POPULATION SIZE AND COMPOSITION OF MOOSE IN THE FORT GOOD HOPE AREA, NWT, NOVEMBER 1992

NORM MACLEAN[1]

DEPARTMENT OF RENEWABLE RESOURCES

GOVERNMENT OF THE NORTHWEST TERRITORIES

NORMAN WELLS, NWT

1994

Northwest Territories Renewable Resources

Manuscript Report No. 78

THE CONTENTS OF THIS PAPER
ARE THE SOLE RESPONSIBILITY OF THE AUTHOR

[1]CURRENT ADDRESS: GENERAL DELIVERY, MINISTRY OF ENVIRONMENT, LANDS AND PARKS, DEASE LAKE, B.C. V0C 1L0

ABSTRACT

A stratified block survey for moose (*Alces alces andersoni*) in the Fort Good Hope area was conducted during 13 - 20 November, 1992. The population estimate was 362 ± 71 (90 % C.I.) moose. The coefficient of variation for the estimate was 12 %. There were 53 calves/100 cows(females ≥ 2 year old), 54 yearlings/100 cows, and 94 bulls(males ≥ 2 year old)/ 100 cows. The twinning rate was 31 % (5/16), and the mean group size was 2.08 ± 1.11. The density was 0.17 moose/ km^2 ,which is the highest reported density for moose in the NWT. This estimate was higher than the last survey in 1984, although there is no significant difference between estimates. Possible reasons for the differences between surveys are that local hunting pressure has decreased and shifted to other areas or the early snow cover in 1992 forced moose down from upland areas, or both. Moose were observed most frequently (52 %) in shrub habitat. The twinning rate and the proportions of yearlings and bulls have also increased since 1984. The population appears to have remained stable since the last survey in 1984.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Introduction

Moose (*Alces alces andersoni*) are an economically important species to communities within the forested portions of the Northwest Territories where caribou (*Rangifer tarandus*) are only available in the winter. In the Fort Good Hope area of the Mackenzie River Valley, it is estimated that approximately 50 moose are harvested annually (Lambert pers. comm.). Despite the importance of moose to the area, information about the region's moose populations was poor until the mid 1980's (Treseder and Graf 1985), when oil pipeline construction in the Mackenzie Valley prompted the first systematic moose surveys to occur. Jingfors et al.(1987) reported low density moose populations with good productivity in the Norman Wells and Fort Good Hope areas in November 1984. Latour(1992) resurveyed the Norman Wells area in 1989 and reported a similar population estimate to that of Jingfors et al. (1987), and he found continued high productivity.

The objectives of this survey were to obtain a moose population estimate, productivity data, and population composition for the Fort Good Hope area to compare with results from Jingfors et al. (1987).

Study Area

The study area encompassed 2182.5 km^2 and its boundaries were identical to those of Jingfors et al. (1987), which included some of the major river drainages between Fort Good Hope and Norman Wells (Fig. 1). Jingfors et al. (1987)delineated the study area based on moose hunting patterns of people from Fort Good Hope, and habitat descriptions by Prescott et al. (1973). The area is mainly black spruce (*Picea mariana*) boreal forest with white spruce (*Picea glauca*), balsam poplar (*Populus balsamifera*), trembling aspen (*Populus tremuloides*), and white birch (*Betula papyrifera*) on well drained sites. Willow (*Salix* spp.) and alder (*Alnus* spp.) occur in thick stands along watercourses, and along the Mackenzie River shoreline and islands in the Mackenzie River. Numerous small lakes, ponds, and bogs occur in upland areas. The mean annual temperature is + 8°C and mean daily temperatures range between -34°C (January) and +22°C (July). Total annual precipitation averages 200mm of rain, and 1200mm of snow.

Methods

The survey used the stratified block survey design designed by Gasaway et al. (1981, 1986). Sampling units were identical to those of Jingfors et al.(1987); each unit was ca. 20 km^2 and was delineated by natural features wherever possible (Gasaway et al. 1986).

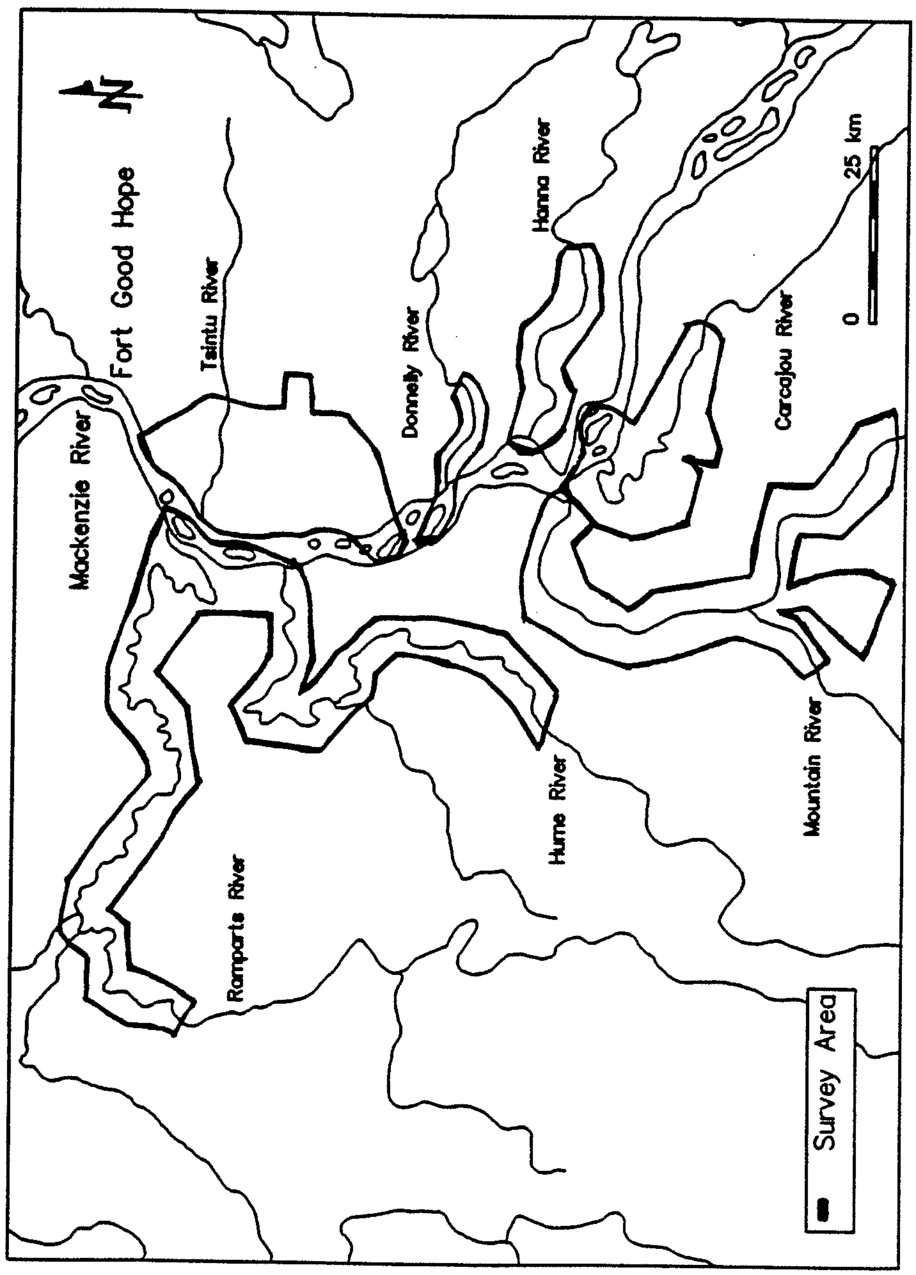

Figure 1. The Fort Good Hope Study area.

Reconnaissance flights to stratify the study area according to moose density were flown in a Cessna 185 with two observers in the rear seats, and a navigator/data recorder in the front. The aircraft flew at 100m above ground level and 160 kph. Each sampling unit was flown across twice and moose locations or tracks were recorded directly onto 1:50,000 topographic maps. After the reconnaissance survey was completed the sampling units were then stratified into high, medium, and low density strata using the criteria of Jingfors et al. (1987) and Latour (1992) (> 9 moose or tracks = high; 3-9 moose or tracks = medium; < 3 moose or tracks = low).

All high density sampling units, and a randomly selected number of medium and low density units were surveyed at 100% coverage by the same observers in a Bell 206B helicopter (Gasaway et al. 1986). Survey transects were spaced 0.5 km apart perpendicular to the long axis of each unit. The sex and age of all moose were determined by presence and size of antlers, and by body size. An assumed 1:1 ratio of yearling bulls to yearling cows was used to estimate the number of yearling females (Jingfors et al. 1987; Latour 1992).

The location of each moose was described according to the following habitat categories; stunted black spruce forest, spruce forest, creek bottom, burn, willow/alder, and cutline. These habitat categories are the same as those of Latour (1992) for the

Norman Wells moose survey in 1989.

A sightability correction factor was not determined because moose density in the study area from the 1984 survey (0.13/ km^2) was less than the recommended 0.36 moose/km^2 (Gasaway et al. 1986).

The computer program MOOSEPOP was used for analysis. D. Reed of the Alaska Department of Fish and Game developed the program which utilizes the methods of Gasaway et al. (1986).

Results

Survey Characteristics

The stratification reconnaissance was conducted during 9-12 November and the block survey was conducted during 13-20 November 1992. Conditions were generally overcast with good visibility. Snow fell on 8 days of the survey, usually at night, and heavy snow prevented flying for 2.5 days. The snow cover was complete over the study area prior to the survey. The daily temperature ranged from -26°C to -6°C.

A total of 107 sampling units comprised the study area. The reconnaissance flight required a total of 11.6 hours of flight time and the block survey required a total of 36 hours of flight time. Thirty nine percent of the study area was covered, and the sampling intensity varied for the three strata (Table 1). The search intensity was not significantly different among the three strata (Table 1; Anova, P=0.11).

Table 1. Search intensity and sampling effort during the Fort Good Hope area moose survey, November 1992.

	Stratum			
	High	Medium	Low	Totals
No. of sample units (s.u.)	3	26	78	107
No. of sample units sampled	3	14	25	42
% of s.u. sampled	100	54	32	39
Search intensity (min/km^2 $\pm$ s.d)	1.8$\pm$0.29	1.5$\pm$0.33	1.4$\pm$0.31	

Population Characteristics and Distribution

The population estimate for moose within the study area was 362 $\pm$ 71 (90% C.I.) moose and densities ranged from 0.14 to 0.30 moose/km^2 among the three strata (Table 2). The overall density was 0.17 moose/km^2. The proportion of cows (females $\geq$ 2 year old) in the three strata was similar, with the proportion of calves higher in the low density stratum (Table 2). Bulls (males $\geq$ 2 year old) were a greater proportion of the high and medium density strata. Overall there were 94 bulls/ 100 cows, 54 yearlings/ 100 cows, and 53 calves/ 100 cows. Thirty one percent (5/16) of cows with calves had twins.

Table 2. Population estimate, densities, and sex and age ratios from the Fort Good Hope moose survey, November 1992.

	Stratum High	Stratum Medium	Stratum Low	Total
Population Estimate	18	73	270	362 ± 71
Variation (%)	0	24	14	12
Density	0.30	0.14	0.17	0.17
Population Estimate				
Bulls	11 (61%)	42 (58%)	107 (39%)	160 ± 39
Cows	7 (39%)	24 (33%)	101 (37%)	132 ± 32
Calves	0	7 (9%)	63 (23%)	70 ± 24
Ratio (/100 cows)				
Bulls (≥2 years)	129	167	75	94
Yearlings	57	17	63	54
Calves	0	29	62	53
Twin Calves	0	8	13	11

The mean group size of 2.08 ± 1.11 did not differ significantly among the 3 strata (Duncan's multiple range test, $P > 0.05$). Moose were seen more frequently in the willow/alder habitat type (52 %) than in any other (Figure 2). Group size and strata were tested separately against the habitat types and were not significantly different (Likelihood Ratio G^2, $P > 0.05$).

Moose primarily occurred in the lower river drainages , and in the 1969 burn south of Fort Good Hope (Figure 3). Few moose were observed outside of the 1969 burn on the east side of the river. On the west side of the river moose were observed in the

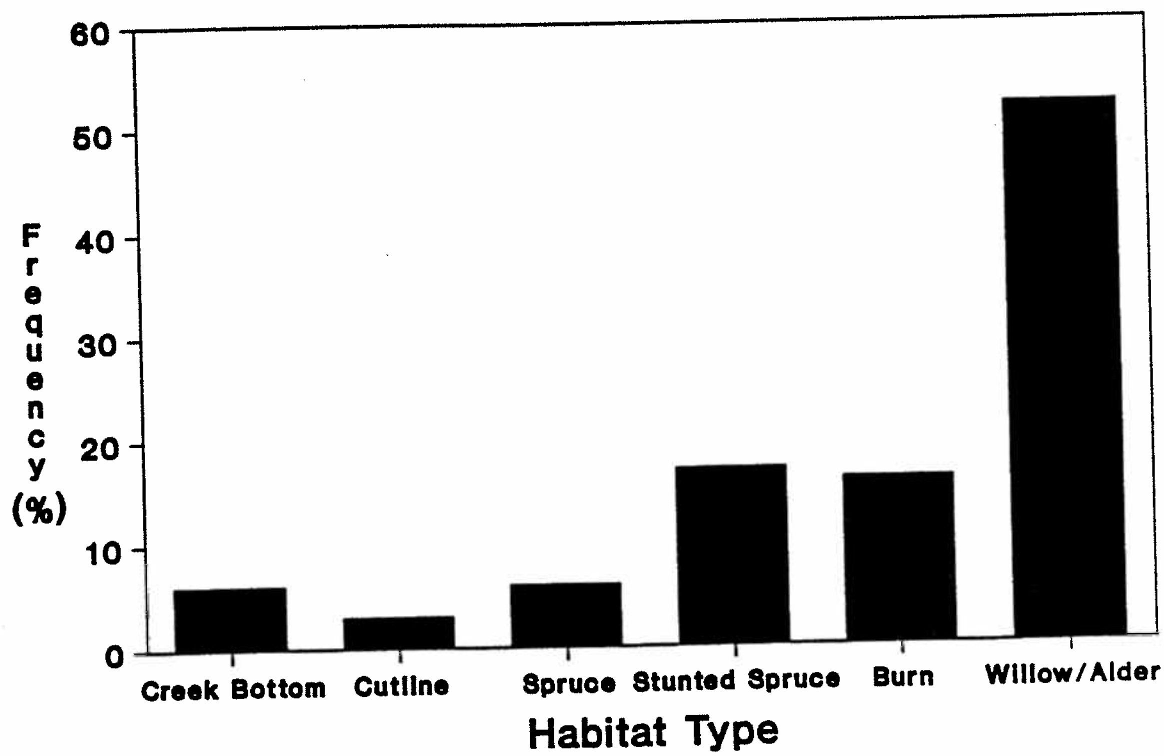

Figure 2. Frequency of moose locations by habitat type.

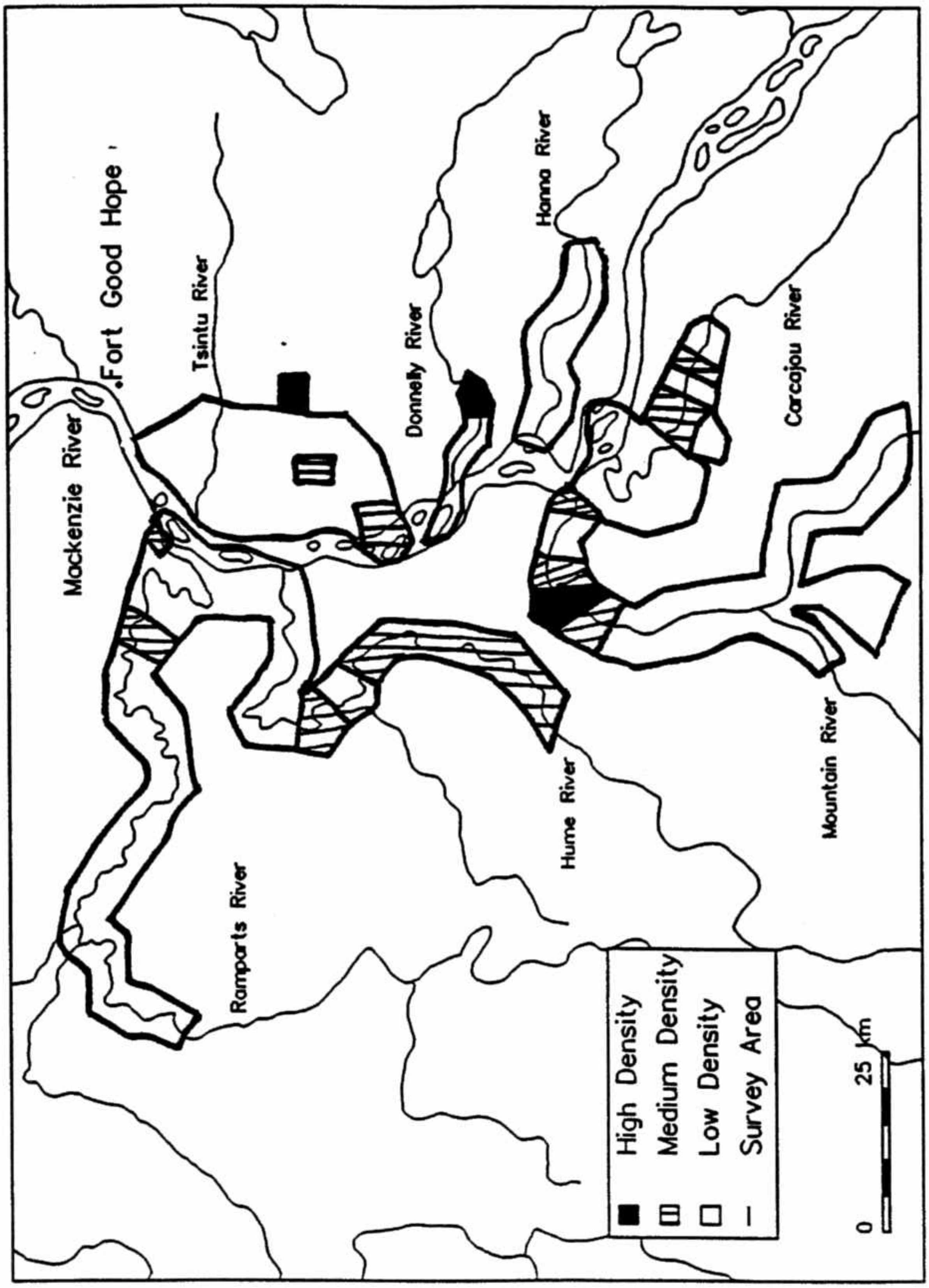

Figure 3. Density of moose of the Fort Good Hope area.

dense willow and alder stands associated with river drainages close to the Mackenzie River (Figure 3). Moose density was low on the drainage areas further upstream. Few moose were observed on Mackenzie River islands.

Discussion

Observability and Classification

The overall search intensity for this survey (1.6 min/km^2) was comparable to other stratified block surveys for moose in the northern boreal forest (1.3 min/km^2 - 2.0 min/km^2; Jingfors et al. 1987; Latour 1992). The complete snow cover resulted in good observability of moose. The chance of misclassification was low because all bulls had retained their antlers.

Population Characteristics

The estimated number of moose in the Fort Good Hope area was 362 $\pm$ 71 (90 % C.I.) moose, which is similar to that reported in 1984 (281 $\pm$ 52 (90% C.I.) moose; Jingfors et al. 1987), but the difference between the two estimates was not significantly different (one tailed T test, $P>0.05$). The overall density was 0.17 moose/km^2. The coefficient of variation, however, was slightly greater (12% to 10%) than Jingfors et al. (1987). Graf (1992) reported moose densities in the NWT range from 0.03 to

0.15 moose/km^2 and coefficients of variation range from 0.04 to 0.57 (all surveys were stratified block design). Therefore, the moose density in the Fort Good Hope area is the highest yet reported for the NWT. However, the density is still low when compared to boreal areas outside of the NWT (see Jingfors et al. 1987 and Graf 1992).

Population composition in 1992 is similar to that reported in 1984 (Figure 4; Jingfors et al. 1987) and the population has maintained the level of productivity reported by Jingfors et al. (1987). The 1992 calf/cow ratio is similar to that reported in 1984 (53/100 vs. 61/100). The yearling/cow ratio for 1992 is greater than 1984 (54/100 vs. 12/100), but Jingfors et al. (1987) stated that observer error may have been a factor in the low number of yearlings they reported. The twinning rate was also greater than the previous survey (31% vs. 18 %).

Population composition for the Fort Good Hope area was similar to that reported in the Norman Wells area in 1989 (Latour 1992). However, compared to other moose populations in the NWT, the population composition ratios and productivity appear to be at the high end of the reported range. (Graf 1992). Graf (1992) suggested that moose in the NWT have high productivity and early winter survival even though densities are low. Stenhouse et al. (in prep.)

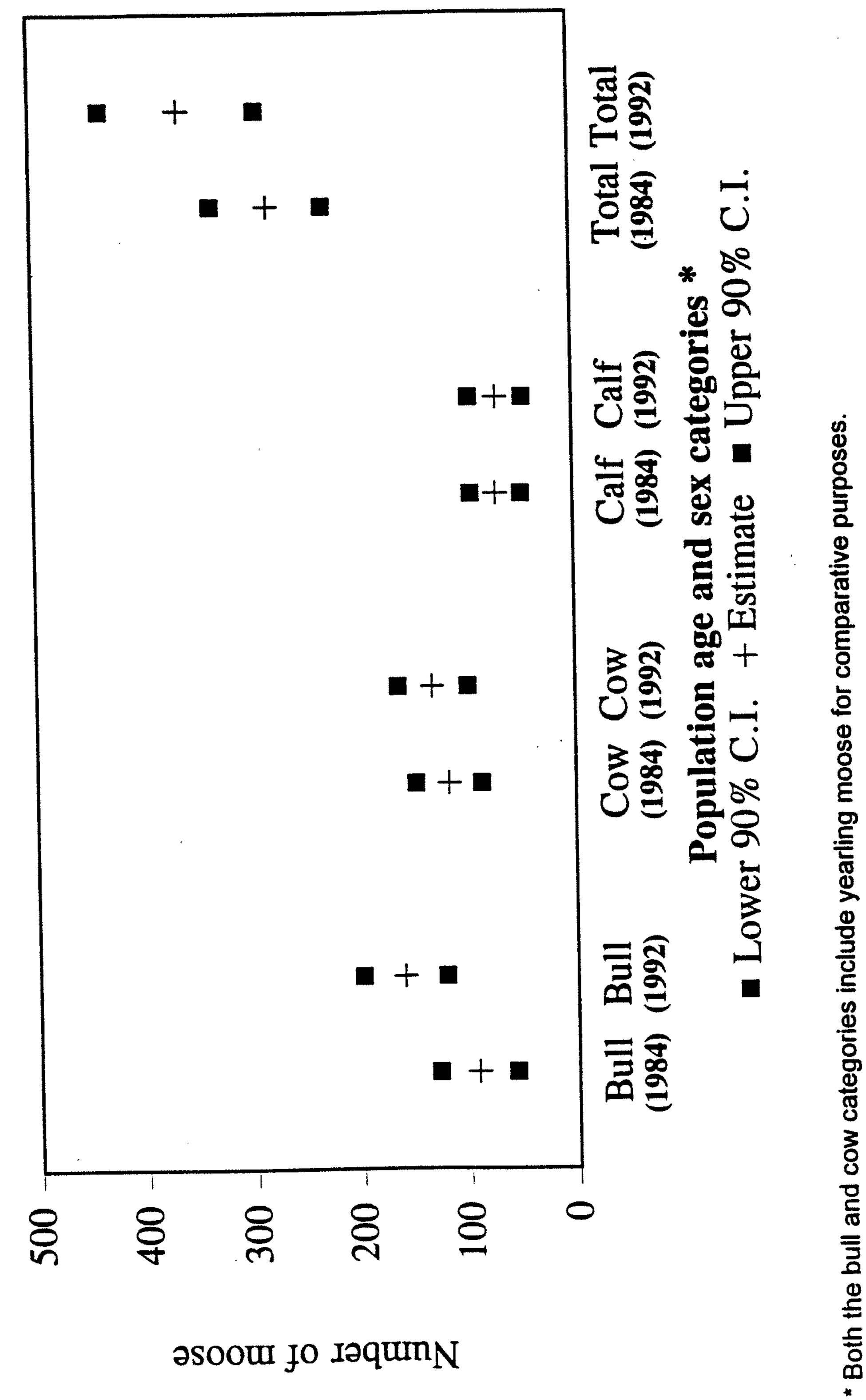

Fig.4. Comparison of moose population estimates between surveys flown in the Fort Good Hope area.

report similar information from a productivity and movement study in the Norman Wells area. They found high productivity, and high calf survivorship, but an average twinning rate (31 %) that is similar to the North American average (Boer 1992). They also report that these parameters are comparable to moose population in other northern boreal areas but are lower than southern boreal areas.

The population estimates, composition and productivity data suggests the population is stable (Figure 4).

Distribution

The high and medium moose densities were associated with old burns (ca. 15 - 20 years old) and riparian river drainages (Figure 3). The distribution was similar to that of Jingfors et al. (1987), except for the Mackenzie River islands, upper Ramparts River, and the Hanna River. Jingfors et al. (1987) reported high densities on several islands and the upper Hanna river. In 1992 only two moose were located on islands; the other river drainages were also at low densities.

A possible explanation for the distribution differences between the surveys was the early onset of snow cover in 1992. Winter conditions arrived earlier in 1992 than 1984 and snow cover was present three to four weeks earlier. It is possible that moose moved closer to the Mackenzie River from higher elevations as a result.

Harvest Levels and Management Concerns

Favoured moose hunting areas for Fort Good Hope residents are located north and west of Fort Good Hope. The study area is not heavily hunted (Tobac pers. comm.). Only 39 % (31/80) of moose jaws collected from Fort Good Hope hunters between 1987 and 1993 were harvested within the study area.

Jingfors et al. (1987) reports 120-160 moose harvested each year in Fort Good Hope. However, harvest has apparently decreased significantly and approximately 50 moose (range 25 to 80) are now harvested annually (Lambert pers. comm.). The Fort Good Hope Renewable Resource Officer feels he has known about 90% of known moose kills for the past several years through the collection of moose jaws (Lambert per. comm.). However, collection of harvest statistics for this population is still not formalized and our current knowledge is still based on estimates. With the implementation of the Sahtu Land Claim, which requires harvest studies to occur for each community, a better understanding of harvest pressure on the population can be determined. Such information is required to ensure current and future harvest levels are within suitable limits for this population.

Management concerns are low for the Fort Good Hope area moose population at present because of the current high density, long term stability, high productivity, decreased harvest, and low exploration activity in the area. However, I suggest that because of the importance of moose to the community that better harvest information be obtained, and periodic surveys be continued.

Personal Communication

Lambert, K. Renewable Resource Officer, Fort Good Hope, NWT, September 1994.

Tobac, H. General Delivery, Fort Good Hope, NWT, November 1992.

Acknowledgements

I would like to thank Charlie Barnaby and Henry Tobac for their assistance as observers during the survey. I would like to thank Ken Lambert (Renewable Resources Officer, Fort Good Hope) for his valuable assistance and hospitality. Pilots Duncan Cameron (North Wright Air) and Clark Buist (Canadian Helicopters) provided proficient service with their aircraft. I would like to thank Paul Latour, Richard Popko, and Alasdair Veitch for reviewing this report.

Literature Cited

Boer, A. 1992. Fecundity in North American moose (*Alces alces*): a review. Alces supplement, pp.1-7.

Gasaway, W., S. Dubois, and S. Harbo. 1981. Estimating moose abundance and composition. Alaska Dept. of Fish and Game, Fairbanks.

Gasaway W., S. Dubois, D. Reed, and S. Harbo. 1986. Estimating moose population parameters from aerial surveys. Biol. Pap. Univ. Alaska, No. 22.

Graf R. 1992. Status and management of moose in the Northwest Territories, Canada. Alces supplement pp. 1-7.

Jingfors, K., R. Buillon and R. Case. 1987. Abundance and population composition of moose along the Mackenzie River, November 1984. File rep 70. Dept. of Renewable Resources. Yellowknife, NWT.

Latour, P. 1992. Population size and composition of moose west of Norman Wells. Manuscript report 42. Dept. of Renewable Resources. Yellowknife, NWT.

Prescott, T.H., G.L. Erickson, L.e. Walton and D.G. Smith. 1973. Atlas of moose habitat maps: part of a wildlife habitat inventory of the Mackenzie Valley and northern Yukon. Can. Wildl. Serv.,Environ. Soci. Progr., Northern Pipelines.

Stenhouse,G.B., P.B. Latour, L.Kutny, N. MacLean, and G.J. Glover. in prep. Productivity and movements of female moose in a low density population in the western Northwest Territories. 24 pp.

Treseder, L. and R. Graf. 1985. Moose in the Northwest Territories-a discussion paper. Manuscript report Dept. of Renewable Resources. Yellowknife, NWT.