Horn River, the land slopes upward forming a plateau of the Horn mountains. These mountains reach a maximum height of 2500 feet in the vicinity of Willow Lake. The spruce forest on the plateau is not entire, but rather consists of areas of considerable density interspersed with open areas of stunted spruce. In general, the forest cover is not as dense or tall as in the Fish Lake, Blackwater Lake region, but from the numerous feeding craters here, it would seem that this region affords suitable winter forage for caribou. It is interesting to note that the Horn mountains derive their name from the Indian legend that caribou go into these mountains to shed their antlers.

The area immediately east of Bulmer Lake consists of an extensive flat muskeg with scattered patches of spruce. The caribou wintering in this area appear to be more or less isolated from the other components of the herd.

From Willowlake River the Franklin Mountains rise gradually towards Greasy Lake, Fish Lake and Blackwater Lake (see figure 3) . These mountains attain their maximum elevation of 5000 feet at Cap Mountain, south of the Ochre River. The climax forest cover in the Franklin Mountains consists of white spruce. There are local patches of poplar (Populus spp.) and scattered white birch (Betula papyrifera).

Occasional stands of jack pine (Pinus Banksiana) are found on the ridges and hillsides. Willows (Salix spp.) and alder (Alnus rugosa) grow abundantly along the edges of streams and margins of lakes. Black spruce (Picea mariana) and a few tamarack (Larix laricina) are found in low moist areas.

White spruce in the vicinity of Blackwater Lake attained a maximum diameter breast-height of 18 inches. One tree with a 15.5 inch diameter was found to be 240 years old by a ring count. The largest trees were found along the margins of lakes and streams (see Figs. 1 and 2) . Inland the spruce attained a maximum D.B.H. of 8 to 10 inches, poplar up to 5 inches and jackpine 8 inches.

The area between Lac Taché and Lac Grandin is in the Cartridge Mountains. It consists of a series of parallel ridges and valleys running in a north-west-south-east direction. The forest cover on the top of these ridges is reduced or in some instances absent. The valleys and the borders of the lakes lying in these valleys support an extensive forest cover of spruce and afford favorable winter caribou range.

The central portion of the winter range of the Rae herd is generally of lower relief with numerous small lakes and muskegs and generally a less extensive spruce forest. This is the area adjacent the headwaters of the Johnny Ho River, east of Fish Lake and south of Keller Lake.

Winter Range of the Radium Herd:

In general, the topographical and botanical aspects of the winter range of the Radium herd were similar to those of the Rae herd. The area around Conjuror Bay and particularly Richardson Island is more rugged than the western portion of the range around the south shore of Great Bear Lake. This area is on the edge of the Precambrian shield and is characterized by rock outcroppings and weathered hills, with elevations of up to 1,000 feet.

The area west of Hottah Lake and south of McVicar Arm, as well as the Leith Peninsula, supports quite a heavy spruce forest. Around Lac Saint Thérese and towards the Johnny Ho River, the land becomes lower and there are areas of open muskeg. West of the Johnny Ho River towards Great Bear River, there is an extensive flat stretch of muskeg and lakes with scattered patches of spruce.

Some of the largest white spruce are found on the peninsula between the Keith and McVicar Arms of Great Bear Lake. One tree measured 21 inches in diameter at the base and had approximately 240 annual rings.

Winter Range of the Great Bear Herd :

During the winter of 1951-52, this herd occupied a wide range of spruce forest. The forest cover of the range around the headwaters of the Haldane River is less dense on the whole, than that of the western portion. At the northern limit of the caribou winter range north of Great Bear Lake, the spruce become more stunted and make up 25 percent or less of the cover and clumps of willows become more predominant.

Along the shoreline of Great Bear Lake a treeless area extends inland from the beaches for a short distance. The range of barren hills west of the Haldane River have been previously described. West of the Katseyedie River and south of Kilekale Lake to Tunago Lake, the forest cover is quite dense. To the north and west of Kilekale Lake, the woods become less dense. Two parallel ridges run north from Kilekale Lake at 124 degrees 10 minutes and 124 degrees 25 minutes west longitude respectively. The east shore of Lac des Bois south to Tunago Lake has considerable areas of open muskeg. Spruce forest again becomes predominant from Tunago Lake to Mahony Lake.

Winter Range of the Hanbury Herd:

The Hanbury herd wintered on the north shore of the east arm of Great Slave Lake, the islands and peninsulas of the east arm and south of Great Slave Lake to the provinces of Alberta and Saskatchewan.

In general the area south of the east arm of Great Slave Lake, in which the major portion of the Hanbury herd wintered, is characterized by a heavy spruce forest. There is a considerable area of flat muskeg-black spruce type of country east of the Slave River near the provincial boundary. The topography of the area to the north and east becomes more rugged.

The islands in the east arm are fairly well wooded, although some of them have burned areas. The peninsulas are rather rugged and precipitous and their forest cover is less dense.

West and north of the Beaulieu River, the country is largely burned. However, the drainage systems of the Beaulieu and François rivers are green. The area from Taltheilei Narrows, west and north to Lac du Mort has a heavy spruce forest cover.

Winter Feeding Habits

From observations made during aerial surveys, it was noted that caribou on their winter ranges fed extensively in spruce forests and around the margins of certain lakes. As previously remarked, evidences of feeding in burned areas were scarce. Observations on feeding habits were recorded from ground studies conducted in the winter ranges of the Rae, Hanbury and Great Bear Lake herds of caribou.

Mr. Kelsall gives an apt description of the caribou's manner of pawing a crater-like hole in the snow to obtain the required plant matter. Observations made this year corroborate his description (see Fig.4).

The following observations were made on the ground patrol in the winter range of the Rae herd in the vicinity of Blackwater Lake. Feeding craters were numerous both in the woods and among the banks of streams and the margins of lakes. Fruticose lichens (Cladonia spp.) were the predominant plants taken in the woods while sedges (Carex spp.) were extensively utilized where available. These two different plant types might be termed as "primary" types of forage with various associated plant species.

(1) lichens -ground cover associated with climax spruce forest.
- associated plants found in craters- spruce (Picea spp.), Labrador tea (Ledum groenlandicum), birch (Betula spp.) and Bilberry (Vaccinium sp.).

(2) sedges and grasses - found chiefly along lake margins and stream banks, also in low areas.
- associated plants found in craters: willows (Salix spp.), alder (Alnus fugosa) and horse-tail (Equisetum sp.).

It was noted that the associated plants were seldom utilized. They were present in the crater only because of their proximity to the primary type.

Several willow shrubs indicated utilization. These shrubs were browsed at the tips, but the infrequence of this occurrence probably indicated a sampling tendency rather than a preference since unbrowsed willows were numerous.

An interesting preference for one plant was noted in an area of some 100 by 15 yards at the edge of a small lake supported a luxuriant growth of horsetail (Equisetum sp.) . Sedges and grasses were present in this same area; these plants had been extensively utilized in other areas. Of the 24 feeding craters examined in this area, 23 contained some Equisetum, while only 4 out of 24 contained sedges or grasses, 18 of the 24 contained Equisetum exclusively. This whole area was pawed up and the stand of Equisetum almost completely utilized (see Figs.5, 6 and 7). This was the only time that a whole area of plant growth was completely and systematically utilized as a feeding area by caribou. Caribou were encountered feeding in this area on several occasions.

It has been pointed out by Mr. Kelsall that certain species of Equisetum are poisonous to domestic stock. Thomson and Sifton in their book "Poisonous Plants and Weed Seeds" (1922) list the following symptoms for Horsetail poisoning in horses: a depraved appetite, diarrhoea and rapid loss of flesh followed by muscular incoordination. No abnormal conditions were noted in any of the caribou that had been feeding on the Equisetum. Droppings were not closely examined, but they did not appear to differ from normal winter droppings. No definite conclusions can be made concerning this topic until further observations are made.

Observations of the feeding habits of the caribou indicated that essentially they are "sporadic" rather than "systematic" feeders. This factor was evidenced by the frequent occasions when only a small portion of a luxuriant growth of sedges was utilized.

Qualitative examinations of the feeding craters in the winter range of the Hanbury and Yellowknife herds were made on Blanchet Island, Wilson Island and east of Fort Reliance and they indicated that fruticose lichens were utilized extensively in the wooded areas while sedges were utilized around the edges of lakes. Labrador tea was present in several craters but was not utilized.

The following observations were made on the north shore of Great Bear Lake in the vicinity of the headwaters of the Haldane River. In this area there were numerous small lakes with swampy edges. The marshy area of these lakes was surrounded by a white spruce forest. Caribou had been feeding extensively in both of these areas. Ground cover in the open area consisted chiefly of sedges, willow, alder, mosses and lichens. In the spruce woods, the ground cover was essentially lichens, Labrador tea, willow and Bilberry. The two cover types were designated as Type I and Type II respectively (see Figs. 8 and 9) and two transects of equal length were paced off in each type. Feeding craters within a yarddon either side of the transect were inspected and the species of each plant appearing were listed. The following table lists the utilized species in 30 craters.

TABLE I

Plant species	Type I	Type II	
sedge alone	1		
sedge - Labrador tea	1		
sedges - willows	1		
sedges - lichens	1	1	
lichens alone	4	1	(see Fig.11)
lichens - Labrador tea	1	3	
lichens - willow	2	7	
lichens - spruce	0	1	(see Fig.10)
lichens - Bilberry	1	1	
lichens - moss	1	3	
TOTAL	13	17	

Cetain observations based on the results shown in this table may be made. It suggests that caribou feed more in wooded than open areas. This may be the result of food preferences or food availability. Qualitative observations of the area indicated that sedges were relatively abundant (i.e. available) in cover type I and lichens to a lesser extent. Lichens were most abundant in cover type II. From the table it will be noted that in type I sedges are found in 4 of the craters while lichens were present in 10. In type II lichens were present in all craters and sedges in only one. Of the 30 craters examined, sedges were present in 5 and lichens were present in 27. This information tends to indicate that lichens are preferred as food matter by caribou more than sedges. This is particularly indicated in type I where lichens were less available than sedges but were taken more extensively.

I would recommend that further observations of this nature should be conducted.

One rather unusual caribou food habit was noted in this area. Along one shore of the lake white spruce trees had regenerated to a height of 6 to 8 feet in an old burn. A number of these spruce trees had been browsed by caribou. The branches had been stripped off the trunk although they had not been entirely consumed (see Figs. 12 and 13) . On several trees, the bark had been partially stripped off the trunk (see Fig. 13).

Predation

Throughout the survey, a record of all wolves and evidence of caribou killed by wolves was kept for both aerial and ground surveys. Information regarding the prevalence of wolves around the various settlements was obtained from interviews. During aerial surveying from December to March, amounting to 9, 150 miles only six wolves were seen. This figure would appear to be very low. However, the caribou wintered in heavy spruce forest and the probability of seeing wolves from an aircraft was relatively small since wolves were seen clearly only on lakes and in open terrain.

Wolves were observed singly on two occasions and in pairs on two occasions. One pair of wolves was observed chasing a band of 13 caribou through the woods. A single wolf was observed running along the shore of a lake. Another was observed standing beside the carcass of a recently killed caribou on a small lake. It stood and watched the aircraft for a few moments and then trotted into the woods.

Only two wolf-killed caribou, or the carcasses of caribou eaten by wolves were noted. They were both on small lakes.

The following observations on the prevalence of wolf tracks were recorded on ground patrols in caribou winter range. While camping out on the north shore of Great Slave Lake, east of the François River, the following observations were recorded. One night our dogs became excited due to the presence of a wolf. On the following morning, it was noted from tracks that a wolf had approached along a snowshoe trail to within 100 feet of the camp. As some fesh caribou meat was stored near the tent, it is possible that it was attracted by this. On a four-mile patrol on Blanchet Island, three wolf trails were noted. The warden's patrolman counted six wolf trails while making a nine-mile patrol through the woods north-west of the camp. A total of 10 wolf trails were noted in approximately 14 miles of ground travel. It is interesting to note that no wolves were observed in over 1200 miles of aerial surveying of this herd.

In the Blackwater Lake region, observations indicated the presence of five wolves in 40 miles of travel by dogteam and snowshoe. The skull with the antlers still attached and the remains of a mature bull caribou were found in the woods some 30 feet from the edge of a stream. It had been eaten by wolves; the cause of its death is uncertain, but for lack of evidence to the contrary, it would seem probable that it had been killed by a wolf or wolves. (See Fig. 14)

While assisting in a range study on the north shore of Great Bear Lake, warden Douglas saw a large grey wolf which had approached to within some 50 feet before it saw him. It was heading in the direction of a band of caribou that were feeding in the woods about one-half mile away.

In 60 linear miles of ground survey conducted in the winter ranges of the Hanbury, Rae and Great Bear Lake herds of caribou the presence of 18 wolves was indicated from their trails, howling and from actual observation. The discrepancy between between aerial observations and ground observations is marked and would seem to indicate that aerial surveys are a poor criteria of the abundance of wolves in heavily forested caribou winter range.

The presence of wolves was reported in interviews at the following settlements : Norman Wells, Fort Rae, Snare River, Yellowknife, Gypsum Point, Grizzly Bear Mountain, Snowdrift and Fort Reliance. With the exception of the last two settlements, wolves were reported as quite bold. They killed and ate a few dogs at several settlements and robbed fish and meat caches. Occurrences of this nature were in all cases from settlements where few or no caribou had wintered . Wolves were reported as moderately common by the barren ground trappers at MacKay Lake, Musk-ox Lake and Aylmer Lake. Sam Otto saw a pack of 11 or 12 on his trapline near Aylmer Lake.

Chief Sangre of the Yellowknife group of Dogrib Indians spent part of January and February hunting caribou in the islands of the east arm of Great Slave Lake; he reported that wolf tracks were numerous. He also stated that he did not believe

that wolves were any more numerous now than they had been many years ago.

Mr. Koenen, a pilot, reported that he flew over five wolves that were feeding on a caribou that they had apparently just killed. This caribou was on a small lake near Rainy Lake.

Constable Knopf, R.C.M.P., Fort Reliance, reported that 10 wolf-killed caribou were seen on a ground patrol from Snowdrift to Nonacho Lake. He stated that they were in the woods and that about half of them were calves.

During the first half of April, several thousand caribou were moving from the Dismal Lakes area to the September Mountains. Wolf-killed caribou were noted on several occasions by various pilots.

From the foregoing observations, it may be concluded that wolves were more prevalent in the winter range of caribou than aerial surveying indicated. It is evident that during the winter months, wolves killed caribou both in the woods and on the lakes. It is possible that wolf predation on the calf group is high (i.e. selective predation).

It would appear that a further and more intensive study of wolf predation is warranted.

TABLE II

Flight #	Date	Location	Miles in caribou herd	Width of transect	Area in sq.miles	# caribou	#caribou sq.miles	%range covered	
2	Dec.15	north shore of Great Bear Lake	57	1	57	32	5.6	9.1	
2	Dec.15	peninsula south of Dease Arm	52	1	52	57½	11.0	5.2	
2	Dec.17	LSte.Therese - Cartridge Mountains	91	1	91	110	1.2	0.5	
4	Jan.28	Simpson, Wilson, Caribou Islands	12	1	12	260	21.6	1.5	
6	Feb.13	Simpson, Wilson, Preble, Caribou	45	2	90	728	8.1	11.2	
6	Feb.13	Thubun Lake - Nonacho Lake	180	2	360	1696	4.7	2.1	
6	Feb.14	Kahochella, Pethei Pen., Francois River	100	1	100	235	2.4	4.5	18
7	Mar.5	Wilson, Preble, Simpson Island	70	1	70	79	1.1	8.8	
7	Mar.5	O'Connor Lake - Ft. Smith	130	1	130	122	0.9		3.1
7	Mar.6	Ft. Smith - Snowdrift - Francois River	400	1	400	388	1.0		
8	Mar.13	Francois River - Ft. Reliance	105	2	210	292	1.4	9.5	
9	Mar.26	L.Des Bois - Haldane River	160	½	80	432	5.4	4.0	
9	Mar.27	Haldane River	20	1	20	351	17.5		8.0
9	Mar.27	Haldane River	12	1	12	326	27.2		
9	Mar.30	L.Ste Therese - L. Tache	35	1	35	186	5.3	0.1	
						1649			

Statistics

On all survey flights over caribou winter range, strips counts of caribou were conducted when possible. Transects were flown over the area and the number of caribou occuring in a strip of a set width was recorded as well as the linear distance flown along each strip. On the basis of numerous flights over the area, the total range occupied by the caribou at the time of the survey was estimated. From these data a crude estimate of the total population of caribou occupying each range could be derived. The height at which the aircraft was flown varied from 500 to 2,000 feet above the ground and the width of the strip varied from one-half to one mile. Whenever possible, strip counts were made by observers seated on opposite sides of the aircraft, thus giving a transect width of one to two miles. As previously noted the caribou wintered in heavily forested regions and as a result, accurate counts were not possible in many cases and the results of others are subject to a considerable error. The data obtained on these transects are recorded in Table II.

Rae Herd :

As previously noted, the Rae herd occupied an extensive winter range of approximately 25, 000 square miles. Because the caribou were thinly scattered throughout this large area and because of the heavy forest cover over most of the range, an accurate census of the Rae herd was not possible during the winter months.

I do not feel qualified to make an estimate of the total population of the Rae herd on the basis of the information secured this winter.

Radium Herd:

The Radium herd was thinly distributed throughout its winter range around the south shore of Great Bear Lake. As they stayed for the most part within the heavy spruce forest, strip counts were not practical. Judging from observations of the density of tracks and the extent of utilization of the range, it is estimated that the number of caribou occupying the 8,000 square mile range would number at least 10,000. However, it is quite likely that a number of these particularly in the area from the Johnny Ho River to the Great Bear River were elements of the Rae herd.

The area of the utilized range on the peninsula between the Dease Arm and McTavish Arm of Great Bear Lake was roughly 1,000 square miles. The December survey indicated that caribou were wintering in a density of 11 per square mile. This gives an overall population of 11,000 caribou.

Great Bear Lake Herd :

This herd wintered over an area of 6,000 to 7,000 square miles. During mid-December, while they were occupying the range around the Haldane River and west of the Katseyedie River and north to Kelekale Lake, an index of 5.6 caribou per square mile was obtained. The actual size of the winter range

occupied at this time was not known definitely, but was estimated to be between the limits of 3,000 and 4,000 square miles. This gives a herd estimate of 16,800 to 24,400 caribou.

During the March flight, caribou were moving through an area estimated at 2,000 square miles. Strip counts at this time yielded a density ratio of 5.4 caribou per square mile. Giving a calculated population of 10,800 animals in this area.

In an area of some 400 square miles adjacent to the Haldane River, an average index of two transects covering 8 percent of this area , was 21 caribou per square mile. This yields a herd count of 8,400.

In an area of 70 square miles immediately east of the mouth of the Haldane River, caribou were concentrated in a herd that was estimated to be composed of between five and ten thousand animals.

On the basis of these combined surveys, the total population falls between 24,200 and 29,200.

As previously discussed under the section on winter ranges, it is felt that those caribou which wintered on the peninsula south of the Dease Arm are more closely related to the Great Bear Lake herd than to the Radium herd because of the similarity of their migration routes and summer range. Including these animals in the total for the Great Bear Lake herd, a total population of between 30,000 and 40,000 caribou is obtained.

Great Slave Lake Caribou :

The term Great Slave Lake caribou has been adopted to represent the combined Yellowknife and Hanbury herds. The winter range occupied by these two herds was extensive and caribou wintered in various areas in varying concentrations. For this reason, three major divisions of the winter range have to be considered separately in determining the population.

The largest area of winter range, some 17,000 square miles, lay between the south shore of the east arm of Great Slave Lake and the provincial boundary. This whole area is generally quite heavily forested and transect counts are not regarded as suitable criteria upon which to base a total population estimate. A conservative estimate of five caribou per square mile of winter range would yield a total of 85,000 caribou.

The islands and peninsulas of the east arm of Great Slave Lake were another area of winter ranges of approximately 2,000 square miles. Caribou wintered in greater concentrations in the western islands, i.e. Caribou, Wilson, Simpson, Preble and Blanchet islands. A mid-February survey of approximately eleven percent of this range gave a ratio of 8.1 caribou per square mile. Using this index a population of 6,500 animals is estimated for these islands. The eastern islands and peninsulas i.e. Kahochella, Pethei and Douglas were surveyed during mid-February and strip counts of six percent of the area gave an index of 2.4 animals per square mile or a total population of 3,100.

A survey of the mainland on the north shore of the east arm of Great Slave Lake was conducted early in March. Strip counts covered eight percent of an area of 1,000 square miles and a ratio of 1.7 caribou per square mile was obtained or as a calculated population of 1,700 animals.

It was previously stated that some caribou followed the Francois and Beaulieu river drainage systems on their northward migration. However, the tracks indicated that these would amount to only a few hundred animals.

The estimated total population is some 96,300 caribou. It is felt that the largest error incurred in this estimate would be in the large herd.

The Hanbury herd usually winters in large numbers in northern Alberta. The Alberta Department of Lands and Forests estimated that only 3,000 animals wintered in northern Alberta this winter.

Calf ratios:

Since the calf ratios obtained during last year's surveys were relatively low, efforts were made to obtain calf ratios for the various herds under consideration this winter. Calf ratios were obtained from classifying, with respect to age, [illegible] caribou observed both on the ground and from the air. Ground counts were made on the Hanbury, Rae and Great Bear Lake herds. Aerial counts were made on all four major herds.

The following system was used with success on bands of 10 to 100 caribou that were either resting on or moving across [illegible]lake. On sighting a band of caribou, the pilot would fly over so that a total count of all caribou on the lake could be made. A second sweep was then made back over the caribou at from 200 to 500 feet above the lake; at this time only the calves were counted. This method was particularly effective in late February and March when bands of caribou were frequently encountered moving in single file across the lakes. When caribou were alarmed by the aircraft, it was noted that the calves almost invariably followed a running cow very closely. This factor frequently aided the observer to distinguish the calves rapidly and accurately.

Aerial photographs K-20-1, 1 to 26 were taken east of the Haldane River over a large concentration of the Great Bear Lake herd.

The number of calves, expressed as a percentage of the total number of caribou, is given for each herd in Table III.

TABLE III

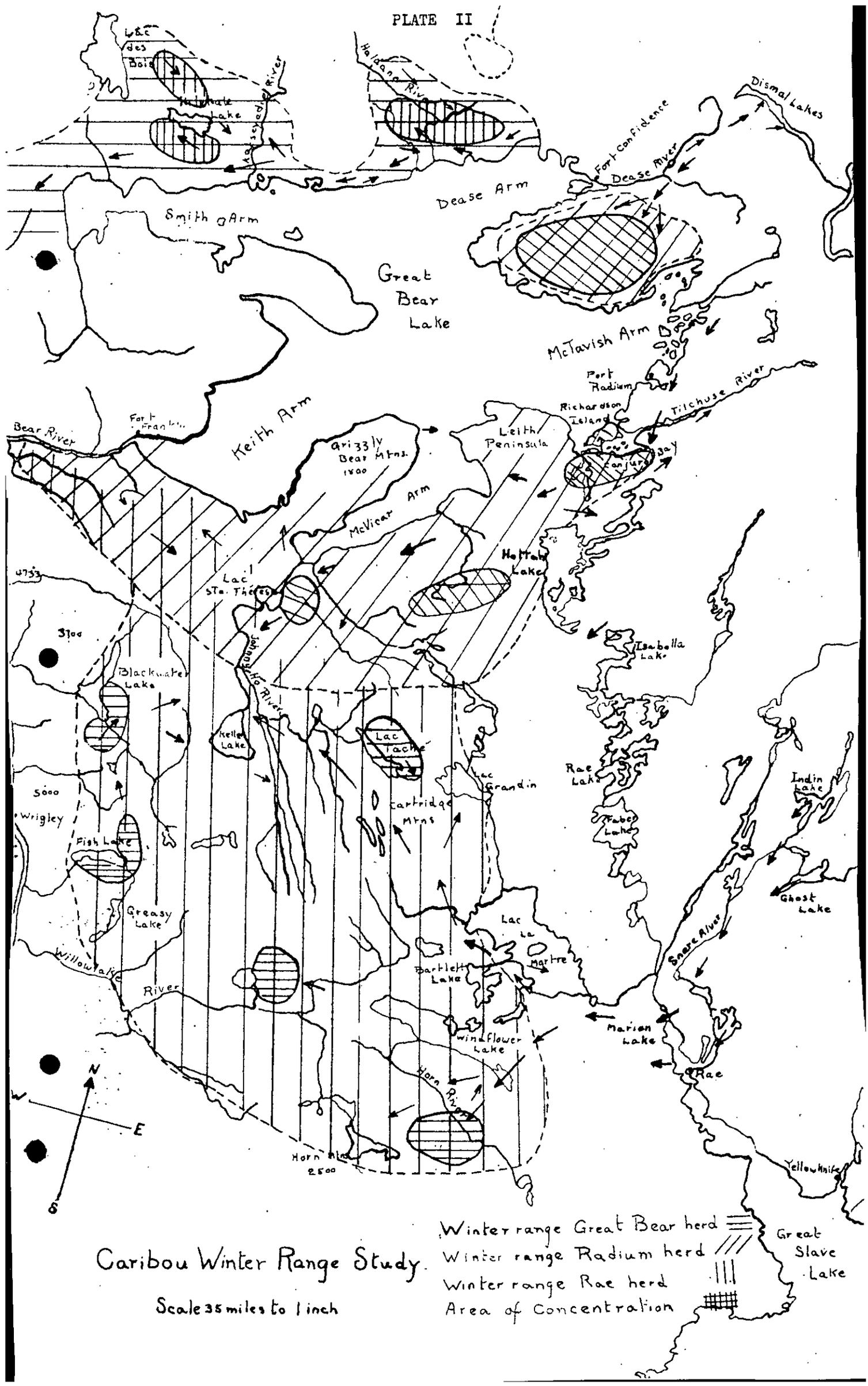
Herd	Date	Method	Total segregated	Total calves	% calves
Rae	Jan29-Feb10	ground	105	7	6.7
Rae	Dec.13&Mar30	aerial	105	10	9.5
Rae	Dec-Mar	average	210	17	8.1
Radium	Dec.&Mar	aerial	241	30	12.4
Great Bear L	Dec.&Mar	aerial	321	37	11.5
Great Bear L	Mar	ground	232	35	15.1
" "	1 Mar	aerial photo	504	62	12.3
Great Bear L	Dec.&Mar	average	~~553~~ 1057	~~72~~ 134	~~13.0~~ 12.7
Hanbury	Jan&Feb	ground	80	17	21.2
Hanbury	Feb &Mar	aerial	289	35	12.1
Hanbury	Jan-Mar	average	369	52	14.1
TOTAL AVERAGE 1951-52			1378	171	12.5
TOTAL AVERAGE 1950-51			1503	108	7.1

The calf ratios obtained for the various herds show a variation which is probably consistent with variations in calf mortality for each herd over the present season. The calf percentages on the whole are somewhat higher than last year. The average winter calf ratio of all herds combined is 43 percent higher than that obtained last year by Mr. Kelsall. Reports of persons who saw the various herds both this winter and the past offer qualitative confirmation to this effect. Assuming an annual increment of 21.1 percent,(as given by Banfield 1950), this would represent a loss of 41 percent of the calf ratio during the period from shortly after birth to late winter.

It will be noted that the Rae herd has the lowest calf ratio, 35 percent lower than the average ratio for all herds. It is felt that this constitutes a real difference and could be the result of one or any combination of the following factors: lower rate of conception, due to some abnormal condition during the rut; higher prenatal loss of embryos, possibly resulting from abortions; higher mortality of calves at birth, possibly climatic effect; greater loss of calves during the first six months as a result of predation and accidents.


PLATE I
Lac des Bois
Kilekale Lake
Haldane River
Dismal Lakes
Fort Confidence
Dease River
Dease Arm
Smith Arm
Great Bear Lake
McTavish Arm
Port Radium
Richardson Island
Tichuse River
Bear River
Fort Franklin
Keith Arm
Grizzly Bear Mtns. 1800
Leith Peninsula
Conjuror Bay
McVicar Arm
Hottah Lake
4753
Lac Ste. Thérèse
3700
Blackwater Lake
Johnny Ho River
Isabella Lake
Keller Lake
Lac Taché
Lac Grandin
Rae Lake
Indin Lake
5000
Wrigley
Cartridge Mtns
Faber Lake
Fish Lake
Ghost Lake
Greasy Lake
Lac La Martre
Snare River
Willow Lake River
Bartlett Lake
Marion Lake
Windflower Lake
Rae
Horn River
Horn Mtns 2500
Yellowknife
N
W
E
S
Great Slave Lake
Caribou Winter Range Study
Scale 35 miles to 1 inch
Dec. 10 #1
Dec. 13 to 17 #2
Jan. 21 #3
Jan. 29 & Feb. 5 #5
Mar. 25 to 31 #9
Apr. 1 to 2 #10

PLATE II



Caribou Winter Range Study

Scale 35 miles to 1 inch

Winter range Great Bear herd

Winter range Radium herd

Winter range Rae herd

Area of Concentration

PLATE III

Caribou Winter Range Study.

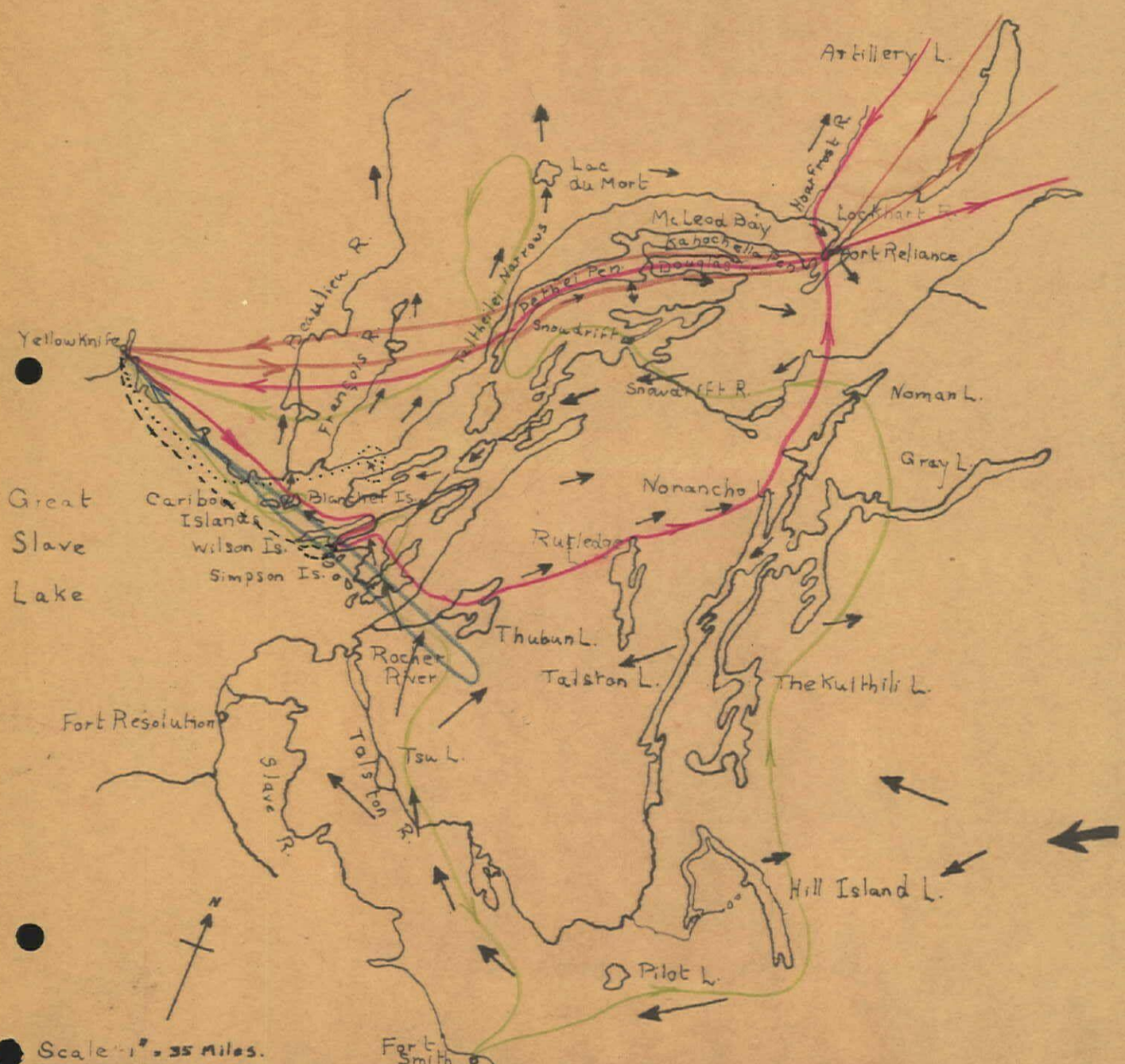


Figure 1

Spruce forest on bank of stream that flows into Blackwater Lake from the east. Note the numerous caribou tracks on the stream

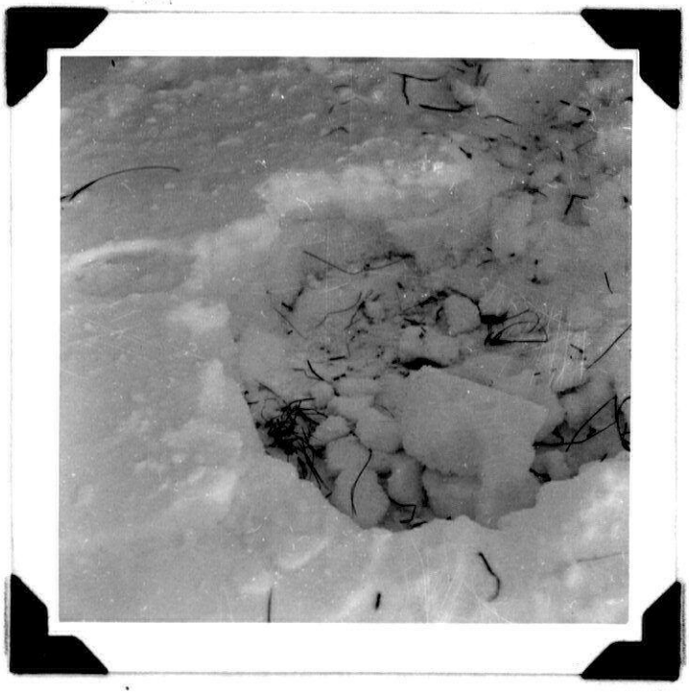
Figure 2

White spruce growth on the shore of Blackwater Lake.

Figure 3

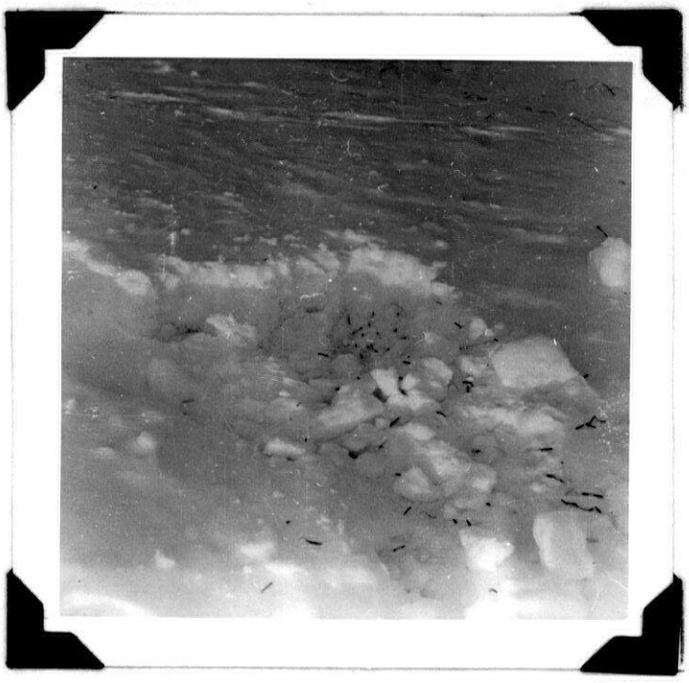
Blackwater Lake, looking west, Franklin Mountains in the background.

Figure 4



Caribou feeding crater, utilized species: Carex sp. and Equisetum sp. Locality: Blackwater Lake area. Date: February 2, 1952.

Figure 5

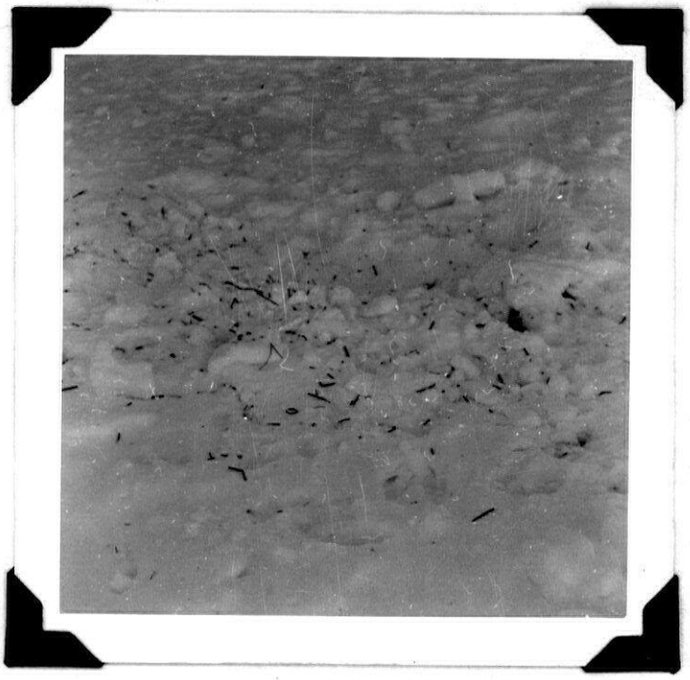


Caribou feeding crater, utilized species: Equisetum sp. Locality: Blackwater Lake area. Date: February 2, 1952.

Figure 6

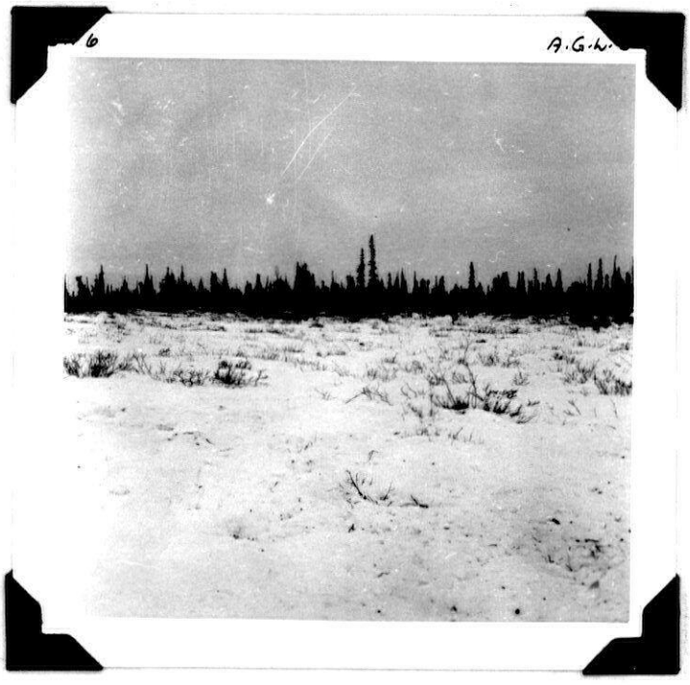
Extensive area around margin of small lake, heavily utilized by caribou feeding upon Equisetum sp. Locality: Blackwater Lake area. Date: February 2, 1952.

Figure 7



Close up of area utilized by caribou feeding on Equisetum sp. Note fragments of the plant. Blackwater Lake area. Date: February 2, 1952.

Figure 8



Plant growth around shore of small lake, showing two cover types utilized by caribou when feeding. Type 1 in forground, willow-sedge association. Type 2 in background, spruce-lichen association. Locality: headwaters of the Haldane River, north of Great Bear Lake. Date: March 27, 1952.

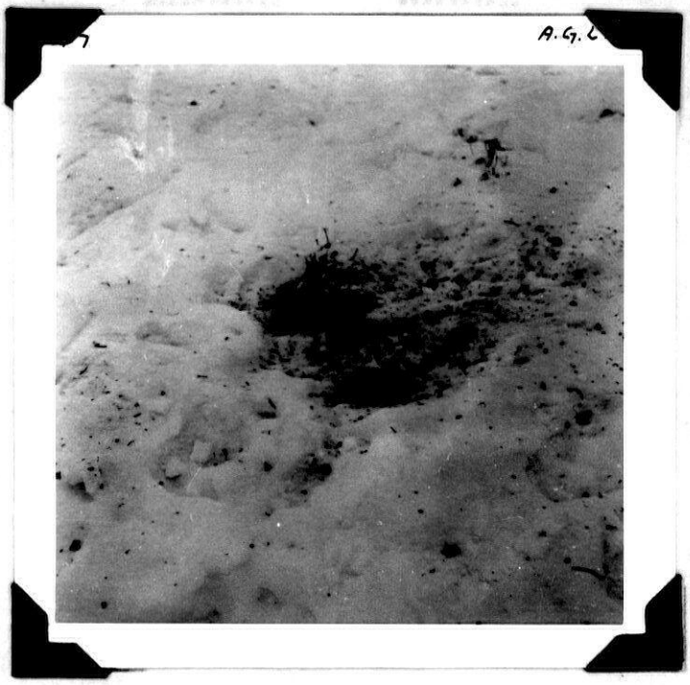
Figure 9

White spruce forest making up cover type 2 (see Fig. 8). Locality: headwaters of the Haldane River. Date: March 27, 1952.

Figure 10

Caribou feeding crater in spruce forest showing lichen (Cladonia sp.) as the utilized plant. Locality: headwaters of the Haldane River. Date: March 27, 1952.

Figure 11



Lichens (Cladonia sp.) ,growing on a small ridge , utilized by caribou. Depth of snow two inches. Locality: headwaters of the Haldane River. Date: March 27, 1952.

Figure 12

Small white spruce browsed by caribou. Note broken pieces of twigs at the base of the tree. Locality: headwaters of the Haldane River. Date: March 27, 1952.

Figure 13

Small white spruce tree browsed by caribou. Note bark stripped off the trunk. Locality: Headwaters of the Haldane River. Date: March 27, 1952.

Figure 14

Skull and antlers of bull caribou found in woods. This caribou was presumably killed and eaten by wolves. Locality: Blackwater Lake area. Date: February 4, 1952.

Exposition!

TITLE

DATE LOANED	BORROWER'S NAME