WILDLIFE INVENTORIES IN G.M.Z. 2
YUKON TERRITORY WITH AN
EVALUATION OF DALL'S SHEEP
POPULATIONS AND HARVEST 1978

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TABLE OF CONTENTS

	PAGE
List of Tables and Figures	1
Introduction	2
Study Area	2
Methods	4
Results and Discussion	10
Sheep Distribution and Abundance	10
Sheep Productivity	14
Sheep Densities	19
Caribou Distribution and Abundance	19
Grizzly Bear Distribution and Abundance	20
Moose Distribution and Abundance	21
Harvest Data - Sheep	21
Management Recommendations	21
Expenditures	
Literature Cited	
Appendix I - Field Notes and Observations	

LIST OF TABLES

PAGE

1. Survey Unit Areas, Available Potential Sheep Habitat and Sheep Densities 6

2. Observed and Estimated Total Numbers of Dall's Sheep (Ovis dalli) From Survey Units in the Low - Jensen Outfitting Areas - G.M.Z. #2 7

3. Wildlife Observations (excluding sheep) 9

4. Observed Number of Rams (3 years and older) /100 Nursery Sheep 12

5. Estimated Sheep Numbers 15

6. Lamb:Nursery Sheep in Jensen's and Low's Outfitting area 17

7. Observed Lamb:Nursery Sheep Ratio in Combined Survey Blocks 18

8. Expected Number of Legal Rams in the Low - Jensen Outfitting Areas 18

LIST OF FIGURES

1. Study Area and Survey Units 3

2. Survey Units and Sheep Distribution 11

INTRODUCTION

This report presents the results from aerial surveys conducted throughout P. Jensen's and D. Low's outfitting areas (6149 square miles) (Fig. 1). These surveys are a part of the continuing big game inventory program in the Yukon Territory initiated by the Game Branch in 1974. As in the past, summer surveys have focussed on sheep and caribou as the primary survey species with moose and grizzly bear sightings considered incidental. This report will discuss the present observed population levels of all the above species, with the emphasis on sheep. Management recommendations will be restricted to sheep and caribou due to the design of the surveys and the implementation of a grizzly bear project in the same area in 1978.

SURVEY AREA

Jensen's outfitting area lies within the South Ogilvie Mountains ecoregion (Oswald *et al*, 1977). The geology of the area is basically sedimentary and metamorphic with dolomite, shale and quartzite as major constituents. This area has been heavily glaciated leaving thick morainal and glaciofluvial deposits in valleys and on lower slopes. Talus ridges and slopes extending into the valley floor are common. Much of the range is between 1500 - 2000 m. Treeline occurs around 1050 m elevation with black and white spruce occurring in protected valleys. Shrub birch and willow are wide spread, occurring throughout the valleys to above

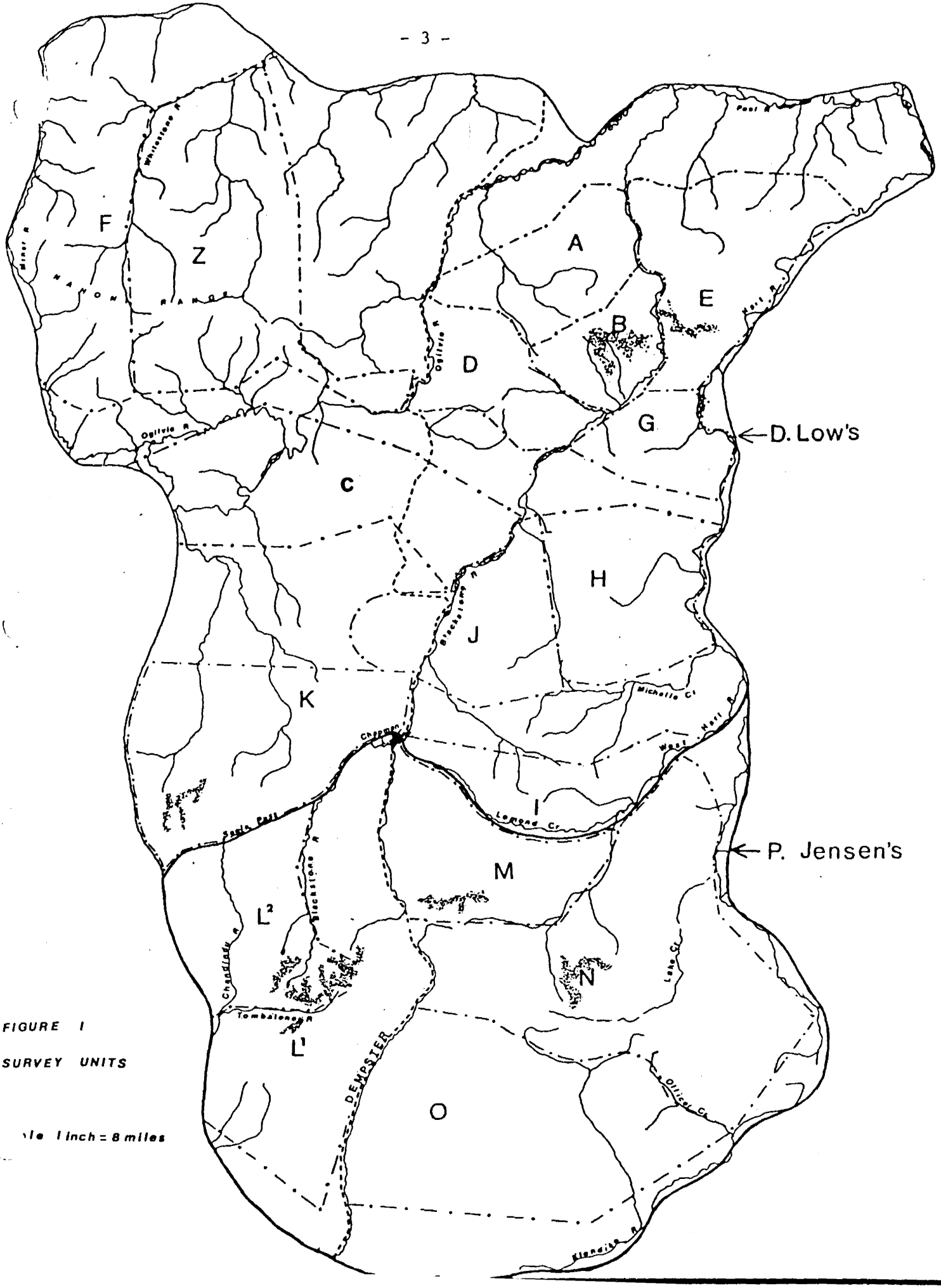


FIGURE 1

SURVEY UNITS

Scale 1 inch = 8 miles

treeline. Alpine habitat varies from lush communities of forbs, mosses and lichens to areas devoid of vegetation.

Low's area occurs in the North Ogilvie Mountains ecoregion (Oswald *et al*, 1977). This area is similar to the South Ogilvie ecoregion with the following differences. Less glaciation has occurred in this area with only some of the larger valleys showing evidence of glaciofluvial sediments. Talus slopes are more extensive and mountain ridges are generally between 900 - 1500 m with treeline occurring around 900 m elevation. Compared to Jensen's area, the topography is generally less rugged with more open valleys and less extensive alpine vegetation.

METHODS

Aerial surveys were flown from July 12 - 28, 1978 using both a Jet Ranger 206A and a Gazelle helicopter. Surveys height and speed varied from 30 - 100 m above ground level (AGL) and 80 - 192 km/h respectively. Two observers were present on most flights. One of these observers was responsible for navigating and recording observations on a 1:250,000 topographic map.

Discrete physiographic areas were delineated to accommodate 1 - 2 day surveys of each unit, thus reducing the chance of double inventory (Fig. 1).

Surveys were designed to focus on sheep populations. Due to the overlap of caribou summer habitat with potential sheep habitat, a high proportion of this species was observed. However,

the reduced emphasis on the other species precludes management recommendation at this time.

The area surveyed within each unit was limited to potential sheep habitat. These areas were selected by the navigator and were based on past experience using relief and treeline as criteria. The extent of these areas were later calculated with the use of a modified acreage grid. Sheep densities were then determined on the basis of available potential sheep habitat (Table 1) in each unit.

Both an observation and percent coverage correction factors were applied to the actual observed number (Table 2). Population estimates were then obtained through extrapolation. As these are intuitive correction factors, both the actual and the estimated numbers are provided.

The percentage of potential sheep habitat surveyed was estimated following the completion of each survey unit. This figure varied with relief, weather, and pilot-observer experience. Generally, 80 - 90% of the sheep habitat was surveyed.

An observation correction factor of 5% was intuitively selected for sheep throughout the area. A low correction factor was selected due to the high observability of the Dall's sheep.

All observed animals were classified according to age and sex, when condition permitted. At times it was necessary to lump sheep and caribou into three broad age groups, i.e. young of the year; females, yearlings and young males; and mature males.

TABLE 1 Survey Unit Areas, Available Potential Sheep Habitat and Sheep Densities for the Low - Jensen Outfitting Areas

Survey Units	TOTAL Area - sq. miles (sq. km)	Available Potential Sheep Habitat - sq. miles (sq. km)	Sheep Densities (Based on Available Potential Sheep Habitat)
A	200 (518)	118 (306)	0.15/sq. mile
B	126 (326)	97 (251)	0.01
C	457 (1184)	206 (534)	0.20
D	173 (448)	116 (300)	0.01
E	303 (785)	251 (650)	0.12
F	530 (1373)	338 (875)	0.17
G	113 (293)	84 (218)	0.15
H	267 (692)	185 (479)	0.41
I	177 (458)	90 (233)	0.57
J	250 (647)	180 (466)	0.09
K	432 (1119)	162 (420)	0.07
L^1	432 (1119)	264 (684)	1.00
L^2	303 (785)	216 (559)	0.30
M	293 (759)	123 (319)	1.20
N	880 (2279)	581 (1505)	0.07
O	668 (1730)	374 (969)	nil
Z	545 (1416)	333 (862)	0.39
Combined Survey Units			
F - Z	1075 (2789)	671 (1737)	0.28
D-A-B-E-G	915 (2370)	666 (1725)	0.09
C-J-H-I	1151 (2981)	661 (1712)	0.32
$K-L^2-L^1$	1167 (3023)	642 (1663)	0.50
M-N-O	1841 (4768)	1078 (2793)	0.64*

* This density was calculated from survey units M - N only, as no sheep were seen in unit O.

The male groups (sheep) were separated into legal (>3/4 curl) and young (<3/4 curl). Small groups of all species were classified from the air while large groups were observed from the ground with a spotting scope.

An attempt was made to establish ratios of various ram age classes to nursery groups within each survey unit. These ratios were then compared to ratios obtained from an unhunted population in the S.W. Yukon (Hoefs, 1975). By comparing ratios of an unhunted population to a hunted one, the author hoped to identify areas of high hunting pressure.

The reader should keep in mind that these figures show trends and should not be taken at face value. Many variables should be considered when making this type of comparison. In this study the most important variables were the small sample sizes, and the fact that age-sex classifications from aerial surveys are not one hundred percent accurate.

Never-the-less, the following ratios have been applied to the Ogilvie populations: mature rams (3 years and older):nursery sheep = 66:100 in an unhunted population and may be as low as 26:100 in a hunted population; legal rams (3/4 curl or greater): nursery sheep = 40:100; old rams (8 - 9 years or older):nursery sheep = 17:100; trophy sheep:nursery sheep = 7:100 (Hoefs, 1975).

Based on the spatial distribution of male and nursery groups, survey blocks were combined to facilitate analysis on separate populations or on a combination of several small populations.

TABLE 3 Wildlife Observations (Excluding Sheep) from the Low - Jensen Outfitting Areas, G.M.Z. 2, July, 1978

Survey Unit	Caribou			Moose			Grizzly Bear						Wolves	Gyrfalcons	Golden Eagle	Peregrine Falcon	Others
	♀ and Yearlings	Calves	♂	♀ and Yearlings	Calves	♂	♀	Cubs of the Year	Yearlings	2 year olds	♂	Unidentified Adults					
A														1	2		
B	1						1			2		1			3		
C						1								2			
D															2		
E																	
F							3	2	3					1	3		1 snowy owl
G															1		
H						1								1	1		
I	1	1													3	1	
J	2	2													3		
K							1							3	2		
L[1]	41	13	7	2								1		1	1		
L[2]	5	3		2			1		2					1	2		
M	1	1	6	1								1	1	3			
N	603	114	27	10	2	1											
O	36	7	3			2								1			
Z							3	1	2		1	2					
TOTAL	690	141	43	16	2	5	8	3	7	2	1	5	1	14	23	1	

This was done to give a more realistic picture of the productivity, density and expected age-sex ratios. The data will also then lend itself better to management recommendations on a population level.

All wildlife observations made throughout the summer appear in Appendix I. A condensed list (excluding sheep) appears in Table 3.

Incidental sightings of all wildlife were made by the numerous Game Branch personnel involved with various studies along the Dempster Highway. These observations appear in Appendix II.

RESULTS AND DISCUSSION

Sheep - Distribution and Abundance

A total of 962 (observed) and 1167 (estimated) sheep were recorded for the entire surveyed area (Table 2). Slightly fewer sheep were seen in Low's area compared to Jensen's. The latter being approximately 1000 square miles smaller in total size, and containing approximately 600 square miles less potential sheep habitat.

A clumped distribution of sheep within each outfitting area was observed (Fig. 2) with the highest numbers of sheep recorded in survey units L^1, M, and Z (Table 2). Although habitat studies were not carried out, high sheep densities correspond to areas precipitous terrain and dense alpine vegetation.

The nursery bands seem to select areas with a thick mat of alpine or subalpine vegetation with adequate relief nearby for

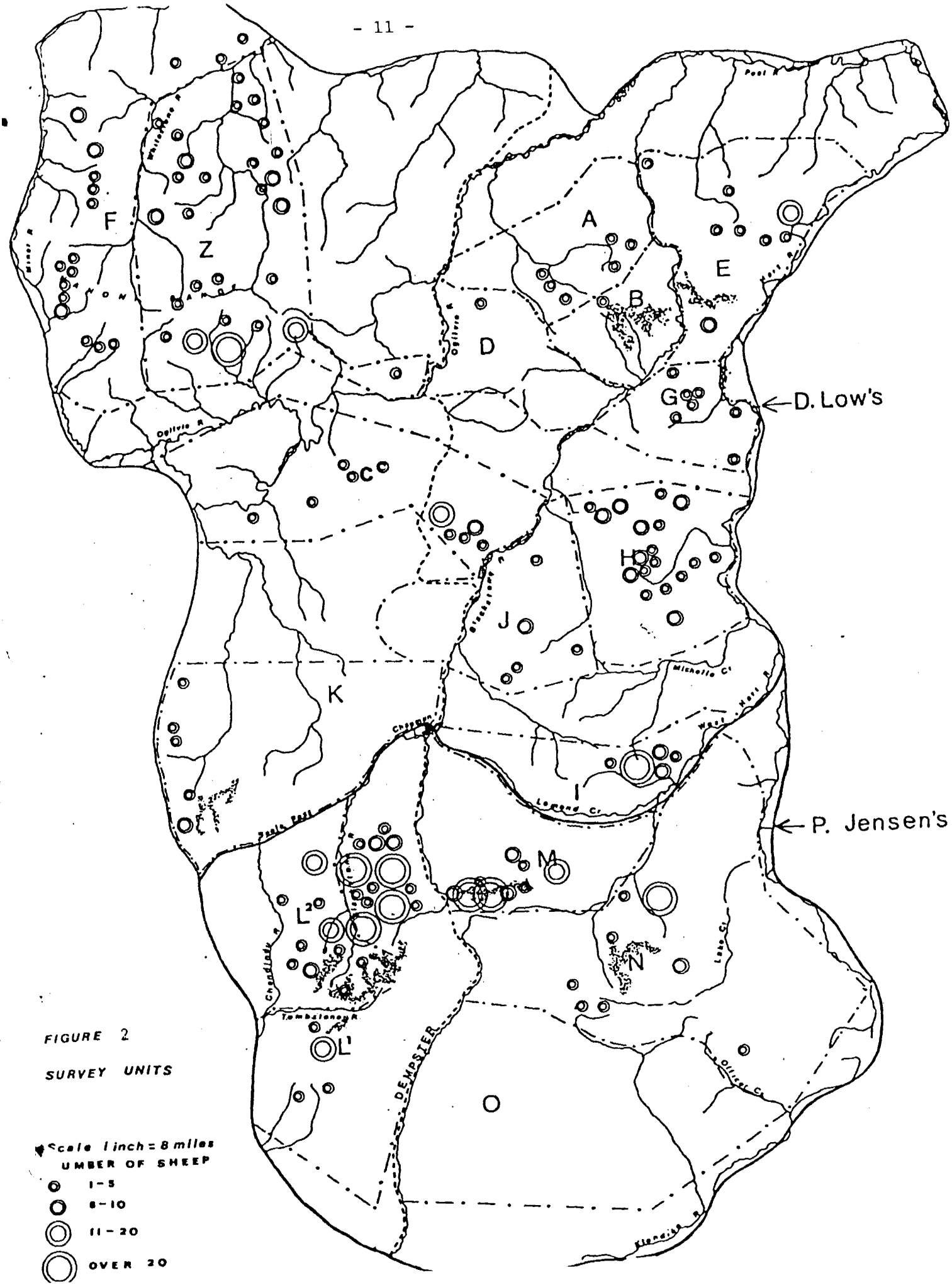


FIGURE 2

SURVEY UNITS

TABLE 4 Observed Number of Rams (3 years and older) / 100 Nursery Sheep

Survey Units	Total Rams Observed	Total Nursery Sheep Observed	Rams/100 Nursery Sheep
A	6	8	75:100
B	-	1	100:100
C	7	26	27:100
D	-	1	100:100
E	9	15	60:100
F	13	34	38:100
G	9	2	450:100
H	21	43	49:100
I	2	39	5:100
J	9	6	150:100
K	5	5	100:100
L^1	28	202	14:100
L^2	22	35	63;100
M	21	102	21:100
N	14	21	67:100
O	-	-	-
Z	15	83	18:100
	181	623	.29
Combined Survey Units			
F - Z	28	117	24:100
D-A-B-E-G	31	27	115:100
C-J-H-I	39	114	34:100
K-L^1-L^2	55	242	23:100
M-N-O	35	123	28:100

escape terrain. The males on the other hand were often observed in areas of rugged terrain with little or no vegetation.

Several areas show a high proportion of females (nursery sheep) to males. Of the combined survey units, F - Z and K - L^2 - L^1 show a ratio in favour of nursery bands and units D - A - B - E - G a high percentage of males (Table 4).

When broken down into individual survey units, the ram: nursery sheep segregation pattern becomes more obvious. The data indicates a high percentage of nursery bands in survey units I, L^1, Z and M. Correspondingly, a high percentage of males were found in units N, E, L^2, H and F.

This data was used to identify potential population boundaries. The following areas are considered to be separate populations: F-- Z, J - H - I, L^1 - L^2, M - N, A - B - D - E - G.

Due to financial constraints, data were not collected at various times of the year to determine actual home ranges and seasonal movements. However, based on spatial distribution of males and nursery sheep, the data does suggest that home ranges and consequently seasonal movements are potentially very extensive (Fig. 2). Hoefs (1975) reports maximum movements from Sheep Mountain and from various locations in Alaska as follows: Sheep Mountain - 15 miles; Dry Creek, Alaska - 16.6 miles; Tonzona River, Alaska - 30 miles. Home range sizes vary between 43.4 square miles from Sheep Mountain (actual sheep habitat) to 30 square miles from Kenai Penninsula, Alaska (Hoefs, 1975). The present data

suggest potential home ranges (actual sheep habitat) of a much larger scale, for example: 704 square miles (M - N), 671 square miles (F - Z), and 642 square miles (K - L^1 - L^2). However, the reader must keep in mind that it is not known if the entire potential sheep habitat is utilized during the annual cycle. This is an area which should be further investigated.

Upon comparison of young rams observed to young rams expected (based on Hoefs, 1975, ratio of young rams to nursery sheep) the data shows that a significant number of young rams did not show up in the survey (Table 5). The writer is not aware of any significant mortality factors which may select only against this young ram cohort. The disparity is at least partially explained by the fact that a number of the two year old rams were with the nursery bands and not distinguished as males. Also, males over two years are often solitary, resulting in poor observability during aerial surveys. Most of the observations on Sheep Mountain (Hoefs, 1975) were made from the ground over a long period of time, resulting in more accurate classifications. Finally, it may be dangerous to compare ratios from an unhunted population in the southern Yukon to a hunted one in the northern Yukon.

Productivity of Sheep Populations

Natality is a measurement of productivity and can also be used in conjunction with other parameters as an indicator of population quality. Productivity is expressed as number of lambs/100

TABLE 5 Estimated Sheep Numbers in Survey Blocks (Based on Density) Derived from Young Rams : Nursery Sheep Ratio

Survey Blocks	Observed Nursery Sheep	Observed Young Rams	Observed young ram : 100 nursery Sheep	* Expected number of young rams	Difference between expected and observed
F - Z	117	14	12:100	30	-16
D-A-B-E-G	27	11	41:100	7	+ 4
C-J-H-I	114	18	16:100	30	-12
K-L^2-L^1	242	15	6:100	63	-48
M-N-O	123	19	15:100	32	-13
TOTAL	623	77		162	-85

*based on expected young ram : nursery sheep ratio 26:100 (Hoefs, 1975).

nursery sheep (Tables 6 - 7).

Lamb ratios varied from a high of 36:100 in survey blocks F - Z to a low of 18:100 in survey blocks M - N - O. A comparison of production between outfitting areas reveals a noticeable difference, i.e. Low's - 41:100, Jensen's - 23:100. The average production for the entire surveyed area was 36:100.

Sheep productivity throughout the Yukon has been reported by Hoefs (1973) as follows: Richardson Mountain populations - 35:100, 39:100, 40:100, 48:100; White Mountain population - 48:100; MacArthurs Range - 34:100; Miners Range - 30:100; Sifton Range - 46:100. Data from Sheep Mountain indicate a high productivity of 47:100 and a low of 28:100 (Hoefs, 1975).

The data presented from this study would indicate an average to below average productivity in the Jensen - Low outfitting areas.

The reader must be cautioned as to the interpretation of these data. They are presented here for comparative purposes. The significance of the ratio itself as a determinent of population quality is open to criticism for several reasons. First, without knowing the mortality rates for the various sex - age cohorts, it is impossible to determine recruitment into the breeding segment of the population. Secondly, the density-dependent response to productivity is not fully understood. A high productivity figure may not always be indicative of a healthy population. In fact, an inverse relationship may exist between productivity and density. A high productivity figure may indicate that the population is

TABLE 6 Lamb : Nursery Sheep in P. Jensen's and D. Low's Outfitting Area, 1978.

Low's Outfitting Area

Survey Unit	Lambs/Nursery Sheep		Lambs/100 Nursery Sheep
A	4/8	=	50:100
B	0/1	=	0:100
C	9/26	=	35:100
D	1/1	=	100:100
E	6/15	=	40:100
F	11/34	=	32:100
G	2/2	=	100:100
H	11/43	=	26:100
I	10/39	=	26:100
J	1/6	=	17:100
K	1/5	=	20:100
Z	33/83	=	40:100

Average Productivity for Low's Area = 486:100 = 41 lambs/100 nursery sheep

Jensen's Outfitting Area

L^1	32/202	=	16:100
L^2	7/32	=	22:100
M	24/102	=	24:100
N	6/21	=	29:100
O	0/0	=	0:0

Average Productivity for Jensen's Area = 91:400 = 23 lambs/100 nursery sheep

Average Productivity for Survey Area = 577:1600 = 36 lambs/100 nursery sheep

TABLE 7 Observed Lamb : Nursery Sheep Ratio in Combined Survey Blocks

Survey Blocks	Average Lamb:100 Nursery Sheep
F - Z	36:100
D - A - B - E - G	58:100
C - J - H - I	26:100
K - L^2 - L^1	19:100
M - N - O	18:100

TABLE 8 *Expected Number of Legal** Rams in the Low - Jensen Outfitting Areas

Outfitters Area	Legal Rams Expected	Rams - Observed	Trophy Rams Expected	Six year average non-resident harvest per year
D. Low	105	52	18	6.5
P.E.S. Jensen	144	52	25	7.5

* Ratios based on Hoefs (1975) analyses of an unhunted population.
Expected legal ram : nursery sheep = 40:100
Expected trophy ram : nursery sheep = 7:100

** 3/4 curl or greater

being taxed to reproduce to capacity. A low productivity figure may be indicative of a stable population, in balance with the carrying capacity of the range. Therefore, a low lamb ratio should not always be viewed as negative.

The present study shows a reverse relationship between productivity and density (Tables 2 and 7). The significance of this relationship as mentioned earlier, is open to interpretation, and is presented here for future discussions.

Sheep Densities

Densities (based on available potential sheep habitat) were calculated for each population (Table 1) and varied from a high of .64 sheep/square mile to a low of 0.09 sheep/square mile.

Simmons (1969) reported 0.34 sheep/square mile in the Mackenzie Mountains and Hoefs (1978) shows a 0.30 density for the Richardson Mountains. However, densities of 3 - 4 sheep/square mile have been reported for populations in the southern Yukon (Hoefs, 1978).

Density figures may be misleading unless compared to the amount of utilized range. Unfortunately, the extent of the utilized range could not be identified from one survey. Therefore, our range estimates may not all be occupied sheep habitat.

Caribou Distribution and Abundance

Eight hundred and seventy-four caribou were observed in

eight survey units (Table 3). Eighty-five percent (744 animals) were seen in survey unit N, 10% (61 animals) in survey unit L^1, and 5% (46 animals) in unit O. The remainder were scattered throughout the southern half of the survey area. Three large groups of 117, 183 and 252 animals were observed in survey unit N. Practically all caribou were first seen on or near patches of snow at high elevations or in north facing cirques. Caribou use these isolated snow patches to regulate body temperature and to escape insects.

The status of these caribou are unknown (J. Russell, pers. comm.). Their movements should be monitored to determine if they are resident or if they mix with the Porcupine herd. It is interesting to note the abundance of caribou in survey unit N and the relative lack of sheep in the same area. The potential for competition between these two species exists in this area.

Grizzly Bear Distribution

Distribution of grizzly bears in this area will be discussed in detail at a future date, therefore, only a summary is given here.

A total of twenty-six bears were observed, with the highest concentrations in survey units F and Z - Nahoni Range (Table 3). The age-sex classifications are as follows: 8♀♀, 3 cubs, 7 yearlings, 2 two year olds, 1♂, and 5 unidentified adults.

As mentioned earlier, the survey technique was designed to census sheep, not bears. Therefore, these numbers represent a gross underestimation of the actual population.

Moose Distribution

Moose observations must be considered incidental, as preferred habitat was not searched. Moose habitat throughout the area is restricted to narrow bands of willow growing along creeks and rivers. Some spruce-bog habitat occurs in the wider valleys, and was most likely utilized by moose. The survey technique was inadequate to discuss the distribution and abundance of moose.

Harvest Data - Sheep

On a six year average (1973 - 1978) Jensen and Low harvested 7.5 and 6.5 sheep respectively per year (Table 8). Resident harvest data are scarce, however, returns from the 1978 season indicate only three sheep were taken from Jensen's area and one from Low's area by resident hunters.

With an observed count of 52 legal rams (3/4 curl or greater) in each outfitting area, and an expected trophy ram count of 18 and 25 in Low's and Jensen's areas respectively (Table 8), the population does not appear to be overharvested.

MANAGEMENT RECOMMENDATIONS

Specific

1. Based on the 1978 aerial surveys of the Jensen-Low outfitting areas, it appears that the sheep populations are being harvested below sustained yield limits. However, populations located close to the highway should be periodically monitoried to

ensure that over-harvesting and human disturbance do not have a negative effect on these animals. Of particular concern are those populations located in survey units M - L and C - J, through which the highway runs.

2. The effects of proposed and existing mineral exploration and other land use activity should be closely monitored over the next 10 years.

3. Inventories of this type require observers to sit in an aircraft for long periods of time. This eventually reduces observer efficiency. Survey teams should work together to reduce animals missed due to fatigue. This could be accomplished by either extending the survey dates, thus flying fewer hours per day or involving greater numbers of observers.

General

4. Aerial surveys should be designed to census specific species at times that will yield the required population information. The optimum survey periods will vary according to latitude; seasonal weather conditions; species observability due to snow cover and sunlight conditions; concentration of the species in specific habitat types, and the ability to distinguish sexes and age groups. The following time periods are suggested: sheep - July and August; grizzly bear - June; caribou - July or October moose - November or January.

Surveys for more than one species should be overlapped whenever possible without compromising the quality of the data, for example, sheep and caribou on summer habitat, or moose and caribou on winter habitat.

5. Various aerial survey techniques should be tested for optimum observability of the species concerned. These should then be tied in with habitat types to facilitate sampling of populations in other areas. This could help to cut back on the very expensive technique of 100% coverage to obtain total counts.

6. Baseline population data are needed on all species in order to interpret inventory data accurately. At present the only existing population data are on sheep from Sheep Mountain. Similar studies should be initiated on moose and caribou.

7. Inventory priority should be given to those areas of suspected overharvesting and areas of proposed developments (exploration, hydro projects, access roads, etc.).

DEMPSTER BIG GAME INVENTORY - Expenditures - Project No. 182

Living Expenses;	Food	$ 1,329.18
	Rental of Jensen's Builings	182.00
	Travel Expenses	250.00
	Sub-total	1,761.18
Helicopter:	Gazelle	9,054.00
	Bell 206 Jet Ranger	3,818.72
	Fuel	3,369.00
	Fuel Transport	568.00
	Fuel Credit	- 513.00
	Sub-total	16,296.72
Vehicle Rental:	4 X 4 @ $650/month plus mileage for two months	1,700.00
Miscellaneous:	Maps, propane cylinder, sample bottles, etc.	500.00
Personnel:	M. Hoefs - 12 days @ $107/day	1,284.00
	D. Larsen - 30 days @ $85.08/day	2,552.40
	B. Smith - 11 days @ $78.23/day	860.53
	D. Horwood - 3 days @ $54.17/day	162.51
	Sub-total	4,859.44
	TOTAL Expenditures for 182	$ 25,117.34

Expenditures - Project No. 202

Helicopter:	Bell 206 Jet Ranger	10,000.00
	TOTAL Expenditures for 202	$ 10,000.00
	TOTAL COST OF SURVEYS	$ 35,117.34

LITERATURE CITED

Hoefs, M. (1975). Ecological investigation of Dall sheep and their habitat. Ph.D. dissertation, Department of Zoology, University of British Columbia.

Hoefs, M. (1978). Dall sheep in the Richardson Mountains - Distribution, Abundance and Management Concerns. Yukon Game Branch Report No. 78-2.

Oswald, E.T.; Senyk, J.P. (1977). Ecoregions of Yukon Territory. Fisheries and Environment Canada. Canadian Forestry Service.

Simmons, N.M. (1969). Aerial Dall sheep and woodland caribou surveys in Game Management Zones 12 and 19, Mackenzie Mountains, N.W.T. Unpubl. report on file with N.W.T. Fish and Wildlife Branch.

APPENDIX I

MAP KEY

Survey zone - A, B, etc.

Sheep observations – 1

Caribou observations – ○

Other observations (raptors, wolves, bears) – △

Potentially good sheep habitat – — — — —

Moose – □

All map numbers correspond to the individual survey write-up.

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone B, Low's Outfitting Area

Date: July 12, 1978

Aircraft: Jet Ranger 206A

Pilot: G. Vaillancourt

Crew: B. Smith, navigator-recorder
M. Hoefs
D. Horwood

Weather: hot, sunny

Survey time: 15:00 - 17:30

Coverage: 80%

Habitat: Total of 126 square miles (326 sq km)
Potential Sheep Habitat - 97 square miles (251 sq km)

Boundary Description: Bounded on the south and west for 40 miles by Blackstone River; on the north by an unnamed creek draining to N.E. of Mt. McCullum (5559 ft), on the west by a variety of passes from a point 10 miles west of Mt. McCullum south-west to the end of that group of mountains. This boundary is not distinct from a habitat separation point of view.

The area was composed of steep and extremely barren talus slopes on the west and south boundary. The area north of Mt. McCullum extending south and west has low elevation hills which are green and luxuriant. Similar habitat was found in isolated areas to the south and west of this.

Observations: One lone ewe was seen in a low elevation (3500 ft) series of convoluted canyons extending south from a ridge line. In this area the flat alpine slope was broken by rugged canyons comprised of steep rock formations above and talus below. Numerous sheep trails were evident between and below the bluffs.

.../2

Throughout the rest of the area caribou trails were evident. Very little evidence of sheep presence was seen. Nearly all creeks were dry. There could be a shortage of escape terrain in the barren talus areas. One caribou (a small antlerless animal) was seen on a snow patch in the midst of the lush low elevation hills described above.

Four grizzly bears were seen in the lush alpine low elevation hills immediately north of Mt. McCullum. These animals were all apparently grazing in alpine habitat - willow shrubs were in this habitat type. A single medium to large adult animal was seen. It was dark with a grizzled appearance and an unusual face pattern. The second sighting involved a blond sow with two 2 year olds. These animals were photographed. All animals responded by running. Evidence of fresh digging was seen. About 70% of this habitat type was properly surveyed. Dens would not be visible from this survey position.

Golden Eagles were observed (u=3+) but the locations were not recorded.

Remarks: The limiting factor for sheep is likely similar to that described for Zone A by M. Hoefs. Some elevation dependent variable might explain the vegetation on lower sites. The lush willow alpine habitat was found on sites receiving ground water from higher elevation and often barren slopes.

B.S.

DEMPSTER SHEEY SURVEY - FIELD NOTES

Survey: Zone D, Low's Outfitting Area

Date: July 13, 1978

Aircraft: Jet Ranger 206A (Shirley Helicopters Ltd.)

Pilot: G. Vaillancourt

Crew: B. Smith, navigator-recorder
D. Horwood
Cynthia (w/Gary)

Weather: hot, sunny, 2/10 cumulus, very strong wind from north boiling down south aspect slopes made flying difficult

Coverage: Talus ridges 90%, forested ridges 5%

Habitat: Total of 173 square miles (448 sq km)
Potential Sheep Habitat - 116 square miles (300 sq km)

Boundary Description: This area is bounded to the west by the Ogilvie River, to the south by the Soldier Creek flats extending towards the Blackstone. On the east it hits area B in a poorly defined series of ridges like octopus tentacles extending north 30 miles to a well-defined eastwest ridge, overlooking a large basin.

The high ridges around the perimeter of this area are talus with some rock outcrops, leading down into forested heath-type vegetation. This area was very dry during the survey. The central portion is composed of lower green ridges. The eastern area is higher and has some alpine but much of the area west of this is permafrost influenced parkland extending done to the Ogilvie River. Canyons form river edges in a few areas.

Observations: One ewe with one lamb was seen. The south expanses and low elevation canyons could be wintering areas but few trails were found. The lack of vegetation probably limits the use of these areas.

.../2

The higher elevation alpine slopes on the east side of the area would offer good bear habitat (berries, etc.) but none were seen. Some digging and old den sites were observed. No bears were seen.

Two golden eagles were observed.

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone A, Low's Outfitting Area

Date: July 12, 1978

Aircraft: Jet Ranger Bell 206A (Shirley Helicopters Ltd.)

Pilot: G. Vaillancourt

Crew: M. Hoefs, navigator-recorder
B. Smith
D. Horwood

Weather: Sunny, warm, wind from north, 10 to 15 m.p.h.

Survey time: 10:30 - 12:45

Coverage: > 80%

Habitat: Total of 200 square miles (518 sq km)
Potential Sheep Habitat - 118 square miles (305 sq km)

Boundary Description: Mountain ranges of about 20 square miles in area bordered by the Ogilvie River in the west, the Blackstone River in the east, low relief in the north, a major depression between the Cronkhite and Mt. McCullum and an unnamed creek draining into the Ogilvie River just upstream from Churchward Hill in the south.

Observations: Sheep were located in seven different locations all in the southern half of this survey area. All sheep were widely dispersed in small bands, and it is reasonable to say that all sheep observed are part of the same population and that the entire southern half of the survey area is part of this population's range. No distinct, obvious, winter range was located and there is no shortage of escape terrain in the face of cliffs.

Remarks: It is difficult to estimate how good our coverage was. I estimate that we did not miss many since four people were looking and the country is rather uniform in colour.

.../2

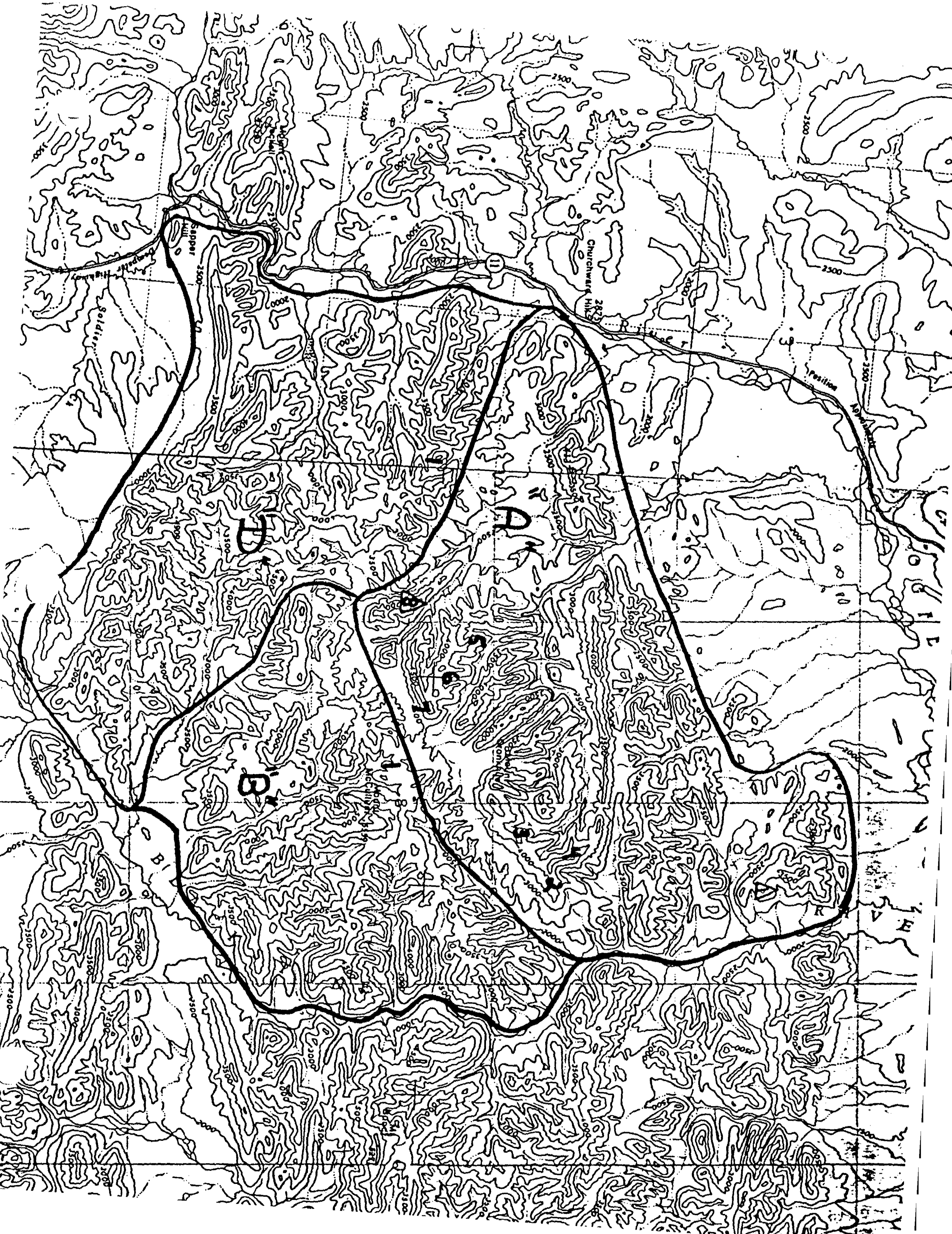
It is estimated that few if any sheep have been missed and that the total population in Survey Unit "A" is not higher than 20 to 25.

The limiting factor seems to be lack of alpine vegetation, which in turn will be due to lack of moisture during the growing season. While the area gets sufficient precipitation, snow as well as rain, the sedimentary rocks must be very porous, allowing fast runoff, before the moisture can be utilized be vegetation.

Comment: (a) Lower elevation lush alpine hills were present in the centre of the above area but were not surveyed. Grizzly bears may have been present in this area.

(b) D. Low does not hunt in this area.

Map Reference Numbers:
1 - 1 falcon observed (dark in colour) most likely gyr
2 - 1 male (young, 3 or 4 years old)
3 - 4 females (1 yearling, 3 lambs)
4 - 1 female
5 - 3 males (all young rams, 2 and 3 years old)
6 - 1 male (3/4 curl, legal, 5 or 6 years old)
7 - 1 female, 1 yearling, 1 lamb
8 - 2 golden eagles



DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone Z, Low's Outfitting Area

Date: July 14, 1978

Aircraft: Jet Ranger (206A) - Shirley Helicopters Ltd.

Pilot: G. Vaillancourt

Crew: M. Hoefs, navigator-recorder
D. Larsen
B. Smith

Weather: windy, overcast, warm

Survey time: 10:20 - 12:50
14:20 - 17:00

Coverage: > 80%

Habitat: Total of 545 square miles (1176 sq km)
Potential Sheep Habitat - 333 square miles (862 sq km)

Boundary Description: Total area "Z" is bordered as follows: Whitestone River in the north and west, Ogilvie River in the south, and a large, narrow ridge of north-south running mountains at a longitude of about 138°50' west, in the east.

Observations: The total number of sheep observed in survey unit "Z" was 131, consisting of 15 males, 83 females and yearlings and 33 lambs. It is estimated that the actual number of sheep in this area will be at least 150, with mainly rams missing from our records.

Remarks: Sheep are found in widely dispersed, small groups throughout the the area. Only three areas were located with reasonable densities; these will most likely also be the lambing area and perhaps winter ranges. These three areas are: a) in the northwest corner of the survey area around "Mount Fowlie" and the "Butte"-like Mountains immediately to the south of it; b) a series of little 'knobs' in the northeast corner of the study area, starting at a

.../2

little unnamed lake and extending in an arc-like manner to the northwest, and c) in the southernmost portion of the survey area around an unnamed mountain with the following coordinates: 139°05' west and 65°25' north. This southern portion also appears to have a high density of grizzly, since seven were seen today in an area of about 50 square miles.

Map Reference Numbers:

1 - 2 males (young)
2 - 8 females, 2 yearlings, 3 lambs
3 - 1 male (legal)
4 - 1 male
5 - 1 grizzly
6 - 1 falcon (probably gyr)
7 - 18 females and yearlings, 5 lambs
8 - 1 grizzly
9 - 2 males (1 full curl, one half curl (3 years old)) 2 females, 1 lamb
10 - 5 females and yearlings, 3 lambs
11 - 7 females and yearlings, 5 lambs
12 - 1 grizzly (female), 2 young (yearlings)
13 - 1 grizzly (female), 1 young (cub) black
14 - 1 male (full curl)
15 - 1 male (3/4 curl)
16 - 3 females, 1 yearling, 2 lambs
17 - 1 female, 1 yearling, 2 lambs
18 - 2 males (legal)
19 - 1 male (legal)
20 - 1 female
21 - 1 male (young)
22 - 2 females, 2 lambs
23 - 2 females and yearlings

M.H.

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone Z, Low's Outfitting Area

Date: July 13, 1978

Aircraft: Jet Ranger (206A) - Shirley Helicopters Ltd.

Pilot: G. Vaillancourt

Crew: M. Hoefs, navigator-recorder
B. Smith
D. Horwood

Weather: sunny, warm, wind from north approximately 10 - 15 m.p.h.

Survey time: 10:05 - 12:40

Coverage: > 80%

Boundary Description: Area bordered in the west and north by the Whitestone River and an unnamed tributary of the Whitestone River in the east. The headwaters of this tributary, which flows south to north, flow between Mount Cluett in the east and Mount Brimstone in the west. The survey area was cut off just south of Mt. Brimstone, because lack of fuel did not allow continuation.

Observations: Sheep were observed in 9 different bands, the locations are marked on the map. Totals seen were 4 males (2 full curl, 2 young), 24 females and yearlings and 9 lambs for a total of 37.

Remarks: This survey area, which is a portion of the Nahoni Range, has a a more continuous vegetation cover than the areas east of the Dempster Highway in the Blackstone River region. However, escape terrain in the form of cliffs is limited. Sheep are widely dispersed and appear to use the entire survey area, with the exception of the narrow, elongated ridge along the eastern boundary of this survey area, paralleling the river.

Total population size should only be estimated when the other surrounding sheep ranges have been surveyed. They are all continuous.

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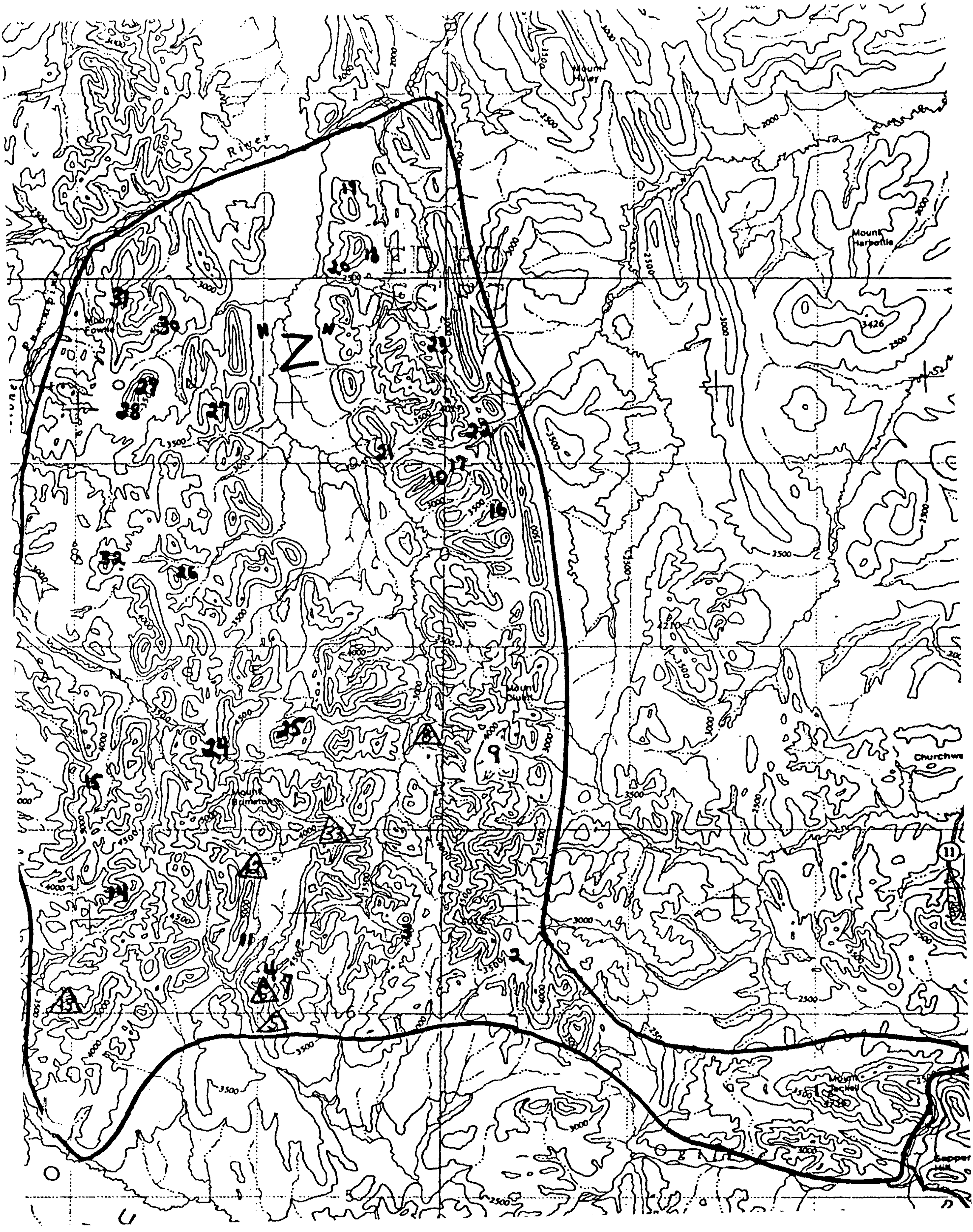
Map Reference Numbers:

24 - 2 females, 2 lambs
25 - 1 female, 1 lamb
26 - 2 females, 1 lamb
27 - 2 males (2 and 3 years old)
28 - 2 females, 2 lambs
29 - 7 females, 2 lambs
30 - 2 males (full curl)
31 - 4 females, 1 lamb
32 - 6 females
33 - 1 female, 1 male grizzly

NOTE: Ewes include yearlings, since the latter are already so large that accurate determination is difficult.


River
Mount Hyley
Mount Harbottle
3426

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone C, Low's Outfitting Area

Date: July 16, 1978

Aircraft: Shirley Helicopter - Jet Ranger 206A

Pilot: G. Vaillancourt

Crew: A.M. M. Hoefs, Navigator-recorder
D. Larsen
B. Smith

P.M. D. Larsen, Navigator-recorder
B. Smith

Weather: Cloudy, cool, calm

Survey Time: A.M. - 9:35
P.M. - 1500 - 1620

Coverage: 80%

Habitat: Total of 457 square miles (1184 sq km)
Potential Sheep - 206 square miles (534 sq km)

Boundary Description: Bounded on the north by the Ogilvie River; on the south by a wide valley; on the east by the Blackstone River; and on the west by a wide valley extending to the Ogilvie River. The Dempster Highway runs through the eastern third of the survey unit.

Observations: A total of 42 sheep (24♀♀, 2 yearlings, 9 lambs, 7♂♂) were observed. One moose and one gyrfalcon were also seen.

The majority of the sheep were located on the east side of the highway. Of the forty-two sheep, five (12%) showed fannin characteristics.

Remarks: The area is characterized by a number of high peaks, Mt. Skookum Jim (5417'), Mt. Chambers (5301') and Mt. Bourette (5000'). Associated with these mountains are steep, barren talus slopes, producing very little vegetation. On the lower elevations, the vegetation is lush. These rolling foothills give way to large open plains on the west, south and east sides of the survey unit.

.../2

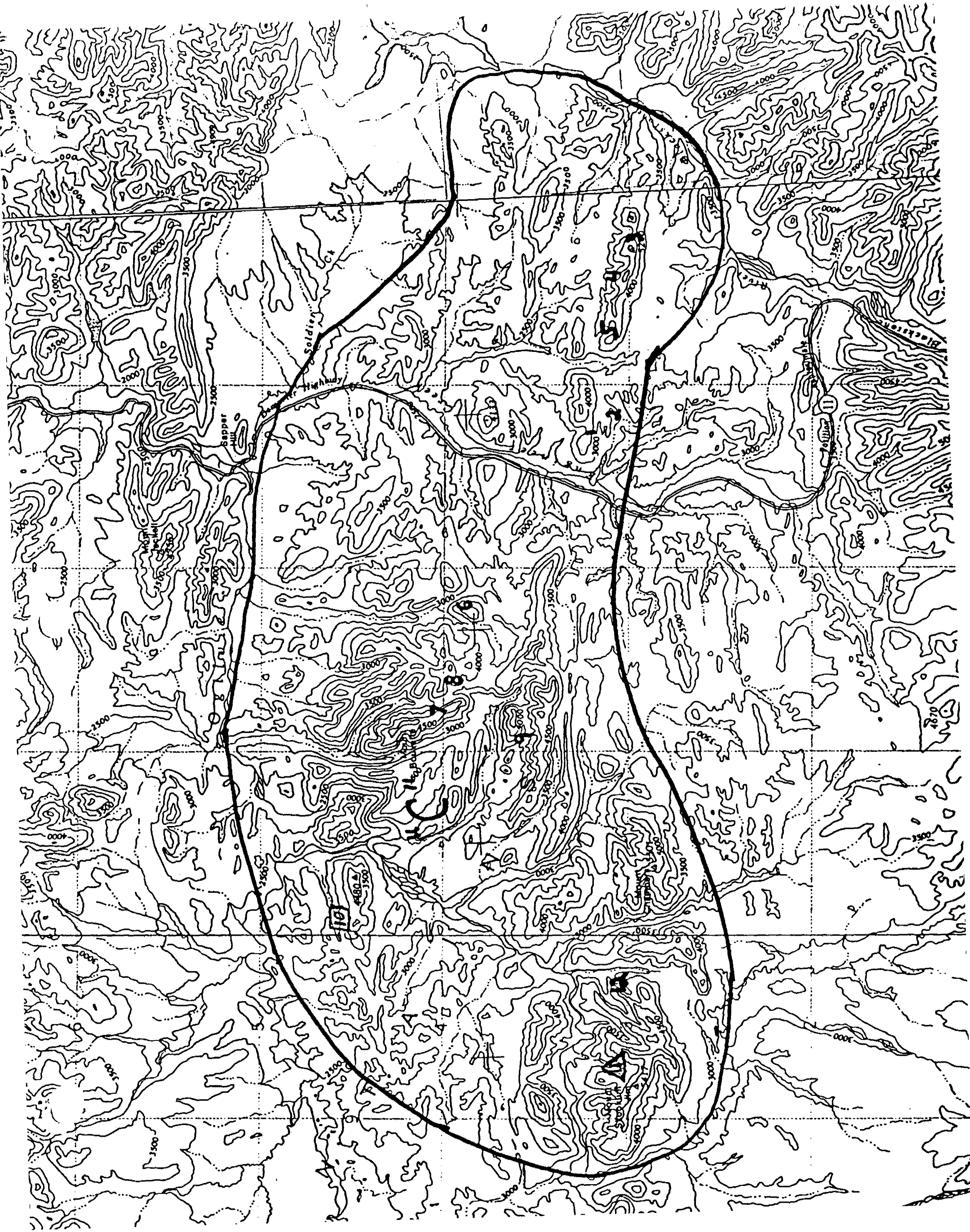
I would anticipate some movement of sheep across the Dempster Highway along Engineer Creek. The mineralization along this creek may attract sheep to the road.

Although no bears were observed during this survey, numerous reports of bear sightings along Engineer Creek have been reported by road maintenance crews, and outfitters. Most of the sightings were made in May and June indicating a possible migration route.

Map Reference Numbers:

1 - 9♀♀ and yearlings, 2 lambs
2 - 2♂♂ (1 legal, 1 young)
3 - 1♀, 1 yearling (sheep)
4 - 6♀♀, 3 lambs
5 - 3♀♀, 2 lambs
6 - 1♂ (legal)
7 - 2♂♂ (legal)
8 - 4♀♀, 1 lamb
9 - 2♂♂ (1 legal, 1 young)
10 - 1♂ (moose)
11 - 1 gyrfalcon
12 - 1♀, 1 yearling, 1 lamb

D.L.



Soldier Ck
Sapper Hill
Highway
Blackstone
4480
4670

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone F, Low's Outfitting Area

Date: July 20, 1978

Aircraft: Shirley Helicopters Ltd. - Jet Ranger 206A

Pilot: G. Vaillancourt

Crew D. Larsen, navigator--recorder
B. Smith
M. Sather

Weather: A.M. - 9/10 overcast, 15 - 20°C, Wind 10 m.p.h. from south
P.M. - 8/10 overcast, 15 - 20°C, Wind 10 m.p.h. from south

Survey time: 10:00 - 11:55
14:00 - 17:00

Coverage: 80% talus, 60% alpine, < 10% other types

Habitat: Total of 530 square miles (1376 sq km)
Potential Sheep Habitat - 333 square miles (875 sq km)

Boundary Description: bounded on the north and west by the Miner River; to the east by the Whitestone River and to the south by the arm of the Ogilvie River draining Gill Lake. The main Ogilvie River and one of its tributaries four miles east of Mount Chief Isaac.

Observations: Fifty eight sheep were seen in this area, the bulk of these associated with nursery herds. Only two legal rams were observed. Dark single rams are easy to miss however. As can be seen from the map, the sightings were concentrated on the Mt. Whitney ridge but were also seen in the northern half in a few locations. Animals were seen frequently far from escape terrain in small pockets of alpine amidst the talus. Ridge-top sheep trails were observed in the Mt. Whitney area and close to the areas where sheep were sighted. There were no trails on the high talus ridges in the northwest part of the survey area.

.../2

A few low elevation canyons were observed in centre of the survey area that could be winter range. Of better quality were the south west slopes of Mt. Whitney.

The eight grizzly bears were all sighted in some form of alpine habitat usually in forb rich areas and/or near willows. Most bears were seen on the southern half of the survey area; approximately in proportion to the amount of alpine habitat. Very few dens were observed in the northern half but diggings were seen in several instances. They were much more numerous in the southern part of the area. Large expanses of habitat similar to that that the bears were sighted in was observed here.

The fact that only sows with yearlings were observed likely indicates that segregation of certain age and sex classes is occurring. Other individuals would not have been observed if they were in other habitat.

One snowy owl and two golden eagles were observed in the survey area.

Remarks: This unit can be divided into two reasonably distinct areas. The northern half is composed of extremely barren ridges with talus sweeping far down the slope into narrow valley floors. Few cliffs or bluffs are present. Timberline is about 3,500 feet on south slopes and lower on north facing slopes. There is very little alpine type habitat. The oxbow form of the Miner River has created a broad valley floor in varying degrees of succession. Aufeis (stream ice that persists well into the summer in flat braided portions of the river) is found in nearly every river draining north and west. As a result of this persisting ice and changing river courses, large expanses of willow are present.

The Whitestone valley floor is similar but is much broader. Some braiding, oxbowing and stream ice was evident and similar extensive

.../3

areas of willow. The permafrost is discontinuous in this area; on the slopes and river edge trees are large in contrast to the sparsely treed tussock habitats between.

Further south in the headwaters of the Whitestone and Ogilvie Rivers the elevation of the valley floors is greater and the extreme relief of the northern half is replaced by more gentle alpine basins and passes. Some rugged peaks (especially Mt. Whitney) provide escape terrain in proximity to these alpine areas. Many areas of forb and willow rich alpine were observed as large as six square miles.

The Ogilvie River basin and the upper Miner are predominantly tussock and tussock parkland with scattered spruce.

With the exception of a small area in the south, this area is not hunted by D. Low. S. Reynolds has a camp four miles north of Gill Lake on the Miner River airstrip. He takes caribou migrating up and down the Miner valley. That caribou were historically taken in this area is suggested by the remains of a long drift fence several miles to the west of this. The Rio Alto winter cat road follows the Ogilvie over the Miner Pass and west along the Miner River into the Orange River drainage.

Map Reference Numbers:
1 - 1♀, 1 yearling (sheep)
2 - 1♀ (sheep)
3 - 1♂ (young)
4 - 1 snowy owl
5 - 3♀♀, 3 yearlings, 3 lambs
6 - 1♀, 2 yearlings (grizzly)
7 - 2♀♀, 3 yearlings, 1 lamb
8 - 3♀♀, 1 lamb
9 - 1♀ (sheep)
10 - 3♀♀, 2 lambs
11 - 3♀♀, 2 lambs

.../4

12 - 2♀♀ (sheep)

13 - 1♂ (young)

14 - 2♀♀, 2 lambs

15 - 1♀ (sheep)

16 - 8♂♂ (5 young, 3 legal)

17 - 3♂♂ (2 young, 1 legal)

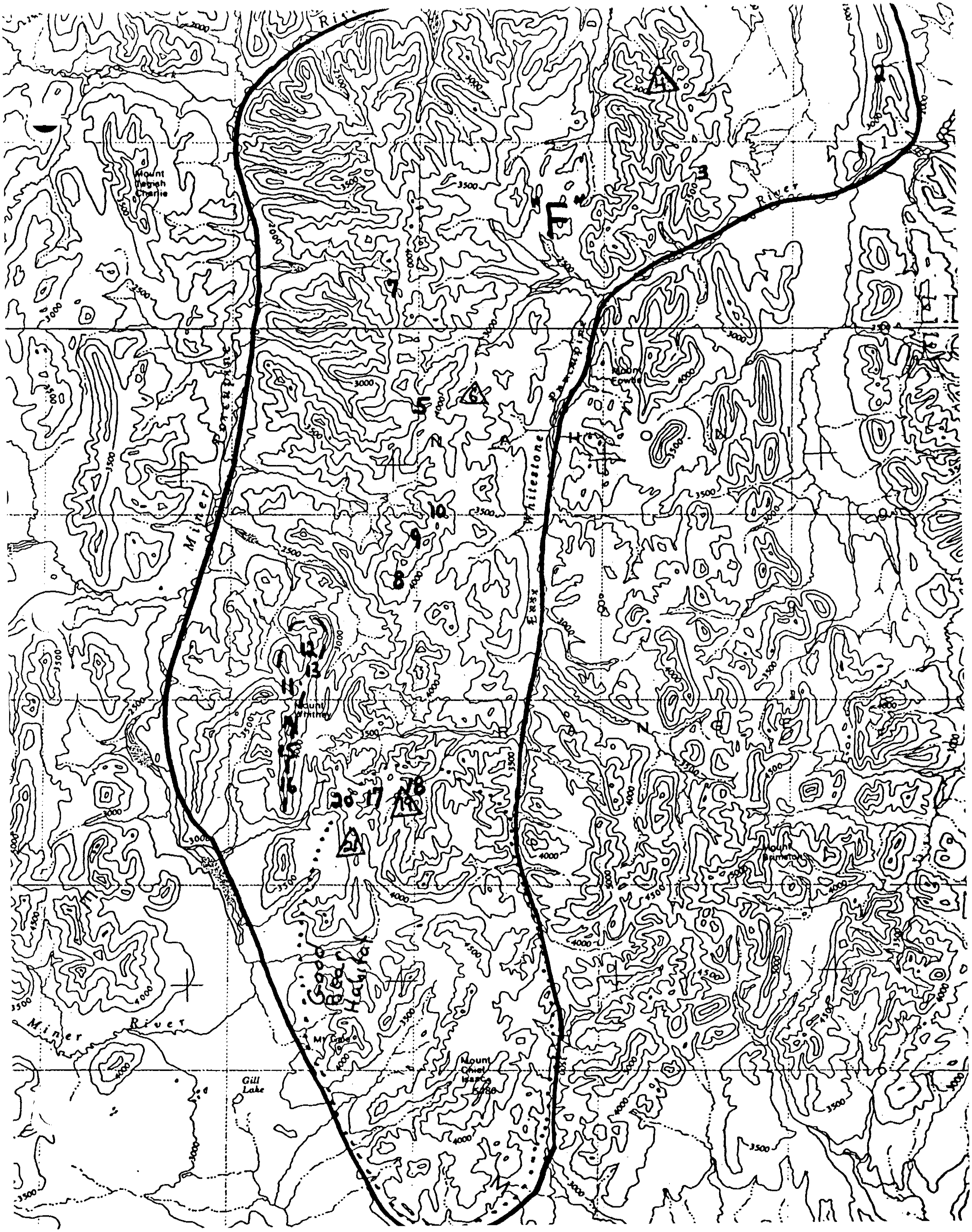
18 - 2♀♀, 1 yearling (sheep)

19 - 1♀, 1 yearling (grizzly)

20 - 1♀, 1 yearling (sheep)

21 - 1♀, 2 cubs (grizzly)

D.L.


Mount Nakiah Charlie
Miner
Porcupine
Whitestone
Mount Whitney
Miner River
Gill Lake
Mount Chief Isaac
Mount Brimston
Mount Fowle
River
Good Habitat

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone G, Low's Outfitting Area

Date: July 19, 1978

Pilot: G. Vaillancourt

Crew: D. Larsen, navigator-recorder
B. Smith

Weather: hot, sunny, calm

Survey time: 09:40 - 10:40
11:00 - 11:30

Coverage: 90%

Habitat: Total of 113 square miles (293 sq km)
Potential Sheep habitat - 84 square miles (218 sq km)

Boundary Description: Bounded on the west by the Hart River; on the south by an unnamed creek running east-west off the Hart River; on the west by the Blackstone River; and on the north by a low valley south of the Mt. Buncz complex.

Observations: A total of 13 sheep (9♂♂, 2♀♀, 2 lambs) were observed, the majority of them were along a predominant east-west ridge. Seven of the nine rams were 3/4 curl or better.

One golden eagle was observed.

Remarks: Suitable escape terrain for sheep is limited to a predominant ridge located in the northern half of the survey unit. The remainder of this area offers little escape terrain or suitable vegetation.

Map Reference Numbers:
1 - 5♂♂ (4 legal, 1 young)
2 - 1♂ (legal)
3 - 1♂ (legal)
4 - 1♀, 2 lambs
5 - 1♂ (young)
6 - 1♂ (legal)
7 - 1♀

D.L.

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone E, Low's Outfitting Area

Date: July 15 and 19, 1978

Aircraft: Shirley Helicopters - 206A Jet Ranger

Pilot: G. Vaillancourt

Crew: D. Larsen, navigator-recorder
B. Smith

Weather: hot, cloud cover varied from 10 - 80%

Survey times: July 15: 16:13 - 17:50
July 19: 11:30 - 12:10 and
14:15 - 16:00

Coverage: 80%

Habitat: Total of 303 square miles (785 sq km)
Potential Sheep habitat - 251 square miles (650 sq km)

Boundary Description: Bounded on the east by the Hart River; on the west by the Blackstone River; on the north by the plains which extend to the Peel River; on the south by an unnamed creek extending between the Blackstone and the Hart Rivers.

Observations: A total of 31 sheep (10♂♂, 11♀♀, 4 yearlings, 6 lambs) were observed. Most of these animals were located in the sub-alpine areas, fringing escape terrain, or on alpine slopes.

Remarks: The area was characterized by rolling talus slopes, extending to subalpine. Generally, neither excape terrain nor adequate vegetation occurred to support large numbers of sheep. Interspersed between the higher talus slopes were numerous low, rolling, vegetated hills.

Two areas of potentially good sheep habitat occurs in the northern half of the survey unit. The first is along the southern aspect of Mount Carter and the second is an area of sheer cliffs along the Hart River. Twenty-one sheep were observed in the latter area. No sheep were seen around Mount Carter.

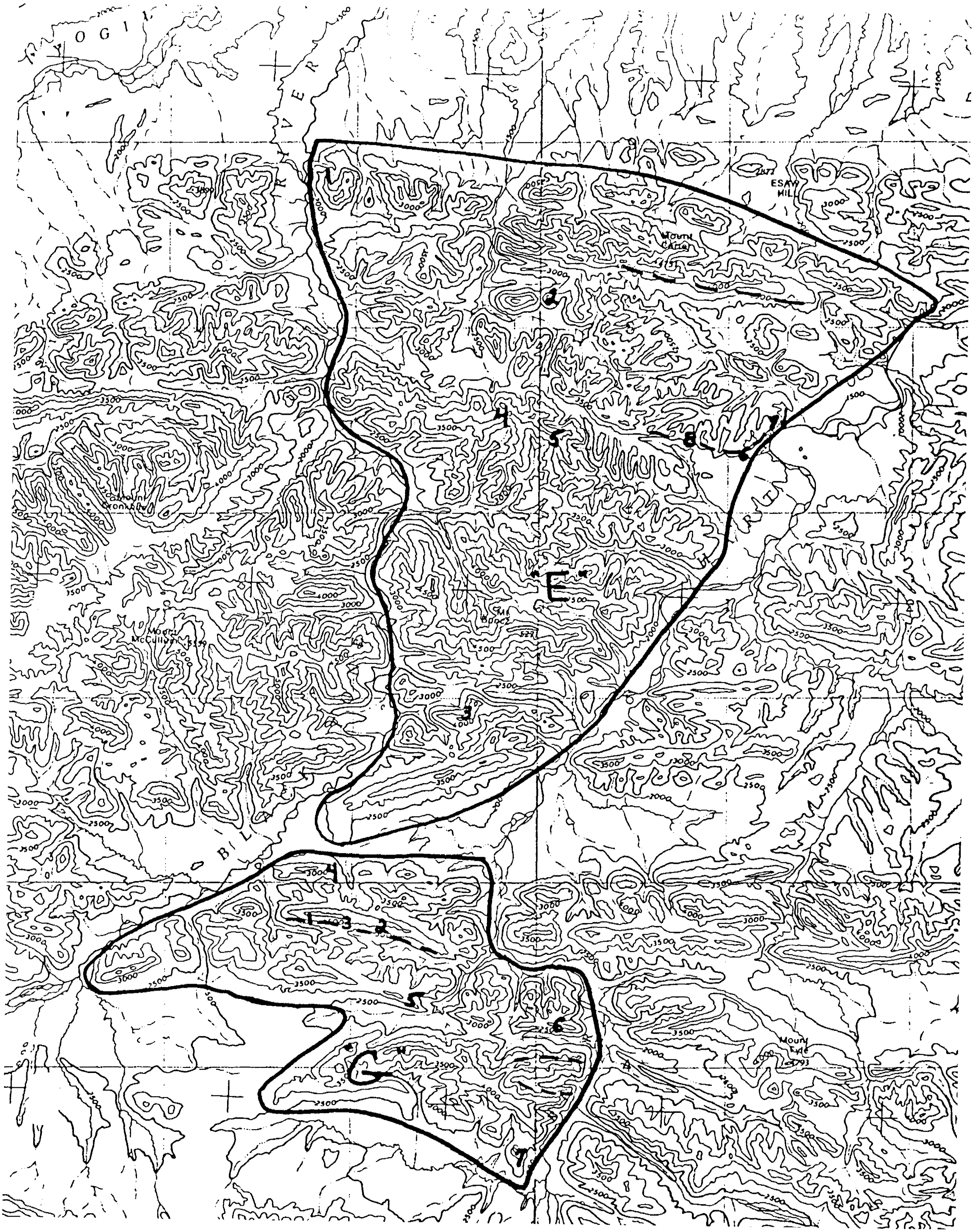
.../2

A few bear diggings and dens were noted along the southern aspect of ridges located north of Mt. Buncz.

Two golden eagles were observed in the southern half of the survey unit.

Map Reference Numbers:
1 - 1♀ (sheep)
2 - 1♂ (legal)
3 - 2♀♀, 1 yearling, 3♂♂ (2 legal, 1 young)
4 - 1♀ (sheep)
5 - 1♂ (legal)
6 - 1♀, 1 yearling, 2 lambs
7 - 5♀♀, 1 yearling, 4 lambs, 2♂♂ (1 legal, 1 young)
8 - 1 yearling, 2♂♂ (young)

D.L.


ESAY HILL
E
G

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Jone J, Low's Outfitting Area

Date: July 23 - 24, 1978

Aircraft: Shirley Helicopters Ltd. - Gazelle

Pilot: W. Eng

Crew: D. Larsen, navigator-recorder
B. Smith

Weather: 15°C, clear, calm

Survey time: 19:10 - 19:30 (July 23)
13:25 - 14:50 (July 24)
15:25 - 15:55

Coverage: 80%

Habitat: Total of 250 square miles (647 sq km)
Potential Sheep Habitat - 180 square miles (466 sq km)

Boundary Description: bounded on the east by a deep, narrow valley, orientated in a north-south direction between Blackstone Lake and Michelle Creek; on the north by the Blackstone River and a portion of the Dempster Highway; on the west by a large open plain; and on the south by the Michelle Creek valley.

Observations: Sixteen sheep (5♀♀, 1 yearling, 1 lamb, 9♂♂) were recorded east of the Highway. Four caribou and three eagles were seen in the same area.

Remarks: This area consists mainly of rolling talus hills with little alpine vegetation. The only escape terrain occurs in the centre of the eastern portion of this survey unit. The entire area was very dry and with only the occasional creek.

This area did not seem suitable for bear and only a few diggings were observed.

Several well used caribou trails were observed east of the Highway.

.../2

Map Reference Numbers:
1 - 1♂ (legal)
2 - 2♀♀, 2 calves (caribou)
3 - 4♀♀, 1 lamb, 3♂♂ (young)
4 - 1♀, 1 yearling (sheep)
5 - 4♂♂ (2 young, 2 legal)
6 - 1♂ (legal)

D.L.

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone I, Low's Outfitting Area

Date: July 23, 1978

Aircraft: Shirley Helicopter's Ltd. - Gazelle

Pilot: W. Eng

Crew: D. Larsen, navigator-recorder
B. Smith

Weather: calm, 12°C, 50% cloud cover

Survey time: 17:50 - 19:05

Coverage: 90%

Habitat: Total of 177 square miles (458 sq km)
Potential Sheep Habitat - 90 square miles (233 sq km)

Boundary Description: The area is bounded on the south and west by Lomond Creek; on the east by the Hart River; and on the north by a wide valley orientated in an east-west direction and bordering Michelle Creek.

Observations: A total of 51 sheep (39♀♀ and yearlings, 10 lambs, 2♂♂) were observed in the eastern half of the survey unit.

One falcon and several golden eagles were recorded, as well as two caribou.

Remarks: The area is characterized by a lack of escape terrain and a predominance of low elevation foothills. One large nursery band (31 sheep) and several smaller ones were observed within a four mile radius of an unnamed peak (5607' elevation) located in the eastern portion of the study area. This group of mountains appear as an island, separated from neighbouring ridges by wide open valleys on all four sides. The importance of this area to nursery sheep should be emphasized.

.../2

Michelle Creek was flown for grizzly bears, however, none were observed. The habitat in this valley appears suitable for bear, and may be utilized as a migration route.

Map Reference Numbers:
1 - 1 falcon
2 - 21♀♀, 6 lambs, 2 yearlings, 2♂♂ (one legal, one young)
3 - 2♀♀ (sheep), 2 golden eagles
4 - 4♀♀, 2 yearlings (sheep)
5 - 6♀♀, 3 lambs
6 - 2♀♀, 1 lamb
7 - 1♀, 1 calf (caribou)

D.L.

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone H, Low's Outfitting Area

Date: July 21, 22 and 24, 1978

Aircraft: Shirley Helicopters Ltd. - Jet Ranger 206A

Pilot: G. Vaillancourt

Crew: 21st - D. Larsen, navigator-recorder
D. Russell
D. Horwood

22nd - D. Larsen, navigator-recorder
24th B. Smith

Weather: 21 - 22: cloudy, showers, 16°C
24th: sunny, calm, 15°C

Survey time: 21st: 10:50 - 12:10
22nd: 12:05 - 12:45
24th: 08:40 - 10:30

Coverage: 85%

Habitat: Total of 267 square miles (692 sq km)
Potential Sheep Habitat - 185 square miles (479 sq km)

Boundary Description: bounded on the west by a deep, narrow valley between the Blackstone River and Michelle Creek; on the south by the Michelle Creek valley; on the east by the Hart River; and on the north by a wide valley through which the Blackstone River runs.

Observations: Seventy-five sheep (43♀♀ and yearlings, 11 lambs, 21♂♂) were observed. One male moose and one gyrfalcon were also seen.

Remarks: This area is very diverse. There are wide valleys on the north and south boundaries and narrow canyons on the east and west boundaries. Many of the mountains are rugged and rise to elevation of 5000 to 6000 feet. Numerous alpine meadows occur throughout. This area appears to be ideal sheep habitat.

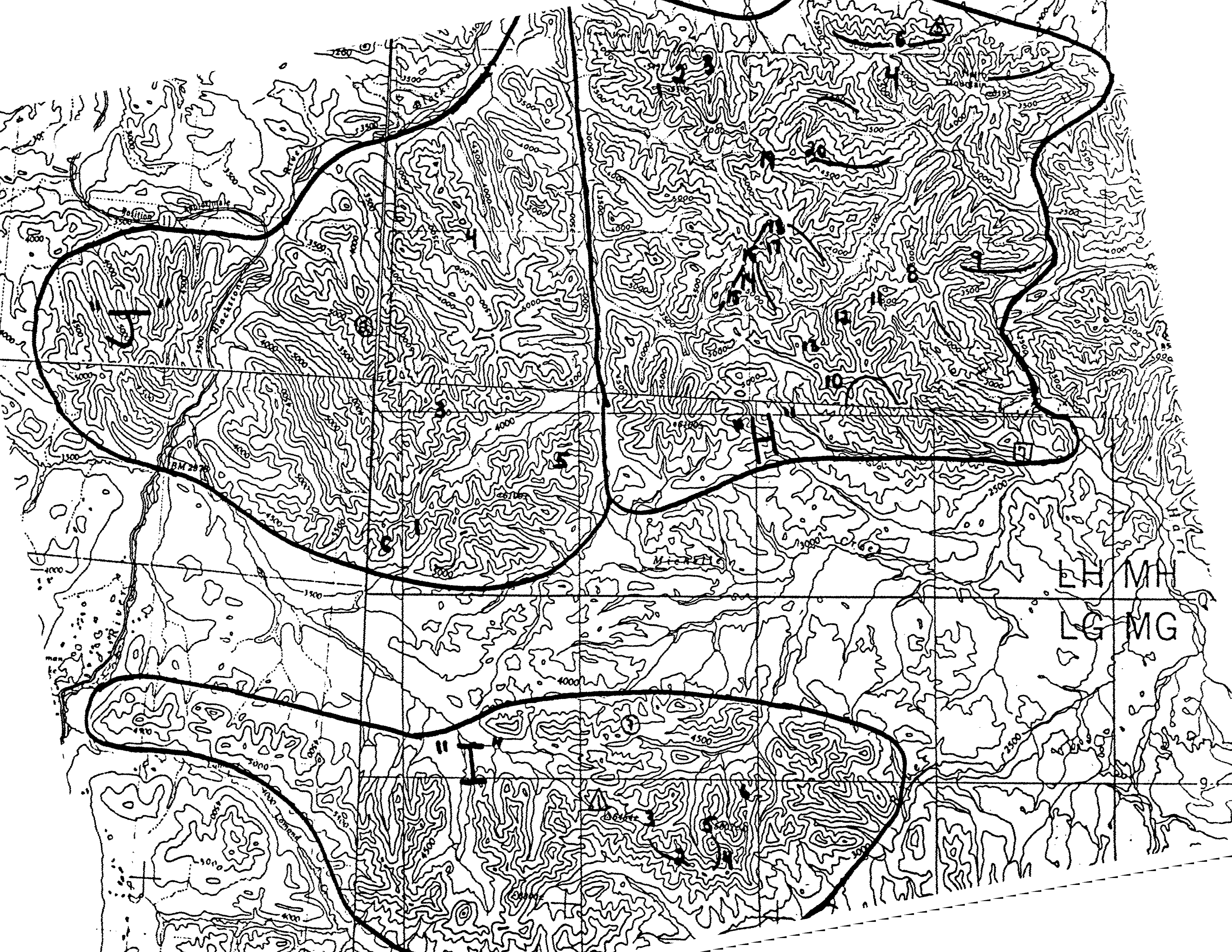
This area also appears to be good bear habitat, although none were seen.

.../2

Map Reference Numbers:

1 - 2♀♀ (sheep)
2 - 3♀♀, 3 yearlings, 1 lamb
3 - 4♀♀, 2 yearlings, 1 lamb
4 - 4♀♀, 3 yearlings, 2 lambs
5 - 1 gyrfalcon
6 - 3♀♀, 1 lamb
7 - 1♂ (moose)
8 - 2♂♂ (one legal, one young)
9 - 1♂ (legal)
10 - 3♀♀, 1 yearling, 2 lambs
11 - 2♀♀
12 - 2♂♂ (young)
13 - 1♂ (legal)
14 - 6♀♀, 1 yearling, 2 lambs
15 - 1♂ (legal)
16 - 9♂♂ (2 young, 7 legal)
17 - 2♂♂ (young)
18 - 1♀ (sheep)
19 - 5♀♀, 2 lambs
20 - 3♂♂ (young)

D.L.



"J"
"H"
"I"
LH MH
LG MG
Blackstone
Michelle
Creek
River
Lomond

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone K, Low's Outfitting Area

Date: July 25, 1978

Aircraft: Shirley Helicopters - Gazelle

Pilot: W. Eng

Crew: D. Larsen, Navigator-recorder
B. Smith

Weather: 50% cloud cover, calm, 17°C, showers

Survey Time: 1130 - 1330
1410 - 1425

Coverage: 80%

Habitat: Total 432 square miles (1119 sq km)
Potential Sheep - 162 square miles (420 sq km)

Boundary Description: The south and east boundaries are distinquished by Seela Pass, Blackstone River and the Dempster Highway. The western border is less distinct due to overlap into Reynolds outfitting area. It runs roughly south and west of Mt. Gibben, north to a large wide valley which also forms the northern boundary.

Observations: Eleven sheep (5♀♀, 1 lamb, 5♂♂), one ♀ moose, three gyrfalcons and two golden eagles were observed.

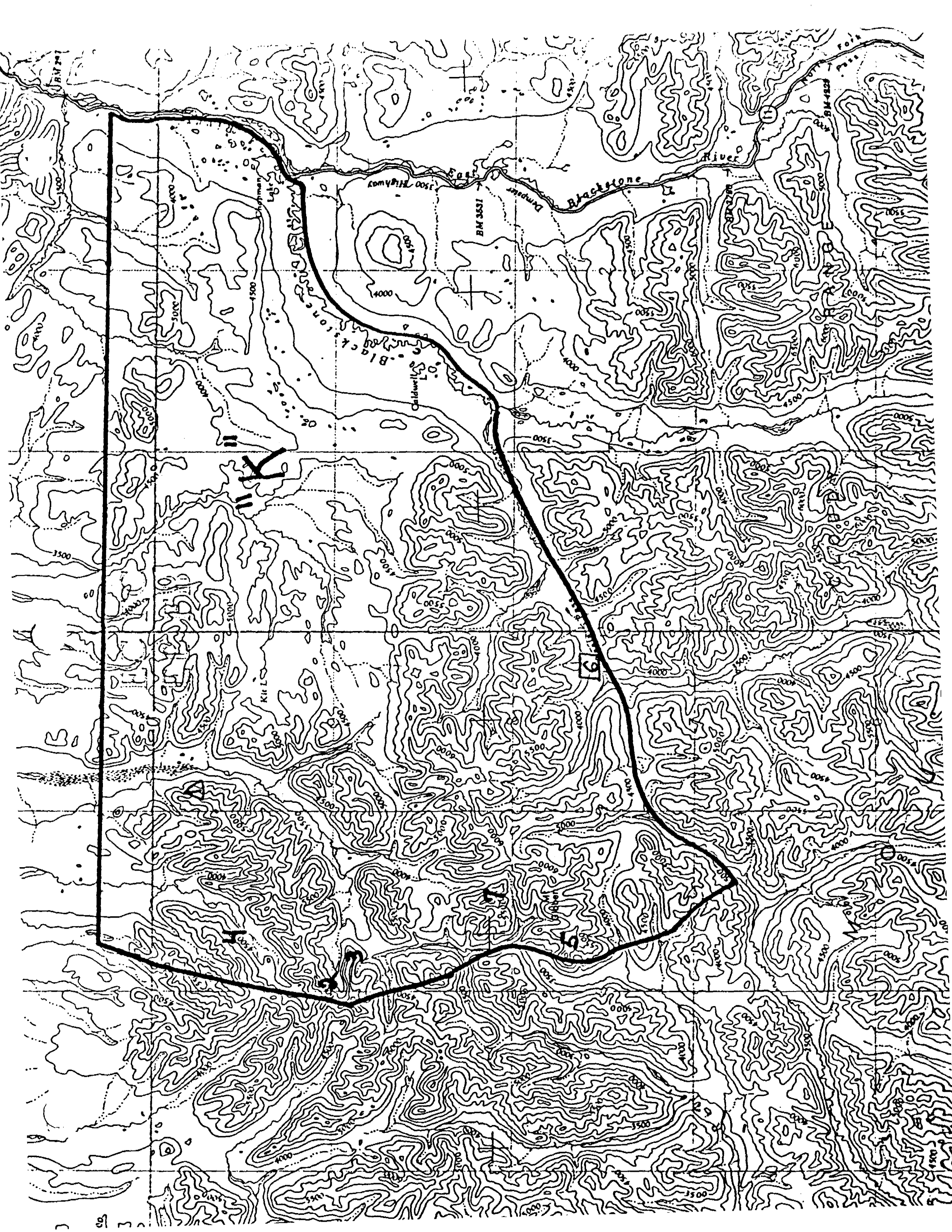
Remarks: The area is characterized by low, rolling vegetative hills in the east and high rugged mountains in the west. The only suitable sheep habitat occurs in the western limits of the survey unit. The remainder of the area lacks relief.

Numerous areas with surface mineralization (potassium and iron oxide) were observed in the western portion of this area.

.../2

Map Reference Numbers:

1 - 3 gyrfalcons
2 - 1♂ (young)
3 - 2♂♂ (legal)
4 - 1♂ (legal)
5 - 5♀♀, 1 lamb
6 - 1♀ (moose)
7 - 1♂ (legal)


East Blackstone River
Dempster Highway
Chapman Lake
Caldwell L.
Kit L.
BM 3531
North Fork Pass

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone M, Jensen's Outfitting Area

Date: July 26, 1978

Aircraft: Shirley Helicopters - Gazelle

Pilot: W. Eng

Crew: M. Hoefs, Navigator-recorder
D. Larsen

Weather: Calm, some sun, a few showers

Survey Time: 1645 - 1850

Coverage: 80%

Habitat: Total of 293 square miles (759 sq km)
Potential Sheep - 123 square miles (319 sq km)

Boundary Description: This survey unit is bordered by Lomond Lake and Lomond Creek in the north; the West Hart River in the south and east; and the Dempster Highway in the west.

Observations: Sheep were found in 12 different locations. The following numbers correspond to the locations on the map where respective bands of sheep, as well as other wildlife observations were made.

Remarks: The area covered has good sheep habitat in its western half and good mountain caribou and grizzly habitat in its eastern half. It is probably more than 80% vegetated. The sheep population is very accessible by the Dempster Highway and by the Hart River Road. According to Dan Drummond, Dawson C.O., 6 rams were taken from this population last season by resident hunters alone, because of this ease of access. It is probably because of this that no legal rams were located in any of the bands along the Dempster or along the Hart River Road. The sheep closest to the Dempster was a large nursery band around a cirque lake only four to five miles east of the road. On July 25, 1978, the pilot observed one ewe trying to cross the Dempster near Mile 60. She is part of this population which may be continuing across the road. The percentage of sheep

.../2

of sheep with black tails is about 5 - 10%, while the percentage of sheep with some grey coloration is higher and may be 10 - 20%, some of the sheep observed are typical "fannins".

Map Reference Numbers:

1 - 1 female moose

2 - 1 wolf

3 - 2♂♂ (rams less than 3/4 curl)
3♀♀, 1 yearling

4 - 1♀, 1 calf (caribou)

5 - 3♂♂ (caribou)

6 - 2♂♂ (rams less than 3/4 curl)

7 - 1♀ (black tail)

8 - 12♂♂ (8 rams more than 3/4 curl, 4 less than 3/4 curl)

9 - gyrfalcon

10 - gyrfalcon

11 - 6♀♀, 3 lambs

12 - 3♂♂ (caribou)

13 - 1♀

14 - 4♂♂ (less than 3/4 curl)
52♀♀ (probably some yearlings) (1 ewe definitely a fannin sheep)
5 yearlings
12 lambs

15 - 25♀♀, 9 lambs

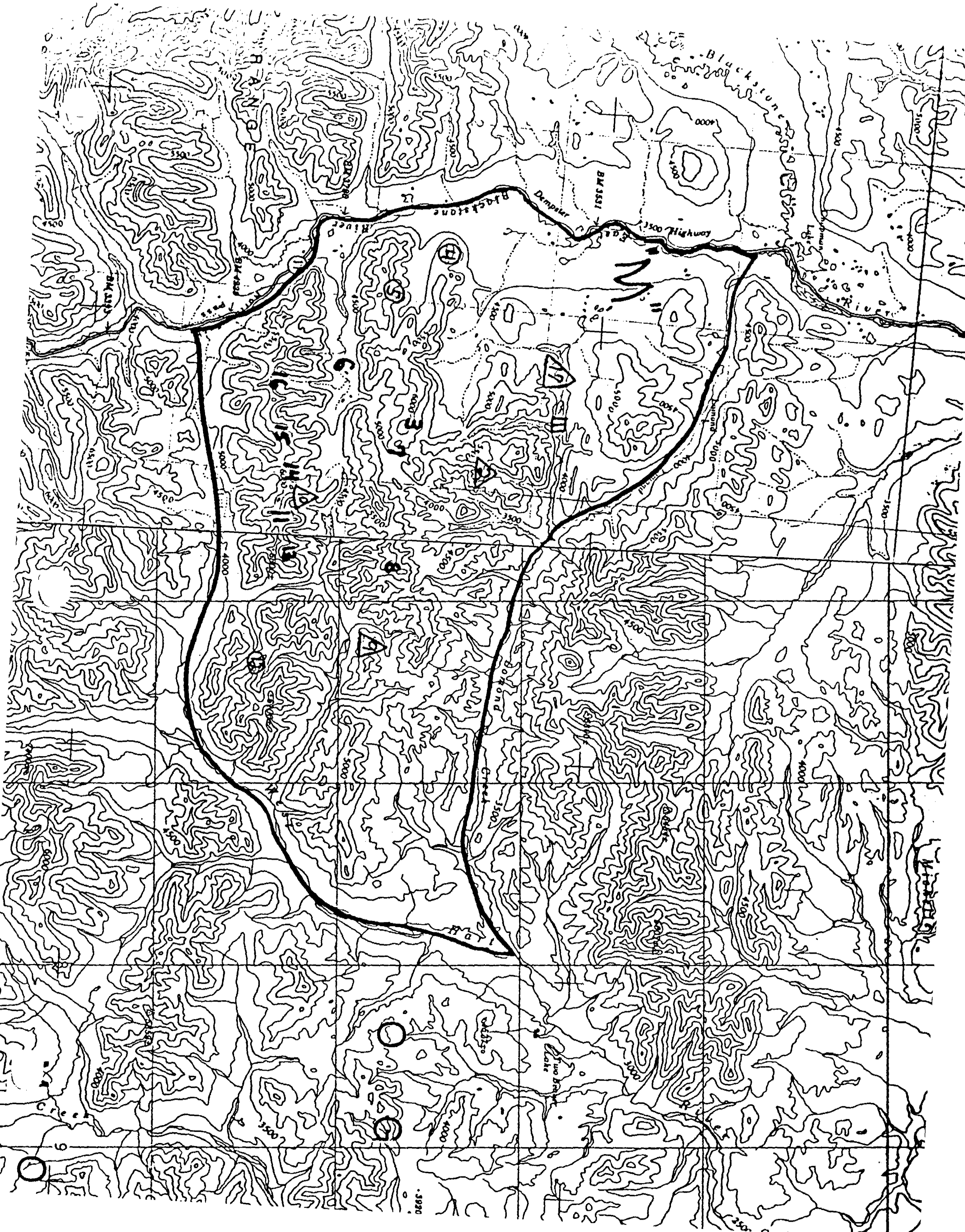
16 - 7♀♀, 2 yearlings, 1♂ (ram less than 3/4 curl)

17 - 1 yearling moose and one grizzly (see write up on Survey Unit "N")

TOTALS: 94♀♀, 8 yearlings, 24 lambs, 8 legal ♂♂ ($>$3/4 curl) and 13 young ♂♂ ($<$ 3/4 curl)

SUM: 147 sheep

OTHER WILDLIFE OBSERVATIONS: 8 caribou (6 bulls, 1 cow, 1 calf)
1 moose (♀)
1 wolf (unidentified)


Blackstone
RANGE
Dempster
Highway
River
Creek
Lake

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone L^2, Jensen's Outfitting Area

Date: July 27, 1978

Aircraft: Shirley Helicopter's Gazelle

Pilot: W. Eng

Crew: D. Larsen, navigator-recorder
M. Hoefs
P. Jenkins (Shirley Helicopters)

Weather: A.M. - 10% cloud cover, 20°C, 5 - 10 m.p.h. winds
P.M. - 90% cloud cover, 15°C, 10 m.p.h. winds, showers

Survey time: 10:25 - 12:15
17:25 - 18:15

Coverage: 90%

Habitat: Total of 303 square miles (785 sq km)
Potential Sheep Habitat - 211 square miles (559 sq km)

Boundary Description: Bounded on the east by the headwaters of the Blackstone near Tombstone Mtn.; on the west by Deadman's Gulch and the headwaters of the Fifteen Mile River (south fork); on the south by the Tombstone River, and on the north by Seela Pass and the headwaters of the Blackstone and Fifteen Mile Rivers.

Observations: A total of 64 sheep (29♀♀, 7 lambs, 6 yearlings, 13 legal rams and 9 young rams) were observed.

One group of caribou (5♀♀, 3 calves) were observed.

Other observations include one sow grizzly with two yearlings, two ♀♀ moose, 1 gyrfalcon and two golden eagles.

Remarks: The area is characterized by sheer vertical rock faces in the south-east corner, to rolling mountains throughout the remainder of the survey unit. The south east corner is part of the Tombstone Mountain formation. The lack of ideal habitat in this area is striking. The remainder of the area has mountains rising to between 4500 - 6500 feet elevation. Most are vegetated to the summit and a few isolated areas provide suitable escape terrain.

.../2

Map Reference Numbers:

1 - 1♀ (moose)
2 - 1 gyrfalcon
3 - 5♀♀, 3 calves (caribou)
4 - 14♀♀, 3 lambs, 1♂ (young)
5 - 1 grizzly, 2 yearlings
6 - 1♀ (sheep)
7 - 2♂♂ (1 young, 1 legal)
8 - 4♂♂ (1 young, 3 legal)
9 - 5♂♂ (1 young, 4 legal)
10 - 6♂♂ (3 young, 3 legal)
11 - 1♀, 1 lamb
12 - 9♀♀, 4 yearlings, 2 lambs
13 - 2♂♂ (legal)
14 - 2♀♀ (sheep)

D.L.

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone L^{1}, Jensen's Outfitting area

Date: July 26, 1978

Aircraft: Shirley Helicopter's Ltd. - Gazelle

Pilot: W. Eng

Crew: D. Larsen, navigator-recorder
M. Hoefs

Weather: calm, 20°C, sunny in the A.M., showers in the P.M.

Survey time: 08:35 - 10:45
13:55 - 15:00

Coverage: 90%

Habitat: Total of 432 square miles (1119 sq km)
Potential Sheep Habitat - 264 square miles (684 sq km)

Boundary Description: Bounded on the east by the Dempster Highway; on the west by the headwaters of the Blackstone and Tombstone Rivers. The southern boundary extends from Georges Gulch in a southeast direction bisecting Little Twelve Mile River and Jeckell Creek across to Benson Creek and back to the Dempster Highway.

Observations: A total of 262 (16299, 40 yearlings, 32 lambs, 28♂♂ (23 legal, 5 young)) sheep were observed in this area with the majority being in the northern half. A few were observed in the Tombstone Range and a few more in the southern third.

One adult grizzly was observed north of Tombstone Mountain. The northern half of this survey area appears good for bear. Some diggings were observed.

Sixty-one caribou were observed in the northern half of the survey area. One large herd of 3499, 11 calves and 1♂ were observed approximately five miles west of Jensen's base camp.

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Remarks: The survey area can be divided into three distinct habitat types. The first extends from the Blackstone River in the north to an unnamed creek running south westerly from the North Fork Pass to the Tombstone River. This area is characterized by rough escape terrain interspersed with extensive alpine vegetation. Numerous snow patches were observed at the 6000 - 6500 foot level. Caribou utilize these snow patches. This area is extensively used by sheep and caribou. The area also looks potentially good for bears although we only observed one.

The second habitat type is characterized by sheer rock faces rising vertically for 2000 - 3000 feet. Extensive escape terrain exists here, however, very little vegetation of any type occurs here. This formation occurs along a ribbon of mountains in the Tombstone Range between Tombstone River in the north, Little Twelve Mile River in the south, Dempster in the east and Georges Gulch in the west.

Numerous cirques occur throughout the middle section of this survey area. Very few sheep occur here.

The third type occurs in the southern third of Survey Area L^1. This area is characterized by areas of extensive escape terrain with significant alpine meadows. Both the east, south and west boundaries consist of foothills running into wide valleys or plains. Few sheep were observed in the area although the habitat seems suitable.

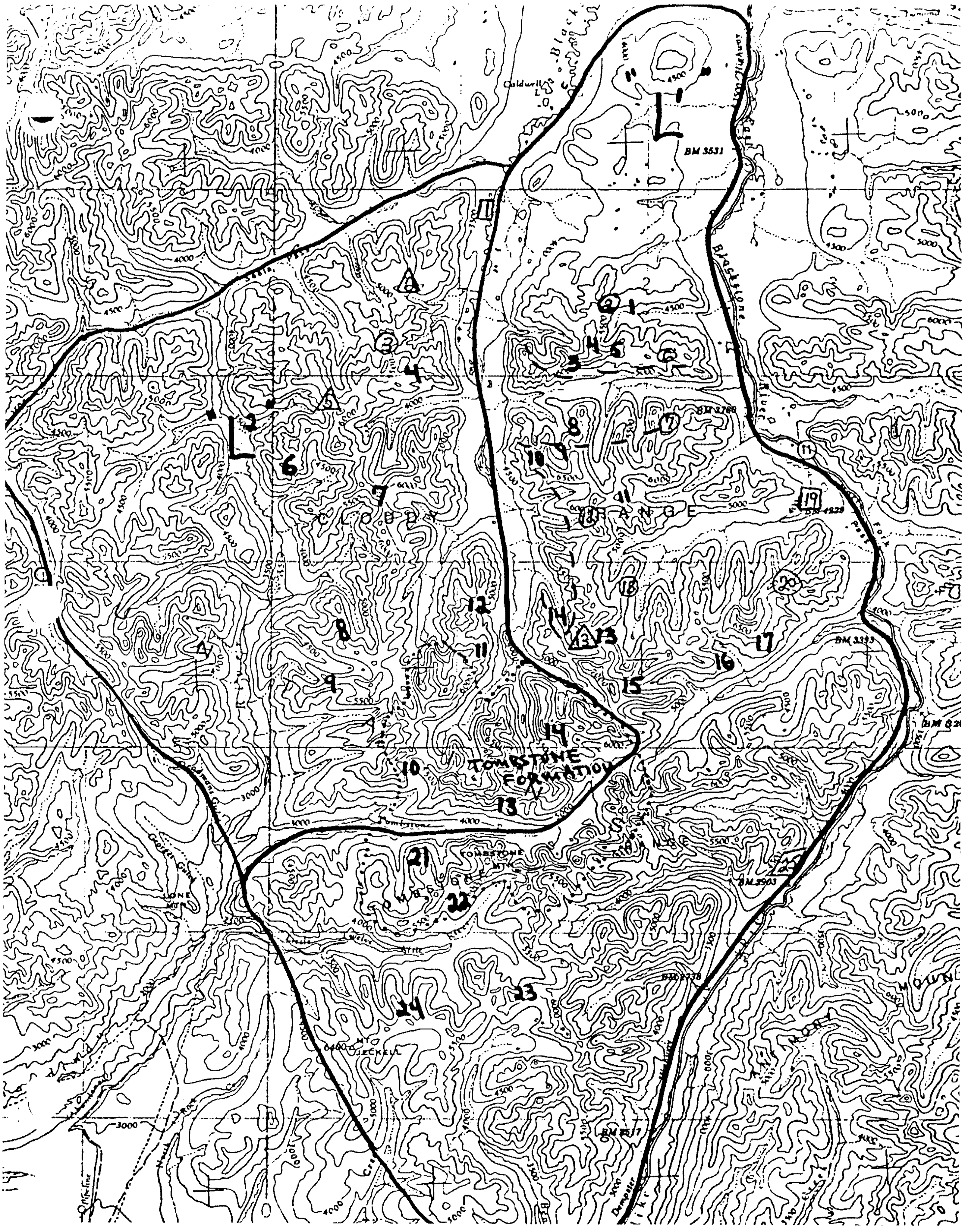
The most productive area within this survey area occurs in the top third.

Map Reference Numbers:
1 - 2♀♀, 1 yearling (sheep)
2 - 2♂♂, 1 ♀ (caribou)
3 - 1♂ (legal - fannin)
4 - 5♀♀, 2 yearlings, 1 lamb
5 - 6♀♀, 2 yearlings (sheep)
6 - 1♂ (caribou)
7 - 34♀♀, 11 calves, 1♂ (caribou)

.../3

8 - 19♀♀, 3 yearlings, 4 lambs, 4♂♂ (1 young, 3 legal)
9 - 1♀, 1 yearling (sheep)
10 - 48♀♀, 6 yearlings, 7 lambs, 2♂♂ (young)
11 - 18♀♀, 7 yearlings, 4 lambs
12 - 2♂♂, 1♀ (caribou)
13 - 5♂♂ (legal) sheep; 1 adult grizzly
14 - 55♀♀, 15 yearlings, 11 lambs, 3♂♂ (legal)
15 - 5♂♂ (3 legal, 2 young)
16 - 2♂♂ (legal)
17 - 1♂ (legal)
18 - 1♀, 1 calf (caribou)
19 - 1♂ (moose)
20 - 4♀♀, 1 yearling, 1 calf (caribou)
21 - 1♂ (legal)
22 - 6♀♀, 3 yearlings, 3 lambs
23 - 2♀♀, 1 lamb, 1♂ (legal)
24 - 3♂♂ (legal)
25 - 1♂ (moose)

D.L.


TOMBSTONE FORMATION
CLOUDY
RANGE
TOMBSTONE MTN
MT JECKELL
LONE MTN
Blackstone River
Caldwell L.
BM 3631
BM 3780
BM 3393
BM 3903
BM 2738
BM 3517

DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone O, Jensen's Outfitting Area

Date: July 28, 1978

Aircraft: Shirley Helicopters - Gazelle

Pilot: W. Eng

Crew: D. Larsen, navigator-recorder

Weather: 60% overcast, 5 - 10 mph wind, 20°C

Survey time: 16:00 - 18:20

Coverage: 70%

Habitat: Total of 668 square miles (1730 sq km)
Potential Sheep habitat - 374 square miles (969 sq km)

Boundary Description: Bounded on the west by the Dempster Highway, on the north by the headwaters of Officer, Hamilton and O'Brien Creeks. The southern border extends on the west from Antimony Creek to the Klondike River on the east. The eastern border runs along Davidson and Officer Creeks.

Observations: A total of 46 caribou (36♀♀ and young ♂, 7 calves, 3♂♂) were located. These animals were observed in the alpine and were closely associated with isolated patches of snow.

No sheep were observed however, several old trails were evident, indicating previous habitation.

Four moose were observed (2♂♂ trophy size, 1♀, 1 calf). These animals were located along creek beds. The female and calf were seen in the North Fork Pass enroute to the survey area.

One gyrfalcon and 4 golden eagles were observed. No bears were seen however, several diggings were spotted.

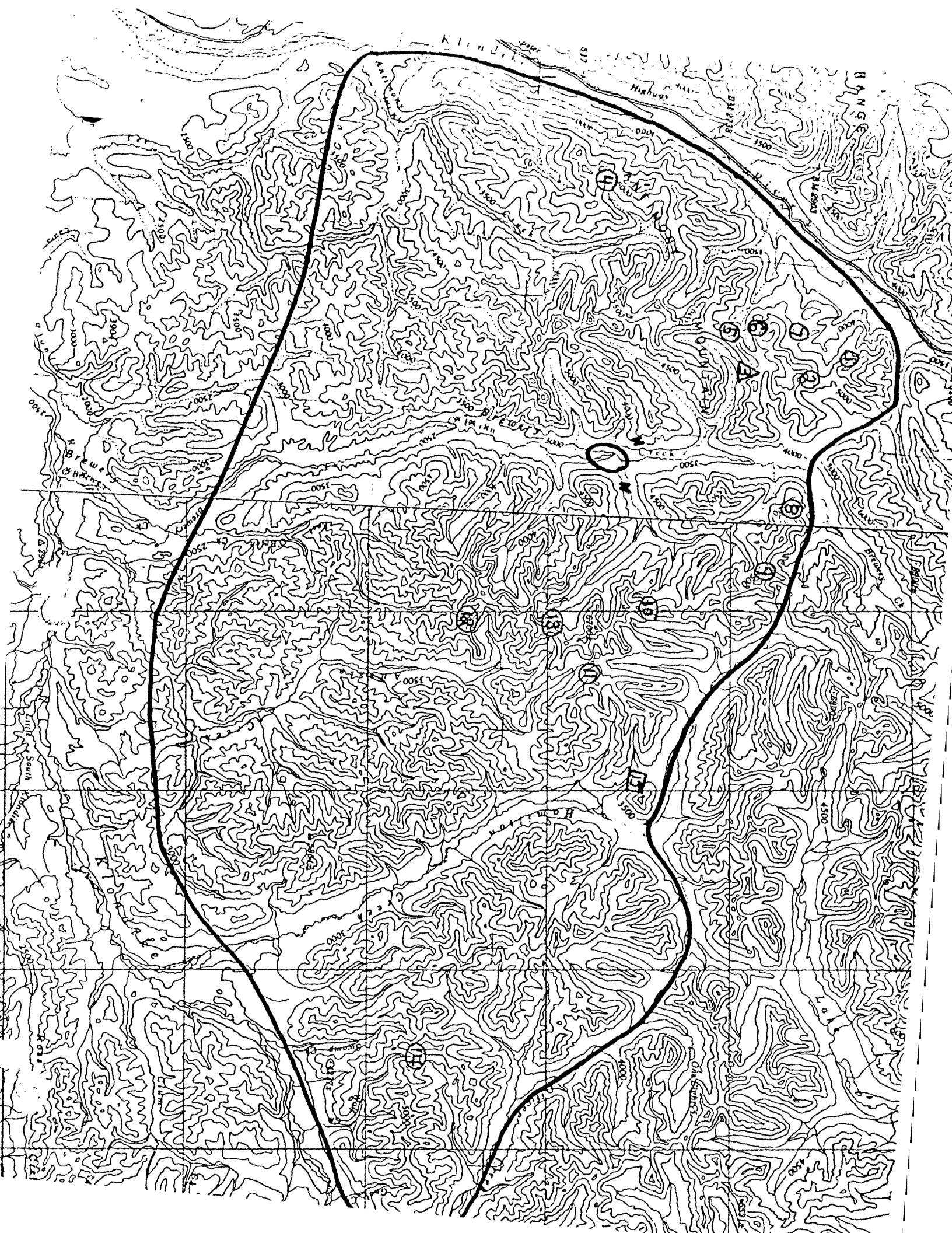
.../2

Remarks: The area is characterized by 80 - 90% rolling foothills, vegetated with a willow - spruce complex. In the central portion of this zone, several peaks and ridges rise above treeline. Escape terrain for sheep is limited.

The willow complex provides ideal habitat for moose and possibly bear.

Map Reference Numbers:
1 - 1♀ (caribou)
2 - 1♀, 1♂ (caribou)
3 - 1 gyrfalcon
4 - 3♀♀, 1 calf (caribou)
5 - 1♀ (caribou)
6 - 1♂, 5♀♀ (caribou)
7 - 2♀♀ (caribou)
8 - 2♀♀ (caribou)
9 - 4♀♀, 2 calves (caribou)
10 - 3♀♀, 1 calf (caribou)
11 - 8♀♀, 3 calves (caribou)
12 - 1♂ (caribou)
13 - 5♀♀ (caribou)
14 - 1♀ (caribou)
15 - 2♂♂ (moose)

D.L.



DEMPSTER SHEEP SURVEY - FIELD NOTES

Survey: Zone N, Jensen's Outfitting Area

Date: July 28 and 29, 1978

Aircraft: Gazelle (Shirley Helicopters Ltd.)

Pilot: W. Eng

Crew: M. Hoefs, navigator-recorder
D. Larsen

Weather: sunny, warm, calm; cloudy in the afternoon

Helicopter time: 3.1 hours (July 28)
3.2 hours (July 29)

Coverage: About 70% for sheep; 50 to 70% for caribou

Habitat: Total of 880 square miles (2279 sq km)
Potential Sheep Habitat - 581 square miles (1505 sq km)

Boundary Description: This large area took two flights to cover on July 28 and July 29, 1978. It is about 880 square miles in size. The area is bordered by the Dempster Highway on the west side, the West Hart River in the north, Rae Creek and Davidson Creek in the east and Officer Creek, as well as the headwaters of the Hamilton Creek and Brewery Creek, in the south. Adjacent to this area on its southside is located survey unit "O".

Observations: On July 28 a total of 30 sheep, consisting of 5 males (2 legal, 3 young), 19 females and yearlings and 6 lambs were observed. 1 male, 4 females and 1 calf moose were seen when flying low on return trip along the Hart River valley. One other female moose was seen in the survey unit. 169 caribou (10 males, 126 females and yearlings and 33 calves) were also observed in the area.

On July 29 2 female moose (perhaps 1 yearling) were seen in a pond along the Dempster Highway near Mile 50. One yearling moose and one grizzly were seen along the Dempster near the headwaters of Lomond Creek (marked "17" on map of survey unit M.

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On July 29 a total of 11 sheep were observed consisting of 6 males (legal), 3 males (young), 2 females and yearlings. One grizzly (medium size, "mottled", most likely a young male) was observed very close to a yearling moose and may have been stalking it. Six moose, consisting of 4 females 1 yearling and 1 calf were observed in the area. 575 caribou consisting of 17 mature bulls, 477 females and yearlings and young males and 81 calves were also observed in the survey unit.

The total for the entire survey unit "N" are as follows:
744 caribou, consisting of 27 mature bulls, 603 females and yearlings and young males, and 114 calves.
13 moose, consisting of 1 male, 10 females and yearlings and 2 calves.
41 sheep, consisting of 8 males (legal), 6 young males, 21 females and yearlings and 6 lambs.
1 grizzly (most likely a young boar).

Remarks: The sheep are distributed in the centre of the survey unit between Brewery Creek in the west and Lake Creek in the east. They are widely dispersed and most likely not subject to hunting. We counted 41 sheep with a natural sex and age structure and I doubt whether the total population in this survey unit is higher than 45 to 50.

Caribou are distributed throughout the survey area, but the largest numbers were observed in the eastern half of the area. We counted 744 and estimate the total to be around 1,000.

Moose and bear observations were made concurrently with sheep and caribou counts, and the numbers seen are inconclusive.

There are a number of areas within this survey unit which appear to be potential sheep range and there are some old sheep trails, particularly close to the Dempster Highway, but these areas are not occupied by sheep at this time. Perhaps there has been a die-off in the past or they were exterminated by market hunters in the goldrush days and have not made a come-back yet.

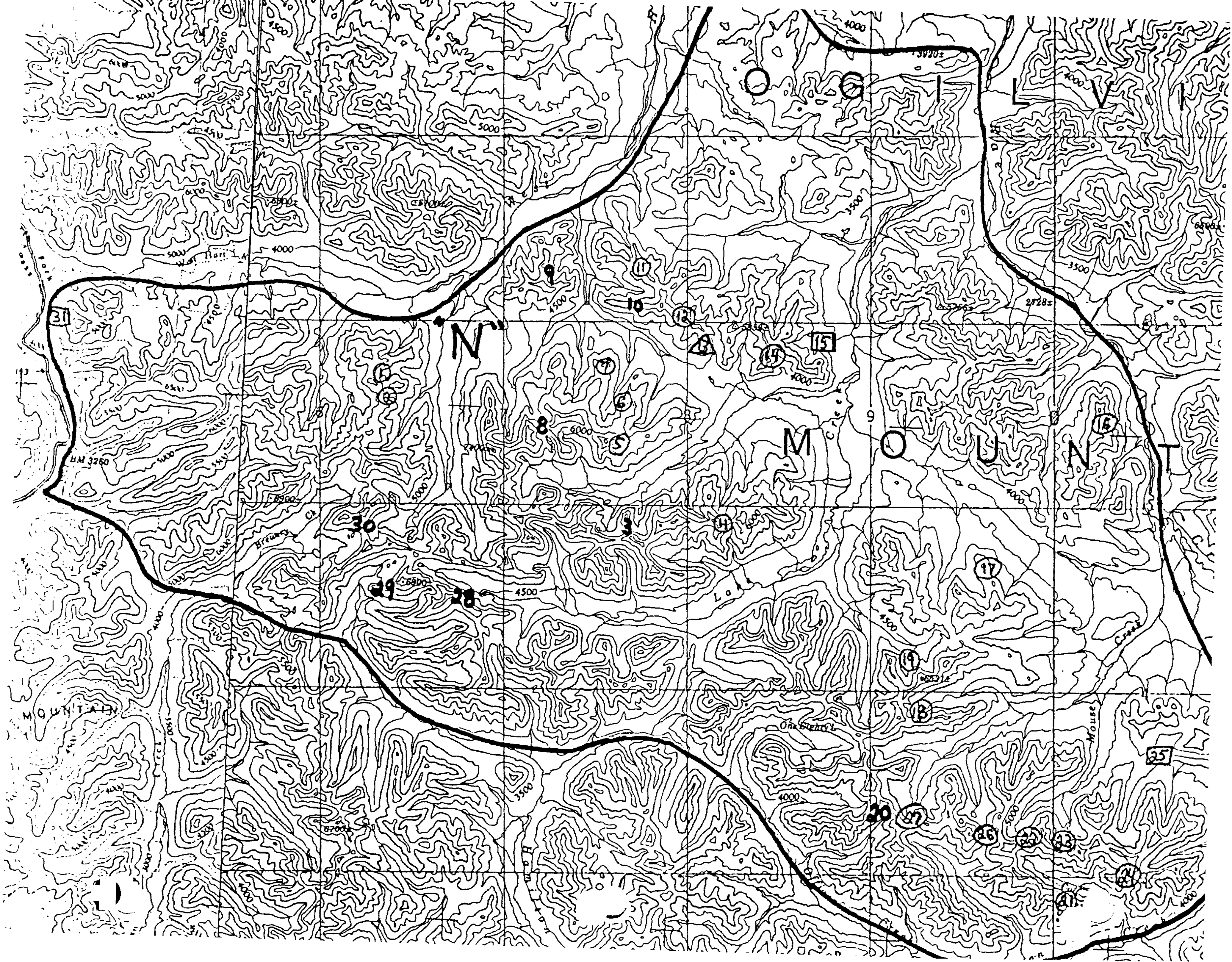
M.H.

Map Reference Numbers:
(July 28, 1978)

1 - 3 females, 1 calf (caribou)
2 - 10 females and yearlings, 3 calves (caribou)
3 - 5 females, 1 yearling (sheep)
4 - 2 females, 2 calves (caribou)
5 - 10 males, 84 females and yearlings, 23 calves (caribou)
6 - 12 females and yearlings, 3 calves (caribou)
7 - 5 females and yearlings (caribou)
8 - 1 male (young ram)
9 - 2 males (legal), 1 male (young ram)
10 - 1 male (young), 13 females and yearlings, 6 lambs
11 - 1 female (caribou)
12 - 8 females, 1 calf (caribou)
13 - 1 gyrfalcon
14 - 1 female (caribou)
15 - 1 female (moose)

(July 29, 1978)

16 - 2 females (caribou)
17 - 1 female, 1 calf (caribou)
18 - 2 males, 4 females, 2 calves (caribou)
19 - 183 caribou consisting of 10 males, 143 females and yearlings and 30 calves
20 - 1 female, 1 yearling (sheep)
21 - 1 female, 1 calf (caribou)
22 - 252 caribou consisting of 5 males, 215 females and yearlings and 32 calves
23 - 21 females and yearlings, 3 calves (caribou)
24 - 65 females and yearlings, 5 calves (caribou)
25 - 1 female (moose)


O G I L V I
M O U N T
Creek
Mouse Creek