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BARREN-GROUND CARIBOU SURVEY, 1948.

By
A.H. Laurie

CANADIAN WILDLIFE SERVICE

Itinerary of Keewatin Party

1948

Baron Ground Survey 1948

by A.H. Lavoie

The party proceeded to Churchill by air on May 19th and after waiting for flying weather landed at Windy Bay on Nueltin Lake on the 23rd. Field work was not commenced until the end of the month save for observations made from the vicinity of the cabin during settling in.

Between the 30th of May and the 20th of July work was carried out in the immediate vicinity of Windy Bay, the party being immobilized early by break-up and from the 7th of July onward by the daily expectation of an Arctic Wings aircraft to move us to Angikune Lake. During this period observations were made on the tail end of the northward migration of bulls and three autopsies were performed. The last caribou was seen on the 16th of June. At about this time a study was commenced of a nearby wolf den and carried through into the second week of July. Much time was given to establishing contact with the natives, supplies were distributed, a nominal roll drawn up, the rudiments of the language mastered and some information relating to caribou obtained. Much initial organizational work was attended to and general observations on the natural history of the area were made.

On the 20th of July the party was moved to a permanent camp on the northwest corner of Angikune Lake and until the 26th remained in that area, scouring the surrounding country on familiarization trips. A small collection of flowering plants was also made at this time. No caribou were present.

On the 26th of July the party, with an eskimo assistant, set out by canoe to explore a route leading roughly northwest from Angikune Lake. Following a small river and a chain of lakes, the southeast corner of Kamilikuak Lake was reached on the 30th of the month. Except for a one day trip into the south east bay of Kamilikuak the party remained in camp, working locally, until the return trip was commenced on August 8th. During this period observations were made on the fore-runners of the mid-summer, southward migration which was encountered first on

ly 31st and comprised small scattered groups of both sexes and all ages. Three autopsies and two partial autopsies were carried out in this time. Route maps were made while travelling and records made of caribou and eskimo sign.

The party arrived back at Angikuni Lake on the 6th of August and remained in the area until the 15th (Mowat is in error when he gives this date as the 20th) when returned to Nueltin Lake by Arctic Wings. On the 8th the southward migration reached this station and the party was occupied in making observations of it until departure. In the course of these considerable mapping of the northwest end of the lake was carried out, and the Kazan River was ascended for some twenty miles. A single further autopsy was carried out.

On August the 15th the party returned to Nueltin Lake and Mowat continued on to Churchill. In his absence which lasted until the 9th of September the writer was kept busy maintaining the base, making further observations ~~xhick~~ of the southward movement which reached Nueltin on the 16th and 17th, and in the distribution of relief supplies to the eskimo - a new load having arrived in our absence. Four autopsies were carried out in this period. The weather being bad and the writer single handed no travel was undertaken and all the work was carried out in the vicinity of Windy Bay.

From the 9th of September until the 13th of October the diffuse phase of the midsummer migration was continually under observation. No travel was undertaken due to the presence of Mrs. Mowat but it is unlikely that much information would have been added by doing so. Once again the work of the last two weeks of this period was much hampered by the necessity of being continually prepared to leave at a moments notice. Six autopsies were carried out in this period.

On the 13th of October Mowat proceeded to Brochet with instruction to set up a winter base and to make observations of the southward movement on its arrival. The first caribou did not arrive in the Brochet area until November 9th and were never plentiful in the

a so that Mowat had only limited opportunities for direct observation. However, his notes, gathered from all available sources give a useful picture of conditions in that area and of the progress of the migration.

From the 13th of October until 3rd of November the writer remained in the immediate vicinity of Windy Bay and extensive observations were made on the large herds of caribou which rutted in the area. A single autopsy was performed.

On the 3rd of November a trip to Cognac River was begun in company with, and using the teams of, several eskimos. The Ihalmiut camps west of Hick's lake were reached on the 5th and the eastward journey begun on the 7th, Cognac River being reached on the 10th. The return journey was commenced on the 12th and completed on the 20th. During the trip the first snow storms of the year were experienced and the caribou largely moved south. Such observations as the weather permitted were made and every effort made to obtain information on utilization while at the camps.

From the 20th of November to December 10th the weather became increasingly severe, the aircraft was expected each day, the labour involved in maintaining camp was multiplied and little field work was done. However, every evidence indicated that caribou were absent. Much work was done inventorying supplies and equipment and storing them for the winter.

On the 10th of Dec. the writer was flown to Churchill by Arctic Wings and on Dec. 16th, proceeded to Ottawa, arriving on the 20th. Following this conference the writer proceeded on leave, which terminated January 5th, in Winnipeg. Since northbound connections to Ilford could not be made until the following week the 6th and 7th were spent in the offices of the Manitoba Game Branch making extracts from their records and arranging for co-operation with their northern personnel.

1949

On the 10th of January the writer proceeded to The Pas and spent the between train hours in the Game Branch offices there where arrangements were made for his return as speaker at their Annual Banquet January 18th, and his attendance at their conferences January 14th to 18th. Accordingly, arriving in Ilford January 12, return was made to the Pas

arriving on the 14th.

Mr. Peterson arrived in Ilford on December 8th and after endeavouring to gather information locally proceeded on December 18th, to Churchill where he spent the following week. On December 23rd he went to Winnipeg on duty returning to Ilford on January 5th. On the 6th and 7th he visited Split Lake by air and on the 9th and 10th made a bombardier trip to God's Lake and return.

During the period Jan 13th to 22nd the writer was in the Pas as noted above while Mr. Peterson remained in Ilford and busied himself with the preparation of new quarters for the party in a building belonging to the Manitoba Game Branch. From the 23rd to the 28th both members of the party were at Ilford and both were stricken with bronchitis during the latter part of the week and forced to bed being treated by Dr. Yule of the Pas on the 27th.

January 28th permission was obtained from Dr. Yule for the writer to accompany a Manitoba Government Air Service flight which visited Oxford House, Shumattawa, York Factory, Churchill, Duck Lake, North knife River, South Indian Lake, Nelson House and the Pas. Overnight stops (in some cases longer) were made at each point and the writer arrived in the Pas February 7th.

On January 31st Mr. Peterson set out for Cross Lake via Waboden but changed his plans on meeting two Inspectors of the Manitoba Fisheries Branch who had just toured the area by air. They reported little caribou sign and very few animals and offered Mr. Peterson a place on their next patrol, due to leave the Pas within a few days for the northwestern part of the province. He therefore joined them in a flight to the Pas. Unfortunately engine trouble delayed his flight until the 12th by which time the writer had joined him in the Pas.

During the delay in the Pas while waiting for the above flight extracts were made from the records relating to caribou in the Manitoba

Game Branch office. On the 12th the flight finally got away and visited Cold Lake, Pukatawagen, South Indian Lake, North Indian Lake, Big Sand Lake, and Barrington Lake, arriving at Lynn Lake on February 16th. Here the writer transplaned and returned to the Pas via Granville Lake and Cold Lake, while Mr. Peterson carried on with the original flight to Laurie, Hook and Granville Lakes arriving in the Pas February 18th, one day after the writer.

Return was made to Ilford on the earliest train arriving February 23rd and work of a local nature was carried out there for the next month. On Feb 27th a trip was mad e to Gillam, on the 1st and 7th of March trips were made to Split Lake. On the 8th and 9th a trip was made to Pickwitonei and return, and on the 13th a short trip was made to Mile 295 and return. March 14th Mr. Peterson proceeded to the Pas and on March 17th flew to Nelson House, South Indian Lake, and Barrington Lake, returning to the Pas the following day.

On March 24th the writer proceeded to the Pas and on March 28th flew to Brochet, via Cold Lake, Pukatawagen, Laurie Lake and Sawbill River. The following day a wide circuit to the north of Brochet was flown following the Cochrane and Kasmere Rivers to Nueltin Lake, west over Charley and Goose Lakes to the headwaters of the White Partridge River and return to Brochet. On March 30th the return to the Pas was made via Barrington, Granville and Cold Lakes. Simultaneously Mr. Peterson flew from the Pas to Norway House, Oxford House, God's Lake and Island Lake, returning to the Pas on the 29th via Norway House and Cross Lake. While waiting for a northbound train and address was given to the Game and Fish Association on the 3rd of April and another to the Rotary Club on the 4th. The party returned to Ilford on the 5th.

During April the party remained at Ilford making local trips as the weather permitted; to Gillam April 10th, 19th and 22nd, to Split Lake April 13th, to Landing River April 15th, and to Churchill and return April 24th to 27th. On the 9th of April a specimen was

secured at mile 306½ on the Hudson Bay Railway and this was autopsied. The last part of the month was largely taken up with preparations for the move north.

On May 4th the party moved to Churchill by train. Following a twelve day delay in Churchill during which permission was obtained to enter areas quarantined for poliomyelytis the party proceeded to Nueltin Lake on the 16th and after a one night stop to secure equipment proceeded to Baker Lake the following day. Here a further delay ensued until the 1st of June, through furtner difficulties relating to the quarantine and to lack of transport. On the latter date however the party was flown to Beverly lake, establishing camp in tents on the south shore of the lake some few miles west of the entrance of the Dubawnt River.

The whole of the months of June and July were spent at this camp, due to complete lack of transport, but as caribou were plentiful many observations were made; further studies on wolves were carried out, and although no dens were found, two young pups were secured and raised; range studies were carried out.

The month of August, actually from the 3rd to the 27th were spent at Nueltin Lake, largely again in the vicinity of Windy Bay. Here range studies were carried out and further contact made with the Ihalmiut eskimo. No caribou arrived in the area, however, and so no further observations were made.

On the 27th the party proceeded to Churchill and on the 1st of September entrained for their homes.

MIGRATION and DISTRIBUTION

Introduction

Since the Barren Ground caribou is almost continually on the move the terms migration and distribution when referred to this species are synonyms. For this reason the topic is treated as a whole in the pages which follow and no attempt is made to discuss first one and then the other. The observations and interviews upon which the discussion is based will be found in their entirety on the observation cards which accompany this report and the maps appended should be consulted as requisite.

The movements of the southern Keewatin caribou seem to fall into three major phases: -

1. A northward migration in the spring which terminates in the areas in which fawning takes place.
2. An extensive southward movement in mid summer followed by a more diffuse northerly withdrawal in late summer.
3. A southward migration to winter range at the first blizzards of fall.

Spring Migration

It is believed that there is a degree of sexual segregation amongst the caribou wintering in northern Manitoba. Cows and calves appear to predominate in more northern areas of the winter range, bulls and yearlings in the more southern. No doubt there is considerable overlap and there is evidence to show that many young bulls associate with the females as there is to indicate the presence of cows in the more southern parts of the range. In the absence of accurate sex ratios from various areas such a contention is speculative, none-the-less the evidence from the Reindeer Lake area supports it and that from other areas

SPRING MIGRATION

is suggestive. It is in accord with the partial segregations observed during the summer and described under the heading Midsummer Migration. It is also consistent with the pattern of the spring migration to be described.

In the Reindeer Lake region, at least in the early part of the winter, cows and calves are known to have concentrated in at least four areas north of 58 30 N, south of which line they were reported scarce. This is fully discussed under the topic Fall Migration. In other parts of the province evidence for such a segregation is more scanty and the conclusion that it does occur thereby less certain. In the area of North Indian Lake and Barrington Lake a preponderance of cows and calves is reported. In the Split Lake - Ilford region both sexes occurred and there is no evidence of segregation except as relates to the spring migration. To the south and east in the Oxford House, Shamattawa area cows and calves were reported as seldom seen. In the great majority of cases the writer was unable to sex animals seen on flights over these areas and so can contribute little direct evidence. The point therefore remains in doubt but is considered worth mention.

There is no doubt that the northward migration is initiated by cows and calves and at an early date. In the Brochet area it is said to begin in late January or early February. At the end of March 1949 the writer observed northbound trails all along the eastern shore of Reindeer Lake from Laurie Lake north but there were still caribou in the area and, in contrast to the 'migration trails', the aimless, wandering trails of a stationary population were also observed. From Brochet Post to Goose and Charley Lakes in the Northwest Territories migration trails were heavy but the animals which had made them were not overtaken, except for two cows and their calves on Charley Lake. These trails were examined on Goose Lake and the tracks were of adult animals

and calves. Unfortunately the writer is not competent to distinguish between the tracks of bull and cow but even with this admission there seems little doubt that the movement had been largely one of cows and calves. It is interesting to note that the movement was not a rapid one. On May 16th caribou were numerous on Windy Bay at the north end of Nueltin Lake and many of these were cows and calves. On the following day few were seen north of Nueltin Lake and none north of South Henik Lake. Thus if we accept the report of early February as the time of initiation of this movement these herds moved barely more than two hundred miles in a little over three months. This is in marked contrast to the speed of the fall migration and the latter part of the spring movement.

At North Indian Lake a heavy movement passed north westward in the first week of February reaching the north end of Big Sand Lake at the end of that week. It is reported to have covered a front which spread northerly for some twenty five miles from Big Sand Lake and to have swung north from the latter. The tail end of this migration was observed on Feb. 13th but the writer was unable to sex the animals seen from the air. Many cows and calves were said to be present.

At Split Lake heavy northbound trails were observed on Mar. 1st and it was reported that cows and calves had been moving north since mid February. This report is of particular interest because local residents considered it an unusually early migration. Notes in the diary of the local free trader record April 24th as the earliest migration date in 1948.

East and south of Split Lake there are no reports of a northward movement in February, first reports from Cross Lake, Oxford House, Gods Lake and Shamattawa are all from late March or early April. Between Ilford and Gillam the first noticeable migration was in early April. In the Nelson House, Granville Lake

Barrington Lake and Lynn Lake sectors caribou were still present well on into the second week of April. In the Nelson House region, which this winter marked the extreme southerly extent of winter range in the central part of the province, pilots' reports indicate that the animals were spreading south in a minor extension of range in late March and early April. There was a similar movement into the Gods Lake and Cross Lake areas and an easterly movement towards Shamattawa at this time. Thus in the southern part of the range there was little sign of an early northward movement. Unfortunately there is little information as to the sex of these animals.

In the first week of April Split Lake reported a northward movement, largely of bulls. At the same time the tails of a diffuse, northward movement were reported general between Devil's River (south of Ilford) and Goose Lake (about thirty miles west of Shamattawa). Only 12 animals were seen in this stretch and of these 3 were bulls, 7 cows and 2 calves. On the other hand Indian reports from the area west of the Hayes and south of the Nelson Rivers record the same migration and state bulls outnumbered cows. Throughout the winter, train crews reported scattered small groups of caribou along the Hudson Bay Railroad from mile 356 to Weir River and in the open country between miles 450 and 475. In mid March a northward movement became evident in the latter. In the first week of April a northward movement along the rail line between Ilford and Gillam was observed and by the 10th, caribou were moving in considerable numbers. This movement continued in force until mid April and by the 24th most of the herds were north of Weir River though small herds were occasionally seen in the Ilford area until May 3rd. On May 4th, en route to Churchill, only four small, scattered herds were seen, numbering about twenty five animals in all. Calves were not uncommon in this movement and some cows were also identified but most of the adult animals defied accurate classification. The party did not remain in northern Manitoba to see the conclusion of the migration but it is commonly

held that the last caribou clear the area as the lakes become badly slushed just prior to breakup. There are persistent reports of caribou summering in the headwaters region of the Owl River, north of York Factory, but as pointed out under Mid Summer Migration these may be the most southerly segment of that movement. It is asserted that a cow remained in the vicinity of the north end of Big Sand Lake and there calved in 1948. Moreover, though rare, this is said to be an occasional occurrence.

In summary it may be said that there is some evidence to support the suggestion of a partial sexual segregation on the winter range in northern Manitoba. The northward migration is initiated in late January or early February by a movement of cows and calves, especially in the more northern and western parts of the province. This is not a rapid movement in contrast to that which takes place later. A second wave of migration occurs in late March and early April and is province wide. Animals of all sexes and ages appear to take part in this latter movement but there is some evidence to suggest that in certain sectors, at least, bulls predominate. The migration is normally clear of all but the most northerly areas by mid May, just before break-up. Two cases of summering caribou were reported.

North of Churchill on the 16th of May the area between Seal River and Caribou River was heavily scored with tracks but less than 50 northbound animals were observed. North and west of the Caribou River tracks were absent until the north end of Nueltin Lake was reached where migration trails resumed and 5 - 600 animals were seen, including many calves. On the 17th these tracks were observed in decreasing numbers heading in a north easterly direction. Approximately 750 animals were seen but very few once the north end of Nueltin Lake was passed and no trails were seen north of the south end of South Henik Lake.

The absence of trails between Caribou River and the north end of Nueltin Lake confirms the report from Duck Lake that caribou usually pass to the east of that post in the spring.

In the Nueltin Lake area cows and calves are reported to arrive from the south in May and to have largely passed on to the north before the arrival of the bulls in June. Similar reports were had from Ihalmiut eskimo in the region of the upper Kazan River. In 1947 Mr. F.M. Mowat arrived at the north end of Nueltin Lake on May 31st to find caribou migrating north in numbers. The movement was heavy until the 5th of June and consisted largely of cows, many of them pregnant, and their calves, to-gether with some young bulls. After the 5th numbers seen daily dwindled until the 14th when the first herds of bulls made their appearance still with some straggling cows and calves among them. This latter movement continued, comprising the passage of many small herds, until the 21st and thereafter straggling herds and individuals were seen until the 9th of July. In 1948 caribou were migrating through the same area on the 23rd of May when the party arrived and continued to do so in dwindling numbers until June 16th, after which no further animals were seen. All of these animals were adult bulls and the movement was a leisurely one of small herds of six to twenty animals. It is presumed that the movement of cows and calves had passed through earlier. In 1949, as noted, cows and calves were passing north through the area on the 16th of May.

To the north of Nueltin Lake little information is available. As noted trails were seen as far north as the south end of South Henik Lake on the 17th of May, 1949. These trails were heading northeast. Ihalmiut eskimo report that the spring migration is heaviest to the eastward passing into the area to the east and north of Yathkyed Lake. Reports received from eskimo and white residents at Baker Lake, from

Mr. R. Hicks of Pistol Bay, from prospectors of the Hudson Bay Mining and Smelting Company, and from several members of the Sigurdson and Martin Trading Company suggest that there are two major calving grounds in southern Keewatin District. The first of these is in the region of Kaminuriak and Maguse Lakes to the east of the Kazan drainage, the second in the area from the north end of Dubawnt Lake to and beyond Beverly Lake. Calving is also said to occur as a rare happening in the Tebesjuak Lake region east of Dubawnt Lake. Eskimos at Baker Lake believe that the caribou which reach the former come from the south, while those which reach the latter come from the southwest and west as well as from the south.

No information was available as to the routes by which caribou reach the calving ground east of the Kazan. To the west caribou were reported in numbers from the Tebesjuak Lake region in the first week of May but by the middle of the month very few remained in the area. On the first of June a heavy movement was observed debouching from the estuary of the Dubawnt River on a very narrow front and crossing the narrows between Beverly and Aberdeen Lakes. While it is possible that caribou also reached the area from the west or southwest no sign of such a movement was observed. The great majority of the animals passed across to the north side of the lakes and perhaps beyond. In any event on the 9th and 10th 3 - 4000 could be made out by telescope on the north shore of Beverly Lake. By contrast an average of only 25 per day was seen on the south shore until June 13th when there was an influx from the west. Between the 13th of June and the 10th of July the numbers of caribou seen on the south shore fluctuated widely (1 to 600) and animals were frequently observed crossing the open lake from north to south as well as appearing from east and west around the ends of the lake. During this period the daily average was 125 and the estimated sex and age ratios were - bulls, 39%; cows, 48%; yearlings, 13%; calves, none. No pregnant cows were seen. Calves of the year were not

observed until July 11th but from their small size (28 lbs. on July 16) and reddish pelage it seems certain that they were dropped not far distant, probably on the north shore of the lake. Beverly Lake then, or the barrens to the immediate north of it, is the terminus of a migration begun four months before and 500 miles to the south.

In summary it may be said that caribou were observed to have migrated north through southern Keewatin District by two routes. The first of these is an eastern route; near coastal and crosses the Caribou River. The second is a western route originating in the Reindeer Lake area and perhaps as far east as North Indian Lake and following the axis of Nueltin Lake. Both these routes seem to lead toward the calving grounds in the Kaminuriak and Maguse Lake area. Caribou reach the other major calving ground in the Beverly Lake area from the south via Tebesjuak Lake and the Dubawnt River. The more southern portion of the route of these animals is unknown. At Nueltin Lake cows and calves lead the migration, bulls being the last to move north through the area. At Beverly Lake both sexes were present when the migration arrived. The migration arrived at Beverly Lake at a time when previous experience would suggest that it was still passing Nueltin Lake in force.

Mid Summer Migration

MIDSUMMER MIGRATION

Information respecting the eastern calving ground and the midsummer migration from that area is limited. Calves have been seen at Pistol Bay in late June, still with the trailing umbilical cord. When the calves are able to travel these herds are said to drift northwesterly towards Baker Lake. In years gone by this movement frequently crossed the east end of Baker Lake and then swung west along its north shore. This has not

occurred recently however. The further movement of these animals in the midsummer migration is unknown but this migration normally passes through Padlei in the first week of August each year. It is presumed that the herds passing Padlei come from this area.

At Beverly Lake in 1949 fawns were first seen on July 11th, as already noted. Though very young they were already able to fend for themselves, grazing and moving freely with the adults. The events of the next two weeks may be summarized as follows.

July 11 - 15

3 - 1700 (Av. 650) animals seen daily: sex and age ratios - bulls 47%, cows 38%, yearlings 9%, calves 6%: herds rarely larger than 100 animals grazing at random with no apparent unidirectional movement.

July 16

5 - 6000 animals in sight all day and continually passing: sex and age ratios - bulls 10 - 15%, cows 40 - 50%, yearlings 15-20%, calves 25-30%: herds of 500 to 2000 very restive and surging in various and often conflicting directions but late at night showing a definite south westerly movement both into and out of the area.

July 17

1300 animals sighted, apparently left behind in yesterday's movement: sex and age ratios - bulls 8%, cows 51%, yearlings 17%, calves 24%: herds of 50 to 300 grazing at random and with no apparent unidirectional movement.

July 18

a day of heavy rain and poor visibility only 20 animals seen.

July 19

200 animals sighted: widely scattered small groups

usually at ranges too great for careful sexing and ageing, but the ratio of bulls to cows more nearly 1:1 than two days ago: an easterly drift was apparent.

July 20 - 22

2500 animals seen daily: sex and age ratios - bulls 34%, cows 45%, yearlings 13%, calves 17%: restless, in herds of several hundred and showing a very definite easterly movement.

July 23 - 25

a rapid diminution in numbers seen daily from 180 to 5 and a continuing easterly drift.

From the above it would appear that the midsummer migration is initiated by a phase of concentration during which cows with calves increasingly join the herds. The lack of sex segregation in the first stages of the migration, July 16 et seq. is in striking contrast to the situation at Angikune and Nueltin Lakes, to be described. These ratios are very similar to those obtained during the rutting season at Nueltin Lake in 1948. The observations suggest that two migrations were in progress. The movement of July 16th with its strong southwesterly trend was in marked opposition to the subsequent southeasterly movement. There was every indication that the first movement was of animals which had crossed the narrows of Beverly Lake over the great peninsula which thrusts out southwest of the mouth of the Tibielik River. The second movement seems equally certainly to have come from the west along the south shore of Beverly Lake and the Thelon River.

In respect of the southwesterly movement the only additional information available is an R.C.A.F. report of a herd of 30,000 caribou headed south some 25 miles northwest of Dubawnt Lake (6350N, 101 45W) Aug. 1st. This report is in the direct line

of the migration observed on the 16th. Information obtained from Ihalmiut eskimo in 1948 indicates a heavy migration to the west of Dubawnt Lake at this time of year.

More information is available concerning the easterly movement. On July 24th caribou were reported in small numbers at Baker Lake Post and eskimo reports indicated that there were greater numbers along the southwest shore of the lake. On Aug. 1st, flying from Beverly to Baker Lakes, the party observed the heavy trails of this migration crossing the Dubawnt River (an occurrence reported by Akilinimiut eskimo on July 23rd) and following the south shore of Aberdeen Lake. This course would carry the main body rather south of Baker Lake and, indeed, fewer tracks were observed east of Aberdeen Lake on course to the post. The latter inference is abundantly confirmed by R.C.A.F. reports of upwards of 125,000 caribou 50 miles southwest of Baker Lake. These herds were moving west in the sweeping curve of the lower Kazan River whose southern arm is Thirty Mile Lake. It seems probable that this marked change in direction resulted from the caribou having reached the Kazan River in their eastward surge, turned south along it and so been gradually led around its curve to the west. In the absence of detailed, day to day information on the movements of these animals such an inference is speculative of course but a number of observations suggest that it is not unreasonable. Thus, several instances have already been cited of caribou following major drainage units in the section on Spring Migration. Moreover, in 1947 Mowat observed such an effect along the Thlewiaza River in August and this party noted it at Angikuni and Nueltin Lakes in 1948. Rivers, even large ones, do not present barriers to migrating caribou and they do cross them, particularly when trapped in a cul de sac, but they also show a marked tendency to follow along the banks and this tendency may result in marked changes in the direction of the migration. More positive evidence is offered by the fact that caribou are said

not to calve in the area of the lower Kazan River but to arrive there from the northwest in midsummer while at Tebesjuak Lake they arrive from the east and southeast as well as from the Dubawnt country to the northwest. Taken to-gether these eskimo reports suggest that the eastern component at Tebesjuak Lake is the recurving group which came down the Thelon and followed the wide swing of the lower Kazan River. The western component presumably derives from the herds reputed to calve near the north end of Dubawnt Lake perhaps with reinforcements diverted down the Dubawnt River from the eastbound Thelon herds and the southwesterly bound Tibielik herds. In any event there appear to be several groups of caribou, perhaps four - the Thelon, the Tibielik, the Dubawnt and the Kaminuriak, on the move during the midsummer migration in southern Keewatin. The routes of these groups appear to be broadly shaped by the major topographical features but there is probably sufficient spillover past these barriers to constitute considerable interchange between these groups.

In 1948 the party experienced the midsummer migration first in the Angikune Lake region and then again at Nueltin Lake. Both were rapid movements initiated by the early appearance of a few stragglers rising in crescendo to a mass movement and more slowly dying away again to leave behind a scattering of animals which had apparently dropped out. A conspicuous feature of both series of observations was the segregation of sexes in the main movement.

In the Angikune Lake region the first southbound animals were observed July 31st on the southeast shore of Kamilikuak Lake where the party was then encamped. The migration had largely cleared the region by the 12th of August and the observations for this period are summarized below.

July 31 - Aug. 7

An average of 8 or 9 animals seen daily (2-20): sex and age ratios over the period - bulls 20%, cows 48%,

yearlings 3%, calves 29%: a general southwesterly movement, particularly marked early it became fitful toward the close of this period.

Aug. 8

1500 animals in sight all day and a continual two to three mph passage in a southwesterly direction: sex and age ratios - bulls 50%, cows 15%, yearlings 35%, calves, none: a steady southwesterly movement of herds of several hundred grazing as they went.

Aug. 9

1200 animals seen during the day: sex and age ratios - bulls 85%, cows 4%, yearlings 10%, calves 1%: the southwesterly movement continuing but the herds now smaller (1-90) and much more diffusely scattered: Many animals observed crossing the Kazan River west of the lake but an even greater number passing westward along its banks and then south past Eenetahls Lake.

Aug. 10

450 animals seen: sex and age ratios - bulls 90%, cows 1 only seen, yearlings 10%, calves, 2 only seen: herds small (the largest 70) and widely scattered, many on islands in the lake, and lesser numbers on both north and south shores: little unidirectional movement apparent but a recently used crossing discovered at the Angikuni narrows and a second a few miles southwest of this across a long arm of the lake, both so heavily used as to be churned into a barnyard mire.

Aug. 11

54 animals seen: no sex and age ratios obtained: widely scattered and little apparent movement.

Aug. 12

214 animals seen: sex and age ratios - bulls 35%, cows 35%, yearlings 5%, calves 25%; herds small and widely scattered but a steady southwesterly movement apparent.

Aug. 13 & 14

69 and 26 animals respectively: sex and age ratios - bulls 50%, cows 22%, yearlings 6%, calves 22%: the south westerly drift continues.

The segregation of the sexes observed above suggests that adult males form definite "stag companies" and that these move as large herds in contrast to the less rapid, much more diffuse movement of the cows and calves. Moreover, at this time of year yearlings have become largely separated from the cows and considerable numbers of them become associated with the bulls. Whether the yearlings running with these stag companies are males was not established for no generally adequate method of sexing this age group on sight was found. The occurence of a considerable number of adult females with the early part of the bull movement suggests that cows which have not borne a calf also join the stag companies. Such an interpretation then would suggest that cows with calves move south in a widely diffused, relatively leisurely manner and that through this the great herds of bulls with adherent yearlings and barren cows make massed and rapid movements. The whole trend of the migration at Angikune Lake was markedly southwest. Such a direction is in accord with the postulated movements described for the Thelon herds. Unfortunately, however, no data are at hand from the intervening areas which can be used to link the two to-gether in decisive fashion.

On Aug. 15th, 1948 the party flew south from Angikune Lake to Windy Bay on Nueltin Lake. The route taken followed the Kazan River to the point where it curves abruptly west to enter Ennadai Lake and thence direct to Windy Bay. Eight caribou were seen from the air north of Ennadai Lake as were southbound trails but the latter were not heavy. However, Ihalmiut eskimos report that heavy concentrations reached their area east of the north end of Ennadai Lake on the 11th or 12th and then went eastward.

At Nueltin Lake the pattern of migration just described from Angikune Lake repeated itself as the following observations indicate.

Aug. 15 & 16

about 25 animals each day: sex and age ratios - bulls 95%, cows, none, yearlings 5%, calves, none: small groups drifting south

Aug. 17

720 animals seen: sex and age ratios - bulls 93%, cows 2%, yearlings 3%, calves 2%: a very rapid movement in large groups swimming south across the river and bay and passing southwest along the river: exceedingly bad weather limited the count in what was clearly a major movement.

Aug. 18t

1000 animals seen: sex and age ratios - bulls 90%, cows 3%, yearlings 5%, calves 2%: a direct continuation of the movement of the 17th which appeared to be coming from the east along the north shore of the lake.

Aug. 19

300 animals seen: sex and age ratios - bulls 66%, cows 10%, yearlings 14%, calves 10%: the southerly movement continued and the smaller numbers are probably attributable to very poor visibility.

Aug. 20

250 animals seen in very bad weather; bulls again estimated to comprise the bulk of the herds: some slackening in the rate of the movement.

Aug. 21

75 animals seen: sex and age ratios - bulls 75%, cows 15%, yearlings, none, calves 10%: continuing southerly movement but many small groups grazing at random: small scattered herds reported as far south as Baralzon Lake: no caribou seen between Windy Bay and Ihalmiut camps near Ennadai Lake from the air.

Aug. 22

40 animals seen: sex and age ratios - bulls 50%, cows 18%, yearlings 8%, calves 14%: only a single herd seen, it was moving east: caribou reported fairly numerous between Ihalmiut camps and Windy Bay during past four days: herds said to be small and scattered.

Aug. 23

16 animals seen moving south east of camp.

Caribou continued present in small numbers throughout the following weeks. However the above observations are the last in which there appears to be any continuity of southward movement and are therefore taken to mark the end of this phase of the midsummer migration.

The movement observed at Angikuni Lake is believed to be the one which reached the Ihalmiut area on the 11th or 12th. It is reported by the eskimos that the animals left their area in an easterly or south easterly direction. Their subsequent appearance at Windy Bay from the east and northeast poses a problem for which the following is a possible solution. The general trend of the major drainages in southern Keewatin is northeasterly, the Dubawnt and Kazan Rivers and Nueltin Lake itself lying along this axis. However in the area of the Ihalmiut camps a secondary northwesterly trend is apparent being principally indicated by the orientation of Hicks, Watterson and Elliot Lakes as well as the smaller lakes, Calhoun, Stearns, McCourt etal to the west. Should this secondary trend turn the migration it would lead animals entering it south of Hicks Lake toward the northeast arm of Nueltin Lake which they might then be expected to follow, in both directions perhaps, but principally southwest. On this basis they should reach Windy Bay from an easterly or northeasterly direction which they did. By the same token animals which followed this trend to the north of Hicks Lake would be expected to turn the

northeast arm of Nueltin Lake. This also happens for on Aug. 16 and 17, 1947 F.M. Mowat observed a very heavy migration across the isthmus between Sealhole and Fitzpatrick Lakes. Finally it may be observed that the Ihalmiut consider the area immediately to the east of Ennadai Lake as poor hunting territory at this time of year. From the above it appears possible that southbound herds do make an easterly swing from the upper Kazan River and in so doing are split into two groups, one passing south to the west, the other to the east of Nueltin Lake.

The southward extent of the midsummer migration is ill defined. In the west reports from sixty miles due north of Stony rapids, from Sunrise Lake and from Eganolf Lake in early September probably indicate the extreme southerly limit of the penetration. Further east the migration passed through the Duck Lake region on Aug. 17th and 18th. According to report the movement was not a heavy one and involved small scattered herds. On the 21st a similar movement was reported from Baralzon Lake. Still further east no information is available for 1948 but in 1949 on Aug. 27th tracks were observed to be fairly common from a point northeast of Duck Lake to the Seal River. On Sept. 1st, 1949 small groups of caribou were observed as far south as mile 383 (Lawledge) on the Hudson Bay Railway. Reports of a summer population in the headwaters area of the Owl River suggest that the animals concerned are in fact midsummer migrants. The exact southern limit in north central Manitoba is unknown but is probably in the area of the headwaters of the Seal River, or perhaps as far south as the Knife Lakes - it does not reach Big Sand or North Indian Lakes.

There seems little doubt but that this pattern shows some variation from year to year. The southward migration in 1949 was distinctly later than in either 1947 or 1948. By Aug. 27th it had not yet reached Windy Bay. On Aug. 17 small numbers of bulls and yearlings were reported from the Ihalmiut

area, and on the 20th and 21st from the northeast end of Ennadai Lake. On the 25th and 26th the vanguard was reported within thirty miles of Windy Bay. Eastward caribou did not arrive at Padlei until Aug. 9th, a date said to be one week later than normal. On Aug. 12th several thousand were reported from the McConnel River area west of Eskimo Point and on the 27th, as noted, were as far south as Seal River in the coastal area. Probably the extremely late summer in the northern calving grounds accounts for the lateness of the 1949 midsummer migration. The delay seems to have been longer in the west than in the east, again suggesting that two herds are involved.

The northward return which completes the cycle of midsummer migration is much less clearly marked than the movement just described. Moreover it was observed only in 1948 and then only at a single station, Windy Bay. In consequence little more can be offered than the summary of observations which follows.

Aug. 26 – Sept. 13

During this period caribou were constantly present in the area of Windy Bay in small numbers, the average daily count being 60 (1-194): sex and age ratios - bulls 25% (3-48), cows 40% (30-64), yearlings 9% (0-18), calves 26% (10-43): in small, widely scattered herds ranging in size from a single animal up to a hundred and more (on two occasions): great variety in direction of movement a characteristic of the period -- 3 days, no discernable movement; 3 days, more pronounced movement but no trend; 4 days, a westerly or northwesterly trend; 7 days of such conflicting directions as north and south, groups swimming across the bay in opposing directions.

Sept. 14 – Oct 20.

36 (1-95) animals seen daily: sex and age ratios - bulls 39% (0-87), cows 38% (0-64), yearlings 7% (0-43),

calves 16% (0-50): herds were small and widely scattered and single animals were common: throughout the whole of the period a continual northerly drift was apparent: on Sept. 30th caribou were reported common in the Ihalmiut area: on Oct 13th small scattered herds, numbering 100 animals in all, were observed along the east side of Windy Lake as far south as its south end on a flight to Brochet.

Oct. 20th is rather arbitrarily considered to mark the conclusion of the midsummer migration for several reasons. It marks the end of a long period during which a steadily northerly movement was observed at Nueltin Lake. It is the approximate date for the onset of the rutting season and caribou were certainly present in numbers to the north but were apparently largely withdrawn from the south of Windy Bay by this date.

A review of the information relating to the midsummer migration may make it more coherent. The southward movement seems to be initiated by a phase of concentration following calving during which sexes and ages are not segregated. Some time after the onset of the migration a sexual segregation occurs. Bulls, yearlings and cows without calves appear to move in large herds following routes which are influenced by topography at a speed and with a momentum which carries them far south shedding stragglers en route. Cows and their calves move south in a more diffuse and leisurely movement on which the possible influence of topography is difficult to demonstrate. This southward movement, so sharply defined at its onset gradually merges into a confused period during which stragglers are still to be found moving south while others have begun the northward return. The latter movement is a widespread, unhurried withdrawal; a steady northward drifting of scattered, small herds in which sexes and ages are indiscriminately mixed. In all the movement may involve six hundred to a thousand miles and three months.

Fall Migration

From Oct. 20th until the 5th of Nov., 1949 caribou were continually present at Windy Bay, sometimes in large numbers. Sex and age ratios for this period were bulls 17%, cows 47%, yearlings 11%, calves 25%. These ratios are probably close to the population statistics for this was the rutting season when no sex segregation was evident. Behaviour at this time is discussed at length under that heading but it may be noted that although there was considerable movement there was no clear evidence of a migration.

The first heavy snowfall began on Nov. 6th at which time the party was at the east end of Hicks Lake. This storm continued until Nov. 10th on which day the party reached Cognac River. On the 7th 100 caribou were seen moving south to the east of Hicks Lake. None were seen thereafter and although visibility was often reduced to less than a sled length the absence of tracks make it probable that there were very few caribou east of Hicks Lake. Caribou were reported to have been plentiful in October but none had been seen there for a week. Returning from that post a single animal was seen on Griffon Lake on the 13th and 2 northe of Watterson Lake on the 14th. These animals were moving southw and a few scattered trails heading in the same direction were observed. On the 15th heavy southwesterly trails were observed the east shore of Hicks Lake and the writer was told by eskimos that the movement began on the 7th and lasted till the 14th. On the 18th 200 animals were observed on Calhoun Lake and the following day a herd of 150 was seen southeast of there, both groups moving southwest. No further caribou were seen until the 25th of Nov. when 10 animals were seen northwest of Windy Bay. None were seen thereafter. However, although it appears that the migration was largely clear of the area by mid November and earlier in the eastern sections, reports received the following spring indicate that caribou wintered near the upper Kazan in considerable numbers.

FALL MIGRATION

Information is not available for the region between Windy Bay and the Kasmere Lake area and only scattered reports from there south to Brochet. Presumably the animals which reach the wintering grounds about Reindeer Lake are those which move south from the north end of Nueltin Lake. The following information was obtained by F.M. Mowat at Brochet.

On Nov. 2nd large herds of caribou of mixed sexes and ages arrived at Sunrise Lake from the north and moved west from that area which was emptied by Nov. 20th and remained so until Dec. 1st when the herds re-appeared from the west. Between Sunrise and Hay Lakes small groups of caribou were present on Dec. 5th and 6th. From Hay Lake to Blue Lake a concentration of several thousand, mainly cows with calves, was observed moving northwesterly on Dec. 7th. The area from Blue Lake northeast to Sandy Lake and northwest to the mouth of White Partridge River on Kasmere Lake contained no caribou on Dec. 9 - 12 and Indians at White Partridge had seen no caribou since August. On Dec. 12th a heavy northward movement of cows and calves was reported to be taking place between the south end of Nueltin Lake and Sandy Lake to the west.

On Nov. 8th caribou appeared in large numbers at Oak Lake (near Egenolf Lake). By Dec. 1st this area was empty of caribou and none were seen between there and the Cochrane River just south of LaPensie Lake. On Nov. 11th caribou were first reported from LaPensie Lake and at about the same time from Lac du Brochet and Whiskey Jack Lakes. On Dec. 1st and again on Dec. 16th a heavy concentration, largely of cows, calves and young bulls, was reported from the south end of Lac du Brochet and the north end of Whiskey Jack Lake with decreasing numbers as far north as the south end of Misty Lake and very few from there to Sunrise Lake.

To the south in the Brochet area the progress of

the migration can be followed with some accuracy. On Nov. 9th a small herd was seen northeast of Brochet east of the lower Cochrane River. It was headed south. On Nov. 10th a single track was observed on the bay behind Brochet. On the 19th, 70 were seen west of Brochet and on the 20th 350 were seen crossing Brochet Bay in a northeasterly direction on new ice. From the 22nd to the 25th few animals were seen and these were maintaining the northeasterly drift. New ice was making in the bays but there was still open water in the open lake and in exposed places. Caribou moving south onto the long points to the west of Brochet seem to have been turned back by thin ice and open water and to have swung northeast, passed Brochet, crossed the Cochrane River and swung south along the east shore of Reindeer Lake. Caribou were first reported from Sawbill Lake Nov. 19th and on the 28th they were reported numerous in the Sawbill River and Lake area but had not yet reached Stump Bay twenty miles to the south. At the same time migrants may have been deflected west by the head of the lake (Zangesi Bay). At any rate on Nov. 26th caribou were reported at Fidler's Bay on Wollaston Lake. On the 27th several hundred were seen at Wollaston Lake post coming from the east andeon the 28th a few were seen moving south.

From Nov. 29th to Dec. 5th there are only scattered reports of a few animals in the Brochet area but on the latter date heavy tracks were observed crossing the mouth of Brochet Bay from the Sawbill River region towards Cumines Island. Caribou were seen on Boundary Island Dec. 4th. On the western side of Reindeer Lake caribou reached Middle Lake, Swan Lake and the mouth of Swan River by the 6th and on the 7th were reported numerous from Cairn Lake. Throughout this period it is reported that caribou were numerous at Wollaston Lake but by Dec. 10th only small grpups were seen there. On the eastern side of the lake 2 caribou were seen at Stump Bay on the 7th and on the 15th a party landing at Brochet reported encountering the first tracks about 20 miles south of the settlement.

As of mid December the situation seems to have become fairly stable in the Brochet area. On the eastern side of Reindeer Lake caribou had penetrated as far south as Stump Bay but the main concentration seems to have 'yarded' in the Sawbill River area in small (3-25) herds. On the western side of the lake the penetration reached Swan River in small numbers but nothing but negative reports were received from the south. To the west of Brochet, from there to Wollaston Lake, caribou appear to have 'yarded' is small herds south as far as Cairn Lake and north at least to Clark Bay. A similar situation prevailed to the north of the post as far as the south end of Whiskey Jack Lake.

No accurate information is available as to the sex and age composition of these herds but the tenor of all reports is that they were largely of bulls, few cows and calves being present. This is conspicuously at odds with the few reports available from the region north of 58 30 N in which each of the four concentrations, that at the south end of Lac du Brochet, at Sunrise Lake, between Hay and Blue Lakes, and between Sandy Lake and the south end of Nueltin Lake, are all spoken of as large numbers of cows and calves. Thus there appears to be a real sexual segregation among the caribou in the Brochet area, most cows and calves remaining north of 58 30 N, most bulls and yearlings penetrating farther south..

The fall migration from the Nueltin Lake area may be summarized as follows. In the Cognac River area the withdrawal apparently began at the end of October. To the west, in the area of the upper Kazan River it began towards the end of the first week of November and by mid month was largely complete. The first reports of caribou from the north of Brochet were from Sunrise Lake early in the first week of November and by the middle of the month the invasion was widespread and the leading herds had reached

the settlement area. In the month which followed these herds gradually occupied their winter ranges and by mid December, after some adjustments, the situation became stable. The fall was unusually open, ice being slow to make, and the migration was several weeks later than usual. Moreover it is possible that the routes followed and the ultimate distribution were largely influenced by this factor. This may account for the hiatus in the Kasmere Lake region, for the failure of caribou to appear at Stony Rapids, Cree Lake or Missi Lake by mid December, and for the unusual concentrations of cows and calves as far north as Putahow River. In any event the winter distribution in this area as it was finally taken up was as follows: cows and calves, to-gether with some young bulls, from 58 30 N as far north as Putahow River with concentrations at Lac du Brochet, Sunrise Lake Hay Lake to Blue Lake and Sandy Lake to Nueltin Lake, the areas between being largely blank; adult bulls, to-gether with yearlings, some cows ad a very few calves, in small groups throughout the area about the north end of Reindeer Lake - as far north as Whiskey Jack Lake, as far west as Wollaston Lake at least and as far south as Cairn Lake, Swan Lake and Swan River on the west side of Reindeer Lake, and Stump Bay on the eastern side. By the 5th of January caribou were thinly scattered as far south as Laurie Lake on the east side but it is believed that these animals came westward from Barrington and Goldsand Lakes.

To the east of Reindeer Lake caribou appear to have reached the central part of the province in two ways. Small numbers passed through Duck Lake in mid November but did not linger, there being none in the area Feb. 4th when the writer flew into the post. This movement reached Big Sand Lake on Nov. 10th and on Nov. 19th caribou were reported as having just arrived at the north end of South Indian Lake. This movement appears to have been of minor proportions and not to have spread much farther south. The main influx of caribou into the region of South Indian Lake did not occur until mid December. On Dec. 17th, a large concentration (estimated at 50,000) arrived at the north end of South Indian

Lake from the northeast, following the Churchill River and crossing North Indian Lake. The herds crossed South Indian Lake to the vicinity of Big Point. Here considerable numbers turned northwest following the lake shore and were seen on Dec. 26th in the Muskwesi River area at the northwest corner of the lake. On the 5th of January they had reached the vicinity of Little Sand Lake. Another segment of the herd continued westerly however and by the end of the month had reached the heavily wooded area along the Churchill and Barrington Rivers and about Barrington Lake. This group appear to have spread northwesterly through Lynn Lake and Goldsand Lake to Laurie Lake and the eastern shore of Reindeer Lake but not southerly to any extent. An offshoot of this movement turned easterly about the south end of South Indian Lake and spread south toward Nelson House, reaching the Rat River and Baldock Lake in small numbers, and also north along the east shore of South Indian Lake into the heavily wooded area north of the post which they reached early in January.

Further eastward along the Hudson Bay Railway the progress of the migration has been documented by Messrs. Banfield and Peterson. The following account is therefore brief. On Nov. 14th a large concentration of caribou (estimated at 100,000) was observed in scattered herds from South Knife River southeast to the Churchill River in the vicinity of Limestone Rapids. On the 17th these herds were reported to have crossed the Churchill and to be scattered between miles 442 and 432 on the rail line. On the 20th they had spread south to Herchmer (412), on the 21st to 374 and by the 30th had penetrated to 252. A report of January 31st of caribou having been seen at 170 (La Perouse) is the most southerly record along the railway (and doubtful). Small remnants of this herd remained behind to winter in the delta of the Knife Rivers and in local areas in the spruces along the railway from Back (434) to Lamprey (478).

It seems possible that the herd reaching North

Indian Lake Dec. 17th was an offshoot of this movement deflected westward by the Churchill River. Probably too the area to the west of the railway and south of the Churchill River was entered by animals from this movement. The movement certainly reached far enough west to include Split Lake and January reports of pilots flying from Ilford to North Indian Lake indicate scattered, small herds along this route. However, the westward penetration cannot have extended far south of Split Lake for there were negative reports from Paint, Wintering, and Partridge Crop Lakes in early January.

Southeasterly penetration by this group seems to have been slow and spotty. In the last week of November caribou appeared in small numbers on the Bigstone River. About Dec. 1st they appeared at the west end of Oxford Lake and subsequently spread thinly over the whole area north of Oxford Lake, the Hayes River and Knee Lake. However, in early January none were seen west of the east end of Bear Head Lake and it was not until a month later that a few reached as far west as Bulger Lake. This fact suggests that the bulk of these animals may have entered this area from the east.

North of the Nelson River and east of the Hudson Bay Railway the southward movement is reported to have spread east to the edge of timber but not, as in former years, into the coastal barrens. Caribou reached the area north of the mouth of the Nelson River at the end of November but early in December the majority turned back and worked their way north along the edge of timber to the headwaters of the Owl River. Apparently they wintered in this area for their sign was observed early in February in this area. A few hundred bulls crossed the Nelson River and worked south to the vicinity of the junction of the Hayes and Gods Rivers. This is the most southerly penetration of caribou toward Shamattawa and on the 31st of January small scattered herds and tracks were observed from this vicinity to within 35 miles of York Factory. A few animals apparently wintered on the islands of the Hayes delta.

The main body of the southward migration in this area passed to the west crossing the ice of the Nelson River at the Head of Navigation in a week long movement centred about Dec. 10th. These herds passed southwesterly along the valley of the Angling River and spread as far east as the Hayes River. It is believed that most of the animals north of the Knee Lake - Oxford Lake axis derived from this movement.

The southward extent of 1948-49 winter range in northern Manitoba was roughly as follows. In the extreme west caribou were never seen south of Laurie Lake. In the Lynn Lake, Gold Sand Lake area pilots' reports indicate a southern limit about 30 miles southeast of Lynn Lake. South of Barrington Lake scattered herds and single animals were observed as far south as Granville Lake. In the Nelson House area Baldock Lake and some of the small lakes just south of the Rat River marked the southern limit until late winter when, in early April, caribou were reported from Wapisu Lake west of the post. Along the railway caribou were not seen south of the Manitou Bridge over the Nelson River (mile 241). The single, doubtful report from La Perouse is an exception to this. From the Manitou Bridge to Bulger Lake and from the latter to the west end of Oxford Lake marks the southwesterly limit and south of Oxford Lake and Knee Lake reports were of very few or no caribou. In the east the line seems roughly to follow the Hayes River to the coast.

The case of an apparent southward extension of range in late winter has been mentioned in the Nelson House area. The same thing seems to have happened south of Oxford and Knee Lakes. Thus, on Mar. 21st caribou were reported along the Carrot River west of Oxford Lake. On the 29th tracks and sign were reported from the Molson Lake area and from Little Playgreen Lake north to within 20 miles of Cross Lake. In mid April caribou were reported to be present in some numbers at the east end of Gods Lake. A similar eastward expansion to within 30 miles of Shamattawa is reported for the first week of April.

The northern limit of the winter range is unknown. Probably it is ill defined, for wintering caribou were observed chiefly in association with heavy coniferous stands, largely Spruce and Tamarack and in the absence of a detailed forest cover map for northern Manitoba it is not known how far north such suitable cover may go. That outlying areas beyond the zone of continuous forest can support small overwintering populations is shown by their occurrence in the deltas of the Knife and Hayes Rivers. That heavy overwintering concentrations can occur almost at tree line is shown by the herds of cows and calves reported from the area between Sandy Lake and the south end of Nueltin Lake but that the northern limit of the winter range is not everywhere coincident with the tree line is shown by the absence of caribou at Duck Lake. Acknowledging the probability of outlying local populations it is believed that a line from Sunrise Lake to North Knife Lake to York Factory would approximate the northern limit of winter range.

The area contained between these two limits comprises approximately 55,000 square miles. Much of this, however, is not actual winter range for caribou do not utilize the open barrens or the poplar-birch subclimaxes of regenerating burns, though they may pass through them. Some idea of the amount of this potential range which is actually occupied is had from the fact that of 872 miles flown over it signs of caribou were seen on only 610, or 70%, of them. Thus the utilized winter range is probably of the order of 40,000 square miles.

The events of the fall migration may be briefly summarized as follows. Caribou reached the winter range in northern Manitoba by two routes. The first of these passed down the Nueltin Lake axis and has already been summarized on pp. 23 and 24. The second entered the northeastern part of the province in mid November and ultimately spread out over the whole eastern and central section. Crossing the Nelson River at the Head of

Navigation the eastern segment passed into the area north of the Oxford Lake, Knee Lake axis early in December and penetrated as far west as Bulger Lake by the end of January. Farther west much of the migration seems to have been turned by the Nelson River and, in early December, to have passed into the area north and west of Split Lake though reaching south of the latter post at least to the Manitou Bridge. A western segment seems to have been diverted by the Churchill River into the central part of the province about South Indian Lake which it reached in mid December. From there it spread west through Barrington and Lynn Lakes to the east side of Reindeer Lake, south almost to Nelson House, east along the east shore of South Indian Lake, and for an undetermined distance northward. These movements were not completed until early January. Small, local populations were left behind in the deltas of the Knife and Hayes Rivers, at the junction of the Hayes and Gods Rivers, in the headwaters of the Owl River, along the Hudson Bay Railway between Back and Chesnaye and probably in many other undetermined areas. There was a slight southerly extension of winter range in late March and early April in the Nelson House, Cross Lake, Oxford House and Gods Lake districts. There appears to have been a partial sexual segregation on the winter range.

CARIBOU POPULATION ESTIMATES

Northern Manitoba (Winter)

All flights made over caribou range in northern Manitoba during the winter of 1948-49 were made in Manitoba Government Air Service aircraft. These flights were engaged on various duties, the writer's position being that of a guest and the observations which he was able to make incidental to the main purpose of the trip. In short, flights were neither planned nor executed as an aerial survey of wintering caribou and frequently fell far short of the ideal in that regard. None-the-less, the estimate of population which follows is considered valuable.

Caribou were never seen in large numbers on winter range, except when actually migrating. Herds of less than ten were the rule rather than the exception. Moreover, considerable areas of the 55,000 sq. miles included between the northern and southern limits of winter range are semi barrens or burnt over land in neither of which were wintering caribou observed at all. No cover maps are available for northern Manitoba but some idea of the extent of unoccupied range is had from the fact that of the total mileage flown over the area 30 percent showed no signs of caribou. Thus caribou were thinly scattered over an occupied range of about 40,000 sq. miles.

POPULATION ESTIMATES

About 70 percent of the animals seen on these flights were on the ice of small lakes, the remaining 30 percent being in the bush. Flights were made at an average altitude of 2000 feet and from this height it is estimated that animals could be seen on lakes for a distance of 1½ to 2 miles on either side of the flight line but that animals in the bush were missed at ranges in excess of ½ mile. For census purposes a strip width of two miles has been assumed as a compromise between these. It is arbitrarily assumed that this strip is censussed with about 30%

percent accuracy. The latter figure takes into account the fact that a single observer cannot work both sides at once, that time is lost in making notes, that 75 percent of the animals in timber will not be visible on a two mile strip, that bad weather, often including heavy frosting of the windows, reduced efficiency, and that the observer's own efficiency was often hampered by crowded conditions and cold.

Neglecting animals which were observed on migration and considering only those whose random trails indicated that they were resident, 296 caribou were seen in 254 air miles over occupied range. Assuming 30 percent coverage of a 2 mile strip this gives a density of 2 per sq. mile and a total population for occupied winter range of approximmately 80,000 animals. It seems unlikely that outlying concentrations such as that between Sandy Lake and the south end of Nueltin Lake would raise this figure to more than 100,000. Compared with Mowat's estimate of a density of 1 per sq. mile and a total population of 15,000 in the Brochet area this seems generous. Obviously an estimate based on a 2.5 percent sample of doubtful accuracy cannot be accorded the value of an absolute count. However, the estimate does have significance when it is remembered that local residents have always talked in terms of hundreds of thousands; even of millions. Such estimates are clearly gross exaggerations. On the other hand the fact that numbers of caribou were reported by eskimos to have wintered north of Nueltin Lake coupled with the fact that the migration did not penetrate as far south during this winter as in the past three years may indicate an abnormally low wintering population for 1948-49.

Southern Keewatin (Summer)

The distribution and movements of caribou herds summering in southern Keewatin District was outlined in the

preceding section. Four herds were postulated : Thelon, Tibielik, Dubawnt and Kaminuriak. The Thelon group was estimated to number approximately 125,000 and the Tibielik about 30,000 animals. No estimate of numbers is available for either of the other herds but it seems probable that they are comparable in size. Thus a total summering population of 3-400,000 caribou in southern Keewatin is likely.

Population Changes

No data sufficient to infer past populations came into the hands of this party. In the Reindeer Lake section there are persistent reports of a great decrease in the numbers of caribou wintering in that area. Mowat was convinced that there had been a 50% decrease in the last 20 years in the section. At South Indian Lake persons interviewed felt that there had been little change in the numbers of caribou, if anything an increase. In 1942 caribou first appeared in some numbers at the south end of the lake near the post. Along the Hudson Bay Railway and in the eastern portion of the Province generally the conviction is that caribou are far more plentiful than formerly. The first heavy southward migrations along the railway began in 1935 and have continued every year since. At York Factory natives were unanimous in answering that caribou were much more plentiful than they were ten years ago. In the Oxford House, God's Lake, and Cross Lake Sections the 1945-46 winter brought the first caribou to the areas for forty years - and they came in numbers. This invasion has gradually been both diminishing in numbers and receding in extent of southerly penetration so that there were everywhere said to be fewer caribou in the winter of 1948-49 than in the preceding three winters.

It is shown that the herd migrating into the Reindeer Lake area is most heavily and abusively utilized both in Manitoba and Keewatin District when compared with eastern

herds. Indeed the progressive withdrawal of non native trappers from the eastern portion of southern Keewatin District, now virtually complete, has undoubtedly relieved the pressure on the latter. Moreover the increase in numbers and extent of winter range in the east, though at times irruptive, has been continuous over the last fifteen years. Shifts in migration routes may have been involved in the decrease in the west and the increase in the east but it seems more likely that these should be attributed to differential utilization.

Southern Keewatin District

The area immediately east of the north end of Ennadai Lake, on or near the Upper Kazan River, is occupied by a group of 48 eskimos who call themselves Ihalmiut - the people of the hills. Of all the eskimo with whom the party came into contact, these people were undoubtedly the poorest, an opinion confirmed by the few other whites who know them. Not only are they materially poor, a fact which may be connected with their remoteness and the weakness of their tie with the trading posts, but one is inclined to feel that they are also spiritually poor. At any rate their workmanship, whether it be in the making of clothing and equipment, or in the care with which their caches of meat are laid in for the winter, is inferior. They are known at the trading posts as shiftless and poor hunters, and they were certainly less aggresive and forward looking than other groups with which the writer had some slight familiarity.

UTILIZATION

These people are caribou eaters. Not only are they too poor and too far from the posts to regularly supplement their diet but there is no doubt that, with the exception of tea, they regard white man's foods as luxuries in the category of cake and meat is their basic and most relished food. Not only is caribou the staple food item but it provides for the great majority of their other needs. Clothing is almost entirely made of caribou skin; so are tents, kyaks, sleeping bags and pack sacks. Lamps are lit with caribou fat and fish are caught on caribou skin lines. White man's tools, gun and trap, needle and file, harness and rope, axe and tea pail are eagerly sought after but still subordinate to the caribou derived, homemade articles. Under these circumstances the demand for caribou is high and the Ihalmiut, with no abstract ideas of conservation to restrain him and with apparently limitless numbers of caribou migrating through his country, takes what he can get with reckless prodigality.

An entirely protein diet is nutritionally inadequate. This the eskimo recognizes and the rule of a mouthful of fat for a mouthful of lean prevails. Failure to heed it produces cramps, general malaise and debility in the initial stages - as the writer can testify - and slow starvation in the end. This need for fat while on a meat diet imposes apparently wasteful habits on the eskimo. Thus in late spring and summer caribou have little fat save in the tongue and marrow while its progressive deposition in the mesenteries and omenta, in the orbit of the eye, pharyngeal and laryngeal musculature, about the ribs and sternum, in the pelvis and ultimately in a suet-like pad over the back and rump occurs in the fall. In the late spring and summer eskimo were repeatedly observed to take only the tongue and the lower part of the limbs from their kills — the lean meat, unfortified with fat, being untouched. As the fall progressed the choice of cuts constantly widened until every part of the caribou WAS UTILIZED save the viscera, neck, shoulders and thighs which were fed to the dogs, the first after removal of the mesenterial fat. Compared with the civilized utilization of domestic meat this represents a gross waste but the writer is convinced that until the Ihalmiut both learn to, and have the opportunity to, supplement theif diet it is unavoidable.

Not only is there a heavy toll taken of caribou for food, but considerable numbers are taken annually for their hides. The making of a tent requires twenty or more hides and the sleeping bench within may comprise another six to ten. A complete suit of winter clothing for an adult requires seven hides, a sleeping bag six, or more, a sled cover four, a pack sack two, akyak ten or more and numbers go into the making of lesser items such as the thin, soon worn out summer boots. Unfortunately hides for most purposes are best in late summer when the weather is still too warm to keep any appreciable amount of meat and so there is great wastage. Conversely, of

course, later in the fall when the weather is cold enough to keep the meat the hides are past prime, making bulky, poor wearing garments and so are little used. It should be noted that the hides of different sex and age groups are prepared for different uses. Thus fawn skin is used for socks and underwear, doeskin for outer clothing and buckskin for boots and lines. It is even emphatically asserted that the hide from the forehead of an old bull makes the best and longest wearing sole for winter boots. These preferences have a real basis, one hide is better than another for a certain purpose, and this poses a difficulty in trying to teach the eskimo to respect a buck law or similar conservation measure. As long as the Ihalmiut remain in such a primitive state it is difficult to see how the annual kill for hides can be reduced below a certain minimum which is still very high.

To these human requirements may be added those of the dogs - for the Ihalmiut feed their teams on meat the year round. This is a general abuse in certain parts of the north and one which is being curbed by enforcing the feeding of fish in lieu. However, these fish must be netted and nets are foreign to eskimos, those who do use them having learned the art from white men. The Ihalmiut were issued nets by our party and had no idea how to weight, float, or set them although they readily learned. If this were the only problem it would be easy of solution but one can neither set nor lift a gill net from a kyak and these are the only boats they possess or are likely to possess. In consequence the feeding of caribou to the dogs, until education backed by the provision of the means makes the feeding of fish possible, will continue.

Bearing all these factors in mind the writer has tried to estimate the requirements of a family of four, two adults and two children, living under such circumstances. Requirements for dog feed come to about 50 caribou a year

based on a team of six dogs fed at an average rate of two pounds per dog per day. Although the dogs are rarely if ever fed on such a regular basis, sometimes getting three times this amount when on the trail, and often getting nothing when rations are short, this is felt to strike a fair average and to give a figure for consumption which is not far wrong. At least 100 hides are needed per year, for the untanned skins do not wear well and clothing must be replaced regularly. This figure, based on the numbers of hides required to make each item of clothing or equipment and the length of life of that item, agrees well with the writer's observations of bales of hides stacked at the doors of the tents when the camps were visited in the fall. The needs for human consumption are most difficult to estimate. The problem of fat requirements has already been discussed. To that may be added the enormous appetites of the eskimo. Five meals a day are consumed while in camp and the modest three while on the trail may comprise five or six pounds. The writer was right royally entertained at a banquet which began and ended with caribou and comprised three whole boiled heads, half a dozen boiled tongues offered as separate delicacies and a wooden tray, a foot and a half by three feet, heaped high with the boiled marrow bones of half a dozen caribou. Nine people made very short work of this gargantuan supper ! In the light of the foregoing, 100 caribou per annum seems modest. Thus the total yearly requirement would be of the order of 250 caribou for a family of four which amounts to 3000 for the whole group of forty eight. This would be bad enough if the kill were restricted solely to these legitimate, if unique, requirements but unfortunately the people are markedly improvident, even as compared to other eskimo, and there is a great deal of avoidable wastage with a consequently increased kill. Some of the most flagrant of these abuses follow.

The Ihalmiut men range widely over the barrens in summer, thinking nothing of walking several hundred miles in

a week or ten days. They travel light, really light, and live from the land, catching fish with spoon and line, or in small streams with their bare hands, and shooting caribou when opportunity offers. Caribou so shot rarely provide more than one or two meals eaten on the spot. Meat is too heavy to carry and another kill to-morrow too great a temptation and too inviting a gamble. However, it is a gamble which is not always successful and the writer often wondered why they did not make more use of dried meat. Not only would its use mitigate a slaughter which literally leaves hundreds of partially utilized carcasses to the foxes and wolves but a stock of it would tide over the starvation and near starvation periods with which these people are plagued winter and summer. Eskimos to the north of them use it: the Ihalmiut know how to make it but suggestions that they should make it in quantity were received with tolerant patience and the warning that foolish wastage of caribou might soon mean no caribou and hence no Ihalmiut brought only blank incomprehension. Not only is tradition and habit opposed to such a view but the people still see caribou in their thousands and like others before them can see no end to this resource.

A still more flagrant abuse rests in the habit of killing caribou everywhere along the line of march, particularly in the fall, to be later used for dog feed and human consumption when on the winter trap line. If all these carcasses were utilized there could be little complaint for as noted before the alternative of using fish is not open to the Ihalmiut. However, the eskimo shoots on spec and many of these kills are never revisited. For example, there were fifty eight such kills known to the party from the area surrounding base camp at Windy Bay on Nueltin Lake during 1948 and of these not more than a dozen were utilized, and those mostly before the party left on Dec. 10th according to C. Schweder who occupied the camp later that winter. A number of these carcasses were shot so early in the fall that

they putrified in the warm weather and were unfit for use even by dogs - a further waste. Finally little attempt is made to properly cache the meat from wolves and foxes and much is lost in this way. The Ihalmiut seem to have concluded that it is easier to shoot a few extra than to build the little sepulchres within which their northern neighbours cache their meat.

The Ihalmiut still practice the ancient method of spearing caribou from kyaks at water crossings. On the 18th of Aug., 1948 a party of four eskimo utilized the party canoe to spear caribou crossing Windy Bay, Nueltin Lake in the southward phase of the midsummer migration. Except for the fact that the canoe was slower and less manouvreable than a kyak the writer was assured that what transpired was typical.

Sect A → "The canoe was held in readiness on the south shore of the bay where the caribou had a half mile swim to make. As the animals neared the shore after this swim the canoe was urged towards them at the first sign of their turning aside. They were thus faced with an equally long swim back to the north shore and escape. Initially more than a match for four paddles they were overtaken in mid bay and the spearing begun with the canoe driven right among the panic striken animals often with the prow riding up onto one.

The spear consists of a diamond shaped blade two inches long and one and a half wide affixed by a socket to a five foot wooden shaft. The heads were obviously of commercial manufacture but the rusted iron betrayed no trademark: the shafts were cut from native spruce, on the spot. The weapon is held very close to the butt and jabbed single handedly into the small of the caribou's back like an overgrown dagger. The stroke, properly delivered, either severs the dorsal aorta, penetrates the spleen, or opens the chest cavity. In any event death is rapid and efficiently speared animals do not reach shore. However the

the eskimo became wildly excited in the process and the spearman laid about him at any animal within reach with the inevitable result that many animals were more or less severly wounded. Many of these lived to reach shore and those which had merely been slashed over the rump went free while the badly wounded either died on the beach or escaped to die in the hills. Twenty caribou were secured in this way including two animals which were tracked down and shot by the writer. There is no doubt that at least as many more were wounded, some of them probably fatally. A single dead caribou, bearing the mark of the spear, was found inland two days later. The eskimo made no attempt to pursue the wounded and contented themselves with skinning out those which had reached the shore (the writer had insisted that they spear only animals which were prime) and ensuring that those in the water would float to drift ashore. This latter is apparently a common practice designed to save the trouble of towing kills ashore - the head is turned back and dorsally and the antlers hooked under the fore-legs in such a way that the muzzle is held above the surface and the lungs do not fill with water.

To the credit of the eskimo it must be said that all of these animals were recovered the following day but the fate of the meat and the hides is an excellent illustration of their failings - perhaps, too, of their difficulties. Tongues and marrow bones were taken for immediate use, the balance piled in a heap on the beach. The suggestion that some of this meat should be dried was met with the assurance that it would serve as dog food in the winter. In deference to the writer's plea that it be properly cached a few dead willows were flung over the pile. In the fall the water rose and the whole, long since putrid, was frozen in ! The hides were dutifully staked out to dry and totally ruined by a subsequent five day rain which brought no action from the eskimo. Quite probably they had never seriously intended to use them - it was a long walk

" End of Sect A.

home and hides are heavy. In conclusion it must be said that spearing is efficient and that people as poor and often without ammunition as the Ihalmiut can hardly be blamed for practicing it. On the other hand it is almost orgiastic in execution and consequently grossly wasteful of animals.

The love of the chase and the improvidence illustrated in the incidents just described also characterizes the eskimo use of a rifle. He is a primitive with a primitives unliscenced urges and a modern destructive weapon. In the two months between mid August and mid October 3000 rounds of 30.30, 500 rounds of .303, and 120 rounds of 44.40 ammunition were distributed at intervals to the eleven heads of families as relief supplies. On Nov. 5th five of these families whose camps were visited had no ammunition left ! It is true that the eskimo hunter dependant on his gun for the days meal often risks long and difficult shots rather than go hungry and so has a much higher rounds per kill ratio than his better rationed counterpart. Even so the expenditure of so much ammunition was assuredly accompanied by the heavy and wasteful slaughter of caribou. Reports from C. Schweder state that he found caribou cached everywhere throughout Ihalmiut territory during the winter - the hills were full of dead deer. Everything considered the writer feels that the 1948 kill in this area may well have reached 5000 caribou. The tragedy is that when the ammunition was issued the people were genuinely destitute and near starving. Without ammunition they had been unable to secure hides, without these the kyaks had not been repaired and without the kyaks the only alternative to shooting was also closed, and even fishing cut off. Escape from this vicious circle is both in the interests of caribou conservation and the Ihalmiut welfare. It will only be accomplished by education and sound supervision.

In summary, the group of 48 Ihalmiut eskimo are probably more closely dependant on caribou than any other group

of people of whatever race. Their annual needs in terms of meat and hides requires the kill of an estimated 3000 caribou. Their natural improvidence and irresponsible love of the chase will raise this figure whenever the means are at their disposal. In 1948 the issue of government ammunition provided the means and the kill is estimated at 5000 animals. The annual need could be greatly reduced by the provision of additional, equally adequate items of diet and the opportunity to earn them, to-gether with the provision of nets and the boats from which to operate them. Education is imperative. Such a program can only be implemented if supervision is close and at once understanding and firm. From a conservation point of view this group are the thorniest and most important group in southern Keewatin district.

The party did not have contact with native groups in the eastern part of southern Keewatin. As a result the annual caribou kill by these people is not known. However, it may be confidently asserted that it is much lower than that of the Ihalmiut for these people are less dependant on caribou than are the latter. Thus, the coastal people live by the sea using both the meat and hides of the seal for most of their needs. Caribou are taken chiefly in the fall by hunting parties which travel inland to secure hides for winter clothing, probably at a rate of about 35 hides for every family of four. Moreover, the area is under the supervision of the R.C.M.P. and it may be assumed that wasteful practices have been discouraged, if not eliminated. The only inland group comparable with the Ihalmiut are the Padleimiut who are centred about the Hudson Bay Company post at Padlei. These people are traditionally caribou eaters too but they have had their needs ameliorated by the presence of the post. The inclusion of many items of white man's food in their diet and the greater use of manufactured items of equipment

have reduced the need for a high caribou kill. It is probably somewhere of the order of 75 per annum for each family. The eskimo population in the Padlei area is said to be about 40 families which would mean an annual kill of 3000 caribou. No accurate figures are available to the writer of the numbers of coastal natives but from scattered reports there appear to be some fifty families involved, spread out from Nunnela to Chesterfield Inlet, but not including the later. If this estimate is correct the annual kill of these people would be of the order of 1700 caribou.

In 1949 there were 21 whites at Baker Lake and eight families of eskimo all in white employ. The natives, who live very largely on a white diet, are provided with fresh meat from time to time through closely supervised hunts. These are controlled by the R.C.M.P. and regulated to the need - an excellent system. White residents take only their annual legal quota and the total kill from these two sources is approximately 75 animals per year. There is considerable complaint among personnel of the Department of Transport station, and the R.C.C.S. station over the lack of fresh meat. The supply brought in by R.C.A.F. transport was clearly inadequate and for several months of the year during freezeup and breakup is non-existant. The effect on morale is marked and the R.C.C.S. have requested permits to kill caribou for food. This is not recommended but it is suggested that the R.C.M.P. be empowered to organize controlled hunts to provide fresh meat for whites as well as eskimos when circumstances warrant. It is suggested that this system is applicable to all stations in the arctic which are similarly isolated.

Two groups of eskimo trade into Baker Lake from southern Keewatin, the Harvaqtormiut from the lower Kazan River and the Akilinimiut from Aberdeen Lake. Neither of these groups was actually visited, the former due to quarantine restrictions, the latter through misfortune. In consequence estimates of their

annual kill of caribou are largely inferences. The people are relatively prosperous. Canoes are owned by both groups and fishing with nets practiced. Eskimos coming in to trade at the post were observed to buy quantities of flour , lard and other foods. For all but winter clothing, apparel of eskimo design but commercial materials seems largely to have replaced caribou clothing and in the same way canvas tents seem to be ousting the heavier skin shelters. The whole impression is one of a people who have found efficient substitutes for the home made article and can afford them. It is reported by the post manager and the R.C.M.P. that the annual sale of ammunition is approximately 175 rounds per hunter and that the spearing of caribou is no longer practiced in this area. Moreover the writer was told that the wasteful practices prevailing among the Ihalmiut were largely unknown among these people. Certainly in the Beverly Lake area the party found many meat caches whose massive stone construction indicated the value placed upon them, and a small party of Akilinimiut met on Beverly Lake at the end of July were travelling with rations of dried meat. In consequence the writer is inclined to aggee with the estimates made at the post that the annual kill of a family is of the order of 60 caribou. The party was unable to obtain exact figures but the Akilinimiut comprise about 15 families, the Harvaqtormiut about 22 and their combined kill about 2200 caribou per annum.

Isolated whites, as well as natives, take a toll of caribou and in some cases their kills have been as excessive as any by the Ihalmiut. Thus records of C. Schweder found at Windy Bay list, in diary form, the killing of 278 caribou between Sept. 11th and Nov. 3rd, 1947 and records prior to and following this period were not available. Probably this is a flagrant case but the practice of using caribou wholesale for dog feed after the manner of the eskimo is said to have been wide spread. Fortunately, the great majority of non-native trappers have gone for good. Losses from other white sources are probably

small despite the annual kill of a few dozen at isolated trading posts (the writer observed about 25 tongues drying on the meat cache at Cognac River, Nov.11th, 1948) and the occasional animal killed by prospectors. Thus the day when whites were responsible for any significant kill in southern Keewatin is now largely past.

In summary the estimated native kill per annum in the southern portion of Keewatin District, excluding Chesterfield Inlet, is estimated to be of the order of 10,000 caribou. It is felt that the figures cited for the Ihalmiut are probably accurate. Those cited for other groups are based on inference and report rather than on the spot investigation and may be in error, particularly as accurate figures on the eskimo population were not available. Utilization along the coasts and in the Baker Lake area is probably at a nearly irreducible limit. Education and supervision, together with material aid in building a new way of life would result in a marked reduction in the kill by Ihalmiut eskimo, the worst offenders, and perhaps result in some reduction for the Padleimiut too.

Northern Manitoba

The heaviest kill of caribou in Manitoba undoubtedly occurs in the northwestern part of the province. In 1947 the R.C.M.P. estimated the kill in the Brochet area and to the north of Lac du Brochet at 85,000 caribou per annum by all races. In the same year the game guardian at Brochet estimated the kill in these same areas at 56,000, while in 1949 Father Eganolf of the R.C. mission at Brochet estimated the kill of the 100 hunting families of Chippewyan at approximately 5000, a figure which should include by far the greatest part of the

annual kill. Thus estimates by the most reliable, on the spot observers range all the way from 5000 to 85,000 !

Having spent only a single day at Brochet the writer scarcely feels competent to select a figure from within this wide range as being the true one. However, an estimate may be made from the following considerations. The Chippewyans of this area, like the Ihalmiut, are traditionally caribou eaters. Though trading into Brochet regularly, most of the families are remote from the post and as there is no R.C.M.P. detachment in the area they live an unrestricted life. Meat probably still constitutes the bulk of their diet and probably too, on such a diet they can utilize only fat meat and so kill many more caribou than are apparently needed. They have largely given up the practice of fishing for dog feed which prevailed until the advent of the high powered rifle made it easier to shoot caribou. It is repeatedly said that in the matter of caching meat along winter trails they are as wasteful and improvident as the Ihalmiut. The .22 rifle is common and the cause of many wounded caribou. Not only do they eat meat but they clothe themselves in skins, and make tents and many other items from them. Their philosophy is one of hand to mouth, day to day improvidence. The picture is so very similar to that for the Ihalmiut that the writer is inclined to make use of the same figure for consumption as a rough guide to the kill, which would place it at 25,000 per annum for the hundred families living a primitive existence away from the post. To this figure would have to be added the toll taken by fishermen, trappers and other whites in the area. However, their kill is probably so negligible as to lie within the error of the above estimate and so is not considered.

A second group of Chippewyan are located about Duck Lake post in the north central portion of the province. The band numbers 198 menn, women and children comprising about 48 families who remain near the post in summer but become more widely scattered during the trapping season. Although caribou skin

tents and clothing were much in evidence during the writer's visit these people lead a much less primitive life than their Reindeer Lake compatriots and make much use of manufactured items and white foods. However, they retain their old habits to the extent of spearing caribou on the Wolverene River during the midsummer migration. At this time the slaughter is said to be excessive due to the indifference with which the Indians regard the loss of carcasses which drift downstream. By the same token the waste is excessive, especially as much of the meat spoils in the hot weather. The chief object of the spearing, however, is not meat but a supply of hides and some idea of the size of the slaughter may be obtained from the fact that 978 hides, 465 lbs. of babiche (at 2 lbs. per hide) and 17 parkas (at 2 hides per parka) were traded at the post in 1948. This represents the kill of 1245 caribou. Meat is used as dog feed whenever available and the practice of fall caching is common. A kill is made in the spring, as well, and often involves travelling east to Caribou River. The chief of the band deprecatingly remarked that he did not think any hunter had got more than 50 caribou during the fall. The post manager is of the opinion that the hides he receives do not begin to represent half the annual kill. Accordingly the writer estimates the consumption per family at 75 caribou per year and the total kill at 3600.

Farther south in Manitoba the Chippewyans are replaced by Crees. These people have a much longer association with the trading posts and, though still trappers and hunters, have become much more dependant on them. For example, mocassins, mitts and parkas of tanned hides are about the only common articles of clothing still native made and both mitts and parkas are facing serious competition from manufactured articles. A similar conversion to what may be called a white man's diet is apparent. Where caribou are plentiful numbers are certainly killed but compared with that of the eskimo or the Chippewyans both the need and the consumption is much reduced. Moreover, in many areas, though harder to hunt, moose are available and bear

some of the brunt of the native needs. Finally, through-out the whole of this area there is fairly close supervision by the R.C.M.P. or by the field officers of the Manitoba Game Branch, or both. As a result abuses are discouraged and the annual kill in most areas is not excessive.

The availability of caribou varies from year to year in southern parts of the winter range. Thus for nearly forty years prior to the winter of 1945-46 caribou had not wintered as far south as the God's Lake, Cross Lake, Oxford House sections in the east, or Nelson House and Pukatawagen in the west. The annual kill in these areas was zero. However, in that winter caribou appeared in large numbers in all these sectors and were welcomed by the natives as heaven sent. Figures from Oxford House are typical. In 1946-47 a very accurate tally by the the Manitoba Game Guardian there showed the kill of 98 hunters (substantially all of them) to be 1140 animals, an average of 12 per man. In 1947-48 caribou were present but in reduced numbers and the kill dropped to 869, an average of 9 per man. In 1948-49 caribou were again present but in still further reduced numbers and they arrived late in the season. By the end of January the kill was estimated to have reached only 200 animals, and although a second check was not made it is doubtful if it exceeded 500 for the whole winter. Comparable figures are not available for the other southern sections mentioned but the pattern is undoubtedly the same. In 1946-47, the R.C.M.P. estimated the God's Lake kill at 3000. In 1948-49 caribou did not reach God's Lake until mid April, and then only in small numbers. No figures on the kill were obtained but it could hardly have exceeded 100. At Cross Lake the 1946-47 kill was estimated at 150-200. In 1948-49, it was zero as caribou did not reach the area. Kills for earlier years are not known for Nelson House and Pukatawagen but caribou did occur in both sections in numbers and were heavily utilized being so much easier to hunt than moose, so that the kill was probably of the

order of several hundreds at each. In 1948-49 it was negligible, if not zero, for caribou barely reached these sections and that not until late in the season and in small numbers.

A somewhat similar situation prevails in the extreme eastern portion of the winter range. The Shumattawa district has never been considered good caribou country and by the first of February the hunters of this band had secured only 15 animals. Normally the spring migration from the Gods Lake section provides them with a small kill in the spring, but in 1949 this movement was light. The party proceeded north before the movement was over but it is doubtful if the total kill for the whole winter in this area could exceed 100. York Factory natives fare little better. Those whose trap lines are to the north and west are in caribou country but others who work the Kaskattamagen area are out of luck. During the writers visit in early February no figures could be obtained and a second projected visit had to be abandoned in favor of aerial survey work. In consequence ~~the kill of~~ the 15 trappers whose lines are in favourable sites have been arbitrarily assigned 10 caribou apiece giving a kill of approximately 150.

All of the bands so far discussed are said to utilize caribou for human consumption only. The numbers obtained are too small to be wasted by feeding to dogs, or careless waste. The only abuse drawn to the writer's attention was the wide spread use of the .22 calibre rifle. It was suggested that, in part, this was due to the accumulated war time shortage of larger calibre rifles, just now being relieved, and in part, to the fact that many natives simply cannot afford the purchase of the latter, especially since the price of fur has gone down while that of rifles has gone up.

The Split Lake band, largest in the area, numbers 526 people in approximately 140 families. In contrast to the

groups just discussed these people receive a regular and plentiful supply of caribou. This is a condition which seems to invite abuse. In 1946 caribou were reported as being widely fed to dogs and though now checked it probably still occurs in isolated cases and places. There is a marked tendency to shoot caribou in numbers when they are arriving in the fall - they are easier to hunt before they break up into the small groups characteristic of their wintering habit. The carcasses so obtained are usually cached on the ice of lakes and many are reported to be subsequently lost to wolves. Twenty two calibre rifles present the same problem here as in other sections. Of the 140 families, at least ten are permanent residents at the settlements of Ilford, Split Lake and Landing River, the remainder have been considered as active hunters. A kill of 18 per family is considered reasonable - it represents a 50% increase over the observed figure from Cross Lake in 1946-47 and thus allows for abuses; at the same time, over the period of the 1948-49 season (which was about one month short) it allows about 75% success in supplying the one caribou per week which the writer is informed an Indian family will use if they can get it. On this basis the 1948-49 kill would be about 2300 caribou.

In the vicinity of South Indian Lake the great part of the native population have turned to winter fishing since the price of fur went down and the industry opened on the lake. As a result the kill is low and although no figures are available it is not believed to exceed 200. The attractions of construction and other work in the Churchill area have also lured many trappers from the bush. There is no Indian band centred here and the majority of the few trappers still in operation are white. None of these men could be visited and one can only guess at their consumption. However, it is certain that they do not have the Indian fondness for the flesh, and recent prosecutions for feeding it to dogs seem to have curbed this practice. Therefore it is suggested that their annual kill probably does not exceed 150 at the outside.

South of the Churchill area in the Indian areas already discussed there are very few white trappers. These to-gether with fishermen (chiefly on God's Lake, South and North Indian Lakes, and Big Sand Lakes in caribou range), tractor train drivers and bombardier operators take a small toll of caribou. None of the three trappers visited were using any; one fishing camp had three on hand, another one; and eight old kills were reported along the trail from Ilford to Shumattawa in early April. Taken all to-gether and including poaching the toll probably does not exceed 150 caribou during the course of the winter. No effort was made to estimate the sporting kill during the fall.

The writer is strongly aware that these estimates contain a large element of guesswork - unavoidable when dealing with a population of three races, speaking three different languages and scattered so widely over a remote country. However, every effort has been made to sift out the truth from local opinion, from personal observation, and from logical inference. The tendency has been to estimate high if in doubt. Taken all to-gether then, the kill during the winter of 1948-49 in northern Manitoba, exclusive of that for sport is as follows:

Reindeer Lake & Lac du Brochet	25,000
Duck Lake	3,600 - 2000
Split Lake	2,300
Oxford House	500
South Indian Lake	200
York Factory	150
Churchill	150
God's Lake	100
Shumattawa	100
Miscellaneous	150
TOTAL	32,250

Laurie's Caribou Report
File W 228.

By 7/9/50 for Col Richards WLU 228 7-8-50

~~Col. Richards~~ ~~Mr. Banfield~~

SOCIALITY AND BEHAVIOUR

SOCIALITY AND BEHAVIOUR

The barren ground caribou is a gregarious, but not a social, animal. Herds, regardless of their size, show none of the characteristics of an organized animal society. No leadership is exercised; little cohesion between individuals of a herd is apparent; no dominance - subordination relations are display except during the rut; and no collective defense mechanisms are utilized. Even during the rutting season herds appear little better than fortuitous aggregations.

The Social Unit

New born calves accompany their mothers throughout the first year of their life and, in some instances, for a few months after the succeeding calf is born. However, calves are quite capable of taking care of themselves even at a very young age. Thus calves seen on July 11th, 1949, at Beverly Lake, NWT, and reckoned to be little over three weeks of age, were grazing freely and were not observed to suckle. A specimen, weighing 26lbs., shot five days later had a full paunch of forage. Moreover, a case was never observed in the course of either summer of a calf being unable to keep up with adult animals, either while running or swimming. Solitary calves, or calves accompanying herds of bulls were commonly observed and were presumed to have become separated from their mothers by accident. Thus the largest family unit among caribou consists of three animals, a cow, her calf, and, for a few months, perhaps her yearling as well, but this unit is by no means universal. In all other respects the fundamental social unit must be reckoned to be the individual.

Herd Formation

Herds are aggregated from the social units described above by the interaction of movement with terrain and weather. That aggregation cannot occur without movement is apparent, that the greatest aggregations occur at the periods of maximum movement, namely during migration, is both a logical inference and an observed fact. As they influence migration routes, barriers of water, of thin newly formed ice, or of rough topography have already been discussed in the section on Migration and Distribution. In the present section it is suggested that these same factors exert a concentrating effect on moving caribou and lead directly to the formation of herds.

On the 20th of July, 1948 the party flew from Windy Bay on Nueltin Lake to the western end of Kamilikuak Lake. No caribou were seen en route but trails were quite plain in the loose sandy soil. The manner in which they funnelled into and out from passes between small lakes was the subject of comment that they must be summer trails since winter trails would simply have crossed the ice of these lakes rather than skirting them. The obvious concentrating effect of such a situation was overlooked until in the latter week of July and the first week of August a canoe trip was made from Angikune Lake westward to Kamilikuak Lake. The route followed a waterway which comprised a string of lakes like beads threaded onto the cord of a small river. Frequent landings were made, and as there were no caribou present at the time, recourse was had to counting trails. It soon became apparent that, though everywhere present, these trails were not randomly distributed but were concentrated at the ends of lakes. Moreover, while along the open shore of the lake the trails largely paralleled the lake, at the ends they led straight down to the narrow water crossing afforded by the river. That skirting the shores of these lakes to seek an easier crossing had a concentrating effect is shown by the following table, which records the numbers of

trails counted in varying numbers of paces at right angles to their direction under the two conditions, together with the means and standard errors of the two classes.

Trail Counts

Open Lake Shore			River Crossings between Lakes		
Trails	Paces	Trails/Pace	Trails	Paces	Trails/Pace
135	226	0.6	40	330	0.1
79	97	0.8	128	252	0.5
39	50	0.8	311	1000	0.3
98	115	0.8	58	123	0.5
111	110	1.0	78	183	0.4
111	133	0.9			
79	110	0.7			
53	77	0.7			
164	240	0.7			
171	182	0.9			
125	155	0.8			
Mean		0.78	Mean		0.36
SE		± 0.05	SE		± 0.05

The difference, so apparent to the eye, is also statistically significant even at the 1% level.

The situation inferred from the above observations was actually observed many times thereafter. The midsummer migration of the Tiebilik herd, observed at Beverly Lake in 1949, and earlier described provides and excellent example of a herd becoming concentrated in crossing the narrows between Beverly and Aberdeen Lakes. The 1948 midsummer migration at Angikuni Lake, also described, offers another. The following passage from the field notes of the 10th of August, 1948 add emphasis.

"Two major crossing places were observed, one at Cairn St. on the south shore and one at the opening into the main body of

Ang Angikune Lake. At the former of these high hills on either side of a deep strait come down to the water in solid outcrops of rock of a granitoid character, and in these trails have been ground down to a depth of several inches. Eskimo camps and deer fences were located nearby, so that this is, in all probability a major crossing. On the eastern side of the strait the softer ground on the slopes above the outcrops showed many mired trails and had a very strong 'barnyard' odour. At the other crossing the ground is softer, indeed quite wet and this had been well churned by the passing herd. These two crossings are almost directly in line with each other on the south westerly line of movement observed on the north shore. It appears that deer are concentrated at crossings, Kue, these two, and perhaps the Kazan (reference is to its mouth into Angikune) and are then carried onward as a herd by their own 'momentum' for some distance before dispersing over a wide area."

Similar notes could be quoted from Windy Bay on Nueltin Lake and Mowat reported a striking case from 1947 of such concentrating at the Deer's Way on the east side of Seal Hole Lake. Others are well known for the spearings practiced there by Eskimos and Indians.

On a much smaller scale the same phenomenon was frequently observed at Windy Bay during the fall of 1948. Caribou were then moving north in the return phase of the midsummer migration. In so doing they came by many devious and crooked little trails through the very rough hills south of the Windy River to cross the river at a favoured spot some fifty yards below base camp. Small straggling herds frequnetly joined forces as they came down out of the hills to make this crossing. A mile and a half to the east, down Windy Bay a steep sided, funnel shaped valley leads down from the hills to the south shore. Locally, it is known as Caribou Valley, for the reason that it is much used by caribou during northward migration both spring and fall. On emerging from it a short swim leads to Flat Island which is peculiar in having a long northerly directed point which almost transects the bay.

An obviously favourable crossing place it is much used by caribou and the coalescing of small herds making the crossing was observed here in the fall of 1948.

In discussing the migration of the fall of 1948 in the Brochet area it was noted that caribou descending to the north end of Reindeer Lake on the points west of Brochet were turned back by the thin, newly formed ice which was not yet strong enough to bear their weight. The concentration so formed soon disappeared. The writer was told by Mr. Buckholtz, many years a resident in the Nueltin Lake area where he trapped, of a tremendous herd of caribou which he had encountered some fifteen years ago in the country west of Simon's Lake and north of the Red River. Mr. Buckholtz attributed it to the fact that the Red was frozen too solidly to permit swimming, but not solidly enough to permit caribou to cross on the ice. During a week of unseasonable mild weather during which the ice failed to make caribou piled up there. It was suggested earlier that the concentrations near Sunrise Lake in the early winter of 1948, 49 were caused in this way.

In consequence of the above and many similar observations the writer is convinced that caribou become aggregated into herds in a purely fortuitous manner and that these herds have no real social structure.

Leadership

Repeated observations of moving herds of all sizes showed positional leadership changeing hand frequently without regard to age or sex. Nor was any evidence secured which would indicate that leadership was exercised from within the herd. A single quotation from field notes of July 16th, 1949, is typical.

"During this period deer were as thick as ever though slightly

changed in relative distribution. A herd of some 5-600 animals was observed moving east fairly consistently at a trot. They were strung out in an extended column and we watched the lead change hands several times in a very few minutes. First a yearling, then a doe, her fawn briefly, then a prime buck taking over as each deposed leader wandered off to the flank after some personal interest."

Cohesion

The momentum of the large, fast moving herds of migration appears to give them considerable stability. Nonetheless, at both Angikuni and Nueltin Lakes the party remarked a definite tendency for these concentrations to diffuse again, once through the funnel like barriers of water crossings. It has also been pointed out that the last stages of the southward movement and the whole of the leisurely northward movement of the midsummer migration is one of small straggling groups, rather than large herds.

In smaller herds the lack of stability and cohesion is perfectly plain. Repeated observations of herds small enough to be easily kept track of have shown them to change continually in size and composition. Within an hour a herd of forty animals may have doubled in size and markedly changed in composition, or it may have split into four or five groups all going their several ways. The following is a typical description of this fragmentation process, taken from field notes of July 15th, 1949, made at Beverly Lake, NWT.

"This herd (of 20) was first observed at 1940. At that time it was near the shore of the lake on low flat ground and was running hard away from the lake in a compact group. After running some fifty to one hundred yards the herd stopped and the animals looked around, then started to graze, moving slowly away from the lake and towards the foot of the slopes. Some

animals faced this way and some that, and as though impelled to eat their way along, moved slowly in these various directions frequently "changing their minds" however, and moving busily some ten yards in a new direction, or, looking up to find themselves alone, turning and moving off after the others. Thus the compact herd became a loose shifting group, all feeding, all moving - but in various directions and for varying distances. The resultant movement of the herd as a whole was southeast parallel to the shore and along the foot of the slope."

"A prime buck closely followed, and sometimes, preceededby another was in the lead. Gradually the animals became strung out over several hundred yards. Then a prime buck well to the rear and close to the foot of the slope began to climb up it to the next bench. Others followed suit, not all at once, nor by any means in his footsteps, but more or less independantly. Thus eleven animals found their way up to this new pasture and there formed a small replica of the original twenty in their loose shifting organization. Meantime the remaining nine continued along the foot of the slope but slowly separated into two groups as the four leading animals ate and walked a little faster than the remaining five. By 2020 the leading animal was a quarter mile from the point where the herd had been first seen and farther as he had walked. Three animals formed a tight little group with him. A hundred yards behind the remaining five deer formed a less compact group. Three hundred yards up the slope, the other eleven had been augmented by four newcomers which had drifted in from the west. They formed a loose group with intervals so large as to almost warrant calling them a number of single animals. This herd contained, as far as I could see, 2 does, 6 yearlings, 3 young bucks and 5 prime bucks, leaving 4 unclassified. I could see no particular arrangements of sexes and ages beyond the common occurence of one of the does being accompanied by a yearling."

Dominance - Subordination

Except during the rutting season , to be discussed later, the only evidence of dominance observed by the party was afforded by the occasional sight of an old male threatening a younger animal which was closely infringing on the area which he was grazing.

Defense Mechanisms

Caribou were found to be active at all hours of the day and night despite a tendency to lie down and rest in the darkest hours. Conversely, it was a common experience to see part or all of a herd lying down to rest at any hour of the day. Resting caribou appeared to lie down at random, adopting no particular formation. Frequently, though by no means invariably, a number of animals remained awake, thus acting as sentinels to the herd. However, such pickets did not belong to any sex and age class in particular, appearing rather to be merely a random selection of animals which simply did not "feel sleepy". The following quotation from field notes of Oct. 24th, 1948, made at Windy Bay, Nueltin Lake, NWT describes typical behaviour of a herd lying down to rest.

> " ... At 1145 however, the sun broke through and almost at once the whole herd (of 194) lay down to take a nap. Buck lay by buck, animosity forgotten, and fawns huddled against their mothers. Animals lay down by simply folding their legs under them and dropping the last six inches or so, foreend perhaps a little ahead of the rear. Some animals lay flat on their sides, heads down, others more or less on their bellies, chins aground; some lay with their heads up, more or less alert, and a few now and then got to their feet. Animals seemed to be facing every which way and no particular guards could be seen - some does of all ages and a scattering of bucks had their heads up."

Thus no organized system of defense of a resting herd was discerned.

There was still less evidence of a social defence mechanism in the face of real or imaginary danger. Indeed, it was the experience of this party that caribou were easier to approach when in large herds than when in small scattered groups. Typically, the apprehension of danger resulted in a snort of alarm from the animal discerning it which, often accompanied by a 'sky hop' as it was, sufficed to panic any animals within hearing. The action then taken by the herd varied considerably depending on the nature of the alarm and the circumstances.

In common with most wild animals caribou appear to be readily alarmed by any sight, sound or scent which is out of the ordinary. Thus on the 10th of August 1948, two large bulls which were swimming across a bay of Angikuni Lake were observed to turn back in panic from three Herring Gulls which were resting on the water in their path. Similarly, a doe and fawn running away from the observer were turned back towards him by flushing up three Herring Gulls in their path at Windy Bay, Nueltin Lake on the 27th of the same month. Many times herds were observed dashing off in complete panic from some alarm quite unapparent to the observer. The quotation on p.6, under the head of cohesion, opens with just such a reaction on the part of the herd described. Such panic stricken dashes normally quickly subside with the resumption of grazing.

The reaction of caribou to a real rather than an imagined danger seems to depend on the degree to which it is clearly recognized as a danger. In this both sense perception and experience must play a part. The sense of smell must be reckoned the caribou's most acute sense and it is commonly used to confirm the nature of a danger not wholly understood. What little data is available to the writer strongly suggests that the sense of hearing is also acute. On the other hand the sense

of sight seems the least effective of the three, competent to discern moving objects and particularly such unusual ones as those of men walking erect, it appears to lack the finer discrimination required to distinguish stationary objects, even when the latter are close at hand. Whatever may be the nature of the integrations of sensual information which go on in a caribou's brain it is clear that a wolf, recognized as such, is an object from which caribou flee, at once and without hesitation, while a man, especially one who is not wielding a rifle is frequently more of an object of curiosity than of fear. A variety of observations will illustrate the point.

On June 10th, 1949 a herd of 23 caribou was under observation on the barrens south of Beverly Lake. They were when first seen, moving leisurely eastward grazing lichens as they went. This placid scene was rudely interrupted by a wolf which howled repeatedly from a sandy knoll some half mile in advance of the herd. The wolf made no attempt to approach the herd. Indeed, examination with binoculars, led the observer to believe that the wolf was concerned not with the caribou but with the human. None-the-less the caribou's reaction was immediate. They became markedly alarmed, turned sharp about, trotted and then ran panic stricken, as the wolf continued to howl, half a mile or more to the westward where they began to graze in uneasy fashion in a westerly direction. In contrast, Mowat's report of three wolves hunting on the barrens to the north of Angikuni Lake on the 11th of August, 1948, suggests that caribou were little disturbed by wolves which did not closely approach them, the only ones taking actual flight being those approached closer than 300 yards. He further states that caribou reacting in this way "had the wolves' wind". To the present writer this seems improbable. It seems more likely that the caribou had sighted but not winded the wolves and were in doubt as to the real nature of the danger with which they were concerned.

On the 9th of August, 1948, the following observations were made on the west shore of Benetah's lake, some twenty miles up the Kazan River from Angikuni Lake.

" Several herds of deer were encountered on the SW shore of Benetah's Lake. Of these, one of 90 plus animals was directly down wind from our position on the slope of a little knoll. They were distinctly uneasy and milled about in short rushes during which the herd was very compact. It was noticed that a yearling animal and the same one as far as I could tell, was leading two such successive rushes in different directions. He would set off at a trot, be followed by two or three nearby animals and the movement spread through the herd like wildfire. Those behind ran hardest and hence caused bunching. Each rush seemed to be terminated by a nervous pause in which the animals seemed to be waiting for the next move. They finally removed about 300 yards (to a total of ¼ mile) and commenced grazing though still noticeably uneasy."

"A second herd comprising some 35 animals was grazing just over the top of the knoll from us, out of sight and up wind. Photo was sent round the base of the hill to scare them down on us for photography. I do not know what he did but the deer became alert, snorted in alarm and were evidently watching something before he was upwind from them, and when he did get upwind they stampeded over the hill directly towards us. As it seemed that we were in imminent danger of being trampled upon we stood up and the herd split and passed on either side of us. However, even in this confusion a few animals stopped dead to stare at us. Seventy five yards past us, though now down wind, the stampede stopped and the animals trotted away at a less panic stricken gait."

On the 11th of August, the following, also from Angikuni Lake, 1948.

" A prime buck was observed lying down and asleep in the afternoon sun. He was lying in a little nook in the side of the eastern slope above Cairn Strait and was facing along the slope to the south with the hill rising to his left and behind him. There was no wind and he was not in the shade, the temperature in the sun being well over 100 F. (the sun Maximum for the day was 121 F). Early in the stalk he was joined by a younger animal which lay down just above him. After he was first seen but before the stalk was begun his attention was caught by Ohoto who was picking berries on the slope about ¼ mile away and he watched him intently for a while/ Shortly, thereafter, however, Ohoto passed out of sight .. his attention was caught several times as I moved, whether by the movement, reflections from the chrome of the camera, or the slight sounds I do not know. During these periods of attention he would gaze at me and his nose could be seen wrinklingas he sought a scent. The younger animal did not move. I found it necessary to lie completely still for as much as five minutes at a stretch before his attention wandered. Finally when nearly at the limit of the stalk the young buck became alarmed and rose to his feet, walked a few steps and stood looking at me. The older animal did not rise but stared intently. I was by then lying in full view on the bare ground .. I rose to my knees .. The big fellow was up quickly and ran off up the slope with his younger fellow."

" Mowat informs me that during the stalk a third buck was alarmed by Ohoto's movements, gave the alarm snort and trotted off head and tail high and this in full view of my animal who watched but did not emulate him. If the angle of view is as wide as it seems from the position of the orbit my position was continually in the deer's sight and certainly I was within hearing, for at one stage he alerted at a yipe from the pup on the beach 150 yards away."

The following observation was made on the 12th of October, 1948, at Windy Bay, Nueltin Lake, NWT.

" Nine prime bucks, 1 young buck, 1 yearling, 6 does and 4 fawns were observed moving easterly along the slopes just above the river on the south shore. They were first observed when they were nearly opposite Phalarope Pond and were then in a loose herd, many of the animals being out of sight to the west, four or five grazing on the bench above the river and a fawn and two does at the water's edge. One of these does entered the water apparently to swim to the north shore and was closely followed by the fawn. Her feet did not leave the bottom however before she changed her mind and left the water, passing up the slope to rejoin the rest of the herd. The herd, after some hesitant milling about, set out eastward led by a doe and a fawn and the van was almost entirely of does and fawns. One by one the remainder of the herd came in sight, including 6 prime bucks and a doe and her fawn. The leading does and fawns showed a tendency to trot along but the bucks followed at a deliberate walk. The herd came down to the waters edge opposite camp and there the leaders slowed up in evident indecision looking curiously at the buildings, Fran (Mrs. Mowat) in the front yard, and Choto, Tegpa and I on the hill. The rear caught up to and mingled with the van. Then a doe and her fawn led up the ridge away from the river. The rest followed and there was a momentary flurry of panic during which they ran. Then they walked and stopped on the crest. I moved forward to scare them further east and succeeded only in attracting the attention of the whole herd which stood gazing intently at me. Almost to an animal the bucks displayed great curiosity but although some of the does did too most of them retreated to the rear of the herd. Finally a doe, followed by her fawn,

and then by a buck, led off to the west again. She stopped to look after going some forty yards and the general movement which was beginning to spread in the herd ceased and the curious stares began again. I walked west and most of the animals stood their ground, a few even coming forward for a better look, but several ran a few yards away to the south. I clapped, roared and howled (literally) - again the puzzled, curious stares, particularly by the bucks, and the brief retreat by the more timid animals. Finally the whole herd swung inland and made a circuit towards a crossing lower down."

Still another observation from Windy Bay, this under date of Sept. 18th, 1948 illustrates the curiosity and indecision with which caribou frequently react to humans.

"I met a prime buck in the open spruces just south of Black Bear Slough. He saw me first and was looking straight at me, crosswind, from about thirty yards away when I first saw him. I stopped stock still and we faced each other for about 4 mins. after which he moved a few paces, stopped and looked again, then grazed a bit and so moved slowly away. I moved after him trying to see what he was eating and stopping whenever he looked my way. He broke into a trot at one point, evidently not from alarm, for neither head nor tail came up, and circled through the spruces to the corner of Black Bear Slough and thence to the open barrens south of it. Here he stopped to watch me (or my direction) and each time he looked I stood still. He turned eastward into the spruces again and I was able to approach within twenty yards. After some hesitation he made one tight circle around me at ten to fifteen yards and showed no

alarm at getting my wind but ran a few startled paces when I reached for the gun. He went back to his graze and look routine and I played the game as before, finally being able to see that he was eating lichens. Several times he was startled by my brushing against a heath or a spruce, hearing the slight noise quite audibly at forty to fifty yards. However, though down wind for fully ten minutes he took no alarm. Finally when I walked out into plain view and kept walking he trotted off swiftly in alarm, head and tail high."

These observations attest the keeness of the senses of smell and hearing and suggest the lack of discrimination of the sense of sight which is remarkably borne out by the following observation dated October 24th at Windy Bay, Nueltin Lake, NWT.

" ... The deer I was counting were downwind from me and it was evident that they had clearly caught the scent at fifty yards and were uneasy. They could frequently be seen testing the wind and they moved in uneasy little starts with six or ten animals frequently galloping off for a hundred yards or so. On the other hand several animals which saw me but did not have my wind approached in evident curiosity until, either alarmed by the uneasiness of the others which had winded me, or on getting the scent direct, they turned away. After the count I moved into the thick of the herds, downwind from them, and stood perfectly still by a tree. Does fawns and bucks alike approached within fifteen feet of me with hardly even a curious stare and I was completely surrounded by deer. When I moved there was

momentary panic but once still again few of the upwind animals ran more than thirty yards before settling down to graze again. Later still I moved out on the open barrens and walked among the herds. I could see little organization in the groups. Like the clouds they shifted and split only to reform in new patterns. I was a mixed object of curiosity and fear. Walking downwind among them the herds split before me, sometimes walking, sometimes running off in downright panic. Many animals stood at gaze particularly the bucks and some approached. Finally after considerable whistling and shouting on my part there was a general movement on the run to the east. They did not run much over a mile however and then began to drift back."

To the writer, the most conspicuous feature of these, as of the many other observations which could be quoted, is the lack of organized action on the part of alarmed caribou. At best they simply run away, following the first animal to take alarm, or not knowing which way to turn if the precise location of the danger is not known to them. There is no socially developed defense mechanism, no marshalling by a leader either to run or to fight. It is every man for himself and the devil take the hindermost. Although a strange sight or sound, and especially a strange scent, will make caribou markedly uneasy a re-inforced danger signal from all three senses often seems necessary to overcome their curiosity. Bulls seem most curious, cows, and especially those with calves, most timid. For all the acuteness of the caribou's sense of smell, this party did not find it necessary to hunt up wind, nor did the eskimos of the vicinity, for the fatal trait of curiosity brought more than enough

gave to the gun. On the basis of the few comparative observations available to the writer it appears that caribou react more positively to wolves than to man, though the latter, being more conspicuous, may be the more readily seen.

The Rut

On the 7th of Sept. a fine big prime buck was seen with the velvet hanging in bloody tatters from the crowns of his antlers. This was the first male seen in the process of shedding velvet. Another male shot the following day as a specimen (#17) and, believed to be past prime, showed no signs of shedding. This early indication set the pattern for the future weeks in that prime animals appear to shed first, followed by both younger and older bulls. By the last week of Sept. all prime bucks had shed their velvet and by mid October all males appeared clear of velvet. Cows shed considerably later than do the bulls although a single isolated adult cow was observed to be free of velvet on the 18th of Sept. 1948. However, it was not until the 24th of October that the first wide-spread shedding was noted among the cows.

The first positive sign of rutting behaviour in the fall of 1948 was observed on October 12th, at Windy Bay, Nueltin Lake. Two of the males in the herd described on page 13 of this section clashed antlers very briefly. On the 17th of the month the first attempt on the part of a male to mount a cow was observed. As the behaviour is typical the observation is quoted in detail.

"A prime buck, two young bucks and three does, one of which seemed smaller and may have been younger than the others, came

down to the river opposite camp. They seemed uneasy, probably smelling the smoke (they were downwind). They ascended the bank again and walked towards the Grayling Rocks crossing fifty yards downstream, frequently making nervous little starts and running a few yards or stopping to eye the cabin. The does were in the lead but it was the prime buck which deliberately led the way down the slope. The does followed, then the young bucks. However, they did not essay the crossing but turned west some thirty yards and reclimbed the bank. I could her a deep snort like belch, much like the sound of a plunger being pulled from a water filled hole. Slowly and with nervous starts they made their way south over the flat bench behind the bank. Here one of the young bucks tried twice to mount a doe but each time she evaded him by simply running away and leaving him pawing empty air. The big, prime buck paid no attention. This movement was led by the does but the prime buck turned west at a trot and the remainder followed, does first astern, then the young bucks. By the time the base of Schweder Hill was reached (200 yards) the formation was broken and one of the does was lagging behind with the young bucks. The prime buck made a pass, a short rush with lowered head, at the youngster nearest her and then herded all three females ahead of him. The young bucks showed no signs of fight. They disappeared into a draw from which they reappeared in single file, two does, prime buck, young buck, doe, young buck and that formation was held roughly until they disappeared from view. One young buck was seen to make a pass at the other who skipped nimbly to one side."

It will be noted that there is here little suggestion of the establishment and defense of 'harems' by the largest bulls. This initial observation was amply borne out in the weeks which followed - caribou continued to occur in very large herds in which the bulls were sexually active but made little attempt to segregate harems to themselves. The description of a resting herd, given on page 8 of this section, is of just such a rutting herd. The following notes describe the activity which preceded and followed the rest period already described.

" .. Milling slowly this way and that, standing at gaze to watch other herds dash by the does and fawns grazed, while the bucks grazed intermittently and dashed feverishly about. The clashing of antlers was a frequent sound. At 1145, however, the sun broke through, ... see page 8 .... At 1212 a considerable number of animals were observed to get up and move about. These were largely males. The snorting was resumed and on several occasions a sleepy antagonist was prodded to his feet for a brief encounter. One prime buck went about snorting and looking for trouble - muzzle outthrust, bell swinging grandly and menace (or bluff) in every line."

Yet in the afternoon of the same day the writer had penetrated into tangled hills some ten miles north of the previous observation (which were made on open flats) and the following observation describes the situation.

"Once in the hills, however, the situation appeared somewhat different: herds were smaller - perhaps because the broken nature of the terrain prevents coalescing of the smaller herds. At any rate, the average herd size appeared to be 15 to 20

animals. (As contrasted with the 194 of page 8) Moreover, the sex ratio approached 1:1 (in the flats it had been almost exactly 1:3, as between males and females). I was particularly struck by one small herd of fifteen animals, 5 prime bucks, 1 young buck, 5 does, 3 fawns and a yearling. Each doe had as consort a prime buck and each pair was grazing quietly shoulder to shoulder."

Thus it would appear that herd size was still being determined by the fortuitous aggregating factors earlier discussed and that be they large or small bulls were not deliberately segregating harems. The only behaviour on the part of bulls which might be interpreted in this way is that reported in the following observation made at Windy Bay on the 25th of October, 1948.

".. A movement soon began back across the river to Duck Ridge, this time quite unassociated with me. Forty three animals crossed and stood grazing on top of the ridge. They were continually joined by other animals from the east side as I approached until there were 243 on Duck Ridge and none left on my side. These animals then moved off northwesterly towards Black Bear Slough. .. The northwesterly movement of this herd was interesting because there seemed to be a definite marshalling activity on the part of several of the prime bucks. They trotted back along the line of march and would make a short rush towards a knot of grazing animals, then turn aside to watch the column move ahead again. In response the does and youngsters seemed to hurry on."

At the same time it should be remembered that this was a mixed herd and that the activity of the bucks was not so much to segregate

th does as to move the herd along. The writer is inclined to consider it more as the only example of positive leadership which the party ever observed rather than as an activity associated with the rut.

By analogy with other Cervids the writer had been led to expect that the rut would be accompanied by competition between bulls which would be serious and might well be mortal. In the light of the above paragraphs it is only logical to doubt that this would be so. In fact it is not so. Passages already quoted, with their references to 'threats','clashing antlers', or'brief enccounters', are quite typical. No serious encounters were ever observed and despite careful search the writer was never able to find a wounded animal. That animals are occasionally wounded is attested to by the Ihalmiut eskimo who have seen it happen but say it is uncommon. The most prolonged and carefully observed encounter is quoted below. The observation is from Windy Bay on Oct.27, 1948.

"Two of the bucks appeared to be young, the antlers of neither showing very clearly at that distance (several miles with a 20x telescope). One was dark coated with a full white mane, the other much lighter in colour. These two animals were engaged in combat. They would face each other some two yards apart and then come slowly to-gether, heads held fully as low as a grazing animal. At the distance at which the observations were made it was difficult to be sure of the details but it appeared as though they engaged in a pushing match. Hind legs could be seen driving and first one and then the other would be thrust back from five to ten yards. Sometimes they shoved to-gether without either gaining any advantage for some

minutes on end. It also appeared that both animals were trying to turn the opponents flank and to rake him with their antlers. The side steps and the twisting of the neck by which they sought this was plainly evident. Some several times one or other animal achieved this purpose and the loser would promptly give ground and swing his hind quarters about so as to come head on again. Thus the combat not only surged to and fro but also rotated. Several times the grey animal broke off and retreated twenty yards or so but each time he was re-engaged by the dark animal which would follow and invite him with lowered head. From my position the whole affair had more the appearance of a high spirited game than an angry battle. I first noticed tha ctivity at 1550 and it was abruptly broken off at 1610 by the close approach of a third, and I think larger, buck. The grey animal broke away and ran some thirty yards on the close approach of the new threat and the dark buck showed an evident disinclination to accept a challenge from the newcomer by turning smartly away several times. Through-out the performance, several does grazed quite unconcernedly within 150 yards of the combatants."

It will be observed that beyond the initial reference to the attempt of a young bull to mount a cow (see page 17) none of the passages quoted containi any further reference to actual coitus between caribou. This is because it was never seen. As previously noted the first sign of the rut was observed on the 12th of October, the first real evidence of sexual excitement on the part of bulls on the 17th, this had reached a peak on the 24th, and on the 25th seemed to have dwindled again and the observation quoted above from the 27th

the last positive evidence of rutting behaviour obtained. During these two weeks, and particularly for the four or five days centred about the 24th, bulls exhibited intense sexual excitement. This took the form, as already described, of extreme restlessness - dashing here and there among the herd, clashing antlers with other males, and occasionally attempting to mount a doe. Usually such attempts consisted simply of rearing up and attempting to mount, although in a single instance, observed on the 18th, a bull was observed to smell and nuzzle a cow before attempting to mount. In every case, without exception the cow reacted by dashing away. To the writer it seems impossible that coitus could possibly have been effected in the few fleeting seconds of partial contact. On the other hand, Mr. C. Schweder, who has spent fourteen years in the area claims never to have seen any more prolonged or intimate contact than that described. It is his opinion that coitus is effected in that way. Certainly many bulls appeared to be sexually exhausted - gaunt, with taut empty bellies they appeared all head and neck and in many instances the penis was limply extruded some three or four inches from its sheath. In contrast cows showed absolutely no sexual behaviour whatsoever remaining quite indifferent to the tumult of the bulls throughout. It seems possible that the period during which females are receptive is very short and that the writer was not fortunate enough to witness true coitus.

Activity on the part of the males was largely confined to fully mature animals but on the 27th a very young bull, certainly not more than three years old, attempted to mount a doe without success.

During the week centred about the 24th of October, 1948, every effort was made to obtain accurate sex and age counts since it was felt that during the rut there would be no segregation of the sexes and counts would therefore be most accurate. Of 541 caribou classified, 98 were adult males, 259 adult females, 135 calves and 49 yearlings, ~~11, 48, 25 and 16~~ percent, respectively.

Conclusion

Though gregarious caribou do not exhibit, even during the rutting season, a stable social structure. The conclusion therefore is that the formation of herds from the basic unit of individual, or at best cow and calf, is one of fortuitous aggregation and it has been suggested that this is brought about by the interaction of movement with terrain and weather in a purely mechanical way. No doubt other less evident factors also play a part. The gregarious, but unorganized habit, together with the strongly developed trait of curiosity, makes the caribou peculiarly vulnerable to hunting, especially with modern firearms.

Lawie, A. H.
Barren-ground caribou survey.

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