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AERIAL DALL SHEEP AND WOODLAND CARIBOU  
SURVEYS IN GAME MANAGEMENT ZONES  
12 AND 19, MACKENZIE MOUNTAINS, N.W.T.  
MARCH 7 - 15, 1969

by

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Abstract

The second in a series of late winter aerial surveys was conducted in two sample areas of Game Management Zones 12 and 19, Mackenzie Mountains, in March, 1969. The purpose of the survey was to determine the number of adult Dall rams in each sample area, determine total numbers and distribution of sheep occupying each area, and to find boundaries of winter sheep ranges. Ten adult rams and 84 sheep in ewe groups were seen in the 450 square miles that were surveyed. The central portion of one of the two sample units was evenly blanketed with snow and the sheep were only on the narrow perimeter. In the other area, the snow cover was shallow and spotty and the sheep were well dispersed. Flights were also made to determine the ranges occupied by woodland caribou, determine the direction caribou were moving, and locate areas where caribou were herding in March. The caribou were found in loosely associated groups of from 7 to 200 animals. In the North Redstone - Twitya Rivers area the caribou, mostly cows and juveniles, were moving upstream (west), as in March 1967 and 1968. Those surveys cannot be compared from year to year nor fully interpreted until the movements of Dall sheep and caribou are better known. Therefore a high priority should be placed on marking sheep and caribou and following their seasonal movements.

Introduction

The first intensive aerial survey of Dall sheep (Ovis dalli) habitat in Game Management Zones 12 and 19, Mackenzie Mountains, N.W.T., was conducted by the author in eight sample areas in April, 1968. During that month a satisfactory technique for conducting aerial surveys of sheep winter range was developed and tested. An average density of .34 sheep per square mile (range 00 - .72) was estimated, and the winter ranges of the sheep were defined for the

southernmost sample areas. In the northern sample areas much of the snow had melted off, and I had little confidence that the sheep were still on their normally restricted winter ranges (Simmons, 1969).

A similar aerial survey was planned for August and September, 1968, but it was cancelled because of poor weather, forest fire smoke, aircraft failures and delays, and early snowfall.

My second intensive aerial Dall sheep survey in Zones 12 and 19 was conducted in March, 1969. The purpose of the survey was to:

1. Determine the number of rams in each sample area (rams two years old and older),
2. Determine total numbers and distribution of sheep occupying each surveyed winter range, and
3. Find boundaries of winter sheep ranges.

I planned to survey sample areas 2c, 4a, 6h, and 15c for reasons outlined in an earlier report (Simmons, 1969. See Fig. 1).

Since flying weather in Dall sheep habitat has to be excellent before intensive surveys can be flown, and since weather in the Mackenzie Mountains is so variable, an alternate aerial survey plan was made. If the weather was too poor for flying in Dall habitat I planned to fly over caribou habitat to:

1. Define the areas occupied by woodland caribou (Rangifer tarandus caribou) in Zones 12 and 19 during March,

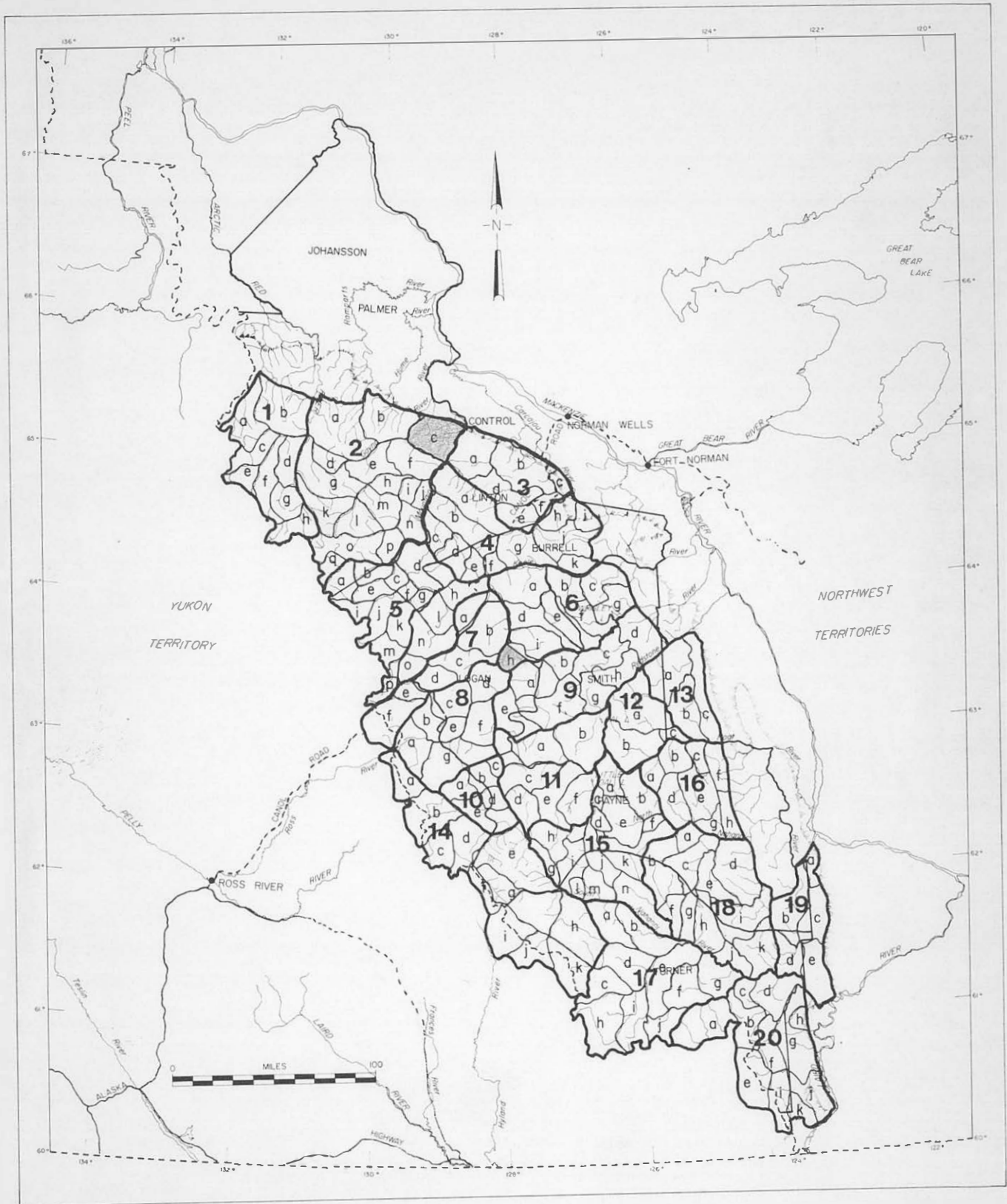


Figure 1. Divisions and subdivisions of Game Management Zones 12 and 19 into sample areas for aerial surveys. Areas surveyed in March, 1969, are colored (from Simmons, 1969).

2. Determine the direction caribou were moving in March, and
3. Locate areas where caribou were herding in March.

In March Indians from Fort Norman hunt caribou in the Mackenzie Mountains. Because they have killed 60 to 100 caribou each year during at least the past five years, I feel it is important that we learn as much as we can about the influence of these hunts on the welfare of the caribou. Learning the winter and spring range limits and caribou movements is a step in that direction.

Because of the density of timber in caribou winter range, the ruggedness of the terrain, and our inability to determine the reliability of caribou counts in such an environment, no attempt was planned to estimate population sizes or herd densities. At best, the figures quoted later represent only minimum numbers of caribou in the areas covered.

Another aerial survey planned for July, 1969, was cancelled after only two areas were flown. The other six areas that were to be included in the survey were not searched because of poor weather. The results of this survey will not be reported here. They are of little value since no other comparable fall surveys had been made before July, 1969.

#### Dall Sheep Survey

##### Methods

The same general methods I described for the April, 1968, aerial survey (Simmons, 1969) were used in this survey of Dall sheep

habitat. The major difference involved the use of a Helio Courier instead of the Piper Super Cub used in 1968. The Helio Courier proved to be a safer and more comfortable plane, and it flew as well as the Super Cub in rugged sheep habitat. The pilot, Perry Linton, acted as navigator and plotted our course and the locations of wildlife sightings on a 1:250,000 scale topographic map. He did not double as observer as did the pilot in the 1968 survey. The area to be viewed was always on the passenger side of the aircraft.

#### Results

Survey conditions. The pilot and I were ready to commence the aerial survey over sheep habitat on 5 March, but due to poor flying weather we were unable to start the survey until 13 March. Overcast skies, snowfall, low clouds that obscured parts of sample areas, and three days of continuous strong winds forced postponement of close-in mountain flying during those first nine days. The strong winds occurred during days of otherwise ideal survey weather. Fifty to sixty mph winds (at 5200 feet elevation) and vertical currents that caused our plane to climb and descend at a rate of 1000 - 4000 feet per minute made safe flying in canyons impossible.

The sheep survey began on 13 March and ended on 15 March. Fair to excellent weather conditions prevailed. Fresh snow blanketed the sample areas. The survey had to be terminated on 15 March because I had to accompany caribou hunters from Fort Norman from 16 to 27 March, and the aircraft was needed elsewhere.

The survey. I was able to survey only two sample areas: areas 2c and 6h. The results of the survey are compared in Table I with data from the April, 1968, survey in the same two areas.

The table shows that generally fewer sheep were seen in both areas in 1969 than in 1968. A more detailed analysis reveals that around 70% to 80% fewer adult rams, and about 20% to 50% more adult ewes and juveniles were seen in 1969 than in 1968. The proportion of rams in the total number of sheep observed was much less in both areas in 1969. The observed density of sheep was also less this year.

I cannot explain the apparent differences between the results of the two aerial surveys, nor will I be able to until I can mark sheep in these areas and trace their movements from season to season.

It is unlikely that hunter kill or other depredations were reflected in the apparent decrease in adult rams. Area 2c has not yet been hunted by non-residents, and no evidence of serious disease or predation on sheep has appeared. Possible causes of the apparent decrease are:

1. Errors caused by observer fatigue and, in area 6h, marginal aerial survey weather.
2. Changes in population composition due to the greater mobility of adult rams and the tendency of adult ewes and juveniles to have restricted home ranges.

TABLE I. Dall sheep seen during April, 1968, and March, 1969, aerial surveys in Game Management Zones 12 and 19, Mackenzie Mountains, N.W.T.

Sample area.	Year.	Area size (Alpine tundra) Sq. mi.	Adult* rams.	No. in ewe groups.	Unclassif.	Total.	Per cent adult rams.	Est. density: Sheep per sq. mi. (alpine tundra)	Average estimated elevation of sheep. Feet.
2c	1968	360	22	35	9	66	39	.18	4000
	1969		6	53	-	59	10	.16	4100
6h	1968	90	23	24	-	47	49	.52	-----
	1969		4	31	-	35	11	.39	5600

\* All were "legal" or had horns describing a 270° arc or better.



Most of the sheep seen during the survey were located around the perimeters of the sample areas, especially in area 2c (Figs. 2 and 3). In area 6h sheep were also seen on the centrally located ridges and canyon walls. Area 6h is more uniformly rugged and the areas of relatively heavy snow cover were more dissected by areas with little snow than they were in 2c. Area 2c has large plateau-like areas that were uniformly covered with snow in the winter. No ungulate tracks could be found in that central portion. Winter range in 2c was on the south and west facing slopes on a two-mile wide border strip, and in the northeast corner overlooking the Mountain River where slopes are steep and snow cover was light.

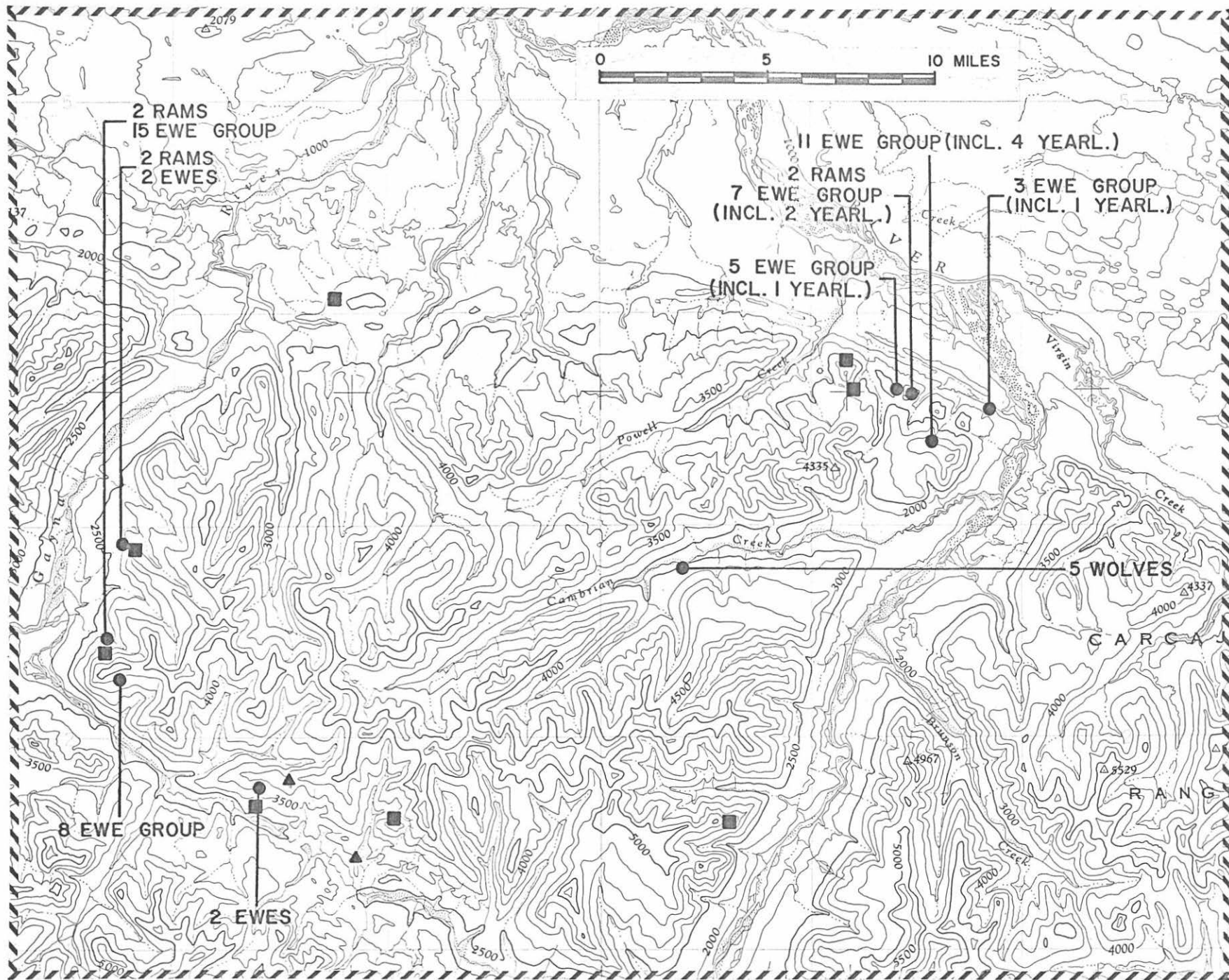
#### Woodland Caribou Survey

##### Methods

The same tape recorder, maps, observation forms, and cameras used during the sheep survey (Simmons, 1969) were used during surveys of caribou range. On two days my assistant, George Pelissey, flew caribou surveys in a Piper Super Cub. He used the same techniques and materials that I used. I flew only in the Helio Courier.

On sunny days between 4 and 15 March, we meandered over the area outlined in Figure 4 in either the Helio Courier or Super Cub, always looking for caribou tracks. Once tracks were found, a survey was immediately started or the location of the tracks was noted and plans were made to search the area later in March.

Fig. 2. Area 2c, Mackenzie Mountains, a block of mountainous terrain bounded by the Gayna and Mountain Rivers and their tributaries and the Mackenzie Valley. Black circles, lines and labels refer to sheep and wolf sightings made during the March, 1969, aerial survey. Triangles show the locations of April, 1967, sheet observations, and squares locate April, 1968, sheep sightings. During all three late winter surveys, sheep were seen only on the perimeter of area 2c.



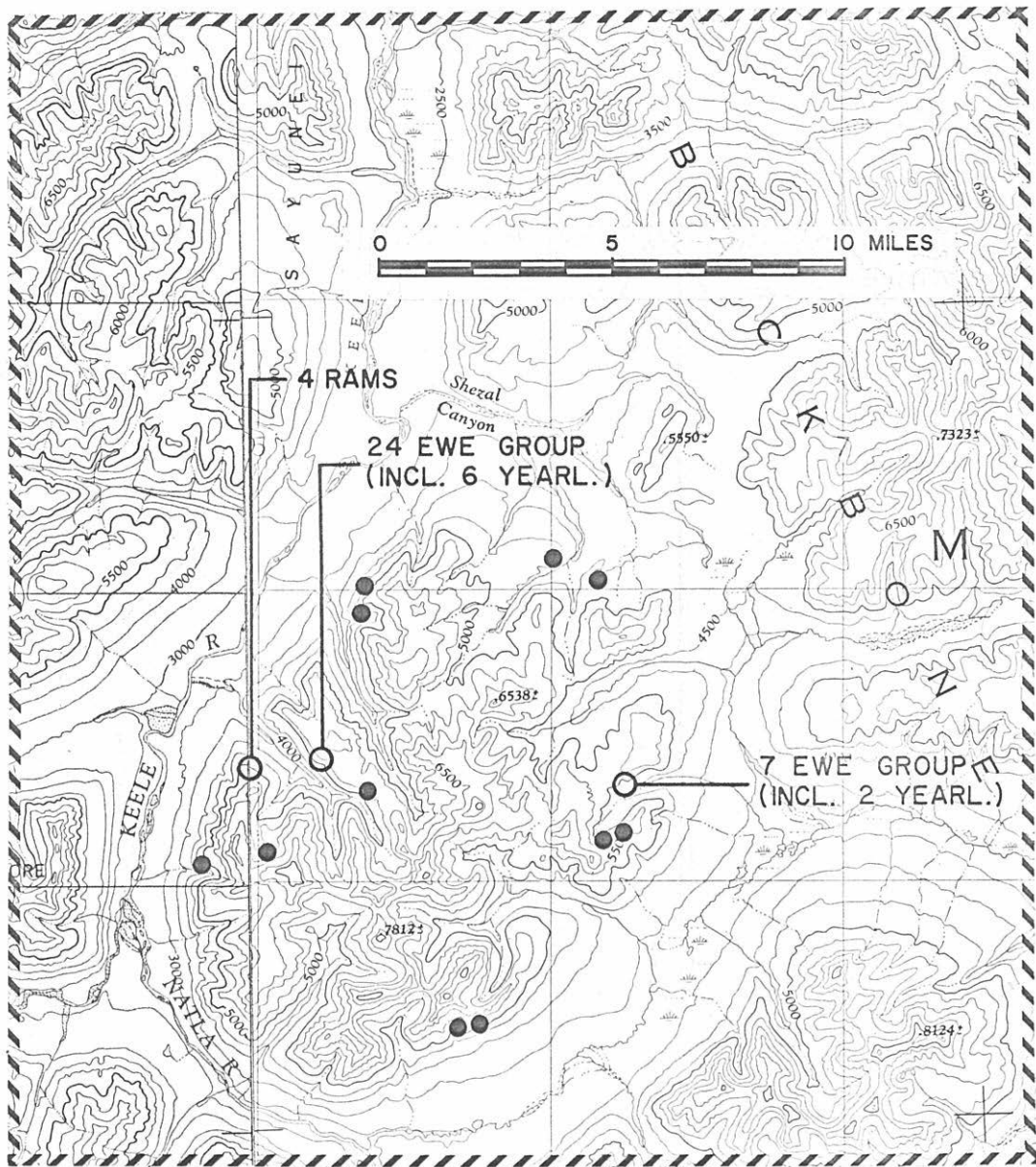


Figure 3 — Area 6h, Mackenzie Mountains, a block of mountainous terrain bounded on the north by Shezal Canyon, on the west and south by the Keele and Natla Rivers, and on the east by the headwaters of two streams. Open circles, lines and labels refer to sheep sightings made during the March, 1969, aerial survey. Black dots locate sheep sightings made during the April, 1968, survey. During both surveys sheep were seen well within the canyons that penetrate this block of mountains.

Areas having caribou tracks were flown over in overlapping strips until the entire area had been observed and, in most cases, until a complete perimeter enclosing tracks could be drawn.

Tracks were positively identified as those of caribou if they were mingled with signs of "cratering" (described by Kelsall, 1968) or were present in large numbers and in a "streaming" pattern.

Normally, in the Mackenzie Mountains, only moose tracks can be confused with caribou tracks in the snow when seen from the air. However, most moose tracks went from willow to willow, were usually made by small groups of animals, and were not often associated with signs of cratering. If there was any doubt about the identification of tracks in the snow, we landed and inspected the tracks on foot. We only had to do this on three occasions.

March, 1969, was a windy month and caribou tracks "drifted in" rapidly. Tracks contained within the boundaries shown in Figure 4 were assumed to have been made no earlier than 1 March, 1969. This was considered to be a conservative estimate.

If caribou were seen during the survey, the plane orbited the caribou until a reliable count was made. Especially in heavily timbered areas, that technique was not completely successful. On occasion we had to orbit an area for so long, as more and more caribou came out of the woods to join into a herd, that we became confused and were unable to make a total count.

## Results

Survey conditions. The caribou survey was conducted under

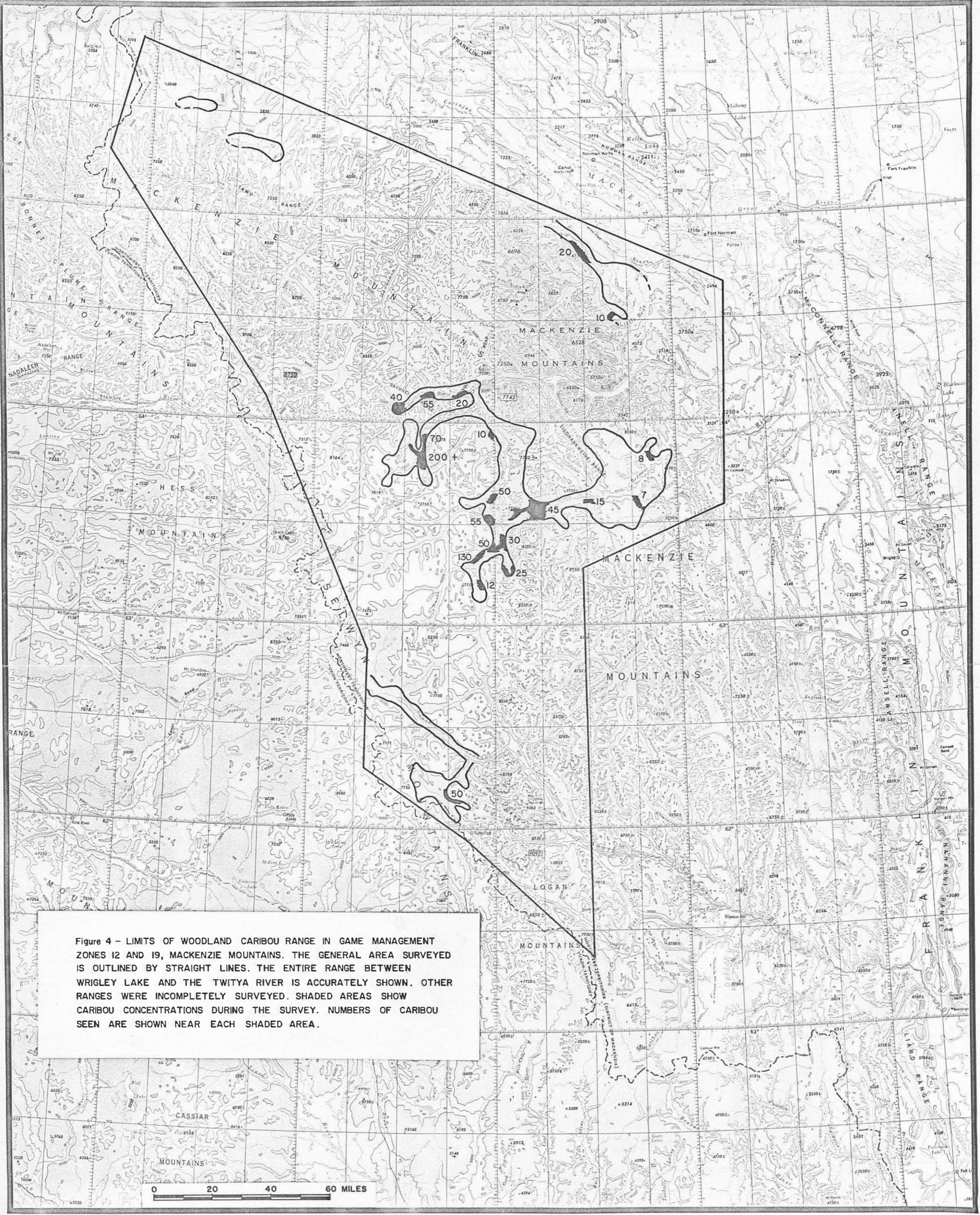


Figure 4 - LIMITS OF WOODLAND CARIBOU RANGE IN GAME MANAGEMENT ZONES 12 AND 19, MACKENZIE MOUNTAINS. THE GENERAL AREA SURVEYED IS OUTLINED BY STRAIGHT LINES. THE ENTIRE RANGE BETWEEN WRIGLEY LAKE AND THE TWITYA RIVER IS ACCURATELY SHOWN. OTHER RANGES WERE INCOMPLETELY SURVEYED. SHADED AREAS SHOW CARIBOU CONCENTRATIONS DURING THE SURVEY. NUMBERS OF CARIBOU SEEN ARE SHOWN NEAR EACH SHADED AREA.

clear, sunny skies on days when winds or clouds around mountain peaks precluded flying over sheep habitat. Bright sunlight was needed so that shadows in tracks were relatively easy to see.

The survey. Caribou were found in loosely associated groups ranging from 7 to over 200 in number. They were found feeding and moving along major stream drainages. At least in the North Redstone River area, the caribou were moving steadily upstream (west). This movement was also noticed in mid-March in 1967 and 1968.

Substantial samples were taken from groups of caribou moving along the North Redstone River in March of 1967, 1968, and 1969, during hunts conducted by Indians from Fort Norman. Nearly all of the caribou taken during those hunts were pregnant cows or juveniles. So far I have been unable to locate and identify groups of adult bulls.

By summer, the caribou are widely scattered from the east edge of the Mackenzie Mountains to the Territorial boundary and beyond. Most of the caribou are found in the higher western half of the Mackenzie Mountains during that season (Simmons, 1968). By late September, at least in the Keele River area, the caribou have begun their eastward movement down from the high tundra along the divide, following the major stream valleys. These groups are made up of all ages and both sexes as the rut has begun.

The caribou range in the areas surveyed covered over 2,600 square miles. Over 1,770 square miles of these ranges were located

between Wrigley Lake and Godlin Lakes along the North Redstone, lower Twitya, Godlin, Ekwi, and lower Natla Rivers.

#### Recommendations

##### Dall sheep survey

Aerial surveys in April, 1968, and March, 1969, resulted in determinations of:

1. Distribution,
2. Approximate density,
3. Winter range boundaries, and
4. Minimum numbers of adult rams.

The surveys did not result in estimates of total numbers of Dall sheep nor did they determine population trends. This failure occurred because of my inability to interpret the resultant enumeration of sheep seen.

A high priority should be placed on marking sheep and determining their seasonal movements, and on developing a technique to interpret counts of sheep in the survey areas. Both tasks will be difficult; the first because of the long time needed to mark sheep in sufficient numbers so that marked individuals can be found again and their movements traced. The latter task will be difficult because standard population estimation techniques cannot apply to this rugged terrain.

During the late winter of 1970, I plan to reduce the sample areas to be surveyed, primarily because such surveys will remain of



questionable value until they can be fully interpreted. I will survey only area 6h for Dall sheep. The survey by fixed-wing aircraft will hopefully be followed by a helicopter survey to obtain an estimate of error. I will also search in areas 4e, 4f, and 4g for the 17 sheep that were trapped, marked, and released near there in September 1969 (Fig. 1).

#### Woodland caribou surveys

The March, 1969, aerial survey of woodland caribou range resulted in an outline of the area caribou used, at least along the North Redstone and Keele River drainages, during their early spring movement to higher country. Because the caribou in the North Redstone River area are hunted by Indians in March and by non-residents in August and September, we should try to identify distinct groups and movements of caribou to better evaluate the effects of that hunting.

Therefore, in 1970, a high priority will be placed on an effort to trap and mark caribou in area 6h, where caribou concentrate in large numbers at a mineral lick. In February, an aerial survey will be conducted to outline the winter range of the North Redstone caribou before they start their eastward movement. The winter ranges of caribou in the lower Flat River and Nahanni River areas will also be identified if possible, as those areas were not searched in the winters of 1968 and 1969. I plan no further extensive aerial surveys of caribou winter range until a substantial number of caribou have been marked.

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