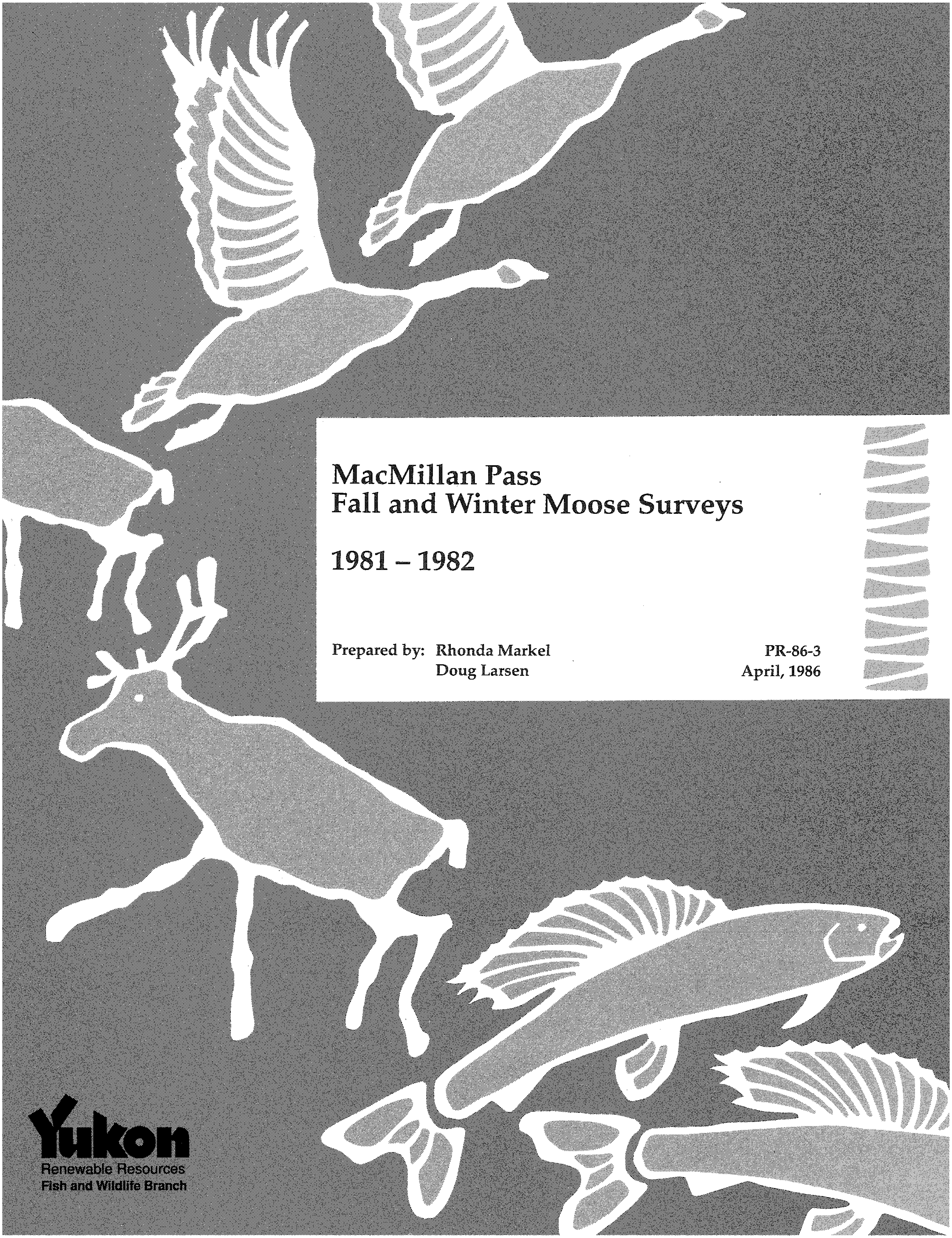

MacMillan Pass
Fall and Winter Moose Surveys

1981 – 1982

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Yukon
Renewable Resources
Fish and Wildlife Branch

MACMILLAN PASS

FALL AND WINTER MOOSE SURVEYS

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Government of Yukon

Department of Renewable Resources

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INTRODUCTION

To date, little information is available on the numbers and distribution of moose in the MacMillan Pass/Howards Pass area. Shortly after the construction of the Canol Road, Rand (1945) conducted a summer reconnaissance of wildlife along the highway for the National Museum of Canada. He summarized the general abundance and distribution of moose and caribou and discussed the level of exploration of big game by the native population. Gill (1978) conducted baseline ecological studies on large mammals in a 250 km^2 area centered on the proposed Amax mine in the MacMillan Pass area. He also summarized the existing published and unpublished literature on large mammals for that area. Pan Ocean (Beak 1980) and Envirocon (1976) participated in local environmental studies in reference to claims, and A. Pearson (1981) prepared a literature review of environmental characteristics in the Mac Pass area. All of the above field investigations were conducted in localized areas and restricted in scope.

In view of the scarcity of information on moose and the potential for extensive industrial development in this region, a study was conducted by the Y.T.G. Department of Renewable Resources to obtain baseline information on the regional moose population. The objectives of this study were:

1. Document the relative distribution of moose during the post-rut and late winter periods.
2. Assess the moose population status through post-rut composition counts.
3. Assess post-rut and late winter habitat selection by moose.

It was not the intent of this study to comment on the potential impact of the proposed development on moose in the Mac Pass area. The purpose was to collect base line data on moose populations inhabiting the general area of the proposed development for future reference.

STUDY AREA

The study area (Fig. 1), which measures approximately 22,500 km^2, contains the proposed mine sites and access roads on the Yukon side of the Mac Pass/Howards Pass region and extends south to Ross River encompassing the North Canol Road. The overall boundary corresponded to Game Mangement Subzones (GMS).

METHODS

Aerial Surveys

Two extensive aerial surveys were conducted, one in the fall of 1981 (October 28 to November 8) and the other in the late winter of 1982 (March 2 to March 8). G.M.S.s were divided into sample units, averaging 64.8 km^2, using natural terrain features for boundaries (Fig. 2). This insured complete coverage of the study area as well as allowed for the stratification of moose into areas of similar density.

Each sample unit was thoroughly searched, however, visibility biases existed amongst various habitat types. Moose in open areas, such as shrub zones, were easier to spot than those in forested areas. No attempt was made to correct for this bias, and consequently a population estimate was not possible.

FIGURE 1

— FALL AND LATE WINTER STUDY AREA

-- EXTENDED LATE WINTER STUDY AREA

GMS (11-07)

SCALE 1" to 14 mi

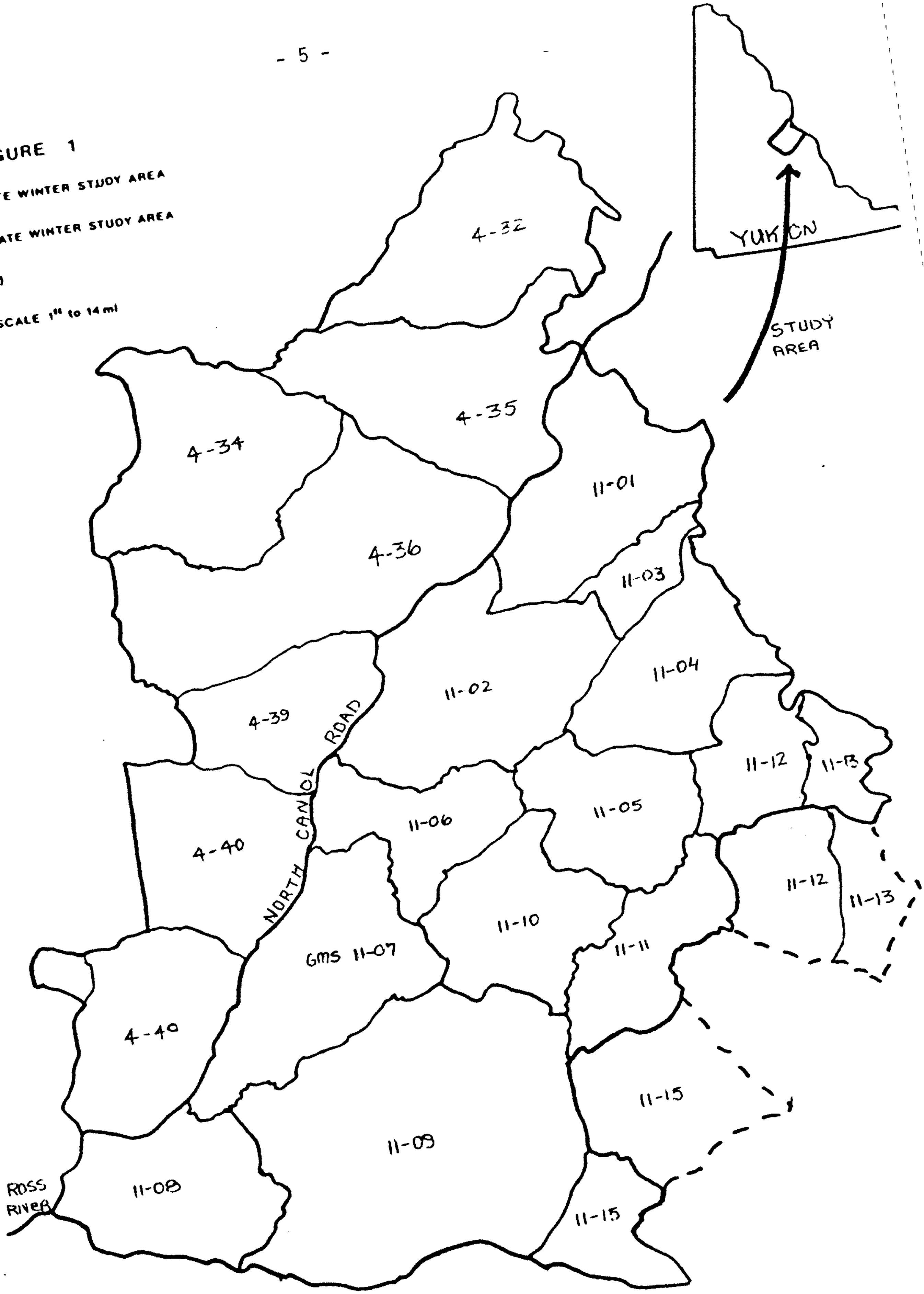
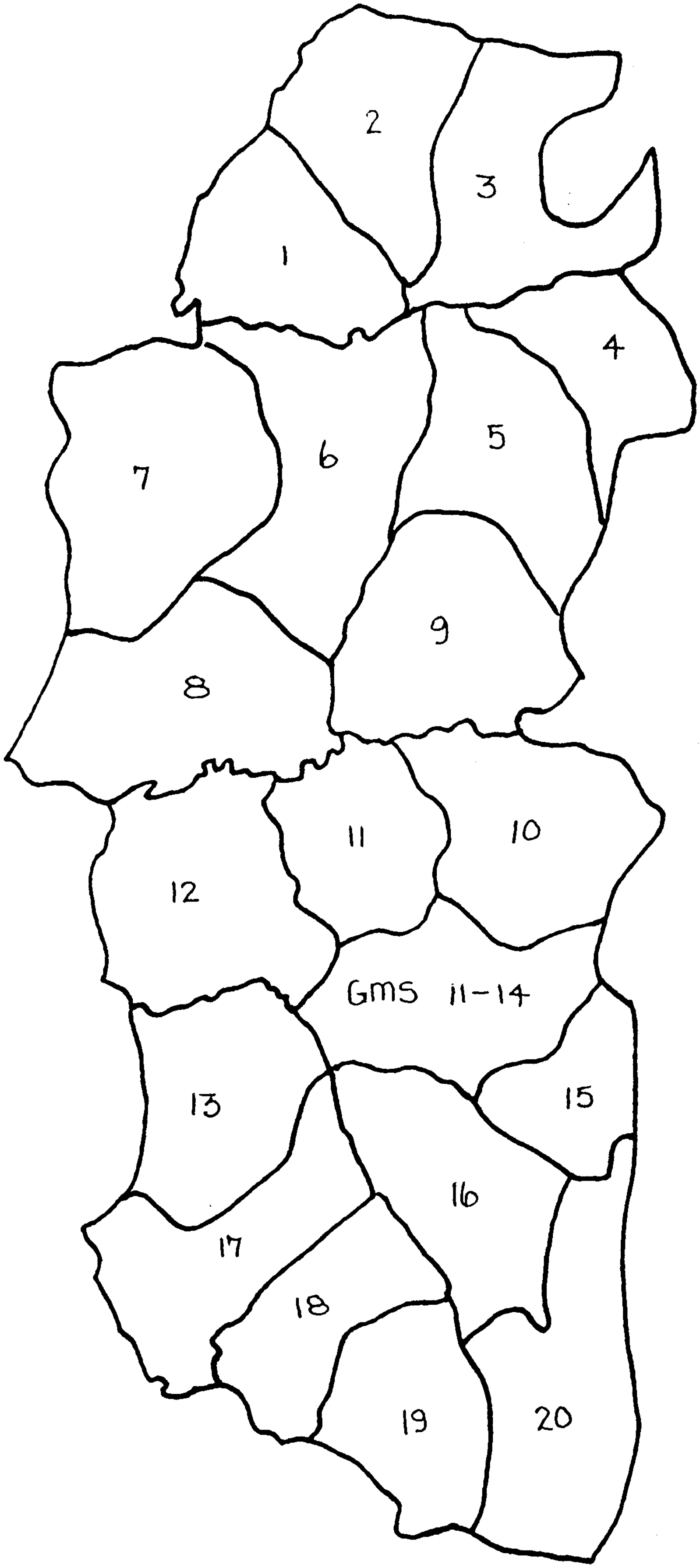


FIGURE 2

REPRESENTATIVE GMS AND SAMPLE UNITS

SCALE 1" to 14 mi



Information regarding the relative distribution and habitat use of moose was collected.

During the fall, surveys were flown simultaneously by a Cessna 185 and a Helio Courier 295 fixed wing aircraft. A Cessna 185 and a Cessna 206 were used during the late winter survey. Each aircraft contained a navigator-observer in the front right seat, an observer in the left rear seat and a pilot-observer in the front left seat. Surveys were flown at an altitutde of 100 - 166 m and an airspeed of 70 - 90 knots.

During the survey, all moose observations and tracks were plotted on 1:250,000 scale topographic maps to the nearest 100 meter contour interval. For each aggregation the total number of moose, habitat type and location were recorded onto data forms or onto cassette tapes.

Sample units were rated into high, medium, low, extra low or zero strata based on moose seen and to a lesser extent, on sign (tracks). Each stratum was assigned a density value based on moose observed.

Composition

During the fall survey, the moose were classified into five age/sex groups:

1. Large bulls - large fully developed antlers.
2. Medium bulls - medium sized antlers.
3. Small bulls (yearlings) - small undeveloped antlers.
4. Cows - large bodied antlerless moose.
5. Calf - small bodied antlerless moose.

The presence or absence of antlers was used to sex moose during the fall survey, as antler drop of mature males does not occur until late November. Since all bulls are antlerless in late winter, only adults and calves were differentiated.

Bergerud and Manuel's (1969) definition of an aggregation as any group of animals occurring within close proximity to one another was used throughout the survey.

Snow and Habitat

Snow depths along the North Canol Road were measured daily from mid-January to mid-March 1982 (unpublished Y.T.G. data). During the late winter survey, snow depth was measured against anatomical features of standing adult moose and converted into height classes.

The habitat type use by each moose aggregation was classsified into the following broad categories:

- shrub,
- riparian,
- open coniferous forest,
- closed coniferous forest, and
- deciduous forest.

RESULTS AND DISCUSSION

The intent of these surveys was not to obtain a population estimate for the study area, so the numbers presented should not be interpreted as such. However, the observations do provide an adequate sample to make an assessment of the seasonal distribution, relative densities and composition of the population.

Relative Density and Distribution

The sample units were rated into strata to facilitate spatial comparisons of abundance of moose within the study area and temporal comparisons between fall and winter surveys. Survey intensity (search time/km^2) was similar between surveys, making this comparison possible.

Stratum - high = greater than .23 moose/km^2
medium = .09 to .23 moose/km^2
low = less than .09 moose/km^2
extra low = heavy to moderate tracking with no moose observed
zero = very little or no tracking was observed.

The relative distribution and abundance of moose during the fall and late winter surveys are presented in Fig. 3 and 4.

During the fall surveys, moose were widely distributed throughout the study area. The southwest section was sparsely populated in comparison to the rest of the study area. Pockets of high moose density occurred in several locations, i.e. Keele Peak, Sheldon Lake, Mt. Christie, south and east of the Itsi Lakes and along the Big Campbell River.

FIGURE 3

FALL SURVEY

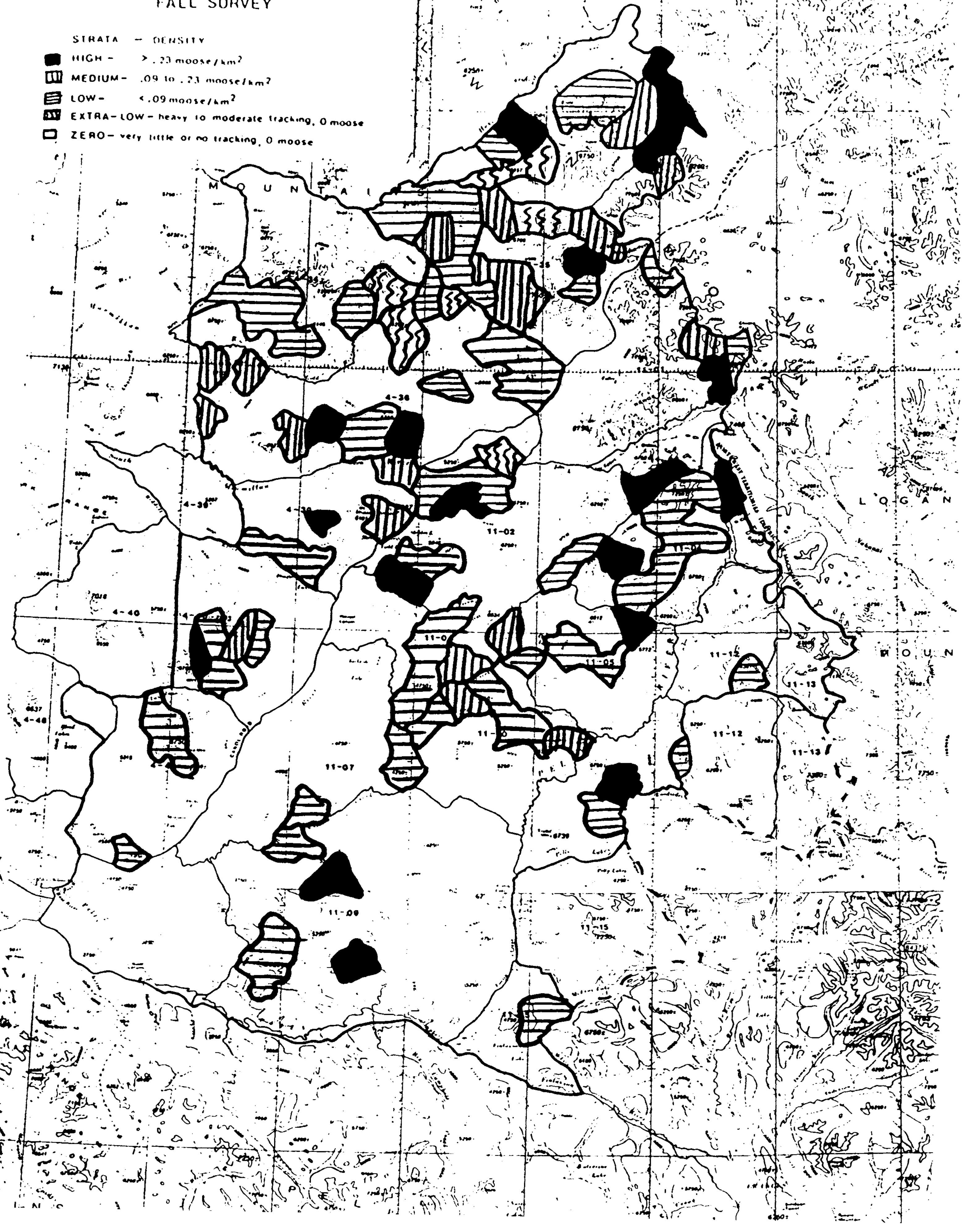
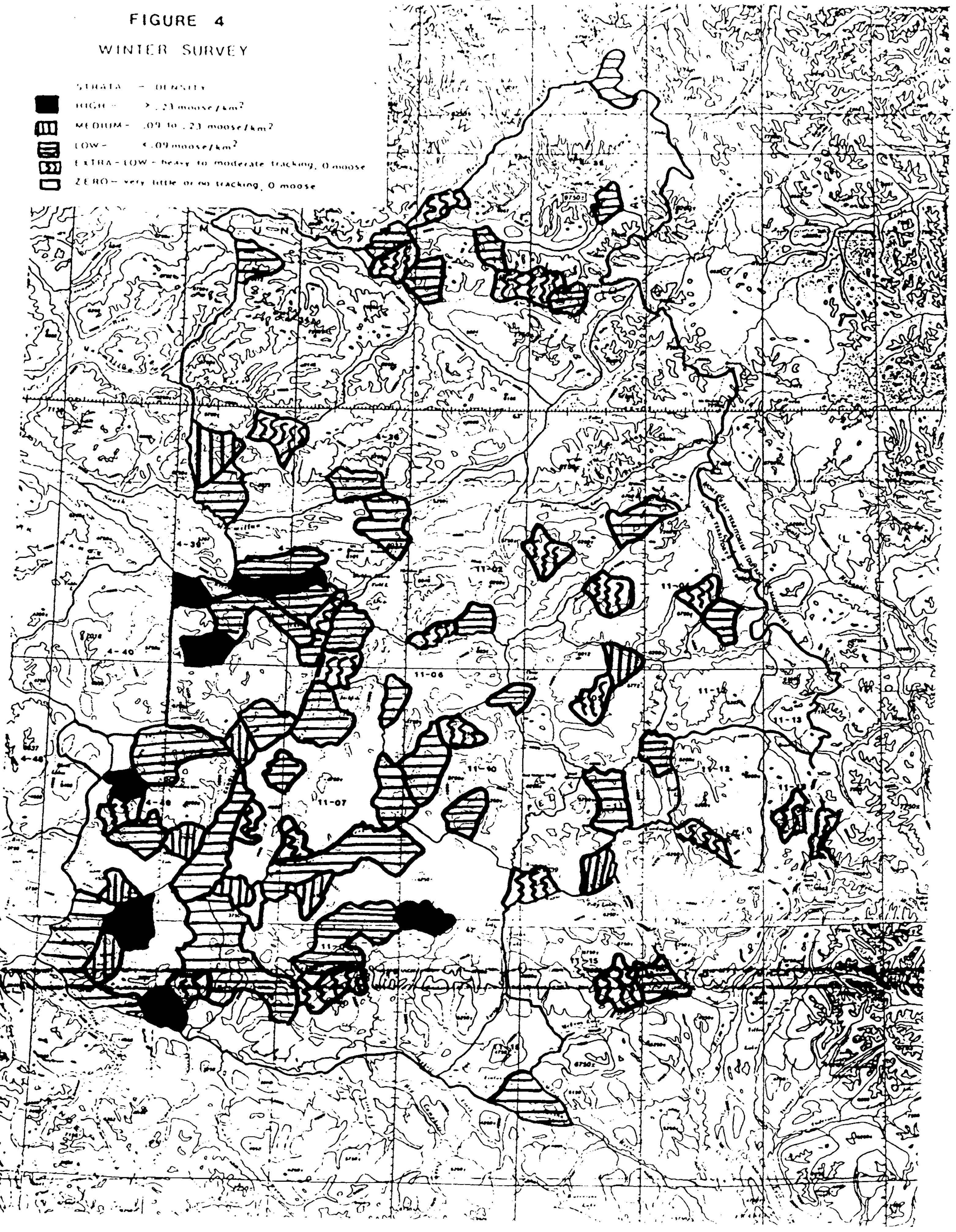


FIGURE 4

WINTER SURVEY



A shift in the population distribution was observed between fall and late winter. In late winter, the southwest portion of the study area was densely populated, whereas the rest of the study area was sparsely populated. Pockets of high moose density occurred in the vicinity of False Canyon (Ross River), Hoole Canyon (Pelly River), Checkera Mountain and the South Riddel River. This shift in population distribution could be the results of animals redistributing themselves within the study area, ingress/egress or a combination.

Variation in snow depths within the area was likely the mechanism causing this redistribution. The Pelly Mountains form a major orographic block which causes a very dry rain shadow in the Ross River-Finlayson Lake area of the Pelly Valley (Wahl 1981). As you proceed northward from Dragon Lake into the Selwyn and Mackenzie Mountains, there is an increase in elevation resulting in increased precipitation. This is supported by snow depth measurements taken along the North Canol Road (Fig. 5). Snow depth varied from 51 cm in the south to 95 cm along the N.W.T.-Yukon border. As well, the area north of Dragon Lake is characterized by a somewhat longer snow season than the Ross River area.

During the late winter survey, 66% of the moose aggregations were found at snow depths less than knee height (Table 1). The remaining animals were found in snow between knee and chest height. Snow depths exceeding 80 cm (calf chest height) are generally considered detrimental to calf survival (Kelsall 1969, Coady 1974). Depths greater than 105 cm (chest height of adults) are restrictive to adults (Kelsall 1969, Kelsall and Telfer 1971). Snow depths in the north east portion of the study area exceeded critical levels for calves and were approaching critical levels for adults.

Table 1. Mac Pass Late Winter Moose Survey Snow Depth Classes.

Snow Classes (based on adult moose)	Moose Aggregations* N	%
1. knee height	68	66
2. bottom of the chest to knee height	35	34

*Only 1 mean snow depth record from each aggregation.

Composition and Group Size

An overall fall ratio of 26 calves/100 cows (≥18 months) was recorded, with calves comprising 11% of the observed moose population (Table 2). This ratio is indicative of a moose population which is probably stable or slowly declining. It is likely that 11% recruitment barely compensates for adult mortality. It is also likely that a substantial number of calves die over the winter leaving less than 11% in the spring. Overwinter mortality was indicated by the 8% calf cohort recorded in March. Lower ratios of 19 calves/100 cows (≥18 months) were observed in the southwestern Yukon in 1981 (Larsen 1982).

The overall fall sex ratio was 104 males/100 cows. This ratio is much higher than the 49 males/100 cows observed in the southwestern Yukon (Larsen 1982). The reason for this high sex ratio is likely due to the low harvest of male moose in the study area compared to the southwestern Yukon. The 1980 resident harvest of moose in the study area amounted to only 4.6% of the total moose harvest for the Yukon and received only 3% of the Yukon hunter effort (1980 Yukon hunter statistics). These figures, however, do not account for any harvest by natives.

Table 2. Classification of Moose within the MacMillan Pass Study Area

	FALL								LATE WINTER		
	Bulls				Cows						
GMS	sm.	med.	lg.	Total	(incl. yearl. females)	Calves	Unident. adults	TOTAL	Adults	Calves	TOTAL
4-32	11	1	17	29	42	8	-	79	4	-	4
4-34	-	-	5	5	5	1	-	11	1	-	1
4-35	7	9	18	34	13	2	4	53	6	-	6
4-36	3	6	9	18	24	7	2	51	12	2	14
4-39	3	-	5	8	12	-	1	21	28	2	30
4-40	-	5	17	22	8	1	6	37	44	5	49
4-49	-	-	3	3	3	1	-	7	21	2	23
11-01	6	2	10	18	6	1	-	25	-	-	-
11-02	5	-	8	13	21	10	-	44	3	-	3
11-03	3	-	2	5	7	2	-	14	1	1	2
11-04	3	5	4	12	21	5	-	38	-	-	-
11-05	1	1	3	5	5	3	-	13	1	1	2
11-06	-	1	9	10	13	6	-	29	2	1	3
11-07	3	-	-	3	1	-	-	4	9	-	9
11-08	-	-	-	-	-	-	-	-	40	-	40
11-09	5	1	8	14	16	2	1	33	34	4	38
11-10	1	-	3	4	9	3	-	16	5	-	5
11-11	5	3	4	12	3	2	-	17	7	1	8
11-12	-	-	2	2	-	-	-	2	2	-	2
11-13	-	-	-	-	-	-	-	-	4	-	4
11-15	-	-	1	1	-	-	-	1	3	1	4
TOTAL	56	34	128	218	209	54	14	495	227	20	247
%				44%	42%	11%	3%	100%	91.9%	8.1%	100%

The observed mean group size during the fall survey was 3.4, whereas it dropped to 1.9 during the winter survey. The smaller mean aggregation size in the late winter is to be expected. The fall survey took place after the rut when the moose are in post-rut aggregations. By the late winter however, the moose have dispersed and are scattered throughout the boreal zone (see following section).

Habitat/Elevation

Shrubs (willow and birch) were the most commonly occupied type in fall and late winter, with 61.9% and 61.1% respectively observed in that type (Table 3). In general, the use of forests increased in late winter. Closed forests were only used by 2.9% of the moose, however, open forests received use by 22.2% of the moose, and deciduous forests received 10.9% use.

Only 243 moose were observed in the late spring, whereas 495 were observed in the fall survey. This may be attributed to the higher use of forested areas by moose in the late winter (visibility bias). Larsen *et al*. (1980) found late spring to be a poor time to survey moose. In the Lorne Mountain census, less than half of the moose observed during the fall were observed in the late winter.

Moose were found at higher elevations during the fall period compared to late winter (Table 4). Fifty-eight percent of all observed moose were found at elevations ≤1,500 meters in fall compared to 92% in late winter.

Table 3. Mac Pass Moose Vegetation Use.

Vegetation Type	Fall	Winter
Shrub	61.9%	61.1%
Riparian	18.7%	2.0%*
Open Coniferous Forest	18.7%	22.2%
Closed Coniferous Forest	0.7%	2.9%
Deciduous Forest		10.9%
Other		2.0%

*Conflicting definitions of 'riparian' occurred between the two surveys. During the late spring, a vegetation was only considered riparian if it occurred in the boreal zone. Whereas in the late fall, it was considered riparian when in the sub-alpine zone.

Table 4. Number of Moose observed by Elevation.

Elevation (m)	Moose Number (%) Fall	Winter
833 - 1000	4 (0.8%)	44 (20.4%)
1001 - 1166	14 (2.9%)	42 (19.4%)
1167 - 1333	78 (16.0%)	57 (26.4%)
1334 - 1500	187 (38.3%)	53 (25.5%)
1501 - 1666	160 (32.8%)	17 (7.9%)
1667 - 1833	41 (8.4%)	3 (1.4%)
1834 - 2000	4 (0.8%)	-

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