MOOSE POPULATION CHARACTERISTICS IN THE CASINO TRAIL AREA

NOVEMBER, 1987

Yukon
Renewable Resources

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by

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1988

INTRODUCTION

Increased hunting access through exploration and development is a major concern to moose management throughout the Yukon. The Casino Trail is a major road building initiative in the remote and inaccessible Dawson Range northwest of Carmacks. Access currently exists between Carmacks and Mount Freegold. The extension of the Mount Freegold road along Big Creek to Casino Mountain is presently under construction. This development has the potential to have a significant effect on the moose population in the area of the road, by improving hunter access.

The current focus of moose management in the Yukon is to document abundance, distribution and composition of moose in areas of high hunting pressure throughout the Territory. From 1981-1984, survey efforts were concentrated in southwestern Yukon which received the highest hunting pressure (Larsen 1982, Markel and Larsen 1983, 1984). In 1986, surveys were conducted near Teslin and Watson Lake (Jingfors and Markel 1987) and in 1987 in the Frances Lake and Sheldon Lake areas (Jingfors 1988). Twenty-five percent of the total land area of the Yukon has been surveyed to date. The Casino area was identified as a priority area not based on existing hunting pressure, but rather on the potential effect of this road development on local moose and other wildlife populations. Regional surveys help managers to evaluate the potential effects of access associated with road development and related hunting on the local moose population.

Concern over increased access and the lack of wildlife density and distribution information led to a socio-economic and environmental overview of the proposed development (Spencer 1985). It was in response to this lack of information that the moose population of the Casino area was surveyed. Funding for this survey was provided by the Department of Community and Transportation Services through the Regional Resource Roads Program.

STUDY AREA

The Casino Trail survey area, which consists of 3300 km^2 total land area, lies in the central Yukon northwest of Carmacks (Fig. 1). It is characterized by smooth rolling topography with moderate to deeply incised valleys. Most of the terrain lies between 1000-1500m elevation with the highest peak at 1856m above sea level. Prospector and Apex Mountains are located in the center of the survey area.

Open black (Picea mariana) and white spruce (Picea glauca) stands occur in the valleys and on lower slopes, with black spruce prevailing in the wetter sites and white spruce in the better drained areas. Treeline occurs around 1200m. Shrub birch (Betula spp.) and willow (Salix spp.) are the predominant moose browse species in an extensive subalpine zone.

The climate of the area is described as continental and cold, with a mean annual temperature of $-7^{o}C$ and an annual precipitation of about 33cm (Oswald and Senyk, 1977). The 10-year average snow depth (March 1) at Victoria Creek is 39cm, while the 9-year average at Casino Creek is 58cm (Petersen, 1985). The physiography, climate, and vegetation of this area are described in more detail by Oswald and Senyk (1977).

Big game densities in this area are low. Two isolated populations of 30-35 Dall's sheep occur in the Dawson Range (Hoefs and Lortie 1975, unpublished internal files 1986). The Dawson Range woodland caribou herd, which ranges beyond the study area borders, has been estimated at 400 animals (Farnell and Lortie, 1987). Wolf densities were not estimated but were likely low based on an estimated density of 32/ 1000km^2 documented from the Nisling River area (Baer and Hayes 1987) located south of the study area (Fig. 2). Grizzly bear densities are unknown but likely range from 10 bears/ 1000km^2 (B. Smith pers comm.) to 16 bears/1000 km^2. The latter density was documented from two studies, one west of Whitehorse (Larsen and Markel, 1987) and another near Tok, Alaska (Boertje et al. 1986). Both studies are approximately 150 km from the Casino Survey Area.

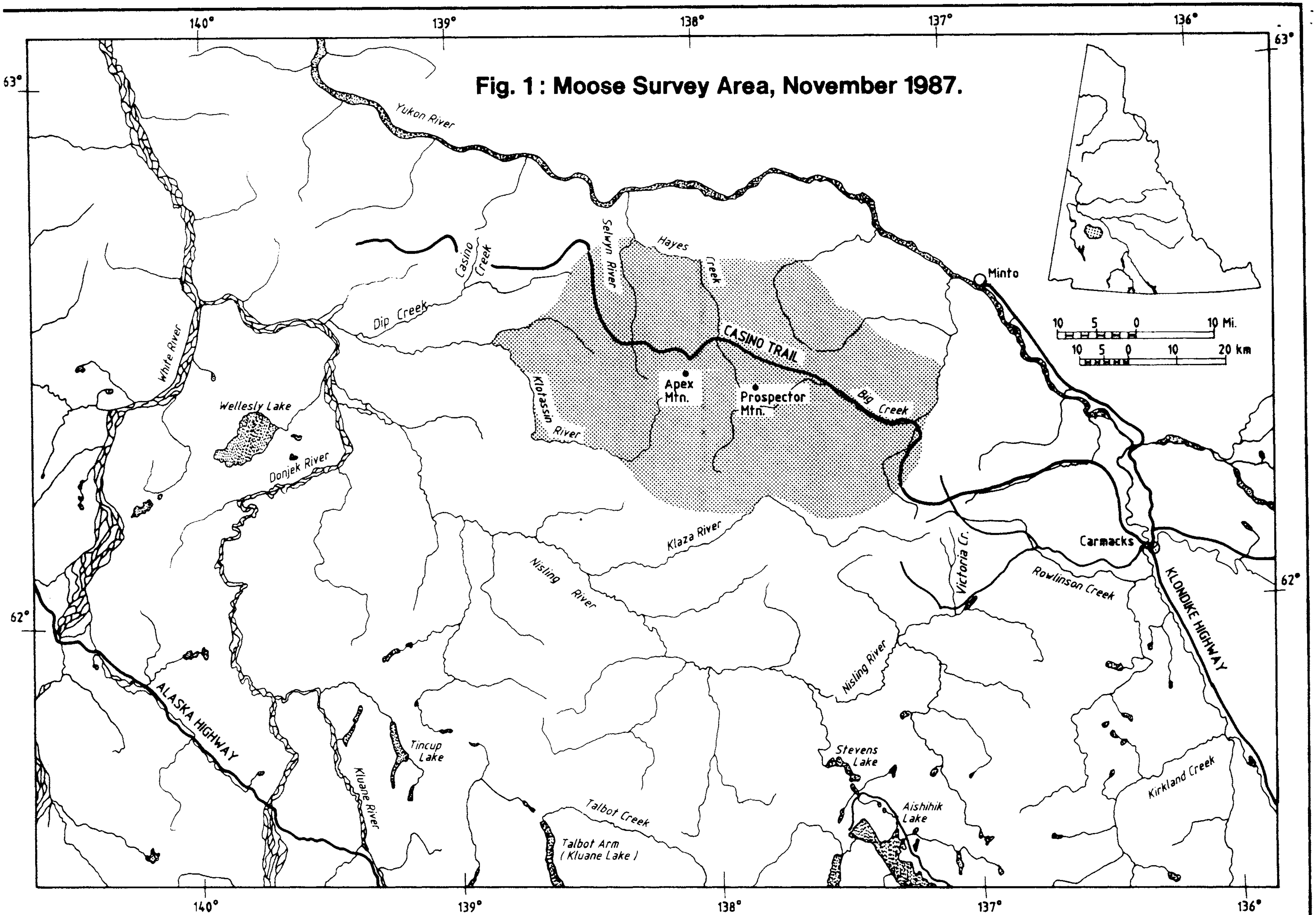


Fig. 1 : Moose Survey Area, November 1987.

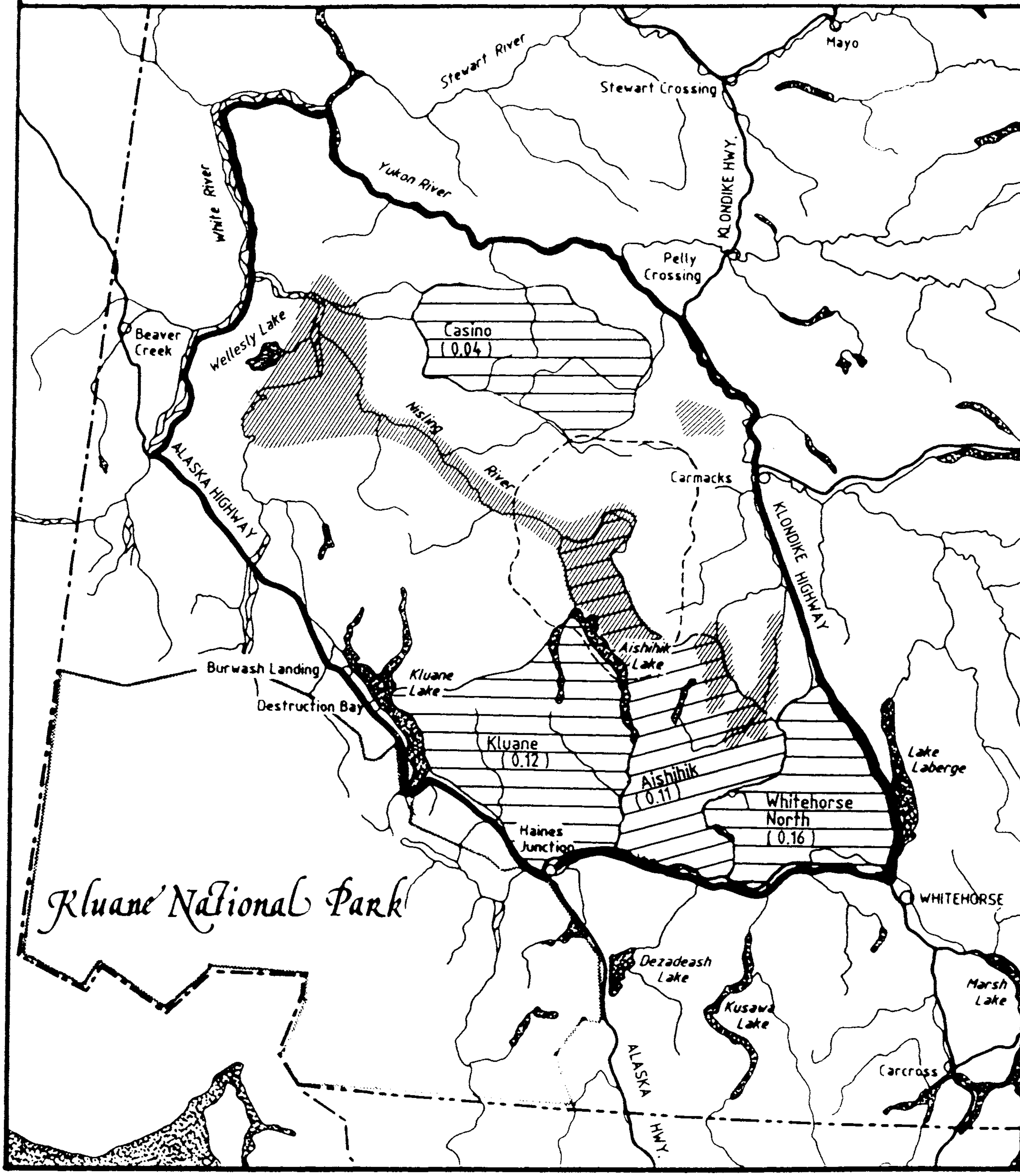
Fig. 2 : Wildlife Studies in the vicinity of the Casino Trail Survey Area

1981, 1982 AND CURRENT MOOSE SURVEY AREAS (DENSITY km²)

WINTER CONCENTRATIONS OF MOOSE RECORDED FROM 1975 SURVEY

– – – 1986 LATE WINTER WOLF SURVEY AREA

—— 1975 LATE WINTER MOOSE SURVEY AREA



METHODS

Aerial surveys were conducted between the 7th - 25th of November, 1987. This is a preferred period to conduct moose surveys due to the aggregation behaviour of moose in open habitats during and immediately following the rut (Peek et al. 1974, Lynch 1975, Rounds 1978, Mytton and Keith 1981, Larsen 1982, Gasaway et al. 1986) and the presence of snow. Both of these factors increase the visibility of moose on aerial surveys (Gasaway et al 1986). In addition, the presence of antlers on males to late November facilitates the sexing of moose from aircraft.

A stratified random block sampling technique was used (Gasaway et al. 1986) with modifications to accommodate the terrain, weather conditions, and distribution of moose in the Yukon (Larsen 1982). A brief description of the technique follows.

The survey area was divided into sample units (SU) using natural terrain features for borders and delineated on 1:50,000 topographical maps. Fixed-wing aircraft are used to stratify SUs into two or more strata based on the number of moose and tracks seen in each SU. Areas above 1542 meters (m) elevation are considered uninhabitable for moose and are not surveyed. These areas consist primarily of talus slopes with little or no vegetation. Helicopters are then used to census a proportion of the SUs within each stratum. Sample units to be surveyed are randomly selected and searched immediately after stratification. Total counts of moose were made within each SU surveyed. Search patterns varied from parallel overlapping transects, following contour lines and tight circling, depending upon the terrain and wind. The average density of moose observed in the SUs surveyed are extrapolated to the unsurveyed SUs. Observed and extrapolated densities are combined for an estimated density for each stratum. Strata estimates are added together to obtain a total population estimate.

Moose observations included information on the number of animals in each aggregation, their age (calves, yearlings, adults) and their sex. Males are classified into yearling and adult bulls based on the size and shape of their antlers (DuBois et al 1981). Females are differentiated from bulls by their white vulva patch and lack of antlers (Mitchell 1970). Body shape and size is used to differentiate calves from adults.

RESULTS AND DISCUSSION

Upon completion of the stratification flights, it was apparent that the survey area could not be divided into strata based on moose density or sign. The few moose that were seen on the stratification flights (n=43) were dispersed over the entire survey area (3055km^2 habitable moose range), individually or in pairs. As a result, the survey area was treated as one stratum, and SUs were randomly selected from the entire area.

Twenty-six of 173 sample units or 15% of the study area was surveyed. Search intensity was 1.96 min/km^2 for the census and 0.29 min/km^2 for the stratification. These search intensities are consistent with those of other moose surveys in the Yukon (Markel and Larsen 1983, 1984). Individual sample units averaged 17.7 km^2 in size and ranged from 13.7 km^2 to 21.7 km^2.

The total population estimate for this area was 137 moose $\pm$ 59% (90% C.I.). The mean density was 0.04 $moose/km^2$ (habitable moose range). Although there is a wide range of uncertainty around this estimate, the estimated maximum density (0.07 $moose/km^2$) is the lowest found in the Yukon to date.

The large range around the mean population estimate is likely due to: 1) the low level of sampling which occurred as a result of not being able to stratify the study area; and 2) as well as the low moose density observed. In an attempt to determine the level of sampling required to reduce this uncertainty, a hypothetical scenerio using 70 SUs (40% of the survey area) was run through the population estimation program. Density values for these SUs were randomly selected from the 26 SUs surveyed. The result was a decrease in the C.I. from 59% to 28%. Although the C.I. is tighter, the projected population estimate only increased by 13 animals or 9%. To actually survey 70 SUs would have cost an additional $19,000. We did not have adequate funds for an extended survey, nor did we feel that the results would justify the expenditure.

The underlying basis for the stratified random block design is the ability to divide the survey area into several strata of different moose densities. According to Gasaway et al (1986), stratification is one of the most important aspects of estimating moose population size, and that without reliable stratification it may be impossible to obtain precise density or composition estimates. Our results support this conclusion.

During the census, a total of 20 moose (11 adult bulls, 3 yearling bulls, 5 adult cows and 1 calf) were observed. We considered this sample too small to accurately determine sex/age ratios. However, it is apparent that calves were not abundant as only one was observed.

The availability of forage did not appear to be a major limiting factor as there were numerous valleys containing shrub birch and willow which were void of moose. All moose were observed between 1220m and 1463m (4000-4800 feet) in subalpine shrub habitat.

Although this area does not appear as productive as some other areas in the southern Yukon (ie. the Teslin Burn, Whitehorse South), we speculate that it could support a larger moose population than presently exists there.

Other potential factors which frequently limit moose population size in northern ecosystem are adverse winter conditions, hunting, and predation. Deep snow ($\geq$ 80 cm) is the most commonly cited climatic factor limiting moose calf survival (Kelsall and Telfer, 1971; Coady, 1974). However, past records on average snow depth from this area (Petersen, 1985) indicate that snow has not exceeded critical limits for moose. Resident non-native harvest in the survey area has remained low over the past 8 years (mean = 2 moose/year) based on hunter questionnaire returns. No information is available on harvest levels by Indian hunters. However, Indian hunters are known to have used the Mt. Nansen road and the Big Creek area in the past. As of November 1987 the Big Creek road was driveable to a point approximately 32 km (20 mi) east of Prospector Mountain. Although predation levels by wolves and grizzly bears are also unknown for this area, inferences can be drawn from predation studies recently conducted in the southern Yukon (Larsen et al. 1987) and east central Alaska (Boertje et al. 1987). Both studies documented predation as the main limiting factor of moose population growth, and both identified grizzly bears as the main cause of moose calf mortality. Considering that the Casino Trail survey area was located midway between these two study areas, and that the moose population demography is characteristic of low recruitment we speculate that grizzly bears are the major cause of moose calf mortality in this area.

The results from this study concur with surveys previously flown in this region. In March 1975, Hoefs and Lortie (1975) flew parallel north-south aerial transects between the Yukon River, the Alaska Highway and the Klondike Highway (Fig. 2). These transects were spaced 0.4 km apart and were intended to delineate winter concentratrations of moose. Only 1 moose was observed in the 457 km^2 of that survey which overlapped with the Casino survey area. The only wintering areas found in 1975 were outside of the Casino study (Fig. 2). During wolf studies in the Nisling River Area in March 1986, only 14 moose were seen (Baer and Hayes 1987). The wolf survey area encompassed one of the 1975 moose 'wintering areas' as determined by Hoefs and Lortie (1975) (Fig.2).

Moose densities in the general area between the Klondike highway and the Alaska border are low. Fall surveys conducted south of the Casino study area in 1981 and 1982 (Larsen 1982, Markel and Larsen 1983), and using the same stratified random block design, documented higher moose densities than those found in the Casino area (Fig. 2). However, even these densities are considered low.

RECOMMENDATIONS

The Casino survey area is characterized by a low density, widely dispersed moose population. The direct impact of the road with respect to habitat destruction will be minimal on the regional population. However, the increased access to hunters created by the road will pose a considerable threat. Due to the low number of moose adjacent to the proposed development, a slight reduction in moose numbers will have a significant impact on the local population. Unless carefully managed the road will result in a drain on the local population as the proposed route traverses open subalpine areas which moose usually prefer during most of the year, and where they are vulnerable to overhunting.

We recommend that road access to the subalpine be kept to a minimum and be avoided when possible. We also recommend a complete closure on hunting. The management objective for moose in the Yukon is to maintain harvest rates at sustained yield levels, and at the same time to maintain populations at reasonable densities. Therefore, low density populations should not be hunted even if positive growth rates were documented. The Casino population is likely declining or has stabilized at a very low density. As a result, all harvest on this population should stop immediately. A local resource committee should be set up to identify both short and long term management objectives. This committee should develop an intensive wildlife plan, with technical input from the Department of Renewable Resources, integrating the wildlife needs of the species inhabiting the area with plans for development.

COST

The survey cost, including personnel, aircraft rental, fuel and accommodation was \$38,180 or \$12.50/km^2 of habitable moose range. Rental of aircraft contributed most to overall cost (50% helicopter and 25% fixed wing) while labour (including food and lodging) added 25% to the total budget.

Table 1. Cost Breakdown for the 1987 Moose Survey.

Item	Cost
Fixed Wing	\$ 9,460.00
Helicopter	19,000.00
Personnel	5,880.00
Food and Lodging	3,140.00
Miscellaneous (Supplies, Phone, etc)	700.00
Total Cost	\$38,180.00

ACKNOWLEDGEMENTS

We would like to thank Ken Frankish, Skeeter Verlaine-Wright and Marcus Waterreus for providing technical assistance. Although few moose were seen, they still managed to retain their enthusiasm. We would also like to thank the Carmacks Indian Band for providing us with an observer, Ron Tom, for the surveys. To our pilots Laurie Smith (Alkan), Pat Bruce (Alkan), Ed Link (TNTA) and Brian Parsons (TNTA) we extend our appreciation for a job well done. Kent Jingfors and Brian Pelchat made comments on earlier drafts of this project.

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