Big Game Inventory in Game Management Zone 11

Hoefs and Lortie

(1976)

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Index

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Introduction:

In 1973 the Yukon Game Branch began a series of big game surveys with the aim to obtain gradually a complete inventory of the Yukon's wildlife resource. Such an inventory is essential for proper game management.

During 1973 the south central Yukon was covered, an area which now constitutes Game Management Zones 7 and 9.

In 1974 this inventory was extended to cover the west central Yukon, a large area which now makes up Game Management Zones 3 and 5.

This report covers survey work done in 1975 summer and 1975/76 winter, as well as a few additional flights to complete Game Management Zone 11 which was done in 1976.

Big game inventories consist of two stages: a) a summer survey done during July to establish the distribution and abundance of goats and sheep and b) a late winter survey, done during February, to count moose and caribou and to delineate their winter ranges.

About 35,000.00 (O & M) of the Game Branch budget is set aside annually for this survey work.

Cost of this Survey:

The cost of this aerial reconnaissance was approximately $36,000.00 for flying time and for aviation fuel purchase. It does not include salaries and travel expenses for the people involved in this project.

The flying costs were distributed as follows:

Summer 1975 (July 6 to July 26)	
105 hours with Hiller 12E	$18,000.00
Winter 1975/76 (Feb. 2 to Feb. 12)	
19 hours Jet Ranger helicopter	
34 hours Turbo Beaver	
TOTAL:	11,440.00
Summer 1976 (July 10-12/76 La Biche Range)	
7 hours Jet Ranger	2,500.00
Summer 1976 (July 23 to 27/76 Itsi Range)	
16 hours Hiller 12E	3,060.00
TOTAL:	$36,000.00

Methods and Materials:

This survey was carried out during the following time periods: July 6 to July 26/75 in the Logan Mountains; February 2 to February 12/76 throughout Game Management Zone 11; July 10 to July 12/76 in the La Biche Range; and from July 23 to July 27/76 in the Itsi Range. During this survey Mr. Hoefs and G. Lortie served as principal investigators with additional logistic assistance provided by Joe Jack, Bill Klassen, and Don Russell, all of the Yukon Game Branch. The aircraft used were Hiller 12E helicopter, Bell 206 Jet Ranger helicopter and De Haviland Turbo Beaver. The type of aircraft used for the individual flights, the pilots involved and the charter company are all listed on the daily summaries which are included in this report.

During the summer survey we operated out of the following base locations: Ross River, Finlayson Lake,MacMillan Pass, Hyland River crossing on Tungsten Road, and Watson Lake.

Aircraft fuel caches had been located throughout the survey area prior to initiation of this inventory. Whenever weather conditions permitted so, we did one morning and one afternoon flight of 3 to 4 hours duration each on the summer surveys. During winter only one mid-day flight is possible because of the short daylight hours.

Previous surveys have shown that the most appropriate period for sheep and goat inventories are the months of July and August. At this time the snow has melted in the mountains and the great majority of these animals have migrated to alpine elevations. Their white coat colour is fairly easy to locate against the dark green background of alpine meadows. Our surveys are largely being restricted to July, since flying time during August would greatly interfere with hunting at that time.

During the summer surveys an attempt is made to get complete coverage of the area and total counts of the animals (sheep and goats). The entire survey area (Game Management Zone 11) is divided into physiographic subdivisions; on most of them the goat or sheep populations appear to be more or less confined. At least, it is highly unlikely that exchange of animals would take place during our surveys. The flight path is traced on a map (1:250 000) to assure good coverage of an area. The next section in this report lists the physiographic subdivisions used in this summer survey.

Whenever a band of sheep or goats is located, one close pass is made over them to get a good count and a classification into adults and young, as well as into legal and young animals in the case of rams. Flight reports are written up in the evening after a days survey, giving details on the terrain covered, the number of sheep and goats encountered and classified, the total number estimated for the area, considering terrain type, percentage of coverage, weather conditions and visibility. Notes are also kept of the location of winter ranges and on other animals observed.

Winter surveys are carried out in February, a time when the great majority of moose have moved into the valleys. Caribou are also easier to count at that time since their dark colour shows up very well in the snow, also the extent of caribou activity and numbers reflected in the amount of tracks and feeding craters observed.

Description of physiographic units used during summer survey.

In order to facilitate complete coverage of Game Management Zone 11 in our aerial surveys this large area was broken down into smaller units, each of which representing a fairly discrete mountain range with a distinct boundary, across which the movement of goats and sheep is unlikely, at least during the period of our survey. The boundaries of these units are briefly outlined below, starting with unit A (Itsi Range) in the northern most corner of G.M.Z. 11 and ending with Unit Z (La Biche Range) in the southeastern corner of G.M.Z. 11.

Unit A.

Bordered by Y.T. - N.W.T. boundary in the north and east, North Canol Road in the west, and Itsi Lakes - Wilson Lake chain and Ross River in the south.

Unit B.

Bordered by Prevost River in the south and east, North Canol Road in the west, and John Lake - Itsi Range in the north.

Unit C.

Bordered by Prevost River in the south, Wilson Lake - Ross River in the north, N.W.T.-Yukon boundary in the east.

Unit D.

Bordered by N.W.T.-Yukon boundary in the east, Prevost River in the north, Otter Lake chain in the west, and Summit Lake-Pelly River valley in the south.

Unit E.

Bordered by N.W.T-Yukon boundary in the east, Pelly River-Summit Lake valley in the north, and Woodside River in the south.

Unit F.

A large area bordered by Prevost River-Otter Lake valley in the north, the Pelly Lakes-Fortin Lake-Fortin Creek valley in the ~~west~~ east, the Campbell Highway in the south and the North Canol Road in the west.

Unit G.

Bordered by Pelly Lakes-Fortin Lake valley in the west, Ptarmigan Creek and Narchilla Brook in the north, Yusezyu River in the east and the Campbell Highway (Finlayson Lake-Finlayson River) in the south.

Unit H.

Bordered by Woodside River in the north, Ptarmigan Creek and Narchilla Brook in the south, and the McPherson Lake-Upper Yusezu River in the east.

Unit I.

Bordered by McPherson Lake-Yusezu River-Little Owls Mountain in the west, N.W.T.-Yukon boundary in the north, the Tillei Lake depression in the south and east extending across the 8437 peak to the Hyland River in the east.

Unit J.

Bordered by the Upper Hyland Lake-Hyland River in the west, the N.W.T-Yukon boundary in the north and east, and an unnamed creek in the south, which drains into the Hyland River about 6 miles north of the mouth of Tyers Pass Creek.

Unit K.

Bordered by the Tillei Lake depression in the north, Hyland River in the east, Yusezu River in the west and Anderson Creek-Anderson Lake in the south.

Unit L.

Bordered by the Hyland River in the east, the Upper Anderson Creek in the northwest up to its drainage into Anderson Lake, a depression between Anderson Lake and Tyers River in the west and Tyers Pass Creek in the south.

Unit M.

Bordered by Anderson Creek in the north, the valley between Anderson Lake and Tyers River in the east, Tyers River in the south and the Campbell Highway in the west.

Unit N.

Bordered by Tyers River and Frances River in the north and west, Tyers Pass Creek in the north and the Tungsten Road in the east and south.

Unit O.

Bordered by the West Coal River and northward extension of same valley in the east and north, the Tungsten Road in the west, and an unnamed creek in the southwest which drains into the Hyland River just south of Lower Hyland Lake.

Unit P.

Bordered by the Hyland River in the west and south, Green River in the east, and a depression in the north which is drained by two unnamed creeks, one draining to the east into West Coal River and one to the west into the Hyland River just south of Lower Hyland Lake.

Unit Q.

Bordered by Coal River in the east, West Coal River in the west, the N.W.T.-Yukon boundary in the north, and an unnamed creek draining into the Hyland River in the northwest.

Unit R.

Bordered by Coal River in the west, the N.W.T. boundary in the north and north east, the Upper Rock River in the east, and a depression drained by an unnamed creek in the south, which joins Coal River just north of the mouth of Quartz Creek.

Unit S.

Bordered by the Tungsten Road in the north, the Hyland River in the east, the Campbell Highway in the west, and the False Canyon Creek-Stewart Lake valley in the south.

Unit T.

Bordered by the Campbell Highway in the west, the B.C. boundary in the south, the Hyland River in the east, and the Stewart Lake depression in the north.

Unit U.

Bordered by the Hyland River in the west, Green River in the north, Coal River in the east, and the B.C. boundary in the south.

Unit V.

Bordered by Coal River in the west, Rock River in the east, and the B.C. boundary in the south.

Unit W.

Bordered by Rock River in the west, N.W.T. border in the north, Toobally Lake chain in the east, and the B.C. boundary in the south.

Unit X.

Bordered by the Toobally Lake chain in the west, the N.W.T. border in the north, Whitefish River in the east, and the B.C. boundary in the south.

Unit Y.

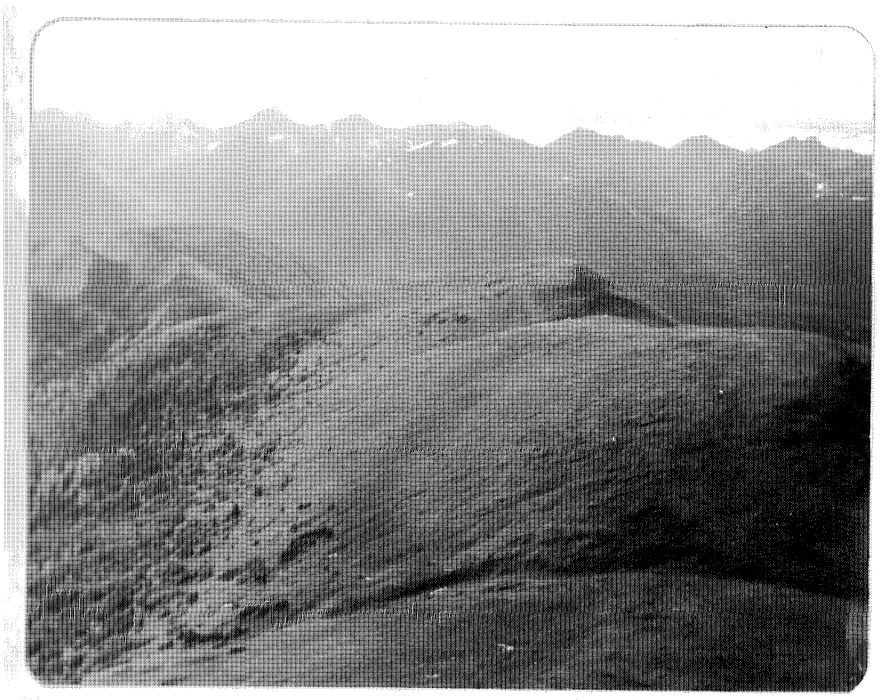
Bordered by the Whitefish River in the west, the N.W.T. boundary in the north, La Biche River in the east, and the B.C. boundary in the south.

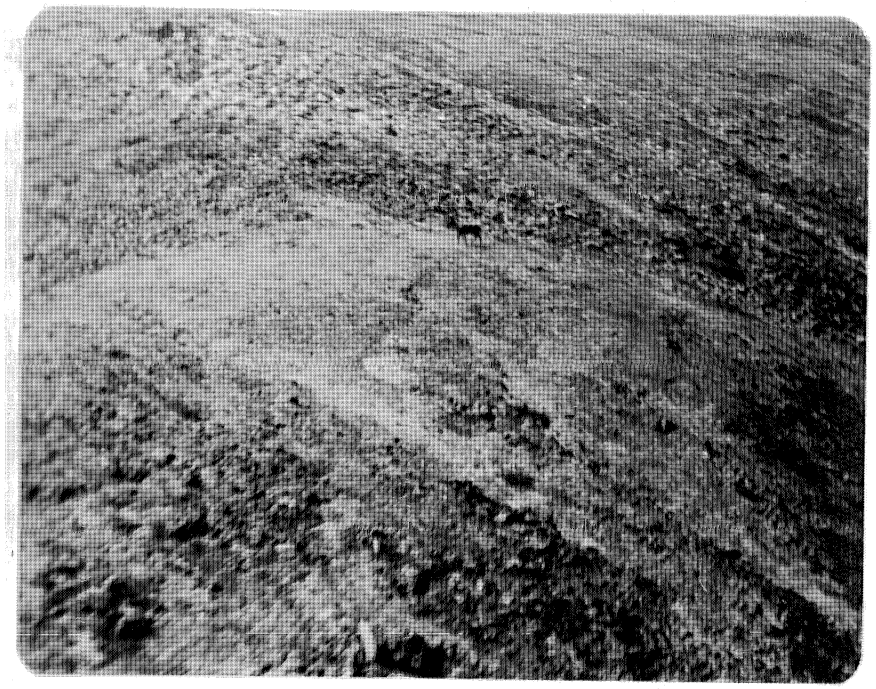
Unit Z.

Bordered by the N.W.T. border in the north and east, and the La Biche River in the west and south.

Photographs of Habitat Types

in Game Management Zone 11





Many of the mountains in Game Management Zone 11 are of the "low-rolling-rounded" types. They do not provide escape terrains for goats or sheep but are excellent summer range for mountain caribou.

Sheep habitat in the La Biche Range, southeastern Yukon Territory. This mountain range is located along the Yukon-N.W.T. border, and most good sheep habitat - as shown on these photos - is found in the N.W.T.

Goat habitat in the Logan Mountain east of Cedar Lakes. Lush green meadows at the base of mountains associated by cliffs above, used as escape terrains.

The Logan Mountains (here Mt. Hunt area) offers some excellent challenges to mountain climbers.

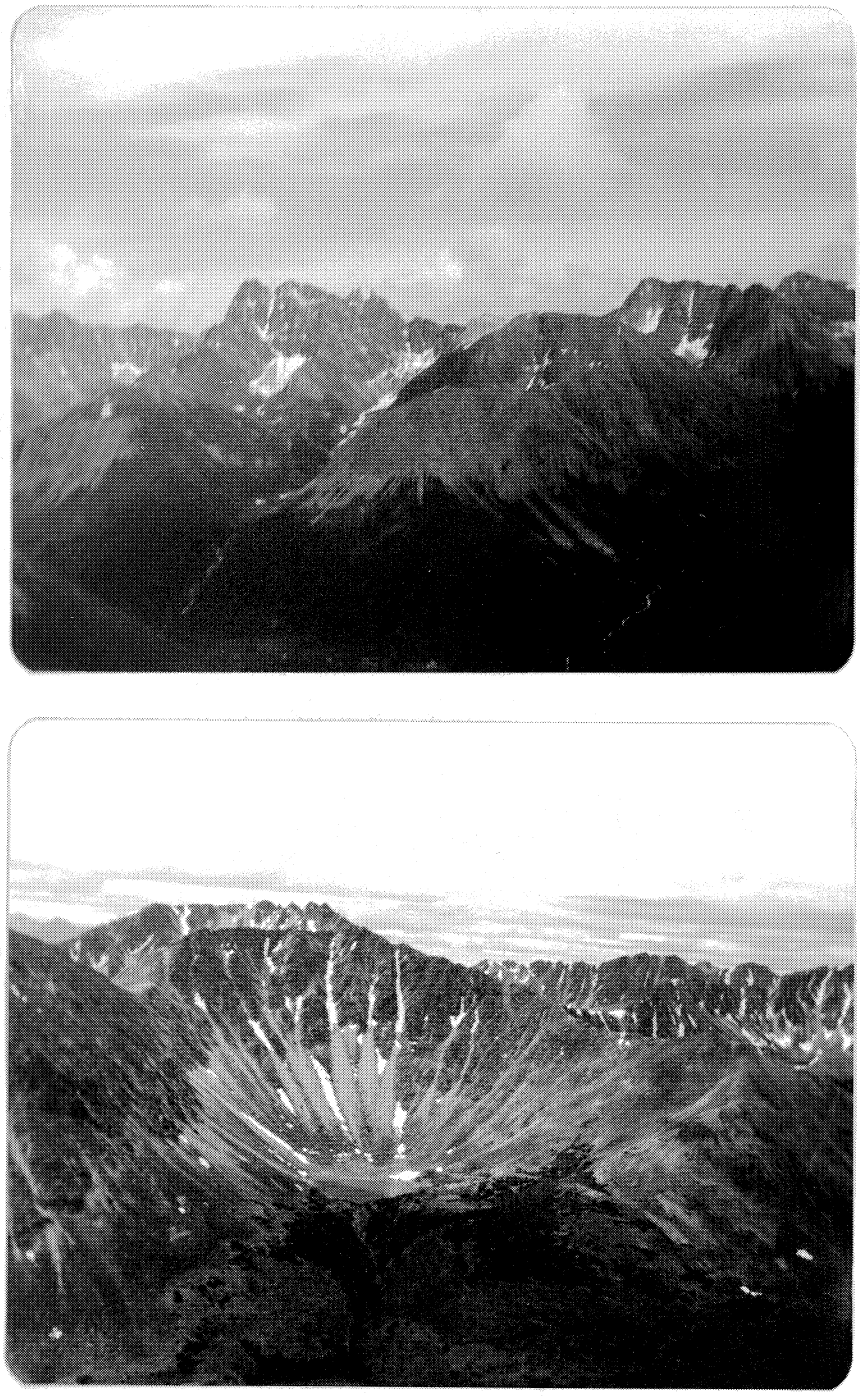


Photo showing typical mountain scenery of the Logan Range near the Yukon-N.W.T. border.

Results of summer surveys

The numbers of goats, sheep and caribou observed in Game Management Zone 11, as well as the total numbers estimated, are shown on the following table.

We located a total of 219 goats and estimate the total population in G.M.Z. 11 to be around 300. Perhaps 10% of these goats may move back and forth across the Yukon - N.W.T boundary.

A total of 177 Dall sheep were located all along the N.W.T. border or over on the N.W.T. side of the border. Based on the sex and age compositions observed it is estimated that the total population will be around 320. It is reasonable to say that none of these sheep will be a year-round Yukon resident.

Besides moose, which will be dealt with in a separate section, caribou are the most numerous big game animal in G.M.Z. 11. We observed 820 during our summer reconnaissance and put the total estimate at at least 1300. Almost all of the caribou leave G.M.Z. 11 during the winter. A population of perhaps 500 winters west of Finlayson Lake in G.M.Z. 10, while the majority is assumed to move across the border and spend the winter in the N.W.T.

Table:

SUMMARY OF GAME POPULATION ESTIMATES

Area	Goats Observed	Goats Estimated	Caribou Observed	Caribou Estimated	Sheep Observed	Sheep Estimated
A	7	10	68	120		
B	0	0	50	80		
C	1	5	11	15		
D	1	1	90	120		
E	0	0	160	200		
F	0	0	12	15		
G	0	0	12	15		
H	0	0	16	20		
I	0	0	32	50		
J	3	5	148	160	19	25*
K	7	20	23	30		
L	40	50	5	10		
M	25	40	7	15		
N	18	25	50	70		
O	19	25	69	100		
P	33	35	21	30		
Q	62	70	35	50	2	5*
R	1	1	10	20	25	30*
S	2	2	0	5		
T	0	0	0	20		
U	0	0	0	30		
V	0	0	0	20		
W	0	0	0	30		
X	0	0	0	30		
Y	0	0	0	20	0	12*
Z	0	0	1	10	131	250*
SUM	219	290	820	1285	177	322

* This sheep habitat is distributed on both sides of the border and the sheep may be found in either the Yukon or Northwest Territories.

DETAILED FLIGHT NOTES
OF
SUMMER SURVEY

SUMMER SURVEY OF GAME MANAGEMENT ZONE 11 - July 6, 1975

DURATION: 1000 to 1715 (6.2 hours helicopter time).

WEATHER: Sunny with some clouds, calm, warm.

PILOT: Chuck FORD

OBSERVER-NAVIGATOR: Manfred HOEFS

AREA SURVEYED: The area surveyed is in the northwestern section of Game Management Zone 11 and is bordered by the North Canol Road and the Campbell Highway in the ~~east~~ west and ~~northeast~~ northwest, the Prevost River in the north, and a meandering valley occupied by Otter Lake, an unnamed creek flowing into the Pelly River from south of Otter Lake, portions of the Woodside River, Ptarmigan Creek and the McEvoy Lake area in the east. For details of boundaries the reader is referred to the maps and to the descriptions of the physiographic units with Game Management Zone 11.

In spite of the fact that the area surveyed had a number of mountain ranges (some, for instance Traffic Mtn. reaching an elevation of 6700 ft.), no sheep nor goats were observed in this surveyed area. Large portions of it show evidence of recent forest fires and the vegetation is of successional nature. This fact, plus numerous lakes, shallow ponds and marshes in the area make it an ideal moose habitat. A few moose were observed in shallow ponds as well as in the sub-alpine shrub zone, but detailed estimations of the number of this species will have to be done during the winter.

The area appears to have a good population of mountain caribou, a total of 12 were observed in 4 different areas, and there were a number of fresh tracks in other areas on snow patches. Many of the mountain ranges have an elaborate trail system going over them, which indicates that a substantial number of caribou have been using the area for a long time.

Well-marked trails were observed on mountains with the following coordinates:

61 - 52' north	131 - 22' west
61 - 59' north	130 - 04' west
61 - 52' north	130 - 16' west
62 - 00' north	130 - 15' west

Traffic Mountain (north of Pelly Lakes)

62 - 14' north	130 - 42' west
62 - 18' north	130 - 22' west
62 - 21' north	130 - 45' west
62 - 32' north	130 - 37' west (Mt. + 6034')

The largest number of caribou actually observed was a bachelor band of eight on the mountain south of Otter Lake, which is a portion of Unit "D".

Some mountains in the area surveyed (for instance the range south of the Prevost River with a peak of 6034 ft., Traffic Mountain, as well as several areas on the large mountainous area between Pelly Lakes in the north and McEvoy Lake in the south) have all the necessary requirements to support at least small sheep and goat populations, but none were seen nor was any evidence of previous occupancy observed. Perhaps these mountain animals never extended their range onto these mountains since they are fairly isolated and large valleys would have to be crossed to get to them. Some of these areas, in particular Mt. Traffic, could be considered for introduction purposes.

A number of photographs were taken of the mountain range between Pelly Lakes in the north and McEvoy Lake in the south to show the phsiography of the area and to document their suitability as habitat for sheep and goats.

DAILY SUMMARY - 7 July, 1975

PILOT:	C.E. FORD	OBSERVATION CONDITION:	Excellent
OBSERVER:	G. LORTIE	% COVERAGE:	75%
HELICOPTER:	CF-OKI	SURVEY HOURS:	6.9

AREA SURVEYED: Western portion of Area "D" and southeastern portion of Area "C".

MOOSE: Observation numbers: (1) male mouth of Fortin Creek in lake feeding on aquatics; (11) near Fortin Lake, 3 unclassified moose in lake feeding on aquatics; (12) males near Fortin Lake in pot hole feeding on aquatics.

GRIZZLY: Observation number 2, 1 small - blond with dark back-stripe and spectacles - root digging in alpine zone.

CARIBOU: Observation #3, recent caribou tracks in a snow bank; (5) 2 female caribou (antlerless) with calves; # (7) 1 female caribou with a calf and 1 unclassified caribou; (8) 4 female caribou and 1 calf; (9) one male caribou. All caribou noted were lying down on snow banks in the alpine zone.

GOLDEN EAGLE: At #(5) D; and (6) C; and (10) D.

At Observation #4; SEREM EXPLORATION camp; Chief, Peter TAGGART, G. DRYZMALA, pilot (CF-YUC). This party has been on location for a week and have seen one male moose; 2 female caribou with calves near their camp.

The ATLAS EXPLORATION camp on the east side of Fortin Lake (Arc. 1966) is a mess. Several dozen boxes of core, tent frames and poles, miscellaneous machinery parts, stoves and garbage are strewn about the site. ATLAS abandoned about 15 MT drums and about 12 full

drums of stove oil, some of which are rusting and subsiding into muskeg. HORMAN MANAGEMENT as well has left 2 aviation 100/130 drums on the site. These drums are dated 19/9/74.

All of the terrain covered today was devoid of sheep and goat or their sign. Habitat in some locations appear favourable compared to known occupied range in the Dawson Range. As Manfred speculates, perhaps prohibitive winter snow depths and a lack of escape terrain precludes year round occupation. These 5000' ridges and hills appear to be first class caribou winter range, and caribou in the past have occupied the area in large numbers as evidenced by extensive well worn trails. Some of these trails, the ones noted on the map, appear to have been used recently. It is possible that several hundred caribou wintered here and moved northeast into the NWT last spring. Wintering caribou were common in the region west of Finlayson Lake last year.

SUMMER SURVEY OF GAME MANAGEMENT ZONE 11 - July 8, 1975

DURATION: 0800 to 1830 (810 hours helicopter time), stops for lunch and refueling at Summit Lake.

WEATHER: Sunny, calm, very warm (ideal for flying).

PILOT: Chuck FORD

OBSERVER-NAVIGATOR: M. HOEFS

AREA SURVEYED: Selwyn Mountains along N.W.T. border, Survey Units "D" (complete), "D" (eastern portion), "H" (small central section). See Nahanni map for details of boundaries.

These areas are located north and south of Summit Lake along the N.W.T.-Yukon border.

DESCRIPTION:

The entire area covered is ideal caribou range. Even though a few rugged mountains with steep cliffs were found, the topography is for the most part gently rolling with rounded hills. A large portion of the area is above treeline and has lush, green meadows, particularly at elevations of the sub-alpine shrub zone. The presence of a considerable amount of snow at this time of the year indicates that the winter cover must be fairly severe, and this is perhaps the reason why neither sheep nor goats become established in this area in spite of the fact that some suitable habitat is available. The dominant vegetation cover in the valleys is black spruce which often occurs in open stands with an abundance of lichen cover on the ground as well as on the trees. These valleys also have many ponds and large sedge meadows. They are, therefore, ideal winter ranges for caribou.

Almost all mountain investigated had signs of caribou on them, either in the form of live animals, or in the form of indirect evidence as cast-off antlers, fresh tracks on snow patches or well-worn trails on scree slopes or along the ridges of mountains. The largest numbers were observed close to the N.W.T. - Yukon border, immediately north and south of Summit Lake.

The following numbers were observed in the three survey units investigated:

Area "H" Very small central section. Only trails seen and tracks of a few animals on snow patches.

Area "D" Eastern portion. A total of 77 caribou were counted consisting of 51 unclassified animals, 3 bulls, 14 cows with 9 calves. A picture was taken of the largest group of unclassified caribou, consisting of about 30 so that classification will be possible from the photograph.

Area "E" Total unit. A total of 160 caribou were counted, consisting of 23 bulls, 49 cows and 6 calves, and about 80 unclassified animals. A photograph was taken of a large group of 60 so that further classification can be made.

OTHER OBSERVATIONS: Two moose, one bull and one cow, were observed to feed in the marsh east of Summit Lake near the Yukon - N.W.T. border. Photographs were taken of both of these animals.

One goat was observed about half-way between Summit Lake and the exploration development (Canax) about 10 miles to the north of it. This goat was in good habitat and it is likely that more of these animals inhabited the area before the exploration boom began in this area, some 3 to 4 years ago.

An inspection of the Summit Lake area showed that the recent exploration boom in the area, during which this lake was used as a staging point, has converted this unique pass into a garbage dump. The south shore is literally covered by old gas drums, tent frames, oil cans, hoses and exploration refuse of many sorts. Even the ordinary kitchen garbage was not buried or burned, but is lying around in big piles.

A number of photographs were taken of this appalling scene, as well as of the caribou and moose of the area.

DAILY SUMMARY - 9 July, 1975

PILOT:	C.E. FORD	OBSERVATION CONDITION:	Excellent
OBSERVER:	G. LORTIE	% COVERAGE:	75%
HELICOPTER:	CF-OKL	SURVEY HOURS:	6.9

AREA SUREVEYED: Area "H", Sheldon Lake and Frances Lake map sheet.

This area, northwest of McPherson Lake, is physiographically similar to those areas surveyed on the 7th.

Sheep and goat, and their sign was absent, despite what appears to be favourable habitat in small patches.

Again, this is first class caribou range with the following summary of caribou observations:

MALE	FEMALE	CALF	UNCLASSIFIED
2	3		11

SUMMER SURVEY OF GAME MANAGEMENT ZONE 11 - July 10, 1975

DURATION: 0815 to 1700 (6.5 hours helicopter time), refueling at Tusles Lake.

WEATHER: Sunny and high overcast in the morning, calm, cloudy and thunderstorm in the afternoon.

PILOT: Chuck FORD

NAVIGATOR: Manfred HOEFS

AREA SURVEYED:

Logan Mountains, including Mt. Hunt and Simpson's Tower. This area is referred to as survey Unit "M" on map sheet "Frances Lake".

DESCRIPTION:

Before beginning the reconnaissance of the high Logan Mountains, two smaller isolated "hills" were quickly investigated. "Nipple Mountain" located south of Mt. Hunt is potential goat range, but it is very small and no goats were observed here. Simpson's Tower is the highest elevation on the peninsula between the east and west arms of Frances Lake. This entire area appears to be good moose range, since much of it shows evidence of recent fires, and the successional vegetation consists largely of willows. Only a very small proportion of this area is above treeline. It is not suitable for goats or sheep, but a few caribou may be in the area in winter.

The mountainous portion of survey unit"M" was divided into four physiograph subdivisions, separated by wide valleys, which would not normally be crossed by goats or sheep (see maps for details). No sheep were observed in this area, and only the western-most two subdivisions had goats on them. The entire area is characterized by extremely rugged topography (mainly vertical granite cliffs), but the eastern ones have less vegetation cover, more scree, and most likely more snow cover. In this area up to 50% of the surface was still covered by snow.

The Mount Hunt area is known for its goats, but only 23 goats (20 adult and 3 kids) were located. Two more goats were found in the

central physiographic subdivision of survey unit "M".

The area shows evidence of caribou utilization, and a total of seven caribou were located; of these 2 were on Mt. Hunt and the other on the eastern subdivisions.

In general, it can be said that this entire area has a very low density of big game. This is no doubt the result of severe snow conditions on the eastern ranges, but it can hardly explain the scarcity of game on the Mt. Hunt area, which has all the characteristics of a good goat range. Considering the size of the area at least 100 goats should be able to live here, yet only 24 were observed.

There is no doubt that some goats may have been missed, because accurate censuses are extremely difficult in this type of terrain. As already pointed out, much of the higher elevations area were still covered by up to 50% of snow, making the locating of 'white' animals very difficult, and also the rugged topography provided many niches where animals may escape from vision. However, it is estimated that at least 50% of the goats were located and that the total population in unit "M" is at present not higher than 40 to 50 goats. As already pointed out, there are no sheep in this area.

DAILY SUMMARY - 11 July, 1975

PILOT: C.E. FORD
OBSERVER: G. LORTIE
HELICOPTER: CF-OKI
AREA SURVEYED: "O"

OBSERVATION CONDITION: Excellent
% COVERAGE: 60%
SURVEY HOURS: 5.7

	BULLS	COWS	CALVES	UNCLASSIFIED	
CARIBOU:	1	4	2		
	1	4	1		
				10 adult	
			3	8 adult	
		1			
		1		8	
				20	
				3	
				1	
	3	10	6	50	(69)
	Adult	Kid	1mm	Unclassified	
GOAT:	14	1	1	3	
	MALE	FEMALE	CALF		
MOOSE:	1	2	2		

EAGLE: 2

While flying over "P" to 23 Mile fuel cache, we noted 7 female and 3 calf caribou.

This range looks like sheep range and G. TOOLE says that he has periodically seen sheep here. However, if they currently occupy this ridge, they were not in

evidence today.

Our 60% coverage figure must be qualified by saying that it pertains primarily to the steep rock habitat at the head of canyons and on some north facing canyon walls, in the areas in which all goat observations were made.

Coverage for sheep would be more like 90% - enough to satisfy me that no sheep are presently on this ridge in the alpine zone.

DAILY SUMMARY - 12 July, 1975

PILOT: C.E. FORD OBSERVATION CONDITION: Fair

OBSERVERS: LORTIE & JACK % COVERAGE: 60%

HELICOPTER: CF-OKI SURVEY HOURS: 3.7

AREA "P" This ridge is physiographically similar to "O", though generally with a less rugged appearance. We were hampered today by a receding wind condition on the west side and our visibility was obscured by smoke of a large fire to the east of us - probably in the N.W.T.

The % coverage of goat habitat - again, near vertical headwalls and north facing canyon walls, was about 60%. Coverage of gentler terrain being about 90%, satisfies me that no sheep presently occupy this ridge.

CARIBOU:

MALE	FEMALE	CALF	UNCLASSIFIED
2	12	3	1

All caribou noted were resting on snow patches.

GOAT:

ADULT	YOUNG
13	3

GOLDEN EAGLE: 2

MOOSE:

MALE	FEMALE	CALF	UNCLASSIFIED
10	4	2	3

All moose noted were feeding in or near lakes in the Hyland River valley to the west of "P".

DAILY SUMMARY - 13 July, 1975

Today we were rained out. A spectacular lightning and thunder storm moved in late yesterday and continued until early this A.M. It rained all day today with fog - and signs of clearing up and promise for tomorrow. Chuck got away today and we have a new pilot - Brad WILSON. Tomorrow we will get started on "J", weather permitting.

We did chores around the camp. Joe drove up the road and located our border fuel cache.

DAILY SUMMARY - 14 and 15 July, 1975

PILOT:	Brad WILSON	OBSERVATION CONDITION:	Good and Excellent
OBSERVER:	G. LORTIE	% COVERAGE:	60 and 75% respectively
HELICOPER:	CF-OKI	SURVEY HOURS:	5.9 and 3.4

AREA "J":

This area, comprised mainly by the higher range that forms the continental divide, and associated ridges to the immediate west at the head of the Hyland, Little Hyland and west Coal Rivers, provides very spectacular scenery, a few goats, the ubiquitous caribou in small, scattered bands and very little else. 9.3 hours of flying produced 19 nursery sheep in one band.

It is most discouraging to cover so much lush and beautiful country and see so little in regard to large game. Most of the terrain reaches 6500' with occasional peaks 7000'+. The upper limit of alpine vegetation averages 6000' but a few valleys have vegetation to 6500'. Above 6500', the terrain is either scree slope or spectacular vertical rock, especially at the heads of canyons along the divide. Our % coverage is lower in this terrain due to its generally rougher geography and more complex drainage pattern.

The most worthwhile survey technique is to contour the range or isolated block of mountains at about the 6000' level, rising or dropping down, more or less to follow

the upper limit of vegetation in employing this technique, it is assumed the icy and rocky region above 7000' has a much lower probability of producing big game observations than the zone between the upper limit of spruce and the upper limit of alpine meadow. Most of the valleys are narrowly V or U-shaped and by flying the 6000' contour, affords the maximum visibility. Ridge-top flying over most of this country provides a very narrow visible zone, directly beneath the aircraft. On more rolling terrain, ridge flying is used, especially if the probability of worthwhile sightings is low.

CARIBOU:	Male	Female	Calf	Unclassified
	15	59	18	56

SHEEP: 19 nursery sheep, no lambs observed

GOAT: 3 adult goat

GOLDEN EAGLE: 3

MOOSE: 4 females

DAILY SUMMARY - 15 & 16 July, 1975

PILOT: B. WILSON

OBSERVER: G. LORTIE

HELICOPTER: CF-OKI

OBSERVATION CONDITION: Good to Excellent

% COVERAGE: 60 & 75%

SURVEY HOURS: 2.6 & 2.3 respectively

plus 1.6 hrs moving Summit Lk fuel cache

AREA "I" This area was remarkably devoid of game. Portions of Area "I" looked good for goat but none were found.

CARIBOU:

Male	Female	Calf	Unclassified
1	11		20

EAGLE: 1

MOOSE: 1 male was noted in the Hyland valley above the junction of the Little Hyland.

Today, the 16th, we moved the Summit Lake fuel cache out to the road at the cache 5 miles inside the Yukon-NWT border.

DAILY SUMMARY - 16 July, 1975

PILOT:	B. WILSON	OBSERVATION CONDITION:	Excellent
OBSERVER:	G. LORTIE	% COVERAGE:	60%
HELICOPTER:	CF-OKI	SURVEY TIME:	2.1 hours

AREA SURVEYED: The northern portion of area "L" between Shannon and Anderson Pass Creeks - Frances map sheet.

This upland comprises the best goat range seen to date by this observer. The geology is primarily folded and horizontally bedded sedements which are distinctively red to yellow in color. Vertical formations of these rocks occur in all canyons in this portion of area "L". A lush vegetation in gullies and erosion channels on the faces reaches to 6500'+ on southwestern exposures of these formations and it was precisely on these sites where most goat observations were noted.

GOAT: 36 adult and 1 kid

CARIBOU: 2 female, 1 calf and 2 unclassified

EAGLE: 1

FALCON: 1 gyr (grey)

WILDLIFE INVENTORY IN GAME MANAGEMENT ZONE 11 - July 17, 1975

DURATION: 0900 to 1800 with two breaks for refueling and lunc (6.14 hours helicopter time)

WEATHER: Variable, some rain in the afternoon.

PILOT: Brad WILSON

OBSERVER-NAVIGATOR: Manfred HOEFS

AREA SURVEYED: Unit "K" on map sheep "Frances Lake".

The area surveyed consists of extremely rugged physiography and extends from Tusles Lake in the east to the Hyland River in the west (see map Unit "K"). In spite of the fact that many areas were located that appeared to be good goat habitat, only 7 mature goats were located. In spite of the rugged topography, caribou and caribou signs were observed throughout the survey unit, particularly in its eastern and southern portions. A total of 23 caribou were observed in 6 groups, consisting of 10 bulls, 11 cows and 2 calves.

Because of the rugged topography and the snow and ice, it is likely that some goats will have been missed, but I doubt whether the entire goat population in this survey unit exceeds 20 to 30 animals.

Other observations: 2 golden eagles were seen during goat surveys and 5 moose (4 cows and 1 calf) were observed in the Hyland River valley during the return trip.

WILDLIFE INVENTORY IN GAME MANAGEMENT 11 - July 18, 1975

DURATION: 1000 to 1700, two stops for refueling and lunch, total flying time about 5.0 hours.

WEATHER: Cloudy, some sun in the late afternoon, occasional showers.

PILOT: Brad WILSON

OBSERVER-NAVIGATOR: Manfred HOEFS

AREA SURVEYED:

1) Southern half of survey Unit "L" between Anderson Pass Creek in the south

2) Northern portion of survey Unit "N", north of 61°x 15' latitude.

Both these survey units are on map sheet' "Frances Lake".

DESCRIPTION OF OBSERVATIONS: The southern half of survey unit "L" was flown in the morning after the rain had stopped. Most of this range is more suitable for caribou than for goats. Even though only one caribou cow was located many of the ridges in this area have well-worn caribou trails on them.

Only three goats in two bands were located, all of which appeared to be males. The coverage for goats was not too good because of cloudy conditions and a considerable amount of snow on north-facing aspects. However, as already pointed out, very little suitable goat habitat was located and it is therefore reasonable to say that not many goats were missed. I assume that we missed one nursery band with a few kids, and that the total number of goats in this half of survey unit "L" is not likely to be more than 10 to 15.

Survey unit "N" appears to be one of the better wildlife areas in the Logan Mountains, considering the low densities of big game observed so far. This area is not quite as high in

elevation and has no glaciers. Most of the snow has melted by now, even on north-facing slopes. The coverage of this area for goats was good and, I assume that 60% to 70% of the goats in this area were accounted for. Portions of this unit are accessible through two mining trails from the Tungsten Road. Goats were located in 7 different bands, totalling 16 animals. All these animals were adults. It is therefore reasonable to assume that some nannies with kids have been missed, since there must be some productivity in a population of this size. It is therefore estimated that the total number of goats in this area will be around 25 at least.

Portions of this range is excellent caribou habitat, as is obvious from the well-worn trails paralleling many ridge tops. A total of 38 caribou were located in 5 different bands with the following compositions: 1 bull; 29 cows and young bulls; and 8 calves.

WILDLIFE INVENTORY IN GAME MANAGEMENT ZONE 11 - July 20, 1975

DURATION: 1000 to 1700, with several breaks for refueling, lunch and fishing trails. (4.3 hours helicopter time).

WEATHER: Overcast, very windy. (flight was terminated because of bad wind).

PILOT: Brad WILSON

OBSERVER-NAVIGATOR: Manfred HOEFS

AREA SURVEYED: Unit "N"; Mt. Billings subdivision and smaller unit south of it to Tungsten Road. (Frances Lake map sheet).

DESCRIPTION: The area surveyed is very poor habitat for big game, since it consisted largely of mountains with no vegetation cover, whatsoever. Eroding intrusive rocks, often basalt, leaving entire mountain sides in "slap rock" formation. A few areas are suitable for goats around Mt. Billings, but only 2 mature goats were observed. It is unlikely that any goats were missed, since coverage was intensive, and little snow was left in the area.

Caribou were observed in rolling topography or on meadows at the base of cirques in 4 different bands, totalling 15 animals, consisting of 12 cows and 3 calves.

On the return trip we checked the large marsh area southeast of Mount Murray. We approached the river at the mouth of Stewart Creek and followed it north to our camp at the Hyland River bridge. Between the mouths of Stewart Creek and Taffie Creek the Hyland River has many oxbows and cut-off channels, there are also many marshes in the flood plains, and the whole area resembles the Nisutlin River valley on the smaller scale.

This area is used for Canada Geese to breed, and a flock of about 12 were seen on the River. They were flightless at this time of the year.

We counted a total of 19 moose in this marsh area, consisting of 3 bulls, 12 cows and 4 calves. This area also has a great variety of shore birds and waterfowl, but we did not approach them close enough for identification.

WILDLIFE INVENTORY IN GAME MANAGEMENT ZONE 11 - July 21,1975

DURATION: 1200 to 1930, with two breaks for lunch and refueling. Total helicopter hours 6.1).

WEATHER: Overcast, some rain, some sunshine, fairly strong wind. Survey did not start until 1200 noon, because of bad weather.

PILOT: Brad WILSON

OBSERVER-NAVIGATOR: Manfred HOEFS

AREA SURVEYED: Approximately the southern two thirds of Unit "Q", not done yet is the area east of Cedar Lakes to the N.W.T. border, which includes the headwaters of Coal River. Unit "Q" is contained on the Flat River map sheet.

DESCRIPTION: This area is good goat habitat and goats were located in 7 different bands, totalling 39 animals with the following classification: 32 mature goats, including yearlings and 7 kids. Goats were concentrated in two areas; firstly, in the central portion of this unit "Q", about 10 to 12 miles east of Cedar Lakes, and secondly, in the southern portion, just north of the junction of Coal River and West Coal River. Large tracts of the other areas were empty, even though many contained good goat habitat. In particular the mountain range west of the Cedar Lake trench appears to be suitable for goats, but none was seen. Perhaps the proximity of this area to the outfitter's camp may be the explanation.

Much of the area surveyed is also good caribou habitat, in particular, the various arms radiating to Coal River in the west, which are too low and too smooth for goats.

Caribou were observed in 4 bands totalling 14 animals, 7 of which were males and 7 females or young males. No calves were observed.

Most of the area covered was free of snow.

OTHER OBSERVATIONS: 4 golden eagles
1 chipping sparrow, where we stopped to refuel.

The coverage for goats was good (80%).

WILDLIFE INVENTORY IN GAME MANAGEMENT ZONE 11 - July 22, 1975

DURATION: 0900 to 1900, with two breaks for dinner and refueling. Total helicopter flying time 6.4 hours.

WEATHER: Mostly overcast and fairly windy, occasionally sunshine, but also some showers.

PILOT: Brad WILSON

OBSERVER: Manfred HOEFS and Joe JACK

NAVIGATOR: Manfred HOEFS

AREA SURVEYED: The remaining northern portion of Unit "Q", as well as the northern half of area "R" (along the NWT border). These units are located on map sheet "Flat River" and are portions of the watershed of the Coal River.

DESCRIPTION: A. Northern portion of survey unit "Q". The area immediately east of the Cedar Lake valley over to the headwaters of the Coal River is primarily caribou habitat. This range is not rugged enough for goats, some portions of it are suitable for sheep. Two isolated sheep were located, either ewes or two-year-old rams, and 4 caribou cows plus 1 calf. The northern most area of unit "Q" is excellent goat range and a total of 23 goats were located here consisting of 19 mature animals with 4 kids. Another 16 caribou were located in this range.

The total number of animals observed in the remainder of this area "Q" was therefore: 2 sheep (most likely ewes), 19 goats with 4 kids and 20 caribou, consisting of 8 bulls, 10 cows with 2 calves.

B. (Northern portion of unit "R"). The survey of this unit began at the south end (61°x 00') and continued northward to its boundary with unit "Q" and the NWT border.

The flight to the south end followed the Coal River flood plains which is an excellent marsh habitat, resembling portions of the Nisutlin River valley. This River is slow and meanders through a very wide valley. There are many potholes, oxbows, cut-off channels in this area. We observed 6 moose on a quick flight and we also saw geese tracks in the sand of a gravel bar, where we landed to refuel. It is likely that geese breed in this excellent marsh.

The southern portion of area "R", from latitude 61°x 00' to about 61°x 20' consists of gently sloping mountains and is primarily caribou habitat, even though only 2 caribou were actually seen, there were many tracks.

The area north of this is sheep and goat habitat. Only one goat was located, but three bands of sheep consisting of 1 ram (legal), 23 nursery sheep and 2 lambs were observed directly on the Yukon-NWT boundary. The sheep appear to range over an area bordered by 61°x 28' in the south and 61° 30' in the north.

Total number of animals observed in unit "R" was: 1 goat, 26 sheep (1 ram, 23 ewes, 2 lambs), and 8 caribou (7 cows 1 calf). Coverage for goats was about 60 to 80%.

WILDLIFE INVENTORY IN GAME MANAGEMENT ZONE 11 - July 23,1975

DURATION: 0945 to 1200 (about 2.0 hours helicopter time).

WEATHER: Sunny, calm.

PILOT: Brad WILSON

OBSERVER-NAVIGATOR: Manfred HOEFS

AREA SURVEYED: Unit "N", southeastern portion (map sheet Frances Lake).

DESCRIPTION: The remaining portion of survey unit "N" was completed today in a two-hour flight from our previous camp near Mile 23 (Dolly Varden Creek)area.

The area surveyed consisted of the southeastern and south most physiographic subdivision of unit "N", both of which lie north and west adjacent to the Tungsten Road.

This area is primarily caribou range, and a total of 17 animals were observed in 4 groups, consisting of 1 bull, 13 young bulls and cows, and 2 calves. Some suitable goat range is found around the high extremities of this range and one mature goat was located in the southeastern sub-unit.

The coverage for goats was good, and it is doubtful whether more than 3 to 5 goats are found in this area.

DAILY SUMMARY - 23 July, 1975

PILOT:	B. WILSON	OBSERVATION CONDITION:	Good
OBSERVER:	G. LORTIE	% COVERAGE:	75%
HELICOPTER:	CF-OKI	SURVEY TIME:	4.3 hours
AREA SURVEYED:	S; Mt. Murray and immediate uplands to the south		

GOAT: 2 adults on Mt. Murray

T; lower hills south of False Canyon Cr. and Stewart Lake.

No wildlife observations noted - old exploration area with several miles of tote roads, trenching, diamond drill sites at observation point #2.

This area is primarily caribou range at higher elevations.

P; the southern portion not surveyed on the 12th July.

GOAT: 14 adult and 3 kid goat

CARIBOU: 3 bulls

DAILY SUMMARY - 24 July, 1975

PILOT:	B. WILSON	OBSERVATION CONDITION:	Raining, higher elevations obscured
OBSERVER:	G. LORTIE		
HELICOPTER:	CF-OKI	SURVEY HOURS:	3.6

Recovered the Tessels Lake fuel cache.

DAILY SUMMARY - 25 July, 1975

PILOT:	B. WILSON	OBSERVATION CONDITION:	Good
OBSERVER:	G. LORTIE	SURVEY HOURS:	7.1
HELICOPTER:	CF-OKI		

Wildlife observations were noted in the Toobally Lake area but due to our fuel cache having been stolen, a systematic search was not possible. These observations are incidental to our flying on trying to locate our fuel.

MOOSE: 3 male, 2 female, 2 calf

SWAN: 1

BALD EAGLE: 1 pair at a nest site (large spruce) midway on the east shore of the more southerly Toobally Lake. (observation #1).

AREA "R" No game was seen in area "R" at all, but it does look like good caribou range, with isolated patches of terrain similar to that of the Dawson Range with known small sheep populations. No sheep or their sign however, was observed.

DAILY SUMMARY - 26 July, 1975

Survey activities concluded. CF-OKI left for Whitehorse around 0730.

Sheep Survey in the La Biche Range

An aerial reconnaissance was made of the La Biche Range with a Jet Ranger helicopter of Frontier Helicopters Ltd.(Watson Lake), piloted by Mr. Baird (July 10) and Don Payne (July 11). M. Hoefs served as navigator and recorder, biologist Don Russell acted as observer. The weather was poor until the afternoon when it cleared up. Total flying time was 6 hours from Watson Lake, with a re-fuelling stop at Fort Liard. We stopped overnight at the Coal River "warm springs" after also having inspected the Larsen Creek Hot Spring" area. We returned to Watson Lake on July 11/76. Total flying time for this survey was 7 hours.

Our survey for sheep began at the Beaver River near Mt. Merrill and continued in a northeasterly direction to Babiche Mt. The weather was very cloudy at this time and no complete reconnaissance of the higher elevations was possible. No really good sheep habitat was observed and any population inhabiting this range will be very small in size. Both outfitter Toole and Pilot Baird have seen a few sheep on the eastern end of this range, around Babiche Mountain. We only saw one black bear. It is reasonable to assume that not more than perhaps one dozen sheep live in this area.

The survey continued after re-fuelling at the La Biche River in a northerly direction along the La Biche Range to the Tlogotsho Range (N.W.T.) just south of Nahanni National Park. Along this range the Yukon-N.W.T. boundary follows the divide; there sheep and caribou populations are continuous across the border and not distinctly "residents" of either political jurisdiction. This makes the management of these populations a very difficult task - and of necessity a cooperative affair.

Bad weather again prevented a good reconnaissance of the higher altitudes until we arrived at two little, unnamed lakes near the border near latitude 60° 45'; from here on north the weather was sunny and visibility was excellent. Good sheep habitat started north of these two lakes and continued north all the way to Nahanni National Park.

Unfortunately, the best sheep habitat is in the N.W.T., the Yukon only covers its western fringes. Our counts extended into the N.W.T. for about 5 miles but did not cover all the sheep habitat of this population, which with all likelihood will extend eastward to the Kotaneelee Range and northward to the Nahanni River. Only a cooperative effort of ours, as well as the N.W.T. Game Branches could establish the entire range and size of the local sheep population.

Sheep were located in 10 different bands, consisting of 24 rams (mostly legal ones) 88 nursery sheep and 19 lambs for a total of 131. On the Yukon side of the border only 27 nursery sheep plus 1 lamb were located. However, all sheep were close to the border and may well be on the Yukon side at other times of the year.

Judging from the size of the habitat and the number of legal rams observed, I estimate the total size of this population to be at least 250 to 300.

Because of bad weather it was not possible to survey the south end of the Kotaneelee Range, which again constitutes the boundary between the Yukon and the N.W.T.. We also observed one male caribou in the northern La Biche Range, but judging from the lack of caribou trails it appears that these ungulates are much less abundant in this area than farther north in the Logan Mountains.

During our stay at the Coal River mineral spring we observed the following birds: several Canada jays, 1 green-winged teal, 1 purple finch, 1 water thrush, 1 chipping sparrow, 1 kingfisher, 2 mew gulls, 1 spotted sandpiper, 2 ruby-crowned kinglets, 2 varied thrushes and also three pairs of swans with cygnets in the Toobally Lake area, as well as two golden eagles in the sheep country in the northern La Biche Range.

M. Hoefs.

GAME SURVEYS IN ITSI RANGE AND SURROUNDING AREAS

An aerial reconnaissance was made of the northern most portion of Game Management Zone 11 (physiographic subdivision A, B, C), which includes the area bordered by the Prevost River in the south, the North Canol Road in the north, and the N.W.T./Yukon boundary in the east. It includes the Itsi Range. A total of 16 hours were flown in a Hiller 12E helicopter from July 23 to 27, 1976, inclusive. M. HOEFS served as navigator and observer. This area was not covered during the 1975 summer surveys when the remainder of Game Management Zone 11 was done.

As was the case in most of GMZ 11 this area has very low big game densities. Only caribou are fairly abundant during the summer. They appear to move into the N.W.T. in winter when snow conditions on the Yukon side of the border become very severe. The survey technique used was the same as applied during the previous summer helicopter surveys, in fact mountains are flown at a certain elevation (5000' to 6000') and an attempt is made to get a complete count. Whenever animals are encountered a second pass is made over them for classification purposes. The flight lines are indicated on the original maps.

The following animals were observed during this survey and total estimates are also given, considering the assumed degree of coverage, visibility and terrain type.

As already pointed out, caribou are the only abundant big game animals in this area. A total of 118 were located, consisting of 89 adults and 29 calves. If we assume that perhaps up to 50% of the adult were bulls and an additional 10% may have been yearlings, then the calf crop indicates a very good reproductive success by caribou this spring. Most caribou located were resting on snow patches or were seen in otherwise obvious locations as along ridge tops. Many will have been missed which were in less obvious areas. It is reasonable to assume that not more than 50% of the caribou in the area were

actually located. The total could, therefore, be around 200 caribou in this 1200 square mile area.

Even though this area supports the northern most goat population in the Yukon, densities are very low. Only eight goats were located, of which only six were in the Itsi Range, an area known for its goats. All 8 goats located were adults. Because of the ideal visibility and the "intensity" of our survey for goats it is reasonable to say that not many goats were missed. I estimate that no more than 12 goats inhabit this area. Our helicopter pilot, who flew this general area all summer to support exploration activity, supports our findings that very few goats are found in this area. The few goats observed plus the fact that there was no reproduction this year indicates that this range is very marginal for goats.

No sheep were located on the survey area, but a few (3 rams plus 1 ewe) were observed north of the Canol Road on the mountains surrounding Cirque Lake - a proposed major mining site.

A special survey was conducted for moose in the large marsh areas north and south at the Itsi Range. The total number of moose observed (including those seen during goat count) was 13 and consisted of 4 bulls, 7 cows plus yearlings and 2 calves. Moose reproduction was, therefore, also very poor during this year.

No grizzly or black bears were observed. Birds observed during two days of hiking in the area included: 3 pairs of snow buntings (Itsi Range) and 3 pairs of wandering tattlers (Itsi Range) as well as 2 swans on Wilson Lake. It appears that both swans as well as snow buntings breed in the area. Other birds observed were gray-crowned rosy finches, horned larks, water pipits, willow ptarmigan, white-tailed ptarmigan, mew gull, phalarope, golden eagle and lesser-yellow legs.

WILDLIFE WINTER SURVEY

G.M.Z. 11

February 3 - 12, 1976

M. Hoefs & G. M. Lortie

Introduction:

During July of 1975, a detail aerial survey of the upland areas of G.M.Z. #11 was conducted. This summer work was undertaken in order to assess the status of sheep, goat and caribou populations in the Logan and Labiche Mountain ranges and the continental divide. As well, the summer work included incidental observations on moose, grizzly, golden eagles and other conspicuous wildlife. (See Hoefs, concurrent report).

As a follow-up on this work, a winter survey in February 1976 was taken to better assess the moose populations in G.M.Z. #11, when these animals were concentrated on winter ranges. Incidental notes on caribou and wolves were included.

The objectives of this winter work were to:

(i) locate and describe the areas of major importance to wintering moose,

(ii) estimate the number of moose wintering on these areas.

From Watson Lake, long-range fixed-wing flights along major drainages were taken in order to locate concentrations of wintering moose. Flight observations of moose and fresh tracks where no moose was seen were recorded on magnetic tape and transcribed after each flight. Areas of moose concentrations in several major drainages were then flown by helicopter in an intensive search to locate every moose in the area.

Man-made openings in the dense,conifer covered uplands between drainages were surveyed by fixed wing aircraft to determine moose densities in these low visibility habitats.

The flying from Ross River on the Pelly and Ross River drainages was done entirely by fixed-wing aircraft. Estimates of wintering moose in these valley bottoms are derived from moose densities determined on a detailed survey conducted on the proposed Granite Canyon impoundment.

An estimate of the moose numbers wintering in the fire modified uplands between the Ross and Pelly Rivers west of 130° 30' W. long. were determined by a transect survey.

This survey used a total of 34.1 hours of fixed-wing flying at $160.00/hr. and 19 hours of helicopter flying at $315.00/hr. for a cost of $11,441.00.

Data:

Daily summaries of the fixed wing flights and analyses of the helicopter flights are as follows:

Daily Summary

Date: 3 February 1976

Aircraft: Turbo Beaver CF-VPV

Pilot: Brian Parsons

Weather: clear and sunny

1000 hrs temp. -35°C

Observers: Hoefs, Mychasiw & Lortie

Survey hours: 3.3

Survey altitude: ±400'

Aircraft speed: 120 m.p.h.

Drainage:	Moose Seen	Fresh Tracks	ℰ
Frances River			
mouth - middle canyon	5	10	15
middle canyon - Campbell Bridge	0	5	5
Campbell Bridge - Cantung Rd.	14	15	29
	19	30	49
Hyland River			
8 mi. north of Dolly Varden Cr. - Green R.	11	18	29
Green R. - Blind Lk.	11	11	22
	22	29	51

This summary includes only the major drainages covered today. Upland areas surveyed will be discussed later pending a survey to determine moose densities in heavily forested terrain.

Daily Summary

Date:	4 February 1976	Aircraft:	CF-VPV
		Pilot:	B. Parsons
Weather:	sunny and clear	Observers:	Hoefs, Mychasiw & Lortie
	high overcast in P.M.	Survey Altitude:	± 400 ft.
	visibility: excellent	Survey hours:	3.7

Drainage:	Moose Seen	Fresh Tracks	
Coal River			
Warm Springs - Quartz Cr.	8	11	19
Quartz Cr.-West Coal River	6	4	10
West Coal R. - Cr. drainage Rock R. summit	3	5	8
	17	20	37
Rock River			
headwaters at summit - Coal R.	23	17	40

Again, the forested terrain between drainages is not summarized here. Moose occupy these densely forested habitats, particularly creek drainages with attendant narrow belts of deciduous shrub species, mostly willow. Flights will be taken to get an estimate of moose densities in these habitats within a few days.

Daily Summary

Date: 5 February 1976

Weather: generally clear
high overcast

Aircraft: CF-VPV

Pilot: B. Parsons

Observers: Hoefs, Mychasiw & Lortie

Survey Altitude: 2 - 400 ft.

Survey hours: 5.5

Drainage:	Moose Seen:	Fresh Tracks:	Σ
Labiche River			
lower river below canyon	0	5	5
upper river above canyon	10	16	26
	10	21	31
Whitefish River			
Dendale Lk. - Beaver R.	5	12	17
Beaver River			
Cr. draining Fantasque Lk.- Fork in Beaver River, N.W. of Toobally Lakes.	22	22	44

In addition to surveying these drainages, a track count in forested habitats along the opening provided by the B.C. boundary was taken, and will be discussed separately.

Daily Summary

Date:	6 February 1976	Aircraft:	CF-VPV
		Pilot:	B. Parsons
Weather:	High overcast	Observers:	Jack and Lortie
	low contrast visibility-good	Survey Altitude:	2 - 400 ft.
	winds variable, occasional	Survey hours:	1.8
	strong and gusty.		

Today was spent flying old cat roads in forested terrain and flying creeks, in order to determine moose densities in these habitats.

One cat road, just east of Watson Lake, was surveyed from its intersection with the Alaska Highway, north to the vicinity of Baker Lake. The other cat road, beginning at Contact Cr. on the Alaska Highway, was surveyed over its length to the Coal River.

Some creek flying was also undertaken this day, and in conjunction with creek and forest surveys taken on previous days, provides the basis for moose densities in forested habitats derived as follows:

With an aircraft speed of 2 miles/min. (120 m.p.h.), fairly accurate distances can be determined. Moose or fresh tracks observed in the openings of creeks, cat trails, and the border were recorded over the flown lineal distance in each major habitat type.

Moose densities in creek bottoms and dense upland coniferous forests are computed as follows:

Border and Cat Road Survey

Spruce-Pine Forest interspersed with birch-willow and aspen

5 February 1976

Time:	Miles:	Moose:	Tracks:
1026 - 1048			
	44		
1049 - 1050			
	2		
1052 - 1054			
	4		
1057 - 1102			
	10	1	12
1103 - 1112			
	18	2	6
		3	18
1113-1115			
	4	-2 creek	-4 creek
		1	14
1116 - 1117			
	2		
			6 February 1976
1109 - 1111	4	1	2
1112 - 1115	6		2
1200 - 1205	10		
1208 - 1213	10	1	6
		2	10
	114 miles	3	24

Evidence of 27 moose in 114 linear-miles of forested terrain.

114/27 = 4.22 lin.mi/moose.

$(4.22)^2$ = 1 moose/18 sq.mi. of upland forest.

Willow dominated creek bottoms and lake shore

5 February 1976

Time:	Miles:	Moose:	Tracks:
(Crow R.) 1121 - 1134	26		5
(Upper Toobally Lk.) 1450 - 1456	12	1	4
(lower Toobally Lk.) 1500 - 1503	6		4
(Smith River Bottom) 1505 - 1519	28	3 + 1 = 4	7 + 4 = 11

6 February 1976

1052 - 1057	10	1	1
1123 - 1128	10	2	3
1137 - 1140	6	1	2
1141 - 1152	22		10
	120 miles		

4 February 1976

(transcr.) 1333 - 1352	38	11	4
	158 miles	21	44

Evidence of 65 moose in 158 linear miles of creek and lake shore.

158/65 = 2.43 mi/moose.

$(2.43)^2$ = 1 moose/6 sq.mi. of creek bottom.

Daily Summary

Date: 9 February 1976

Weather: sunny with an ice haze
observation cond: excellent

Aircraft: CF-VPV

Pilot: B. Parsons

Observers: Jack and Lortie

Survey Altitude: 400 ft.

Survey hours: 1.6

Drainage:	Moose Seen:	Fresh Tracks:	
Liard River			
Liard R. directly west of Watson Lk. -			
Mouth of Frances R.	15	2	17
Mouth of Frances R.- Mouth of Hasselburg Cr.	44	19	63
	59	21	81
Meister River			
Jct. of Little Moose R.- mouth of Meister R.	4	13	17
Rancheria River			
Jct. of Little Rancheria- mouth of Rancheria R.	56	7	63
	119	41	160

Daily Summary

Date:	10 February 1976	Aircraft:	CF-VPV
		Pilot:	B. Parsons
Weather:	locally foggy at Watson Lake. Clear and sunny to the north.	Observers:	Lortie
		Survey Altitude:	2-400 ft.
		Survey hours:	2.8

Flight from Watson Lake to Finlayson Lake along the Campbell Highway.

Campbell Highway:	Moose:	Tracks:	Σ	Miles:
Watson Lk.-Frances R. Bridge	4	15	19	24
Frances R. Bridge - S. end Simpson Lk.	1	5	6	16
Cantung Rd.-Money Cr. Bridge	5	11	16	42
Money Cr. Bridge - Finlayson Lk.(w.end)	1	12	13	40
	11	43	54	122

Evidence of 54 moose in 122 linear miles.

122/54 = 2.26 lin.miles/moose.

$(2.26)^2$ = 1 moose/5 sq. mi. over the length of Campbell Highway from Watson Lake Airport to Finlayson Lake.

Drainage:

Fortin Cr. bottom from west end of Finlayson Lk.- Pelly R. at N. end of Fortin Lk.

	Moose:	Tracks:	Σ	Miles:
Finlayson Lk.-S.end of Fortin Lk.	8	4	12	25
S.end Fortin Lk.- Pelly River	5	4	9	10
	13	8	21	35

Pelly River (below Fortin Lk.)

Mouth of Fortin Cr.- W. for 22 miles (big bend to S.)	13	4	17	22
Big Campbell Cr.- Hoole River	26	7	33	28
Hoole R.-Ross River	4	11	15	30
	43	22	65	80

Density: 1 moose/1.5 sq.mi. (average) in the Pelly R. bottom from Fortin Lk. to Ross R.

Density: 1 moose/ 1 sq.mi. in the Pelly R. bottom between Fortin Lk. and Hoole R.

Notes on Caribou:

66 caribou were located in the small lakes and hills immediately east of the Pelly R. north of Campbell Cr. One group of 22 was crossing the river, travelling north. The total area of distribution of this caribou herd will be determined soon.

Wolf:

One wolf was noted hunting moose on Fortin Cr. above the lake.

Daily Summary

Date: 11 February 1976

Aircraft: CF-VPV

Pilot: B. Parsons

Weather: clear and cold

-40°C in a.m.

obsv'n. cond: excellent

Observers: Russell, Jack & Lortie

Survey Altitude: 2 - 400 ft.

Survey hours: 5.5

Drainage:	Moose	Tracks:	ℰ	Miles
Ross River				
Ross River Village-Prevost Canyon	34	25	59	72
Prevost Canyon John Lake	3	8	11	64
Pelly River (above Fortin Lk.)				
extreme head of Pelly R.-Wolf Canyon-including two major tributaries	1	3	4	108
Wolf Canyon-Fortin L.	3	9	12	20
Prevost River				
130° 30' W. - Ross R.	4	6	10	26

All of the major drainages (Ross R., Pelly R., Prevost R., and Woodside R.) and their tributaries are practically devoid of game or their sign east of Transect #6 (130° 30' W long.)

Notes on Wolves:

(1) One wolf was observed near a fresh kill approximately 12 miles east of Sheldon Lk. on Ross R. More are suspected to be in this area but were not seen.

(2) On the Lower Pelly Lake, 3 wolves (greys) were observed at a kill (adult moose). A landing was not possible due to heavy slush on lake surface.

Daily Summary

Date: 12 February 1976

Weather: clear and cold

obsv'n. cond: excellent

Aircraft: CF-VPV

Pilot: B. Parsons

Observers: Russell, Jack & lortie

Survey Altitude: 200 - 400 ft.

Survey speed: 120 m.p.h.

Survey hours: 4.7

Our flying today included a transect survey of the uplands west of 130° 30' west long. between the Ross & Pelly Rivers. Much of this area, unlike the region to the east, has a recent fire history, with large areas of burn regenerating to shrub - primarily willow.

This lower relief terrain is better suited to the type of survey coverage than the higher country to the east. Transect interval was every 15 minutes of longitude (8 miles) from 130° 30' W long. to 132° 00' W long. with an observable width of 1 mile.

Transect#	Moose	Tracks	Σ	Miles	Sq. Miles	Density
6	0	16	16	60	60	.27 moose/sq.mi.
5	8	13	21	74	74	.28 moose/sq.mi.
4	6	11	17	52	52	.33 moose/sq.mi.
3	3	13	16	46	46	.35 moose/sq.mi.
2	11	7	18	46	46	.39 moose/sq.mi.
1	7	2	9	24	24	.38 moose/sq.mi.
0	6	4	10	18	18	.55 moose/sq.mi.
	41	66	107	320	320	

Notes on Caribou:

In addition to the transect survey, a random search survey was done to determine the occupied area and approximate numbers of the small caribou herd wintering west of Finlayson Lake.

A total of 303 caribou were observed today on an area bounded by the Hoole River on the west, the mouth of the McNeil River on the Hoole R. to the head of Mink Cr. on the south, a line directly north from the head of Mink Cr. to the Pelly R. above Slate Rapids on the east and by the Pelly River on the north.

This area is characterized by open canopy black spruce, extensive older burns and muskegs in a rolling terrain, interspersed with numerous small, shallow lakes.

This herd is moving slowly northward, crossing the Campbell Highway primarily between the mouth of Mink and Campbell Creeks. Isolated small groups and the sign of others were noted north of the Pelly R.

An approximation of the total numbers currently occupying this area is 400 - 500 caribou.

Notes on Wolves:

(i) Four wolves (2 blacks and 2 greys) were noted at a fresh moose kill (adult) about 8 mi. northeast of Jackfish Lake. The jaw was recovered.

(ii) 4 wolves were seen hunting caribou about 5 miles south of Slate Rapids. No kill was seen.

(iii) 1 grey wolf was observed in the vicinity of a group of 3 caribou about 8 miles N.W. of the mouth of the Hoole R.

MOOSE SURVEY IN COAL AND ROCK RIVER ON FEBRUARY 6TH, 1976

In order to establish some baseline by which to evaluate the "degree of coverage" of our surveys with a fixed wing aircraft, two of the rivers that had been surveyed with a Beaver were done again today with a Jet Ranger helicopter. Approximately 3.6 hours were flown today, HOEFS served as navigator and observer and Len MYCHASIW assisted as observer. Weather was sunny in the morning but overcast in the afternoon. We flew from 10:37 a.m. to 4:00 p.m. with a stop at the hot-spring on Coal River for refuelling.

The Rock River was surveyed from its confluence with the Coal River northward (upstream) for a distance of about 30 linear miles to the mouths of Dalziel and Camp Creeks. Flying upstream the west shore was surveyed and on the return flight the east shore. An attempt was made to "bring up" every moose along the river whose presence was revealed through fresh tracks. About 70 minutes were used for this Rock River reconnaissance.

A total of 35 moose were located in this area of which only one was positively identified as a calf, the remainder being adults of both sexes. The lower 18 miles of this portion of the Rock River is the better moose habitat, very few were located in the narrow canyon and north of the canyon.

The Coal River was surveyed approximately from the site of the hotsprings (where the river makes an abrupt turn to the east) northward for a distance of about 50 miles to a location where its course makes an abrupt change to the west, a few miles north of the mouth of Quartz Creek. The same reconnaissance method was applied as for the Rock River, but by this time the weather had deteriorated and the prevailing overcast condition made it very difficult to evaluate recent tracks. Only 22 moose were observed in this 50 mile stretch of which 4 were definitely calves, the other 18 were adults of both sexes.

While the Coal River as a whole will support more moose than the much shorter Rock River, for the portions of those rivers surveyed today the Rock River is definitely superior having better moose habitat as well as a higher number observed. Even though a serious attempt was made to locate all moose, judging from fresh tracks which led into deeper forests, it can be assumed that another 20 to 30% of the moose in the area were not accounted for.

A small concentration area of moose was observed during our return flight to Watson Lake. Immediately adjacent to the Coal River valley (southwest of the hotsprings) we located 14 moose in an area not more than 5 x 5 miles square, which consists of burnt forests with many little lakes. Another 4 moose were observed on the 10 mile flight to the southwest directly back to the Alaska Highway. This observation indicates that there are a few hotspots for moose in this large forested country besides along the shores of the rivers.

MOOSE SURVEY OF THE "FRANCES LAKE" PROPOSED HYDRO-DEVELOPMENT

A detailed helicopter survey was done on February 9th, 1976, of the Frances River - Frances Lake area, which is one of the proposed sites of a new hydro-electric power development. Approximately 5½ hours were spent in a Jet Ranger helicopter (Frontier), M. HOEFS served as recorder and navigator and Len MYCHASIW assisted as observer.

This survey included the Frances River upstream from the location where it is crossed by the Tungsten Road (about 60 miles), both areas of the Frances Lake, the Yusezyu River for a distance of 12 miles upstream from its mouth at the West Arm of Frances Lake and the Anderson Creek upstream for a distance of 6 miles from its mouth at the East Arm of Frances Lake.

The weather was ideal for flying (clear, cold, calm), and only very fresh tracks were observed since heavy snow-storms were experienced in this area for the past two days. It was therefore possible to fairly accurately estimate what number of moose utilize this area at this time.

In general, the rivers had more moose in them than the lake shores, and of the lake shores the East Arm of Frances Lake was much better than the West Arm. The accompanying map shows the locations where moose or fresh moose tracks were observed.

Our estimates totalled 118 moose for this area, of which about 110 would be displaced if this area should be flooded.

The individual aerial counts were as follows:

Moose Estimates:

Frances Lake East Arm

a) west shore: 5 moose + 26 tracks = total 31 moose

b) east shore: 4 moose + 8 tracks = total 12 moose

Frances Lake West Arm

c) west shore: 2 tracks = total 2 moose

d) east shore: 2 moose + 3 tracks = total 5 moose

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Frances River (60 aerial miles)

5 moose + 30 tracks = total 35 moose

Yusezyu River (12 aerial miles)

9 moose + 13 tracks = total 22 moose

Anderson Creek (6 aerial miles)

6 moose + 5 tracks = total 11 moose

118 moose

Of these eight physiographic sub-divisions, the Yusezyu River has the most moose per "linear mile" and of the lake shores the west shore of the West Arm of Frances Lake exceeds the other shores by far. In particular the area around the mouth of Finlayson River is excellent moose habitat. A fresh wolf kill was located here.

Our observations indicate that a winter survey at this time may not reveal the greatest number of moose in the annual cycle. Moose appear to move downstream to get away from very deep snow. Many of the potholes along the upper Frances River are definitely good summer moose range, but did not have tracks in them at this time. To come up with the best estimate of the number of moose affected by this proposed hydro-development, the winter survey must be supplemented by another count in July or August.

Moose survey of the Hyland River valley on February 10,1976.

A detailed moose survey was done with a Jet Ranger helicopter on February 10, 1976, of the Hyland River valley, starting at the B.C.-Yukon boundary in the south upstream to the airstrip at around Mile 78 of the Tungsten Road. Approximately 4.5 hours were flown; Mr. Hoefs served as navigator and recorder and Len Mychasiw assisted as observer. The helicopter was piloted by Ron Payne of Frontiers Helicopter Ltd., Watson Lake. The weather was calm and cold, with ice fogs prevailing most of the survey time from 10:00 a.m. to 4:00 p.m.

Flying upstream in the morning the west shore of the Hyland River was surveyed, while the east shore was surveyed on the return trip in the afternoon. We flew at about 200 feet elevation and kept track of moose as well as of fresh tracks. Fresh tracks were easily recognized because of the recent heavy snow storm which covered all previous signs.

A total of 144 moose are known to use the Hyland River valley as winter range. This must be considered a conservative estimate since we spent very little time in the "back country", where few tracks were seen. Also the northernmost portion (about 30 miles) were only flown once, since we intended to locate goat wintering ranges in the area. It is therefore realistic to assume that the real number of moose using the Hyland River floodplain as winter range will be around 160 to 170.

The observation of 144 moose is based on the following aerial counts of sections of the river:

Lower Hyland River (from B.C. - Yukon Border to the north side of Blind Lake: (about 16 aerial miles).

13 moose + 4 tracks = total 17.

Middle section of Hyland River (from Blind Lake north to mouth of Green River: (about 36 aerial miles).

15 moose + 45 tracks = total 60.

The section of the River was dealt with separately to be able to compare this count to one made earlier of the same area with a fixed wing aircraft.

Upper Hyland River (from mouth of Green River north to airstrip at Mile 78 Tungsten Road): (about 72 aerial miles).

11 moose and 56 tracks - total 67.

The section of the Hyland River below the mouth of Green River is supporting more moose (average about 1.5 moose per linear miles of river), compared to the section upstream from the mouth of Green River, which supports on the average 0.9 moose per linear mile. Densities decrease progressively going upstream, for instance, the uppermost 40 miles of the river valley surveyed had only evidence of about 16 to 20 moose. On the other hand 9 linear miles of marsh habitat along the Hyland River just north of Stewart Lake had evidence of at least 20 moose, and is known to support much greater numbers in summer.

A pack of 14 wolves had just killed a moose calf near the mouth of Sunrise Creek when we flew over the area.

As was already pointed out in the report on the Frances Lake survey, moose appear to move downstream in this area during winter, and it is likely that a greater total number will be observed in this valley during July and August. This is particularly true for the uppermost Hyland valley, which has practically no moose at present.

Results:

The estimates of wintering moose on the Yukon portions of the Coal, Rock, Hyland and Frances Rivers are based on the helicopter work.

Estimates for the Beaver, Whitefish and Labiche Rivers are based on a fixed-wing reconnaissance of 5 February 1976.

Moose wintering in intervening forested uplands are estimated on the basis of density figures from fixed wing surveys applied to a known total occupied area below 3500' elevation.

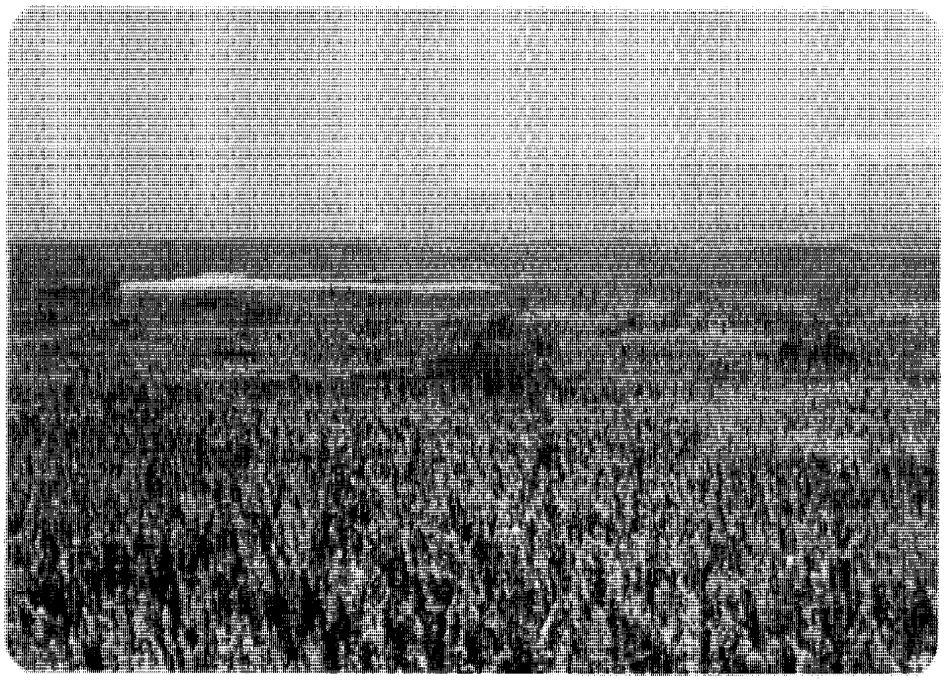


Photo 1: Typical dense coniferous forest between the Frances and Hyland Rivers.

Results: (cont'd)

The estimates of wintering moose on the major Liard tributaries are summarized as follows:

G.M.Z. # 11

Rock River: between the mouth and Dalziel Creek:	35 moose
Coal River: between the Warm spring and Quartz Creek:	43 moose
Hyland River: between the B.C. boundary and Dolly Varden Creek:	160 moose
Frances River: middle canyon to Cantung Road:	34 moose
Frances Lake: proposed hydro impoundment:	118 moose
Labiche River: B.C. boundary to head waters:	31 moose
Whitefish River: Densdale Lk. to Beaver River:	17 moose
Beaver River: from the creek draining Fantasque Lake to the forks N.W. of Toobally Lakes:	44 moose
TOTAL:	482 moose

5,838 square miles of forested upland below 3500' elevation:
moose density = $\pm$ 1 moose/15 sq.mi. = 389 moose

871 moose

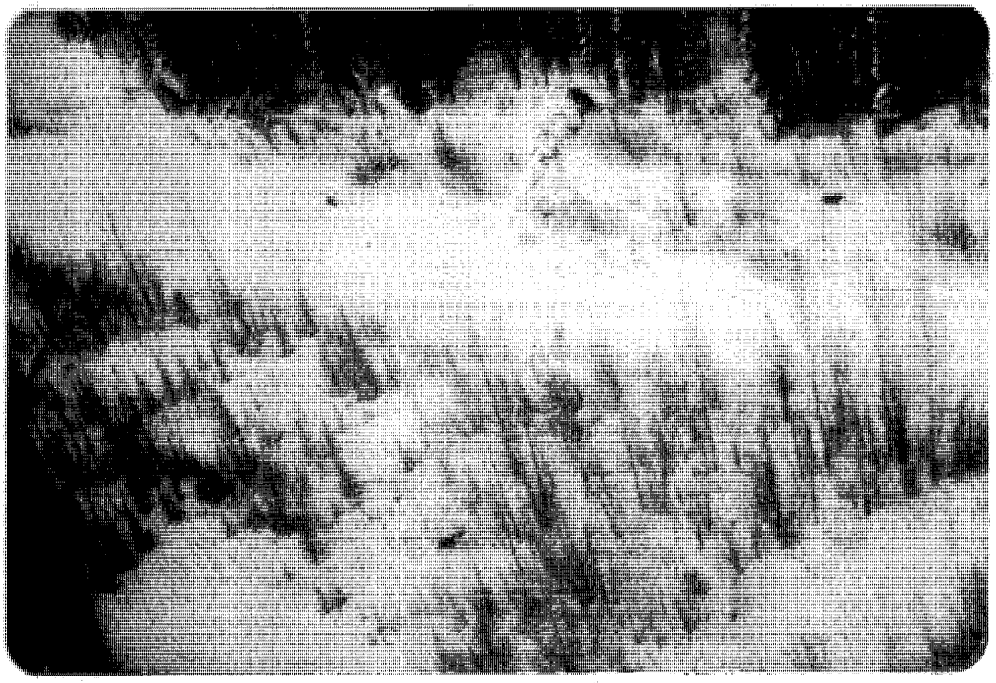


Photo 2: Floodplain moose habitat preferred by wintering moose.

Photo #3: Creek bottom habitat preferred by moose in densely forested terrain.

Photo #4: Low density moose habitat near B.C. border. Note the old fire scar in mid-foreground.

Results (cont'd):

In the northern portion of G.M.Z. # 11, two important moose wintering areas were located:

Ross River between Carolyn Lake and Prevost Canyon

45 sq. miles @ 1 moose/ .50 sq. mi. = 90 moose

Pelly River between Hoole River and Pelly Lakes

85 sq. mi. @ 1 moose/.50 sq. mi. = 170 moose

Between the Ross and Pelly Rivers, moose densities increase from east to west. (See daily summary for 12 February 1976).

Transects 0, 1 and 2:

average density .47 x 675 sq.mi. = 320 moose

Transects 3, 4, 5 and 6:

average density .30 x 1742 sq.mi. = 524 moose

1104 moose

Discussion:

In the southern part of G.M.Z. # 11 at the time of this survey, moose occupied lower sections of the river valleys with a strong downstream trend in movement. This was especially so in areas of heavy snowfall i.e., the Rock, Coal, Hyland and Frances Rivers. Further east, snow depths were much less, and movements of moose appeared to be much less determinate. In fact, on the Labiche River moose appeared to have arrived at their site of observation from downstream on the river.

Densely forested uplands between major drainages harboured moose in low numbers, the animals preferring the many small drainages and narrow creek bottoms up to elevations of approximately 3500 feet.

Good winter range in this portion of G.M.Z. # 11 is scarce, and this is reflected by the relatively low moose estimate. Factors contributing to this situation are:

(i) Lack of riparian plant communities along the narrow, high bank river bottoms.

(ii) In the upper and middle sections of the Rock, Coal and Hyland valleys, deep, late winter snow forces moose down to the lower stretches of river to limited available range as noted in (i).

(iii) High year-round precipitation seems to have suppressed forest fire and, as a consequence, large tracts of unproductive climax coniferous forest prevail on upland terrain.

In the northern portion of G.M.Z. # 11, moose densities are much higher. Apart from the floodplains of the Ross and Pelly Rivers, the uplands between these two rivers have experienced forest fire over large areas. There, second growth habitats are supporting approximately 1 moose/3 sq.mi., five times the density on upland sites in the southern portion.

As well, winter snow depths here are much less.

Ross River below Carolyn Lake and Pelly River below the mouth of the Hoole River are excellent moose winter ranges. But likely due to the close proximity to Ross River village, moose were not abundant.

It should be noted that stretches of river valleys, other than those mapped as high density moose winter ranges, are, earlier in the winter, important to moose as evidenced by abundant old signs on abandoned sections of river.

Conclusion:

This survey located and defined the important moose winter ranges in G.M.Z. # 11. These ranges currently support an estimated total of 1,586 moose. Marginal low density habitats support an additional estimated 389 moose for a total population estimate of 1,975 moose for G.M.Z. # 11.

The upper Liard basin in G.M.Z. # 10 supports a minimum winter moose population of 379 animals.

Caribou, common and widely distributed in the Logan Range and the continental divide during summer months, were not found on this winter survey. A small herd of approximately 500 caribou is wintering southwest of Finlayson Lake, as they have for the last four or five years.

Notes on wolves in the southeastern Yukon.

During the winter surveys carried out in the southeastern Yukon from February 2, 1976 to February 12, 1976, an opportunity presented itself to evaluate the status of wolves in the area.

During moose counts records were kept on wolf observations, kills and tracks. In addition it appears that wolves, as well as moose, move into the river valleys at this time of the year when the snow conditions on the mountains become too severe. It is also reasonable to say that moose are the only prey animals of wolves in this area at this time.

On the accompanying map wolf observations are indicated as black numbers and will be briefly summarized:

On February 2, 1976, an old wolf kill (mature moose) was located on Lingfish Lake, northeast of Watson Lake (2). On February 4, 1976, 2 black wolves were observed on a high, windswept alpine ridge between the Coal and Rock Rivers (5). On February 5, 1976, a band of 9 wolves near a kill were located in the headwaters of the Whitefish River (6) and a band of 6 wolves in the headwaters of the Beaver River (7). On the same day 2 old kills were located, as well as wolf tracks, along the upper La Biche River (9, 10). On February 9, 1976, a recent kill (calf or small yearling) were located at the northern end of the west side of Frances Lake (1). On February 9, 1976, a fresh kill with 2 wolves was observed on a small pond along the Liard River (8). On February 10, 1976, a band of 14 wolves had just killed a calf on the Hyland River when we flew over the site (3) and another old bull kill was located on the same day not too far away from the Hyland River airstrip (4).

Based on these observations and dates some speculations are justified with respect to the numbers and distribution of wolves in the southeastern Yukon.

It has been established that two different bands hunt the area east of the Rock River, since they were observed on the same day (within an hour) about 30 air miles apart (observations 6 and 7). It is likely that the kills observed along the LaBiche River (9 and 10) can be attributed to the band of 9 wolves observed along the Whitefish River (6), since this location is only 16 to 20 miles away.

The Coal and Rock Rivers do not support a moose population large enough (less than 100 moose) to maintain by themselves a wolf pack, even though they could support the two wolves observed at location 5. It is unlikely though, that two wolves would remain on their own at this time of the year. They were most likely members of the larger packs observed in the Beaver - or the Hyland River valleys.

The large pack of 14 observed in the Hyland valley will most likely also hunt the lower Liard River, since the Hyland River itself with its 150 moose could not support such a large pack all winter. The fact that we did not see any large pack or tracks into the Liard valley at that time supports this assumption. Only 2 wolves were observed here.

It is reasonable to assume that the 31 wolves observed were all different animals, considering the dates of observations and the distances between them. It can therefore be said that at least 3 packs hunt the southeastern region discussed here: (a) one in the Hyland-Liard area, (b) one in the Beaver River-Tobally Lakes area,

and (c) one in the LaBiche-Whitefish River area. In addition, there are a few stragglers which most likely belong to one or the other larger band, but may also be independent.

It may be an indication of the reliability of our assumption that these 31 wolves observed correspond to an estimated total number of about 1000 moose in the area. Studies in other areas have shown that a ratio of 1 wolf per 25 to 35 moose is found in set-ups where moose are the only prey animals for the wolves (for instance, Isle Royal).

M. Hoefs.

Photo #5: Wolves killed this yearling moose near Lingfish Lake. Utilization of this carcass, including the hide, is complete.

Productivity:

Productivity was low for all big game species evaluated during this summer survey and it may reflect the unusual severe winter encountered in 1974/75, where heavy snow falls were measured along the Tungsten road.

Of 208 goats classified, 186 were adults and only 22 were kids. This works out to a kid to adult ratio of only 11.8%, hardly enough to replace winter losses. In the Itsi Range, which was surveyed in 1976 summer, only 8 adults were located and no calves at all. It is, therefore, reasonable to say that not only does the entire area have a very low goat density, but reproductive performance is also very poor. Based on these observations, the sustainable yield - or the hunting pressure these populations can be exposed to - will of necessity also be very low.

Even lower reproductive success was observed in the few sheep bands located along the Yukon-N.W.T. border in 1975. We found in nursery bands a total of 42 adult members (these are ewes, yearlings and a few two-year old males) accompanied by only 2 lambs for a ratio of only 5%. A slightly better performance was recorded for the La Biche range in 1976, where 88 nursery sheep were leading 19 lambs for a ratio of 21.6%. While this is a better reproduction than that observed in 1975, it is still well below the averages observed in other sheep ranges of the Yukon, which is usually between 35 to 50%.

Caribou showed a better reproductive success than either goats or sheep in this area. In 1975, nursery bands were classified and consisted of 252 adults (cows, young bulls, yearlings) leading 67 calves for a calf to adult ratio of 26.6%. A slightly higher performance was observed in the Itsi Range in summer 1976, where 89 adult members of nursery bands were accompanied by 29 calves for a calf to adult ratio of 32.6%.

Based on these observations it appears that caribou are holding their own in game management zone #11, while both goats and sheep perform poorly on what appears to be marginal range for them. Their hunting must be very closely monitored if we want to maintain these low-density populations.

Big Game Densities in Game Management Zone 11

Game Management Zone 11 has the lowest big game densities of any of the areas in the Yukon surveyed so far. There can be no doubt that the severe snow conditions encountered in this area in winter will be an important contributing factor in this connection. The following table lists the densities for goats and caribou, the two most important big game species in the area, per survey unit.

The average densities for the whole of Zone 11 is 1 goat per 100 square miles and 5 caribou per 100 square miles of habitat. The caribou density is only applicable for the summer months, since these animals move out of the area in late fall. There is, however, great variation of densities within Zone 11 as is obvious from the table. The highest densities for goat were observed in survey unit L with 14 goats per 100 square miles, and in Units O, P, and Q with 7 to 8 goats per 100 square miles of habitat. The highest densities of caribou were observed in survey units E with 49 caribou per 100 square miles, and units A, O, and J with 26 to 28 caribou per square mile of habitat.

The low densities of Zone 11 become very obvious through a comparison with those observed in Game Management Zone 5 during the 1974 inventory. Highest densities observed in Zone 5 were around 220 to 300 sheep per 100 square miles of habitat, compared to 8 to 14 goats per 100 square miles in Zone 11. The densities of these ungulates, therefore, which are similar in size and therefore range requirements are 20 to 25 times as high in Zone 5 compared to Zone 11.

Table

Big Game Densities in Game Management Zone 11

Survey Unit	Area (sq.miles)	Goat Estimation	Density/Goat (sq.mile)	Caribou Estimate	Density/Caribou (sq. mile)
A	430	10	0.04	120	0.28
B	548	2	<0.01	80	0.15
C	180	5	0.03	15	0.08
D	797	1	<0.01	120	0.15
E	411	0	0	200	0.49
F	2493	0	0	15	<0.01
G	903	0	0	15	0.02
H	355	0	0	20	0.06
I	318	0	0	50	0.16
J	623	5	<0.01	160	0.26
K	536	20	0.04	30	0.06
L	355	50	0.14	10	0.03
M	816	40	0.05	15	0.02
N	866	25	0.03	70	0.08
O	361	25	0.07	100	0.28
P	492	35	0.07	30	0.06
Q	853	70	0.08	50	0.06
R	722	1	<0.01	20	0.03
S	498	2	<0.01	5	0.01
T	1146	0	0	20	0.02
U	1158	0	0	30	0.03
V	685	0	0	20	0.01
W	1613	0	0	30	0.01
X	2273	0	0	30	<0.01
Y	1277	0	0	20	0.01
Z	446	0	0	10	0.02
SUM	21155	290	0.01	1285	0.05

An evaluation of hunting on the big game populations in Game Management Zone 11.

While 3 outfitting areas are fully or partially contained in game zone 11, only one (Toole's area) is relevant in this connection. Koser's area only takes in a very small portion of the northern extreme (Itsi Range) and has not been hunted for the past 3 years. Pospisil's former area, which takes in the Frances River drainage was shut down three years ago and has not been opened up by another outfitter. The northern portion of Teslin Outfitters also takes in a portion of game zone 11 (around Finlayson Lake), but this area also has not been hunted by the outfitters. It is, therefore, in zone 11, reasonable to say that hunting of the big game is carried out by outfitter Toole in his area along the Yukon-N.W.T. boundary, by resident white hunters, primarily local but also from Whitehorse and Faro, and by the natives of Watson Lake and Ross River.

While it is not possible at this time to provide accurate statistics on the take of moose and caribou by resident and native hunters, it is reasonable to say that their take is within the allowable yield of these two species. There are 2,000 moose in the area in late winter and therefore about 2,400 during the hunting season. A "safe" harvest will be around 10% or 240 moose, but we have no evidence that that many are shot. Similar reasoning applies to the caribou. The major harvests appear to take place by natives in winter, when caribou use ranges along the Campbell Highway near Finlayson Lake. Our inquiries indicate that the total take is less than 100 caribou, which is also within the allowable yield of this herd of 1,200 to 1,500 animals.

Better statistics are available for the other three species, goats, sheep and grizzlies, since their harvest is primarily brought about by non-resident hunters being accommodated by outfitter Toole, and since it is compulsory for both non-resident and resident hunters to submit their trophies to the Game Branch for inspection. The great bulk of these animals are taken through outfitter Toole and the harvest statistics from his area are revealed in the following table.

It was pointed out earlier that the sheep populations are restricted to very few areas along the N.W.T.-Yukon border; they are inaccessible, and are only hunted by the outfitter. Our sheep count revealed a total of about 300 sheep in the area on both sides of the border. Ofthese, 130 were ewes in reproductive age. Long term research on sheep has revealed that these 130 ewes can be expected to produce 12 to 13 legal (3/4 curl) rams annually or 6 to 8 "trophies" (full curl rams of 9 years of age). It is therefore reasonable to say that the present harvest by Toole (11 sheep during the 1975 season) is the maximum these small populations can stand, even if he hunts on both sides of the border.

Table:

Hunting statistics for Toole's outfitting area, which constitutes the eastern half of Game Management Zone 11.

YEAR	NO. OF HUNTERS	MOOSE	CARIB OU	SHEEP	GOAT	GRIZZLY	BEAR	WOLF	DAYS HUNTED
1965	15	4	8	1	9	4	-	-	131
1966	18	8	14	1	10	3	-	2	246
1967	25	8	21	3	19	2	-	-	338
1968	14	5	10	3	5	5	-	-	197
1969	32	19	22	-	11	7	1	1	466
1970	22	9	12	4	7	4	1	-	302
1971	20	12	15	5	13	5	-	3	285
1972	33	16	22	7	22	9	-	1	438
1973	28	10	19	7	17	10	1	-	399
1974	28	13	20	7	13	4	-	3	438
1975	30	11	22	11	13	6	2	2	456

There is presently a surplus of legal rams because the La Biche area was never hunted prior to 1975. However, it can be predicted that this surplus will be removed in 2 to 3 years, and subsequently there will only be those rams available that are becoming legal in the respective year. Nothing is known about the intensity of harvest of these small populations on the N.W.T. side. However, even if Toole is the sole harvester of these small herds, it is recommended that he take no more than 6 to 8 sheep per year, if he intends to maintain quality hunting. The accompanying table shows the age and size distribution of the rams taken by Toole during the past three hunting seasons.

The goat situation is also not very encouraging. Of the total of about 300 goats in Game Management Zone 11, about 120 to 150 are estimated to be in Toole's outfitting area. We have no research data which indicate what is a "safe" harvest rate for goats, while we do have such parameters for moose, sheep and grizzlies. However, considering the fact that goats can only have a single kid, and their life expectancy is 12 to 15 years, it is reasonable to say that the sustained yield a population can be exposed to is very low and is similar to that of sheep. A few calculations will demonstrate this point. Our surveys have shown that only 12% of the goats observed were kids. It is not known how many of these will die during their first winter, but judging from the performance of other ungulate populations a 20% to 30% mortality can be expected. There is additional, even though a small, mortality rate during the second year of life before these young goats are "recruited" into the breeding population. The 2-year old recruits will therefore not make up more than 6 to 8% of the total population, judging from the low reproductive performance observed. If we want to maintain a stable population the harvest of adult goats can not exceed this rate of recruitment of young animals. If there is additional adult mortality besides hunting, which is likely, then the rate of removal by hunting must even be lower than 6 to 8% of the population. It was earlier pointed out that it is estimated that 120 to 150 goats are in Toole's outfitting area. A "safe" harvest quota would therefore be around 10 goats per year, with a variation of 7 to 12 depending on the nature of the kid crop, as well as the severity of winter mortality (both kids as well as adults). The present harvest by Toole (see Table), which was 13 in 1975, but which was as high as 22 in 1972, supplemented by one or two goats shot per year by resident hunters, may therefore already be too high and may result in a reduction of the goat population. This argument does not hold if some of the goat harvested are N.W.T. animals, since these roam freely across the border just as sheep do.

The following table shows the age structure and composition of goats shot in Game Management Zone 11 during the 1975 hunting season. Of a total of 14 goats shot, 10 were billies and 4 were nannies, which is a desired ratio since the new regulations protect nannies which are accompanied by kids.

SHEEP AGE CLASS DATA

OUTFITTER	TOOLE, G.

	Length of Longest Horn												
AGE	4 - 5	5 - 6	6 - 7	7 - 8	8 - 9	9 - 10	10 - 11	11 - 12	12 - 13	13 - 14	Unclass.	Sums	Yr.
N-R				30 7/8		31 7/8 33 3/8	34 1/8					4 (7)	173
N-R		28 1/8	31 7/8	34 5/8 32 3/8 32 -		34 5/8						6 (7)	174
N-R			34 3/8 34 4/8	35 3/8 33 3/8 33 1/8	34 34 4/8	35 37 3/8 34 4/8		37 1/8				11	175

Table:

Age structure of goat harvest in Game Management Zone 11 during 1975.

Age of goat	2	3	4	5	6	7	8	9	10	11	Sum
Toole's hunters			1		3	1	2	1		1	9
Resident hunters							1				1
Total Billies			1		3	1	3	1		1	10
Toole's hunters				1		1		1			3
Resident hunters								1			1
Total Nannies				1		1		2			4
Total of all goats	0	0	1	1	3	2	3	3	0	1	14

Average age of billies taken: 7.3 years
Average age of nannies taken: 7.5 years

The average age of both sexes was around 7.5 years, which is also what we tried to achieve by the requirement the horn length of a legal goat to be 8 inches. There are some indications that the horns of the goats in Game Management Zone 11 do not grow as fast as those in the south-central Yukon (Game Management Zone 7). The following table compares the annual increments of horn growth from goats in these two areas, as well as compare the sexes. Most growth takes place in the first plus second and to a lesser degree in the third year, and valid comparisons are only possible in these young age increments. It appears that in both areas, billies' horns have exceeded that of nannies by about 1/2 inch three years of age. There is also some indication that the horns of goats in Game Management Zone 7 are larger by about 1/2 after 3 years of life, than those of goats from Game Management Zone 11. For a valid comparison, however, a much larger sample size is necessary.

Not much is known about the grizzlies in the area. During the 1975 season, 6 (2 males and 4 females) were shot by the outfitter, but his harvest has been as high as 10 in 1973. Age and sex data on grizzly harvest have only been collected by the Game Branch since 1974 and are summarized on the following table for Toole's outfitting area. It is at this time premature to make any comments on the impact of hunting on the grizzly population in the area.

Table:

Comparison of horn growth rates between goats of Game Management Zone 11 and Game Management Zone 7.

Annual Increment In Inches		1 & 2 -	3	4	5	6	sample size
Billies	G.M.Z. 7	6 14/16	1 6/16	10/16	6/16	4/16	4
	G.M.Z. 11	6 5/16	1 7/16	10/16	5/16	3/16	8
Nannies	G.M.Z. 7	6 2/16	1 12/16	12/16	4/16		4
	G.M.Z. 11	5 10/16	1 10/16	12/16	12/16	6/16	3

nature

GRIZZLY BEAR: SEX AND AGE DATA

OUTFITTER	1974 SEX ♂	1974 SEX ♀	1974 AGE	1975 SEX ♂	1975 SEX ♀	1975 AGE	1976 SEX ♂	1976 SEX ♀	1976 AGE
Toole	✓	✓	8	✓	✓	15			
GMZ # 11	✓	✓	(2)	✓		(6)			
		✓	(5)	✓		8			
		✓	11	✓	✓	(5)			
					✓	7			
					✓	10			
TOTALS:									

A P P E N D I X

Government of the Yukon Territory

X 2703, WHITEHORSE, YUKON TELEPHONE 403-667-7811 TELEX 0498260

OUR FILE 751-5
YOUR FILE

17 June, 1976

Game Branch,
Government of the Yukon Territory,
Box 2703,
Whitehorse, Yukon,
Y1A 2C6

Re: Mineral Licks

I would like to direct your attention to what is becoming something of a problem in the matter of caribou being killed near certain mineral licks along the Nahanni Range Road. There are two such licks which are readily accessible from the road. So easy is this access, in fact, that many hunters remain in their vehicles while waiting for animals to appear. One such area is near mile 62.5 and the other near mile 86.

When caribou are using these licks they are so temerarious that one may easily approach without causing them to take flight. This is not an altogether sporting way to hunt, but many hunters choose to conduct their affairs in this manner. I cannot say how many caribou are actually killed in this way, but during the season there are very few days when the licks are not being observed by hunters.

In as much as caribou are especially vulnerable in such areas, and in view of the constant harassment being occasioned them, I suggest that statutory constraints be enacted to ban hunting in the areas in question. Technically there is no difference between hunting with the use of artificial salt licks, which is illegal, and killing game that happens to be attracted to a natural lick.

Yours truly,

L. Nychasiw
Conservation Officer

LM/mh

RECONNAISSANCE OF THE DRAGON LAKE AREA AND THE NORTH CANOL ROAD LEADING TO IT

On July 4, 1975, a quick reconnaissance was made of the North Canol Road to Dragon Lake, and about 4 hours were spent with a boat on the lake to become familiar with the aquatic vegetation and animal life in the area.

In general, the area is very poor in wildlife compared to the southern and southwestern Yukon. In spite of the fact that much of the forests along the Canol Road has been burned, and successional vegetation mainly in the form of willows prevails, very few signs of moose were observed. Over much of the terrain, black spruce appears to be the climax forest cover.

The aquatic vegetation of Dragon Lake is similar to that observed in the Nisutlin River valley, even though on a much smaller scale. Most shores of the lake are fairly steep with no submerged or emerging aquatic vegetation. Black spruce, paper birch, willow,and in some locations, alder grow to the water's edge. An unidentified shrub (no flowers or fruit found) is fairly abundant close to shore. It is most likely a member of the Ericaceae family or a species of Spirea. Where the shores are low and the water shallow, water lilies (yellow ones) are found in great abundance. The usual sequence observed was as follows: Willows or Spirea at the water's edge, Carex (most likely Carex aquatilis), growing in the water, often mixed with Calla, a plant which I have never seen in the Yukon anywhere else, and also a few specimens of Buck bean. In deeper water, with silty substrata, there are tall Equisetum stands and water lilies in deeper water yet. Submerged vegetation includes Maretails, Potomogeton, Sparganium and Polygonum.

In spite of the fact that some large bays have a very rich flora with the above aquatic elements, the animal life usually associated with such productive marshes was lacking. Only one loon was seen and a pair of bufflehead were observed by Bill Klassen the day before. The only waterfowl we noticed was one unidentified

duck that flew by, and we heard one snipe in the air. No other shore birds were observed. There were some very old signs of beaver, but no indication of muskrats.

The following birds were observed around Dragon Lake: About 20 pairs of rusty blackbirds, 2 pairs of red-winged blackbirds, a few herring gull, arctic tern, bohemian waxwing, common snipe, hermit thrush, yellow-rumped warbler, junco spp., pine grosbeak.

In addition, the following birds were observed along the North Canol Road to Dragon Lake: pine grosbeak, spotted sandpiper, yellowleg, chipping sparrow, robin, cliff swallow, tree swallow, night hawk, boreal chickadee and one spruce grouse with 4 chicks.

Interesting was that some of the water lilies observed in Dragon Lake had red flowers - probably a colour variant of the usual yellow type.

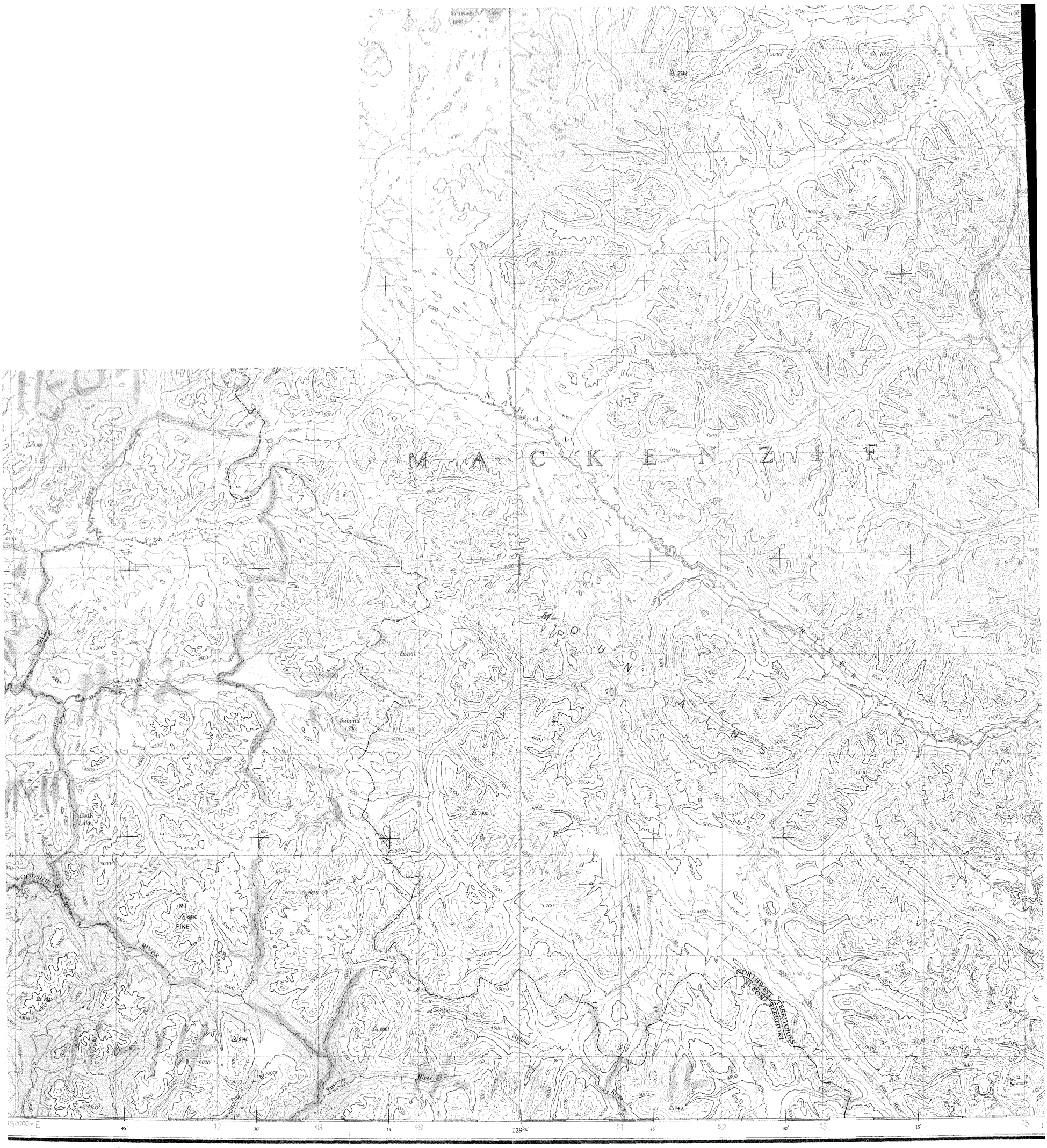
ANIMALS OBSERVED ALONG TUNGSTEN ROAD AND WHILE FLYING FROM HYLAND RIVER CAMP

Robin 2
Say's Phoebe 1
White-crowned Sparrow 3
Yellowlegs 2
Swallow (red spot)
Arctic Tern 3
Chipping Sparrow 4
Northern Phalarope 2
Semipalmated Plover 2
Scaup 8
Junco 1
Savannah Sparrow 2
Pine Siskin 2
Tree Swallow 4
Jay 4
Least Sandpiper 2
Spotted Sandpiper 4
Boreal Chickadee 4
Water Pipit 4
Nighthawk 4
Waxwing 6
Bonapart's Gull 4/Tungsten L.
Scaup 6
Raven 2+ 3 + 3
Pine grosbeak 2
Horned Lark 1
Sparrow Hawk (Cratron Lake) 3
Goldeneye (brood 12)
Bald Eagle 1 + 1
Mallard brood

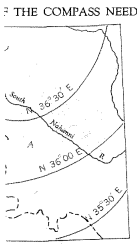
Arctic Groundsquirrel 4
Red Squirrel 1, 1
Black Bear
Golden Eagle 2+6
Least Chipmunk 1

Common Loon
Black and white Warbler
Gray-crowned Rosy Finch 4
Canada Goose (15) + Coal R.
Yellow-rumped Warbler 6
Solitary Sandpiper 1
Kingfisher 1


Map showing boundaries of physiographic subdivisions used in the summer surveys, as well as the estimates of sheep and goat in those subdivisions.
CASSIAR MOUNTAINS
DORSEY RANGE
SELWYN MOUNTAINS
PROVINCE OF BRITISH COLUMBIA
YUKON TERRITORY
G. TOOLE'S AREA



THE COMPASS NEEDLE, 1954



ss needle at any place along a red line
it red line. At other places the declina-
the neighbouring red lines; thus at the
on is between N. 36° E. and N. 36°30 E.
ue compass needle are decreasing

Surveyed, compiled, drawn and printed by the ARMY SURVEY ESTABLISHMENT R.C.E., 1949-54
Aerial photography by the R.C.A.F. 1949

Universal Transverse Mercator Projection.

NAHANNI

YUKON TERRITORY – NORTHWEST TERRITORIES

Scale 1 : 250,000

1 Inch to 4 Miles Approximately.

Miles 5 0 5 10 15 20 Miles

Kilometres 5 0 5 10 15 20 25 30 Kilometres

North American Datum 1927

Copies may be obtained from
The Map Distribution Office,
Dept. of Mines and Technical Surveys,

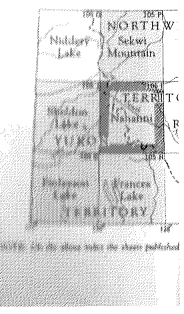
Contour interval 500 Feet
All Elevations in Feet above Mean Sea Level.

REFERENCE

Road, Hard Surface, All Weather	More than 2 Lanes, Route No., 2 Lanes
,, Loose Surface, All Weather	2 Lanes Wide or More
,, ,, ,, Less than 2 Lanes	All Weather, Dry Weather
Cart Track, Trail	Cart Track, Trail
Railway, Multiple Track	
,, Single Track	
Boundary, International	Marker
,, Province or State	
,, County or District	
,, Reservations, Indian, Military, etc.	

REFERENCE

Horizontal Control Point △	Spot Elevation, in feet 124
Contours, Elevation 5500 6000	Wooded Areas
,, Depression 5000 4500	Swamp or Marsh
,, Approximate	
Glacier or Snow-field	
Streams, Intermittent	Ferry, W. L. 123
Dam	Lighthouse
Falls	
Airfield, on Land	Wreck, Landing Ground, Anchorage
Power Transmission Line	



SEKWI MOUNTAIN

NORTHWEST TERRITORIES – YUKON TERRITORY

Scale 1 : 250,000

1 Inch to 4 Miles Approximately

Miles

Kilometres

Contour Interval 500 Feet

All Elevations in Feet above Mean Sea Level

North American Datum 1927

REFERENCE

Horizontal Control Point

Contours, Elevation

Depression

Approximate

Glacier or Snowfield

Stream, Intermittent

Dam

Falls

Airfield, on Land

Spot Elevation, in feet

Forest, unclassified Scrub

Swamp or Marsh

Ferry

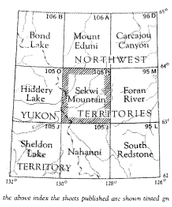
Lighthouse

Water

Mud

Sand

Landing Ground



On the above index the sheets published are shown tinted ye

NATIONAL TOPOGRAPHIC SERIES

CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

EDITION 2
~~FIRST EDITION~~

SHEET 105 A

Universal Transverse Mercator Projection
All Elevations in Feet above Mean Sea Level
Contour interval 500 Feet
North American Datum 1927

Magnetic Declination 33°35' East at centre of sheet, 1950
The variation of the compass needle is decreasing 2 minutes ann

Surveyed, computed, drawn and printed by the Army Survey Est. R.C.E. 1948-50.
Aerial photography by the R.C.A.F. 1948.

Interim Corrections 1974

WATSON LAKE

YUKON TERRITORY

Scale 1:250,000
1 Inch to 4 Miles Approximately

Miles 5 0 5 10 15 20 Miles

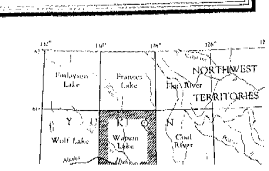
R E F E R E N C E

Road, Hard Surface, Heavy Duty .... 3 or more Lanes / Partially completed
Road, Hard Surface, Heavy Duty .... 2 Lanes / Route No.

R E F E R E N C E

Triangulation Station .... △
Contours, Elevation 1500 2000
Spot Elevation, in feet .... .821
Wooded Areas ....

Copies may be obtained from the Map Distribution Office, Department of Mines and Technical Surveys, Ottawa.



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Aerial photography by R.C.A.F., 1949.

Universal Transverse Mercator Projection.

Scale 1 : 250,000
1 Inch to 4 Miles Approximately

Miles 5 0 5 10
Kilometres 5 0 5 10 15

SHELDON LAKE
YUKON TERRITORY

REFERENCE

Road, Hard Surface, All Weather	More than 2 Lanes	Partially Completed
,, Hard Surface, All Weather	2 Lanes Route No. (15)	Less than 2 Lanes
,, Loose Surface, All Weather	More than 2 Lanes	2 Lanes
,, Loose Surface, Less than 2 Lanes	All Weather	Dry Weather
Railway, Multiple Track		
,, Single Track		
Boundary, International		

Interim Corrections 1979

Magnetic declination 1979 varies from 33°25′ easterly at centre of west edge to 33°48′ easterly at centre of east edge. Mean annual change decreasing 3.8′.

Copies may be obtained from the Canada Map Office, Department of Energy, Mines and Resources, Ottawa, or your nearest map dealer.

Corrections

La déclinaison magnétique pour 1979 varie de 33°25′ Est au centre de la limite Ouest à 33°48′ Est au centre de la limite Est. Variation moyenne annuelle décroissante 3.8′.

Ces cartes sont en vente au Bureau des Cartes du Canada, ministère de l'Énergie, des Mines et des Ressources, Ottawa, ou chez le vendeur le plus près.

…E

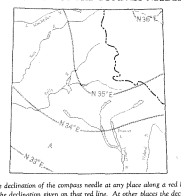
…ft.
…n Sea Level.

Triangulation Station △	Spot Elevation, in feet .257
Contours, Elevation 1500	Wooded Areas
,, Depression 2000	Swamp or Marsh
,, Approximate 1500	
Stream, Intermittent	Ferry
W.L. 241	Mud

NOTE: On the above index the sheets published are shown tinted g…

NATIONAL TOPOGRAPHIC SERIES — DEPARTMENT OF NATIONAL DEFENCE — *FIRST EDITION* — CANADA, SHEET 105 J

THE DECLINATION OF THE COMPASS NEEDLE, 1951.



The declination of the compass needle at any place along a red line is the declination given on that red line. At other places the declination is between those given on the neighbouring red lines; thus at the place marked A, the declination is between N. 35° E. and N. 34° E. The easterly declinations of the compass needle are decreasing

Surveyed, compiled, drawn and printed by the ARMY SURVEY ESTABLISHMENT R.C.E., 1949-51.
Aerial photography by R.C.A.F., 1949.

Universal Transverse Mercator Projection.

REFERENCE

Road, Hard Surface, All Weather	*More than 2 Lanes*	*Partially Completed*
,, *Hard Surface, All Weather*	*2 Lanes* *Route No.* 10	*Less than 2 Lanes*
,, *Loose Surface, All Weather*	*More than 2 Lanes*	*2 Lanes*
,, *Loose Surface, Less than 2 Lanes*	*All Weather*	*Dry Weather*
Railway, Multiple Track		
,, *Single Track*		
Boundary, International		
,, *Province or State*		
,, *County or District*		
,, *Reservations, Indian, Military, Park, etc.*		

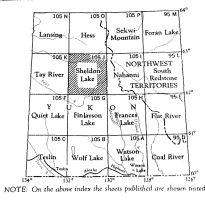
Scale 1 : 250,000
1 Inch to 4 Miles Approximately

Miles 5 0 5 10 15 Miles
Kilometres 5 0 5 10 15 20 25 Kilometres

Contour interval 500 Feet.
All Elevations in Feet above Mean Sea Level.

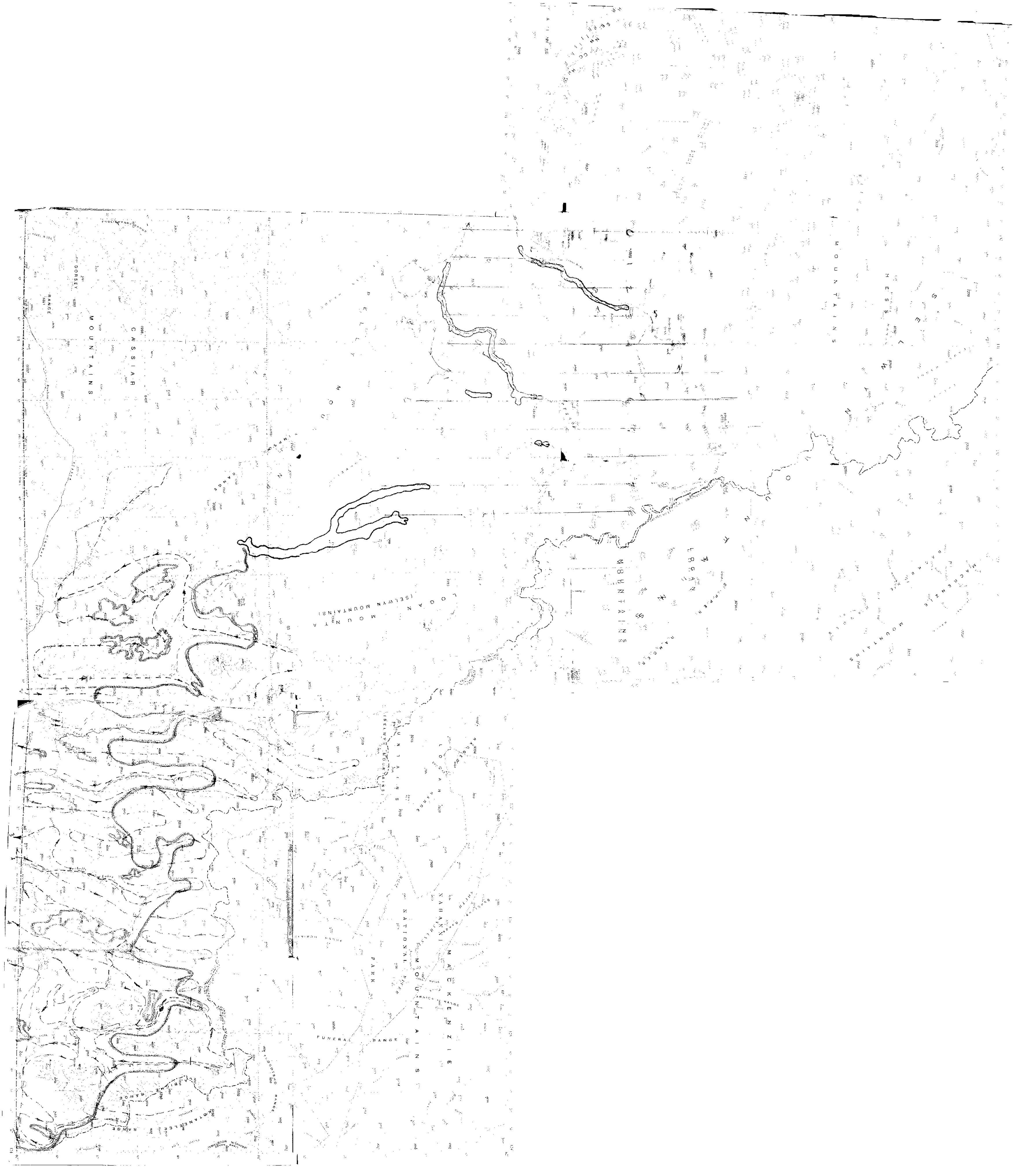
REFERENCE

Triangulation Station △	*Spot Elevation, in feet* 25
Contours, Elevation 1500 2000	*Wooded Areas*
,, *Depression* 2000 1900	*Swamp or Marsh*
,, *Approximate*	
Stream, Intermittent	W.L. 241
Ferry	
Dam	*Mine*
Falls	*Sand*
Navigation Light	
Aerodrome, on Land	*Elevation in Feet* 250
on Water	
Main Electric Power Line	



NOTE: *On the above index the sheets published are shown tinted green*

SHELDO
YUKON TE



CASSIAR
MOUNTAINS
MACKENZIE
MOUNTAINS

LEGEND

Flight lines surveyed to compare helicopter and fixed-wing aircraft.

Flight lines surveyed with helicopter only.

(1) Wolf signs (kill location or observation of wolves).

131° 130° 129° 128° 127° 126°