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TRADITIONAL USE OF EARLY WINTER CONCENTRATION AREAS BY MOOSE IN NORTHEASTERN ONTARIO

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Abstract: Areas of early winter concentration of moose (Alces alces) were surveyed by aircraft from 1975 to 1981. Moose concentrated traditionally in these areas from early November to late December. Sites were topographically discrete upland/mesic habitat with large amounts of browse. Peak densities ranged from 4.06 moose/km^2 to 9.80/km^2 depending on the area, as compared to an average density of 0.14 to 0.32/km^2 in surrounding areas later in the winter. Sex composition of the groups was skewed to females.

These areas represent an important component of moose habitat which should be protected by area managers during timber harvesting operations.

Movements of moose from summer range to winter range where they may concentrate are well documented (Des Meules 1964, Pulliainen 1974, LeResche 1974). These movements generally reflect accumulating snow (Coady 1974). Less reported has been movement and concentration of animals during the post-rut and early winter period. Peek et al. (1976) recognized early winter habitat as different from fall and late

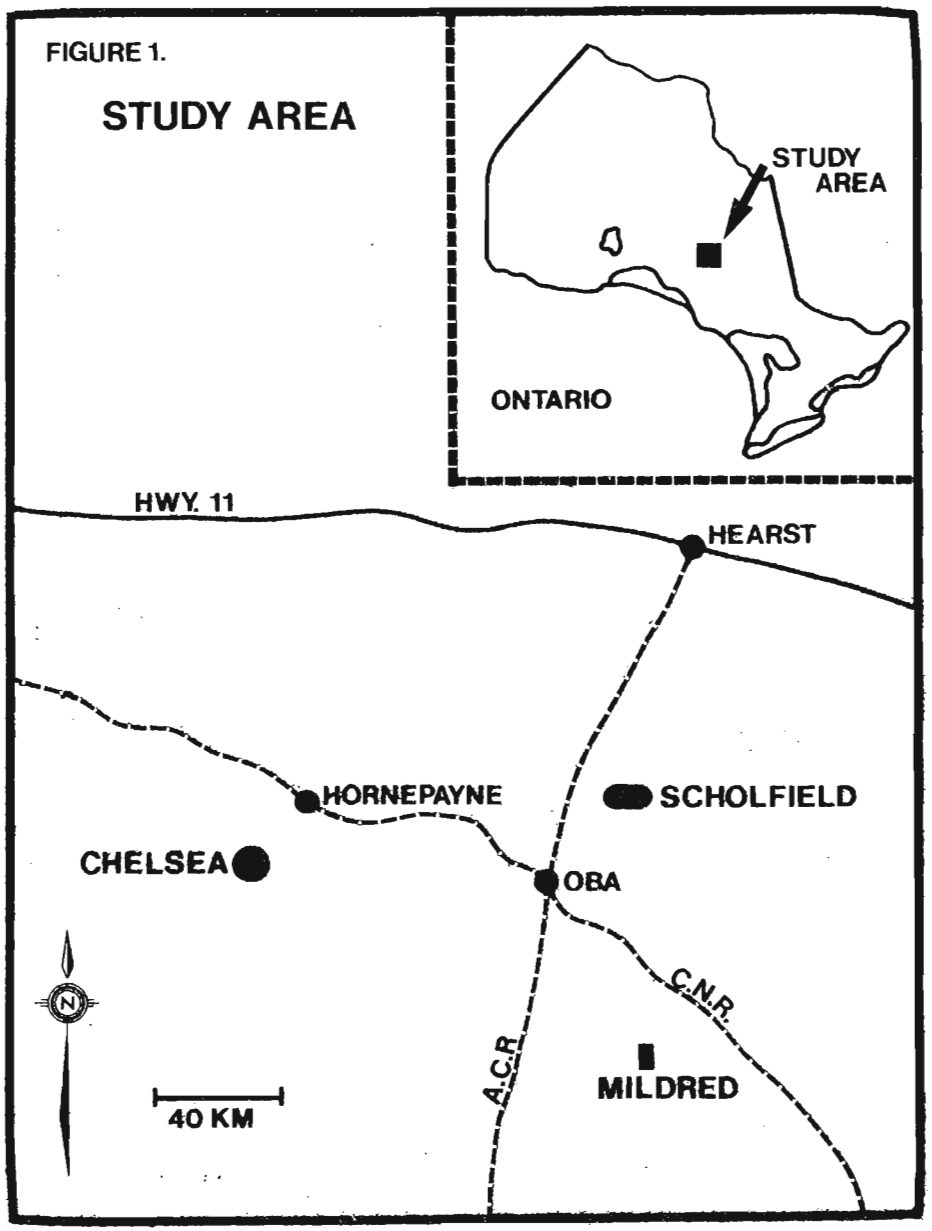
winter habitat in Minnesota but his study did not deal with traditional use or density. Winter yards in Parc Mont Tremblant, Québec were separated into those used in early winter and others used in late winter by Poliquin et al. (1977). He indicated the early winter yards were located on dry soils, generally had an open canopy and had a high availability of browse. No mention was made of time of year, density of moose or whether such areas were used year after year.

Observations in several areas of Ontario have suggested the apparent traditional use of specific areas in early winter by large numbers of moose. This paper reports results of aerial inventories on three such areas located in northeastern Ontario.

STUDY AREA

Three areas were chosen for study (Figure 1): a series of hills in Mildred Township (84°15' long., 48°45' lat.) in the northern Chapleau Crown Game Preserve, a group of hills in Chelsea Township southwest of Hornepayne (84°55' long., 49°07' lat.) and a burned area in Scholfield and Talbott Townships (83°53' long., 49°14' lat.).

The latter area is located in the clay belt section of the boreal forest, characterized by flat topography with widespread surface deposits of lacustrine material. Black spruce (Picea mariana) is abundant both in continuous lowland tracts and on uplands. Other common species are trembling aspen (Populus tremuloides), balsam fir (Abies balsamea), balsam poplar (P. balsamifera), white birch (Betula papyrifera), and white spruce (Picea glauca) (Rowe 1972). The



Scholfield Township site was partially (50%) burned in 1948, and the remainder was partially cut during the early 1950's.

The Mildred area and Chelsea hills are found in the central plateau section of boreal forest (Rowe 1972). These areas have a more rolling topography with extensive till, sand and gravel deposits. Black spruce dominates in lowlands, but black and white spruce and balsam fir are generally equally abundant in uplands. Both Populus species and white birch are common in mixed upland communities. The Mildred site was selectively cut in 1964, while the Chelsea area has not been logged.

Both the Chelsea and Scholfield areas are lightly hunted. Access into both is limited to snowmobile or aircraft. Mildred Township is within the Chapleau Crown Game Preserve, which is closed to hunting.

METHODS

Moose concentrations in the three study areas were originally noted during reconnaissance flights for moose wintering areas in December and January in the mid to late 1960's. In 1976 the Ontario Ministry of Natural Resources expanded its habitat management program for moose; this included regular monitoring of known concentration areas. In addition, the Canadian Wildlife Service commenced a study on moose habitat in the Chapleau Crown Game Preserve, which included the Mildred concentration area.

The Scholfield and Chelsea areas were censused one to three times each year between 1975 and 1980 (Table 1) except in 1977 when there was no snow until December and no surveys were conducted. Surveys were flown using a de Havilland Turbo Beaver aircraft with one or two

Table 1. Results of surveys at early winter concentration areas, 1975-1981.

		Chelsea					Scholfield					Mildred				
Date	Snow Depth (cm)	M	F	Ca	Unk.	Total	M	F	Ca	Unk.	Total	M	F	Ca	Unk.	Total
25 Nov. 1975	15.4	9	29	9		47	21	14	4		39					
27 Nov. 1978	31.2						12	19	3		34	4	13	3	2	22
19 Nov. 1980	26.0	8	0	6		34	6	7	6		19					
1 Dec. 1976	30.5						7	9	2	2	20					
23 Dec. 1976	44.6	4	7	2	7	20										
13 Dec. 1976	38.5											4	7			11
11 Dec. 1977	41.9											5	14	2		21
11 Dec. 1978	32.3	1	11	2	3	17										
9 Dec. 1980	60.5	5	11	8		26	13	1	4		9					
11 Jan. 1977	52.1											2			5	7
6 Jan. 1978	47.9	3	3		7	13	4	5	1		10					
17 Jan. 1978	57.0											7	12	1	1	21
5 Jan. 1979	48.2	3	6	3		12										
19 Jan. 1979	49.9											0	0	0	0	0
21 Jan. 1980	87.3											4	5	2		11
20 Jan. 1980	87.3												4	1		5
3 Feb. 1978	60.0												3	1		4
21 Feb. 1978	64.0											2	1	1		4
11 Feb. 1979	63.4	0	0	0	0	0		1	1	8	10	0	0	0	0	0
6 Feb. 1980	82.1												1			1
28 Feb. 1980	82.6											2	5	1		8
14 Feb. 1981	69.5												3			3

observers, and conducted up to 72 hours after fresh snow. Because the areas are small and contain a large number of moose, one observer was preferred to reduce confusion in counting. The areas were circled continuously until the observer felt all moose had been found.

The Mildred Township concentration area was located within a 2.5 X 10 km survey plot used on a management unit census. Coverage was during regularly scheduled surveys, two to four times per year from 1976 to 1981 (Table 1). The aircraft used was a Cessna 185 with navigator and two observers. In all cases fresh tracks were circled until all moose were spotted. Moose were sexed by antlers and the vulva patch technique (Mitchell 1970).

Locations of moose were plotted on aerial photographs (1:15840) for the several years involved. Boundaries of areas were determined by an obvious clustering of animals within a topographically discrete area. Generally these areas were surrounded by lowland with conifers while the areas themselves were upland/mesic with a high deciduous component.

RESULTS

The size of the concentration area at Chelsea hills is 8.9 km^2, at Scholfield Township is 9.6 km^2 and in Mildred Township is 2.3 km^2. These areas represent a summary size based on the several years of observation. No obvious shift within areas used from year to year was seen.

The earliest surveys flown were 19 November. Highest counts at Chelsea were 47 animals (5.98/km^2) on 26 November 1975 and 34 animals (3.82/km^2) on 19 November 1980; at Scholfield high counts occurred on

25 November 1975, 39 moose (4.06/km^2) and on 27 November 1978 when 34 moose (3.54/km^2) were seen; at Mildred high counts were 22 moose (9.80/km^2) on 30 November 1978 and 21 moose (9.40/km^2) on both 11 December 1977 and 17 January 1978 (Table 1). The latter count was exceptionally late for a high value. Numbers of animals decreased through January until lowest values were obtained during February. The reduction in numbers through time is significant at Chelsea and Mildred ($P<0.01$) and although not significant for Scholfield ($P<0.1$), the trend is the same. Only seven data points are available for the latter area, which appears to hold some moose throughout the winter (Figure 2).

The majority of moose left the areas prior to mid-January (Figure 3). Surveys were not sufficiently numerous to determine actual rate of departure.

It was common for the sex ratio to be highly skewed towards females, particularly those without calves (Table 1). During the November-December period when most animals were present, the sex ratio was not greater than 57 males per 100 females at Chelsea or Mildred. Scholfield did not consistently follow this trend. Females were generally more numerous than males but on two occasions (25 November 1975 and 9 December 1980) more males than females were present.

For comparison, population statistics taken from inventories of management units during January-February are shown in Table 2. Moose densities in the concentration areas are considerably higher than average density or density in high strata. These figures do not provide a control but are presented to indicate the lower density at which animals normally occur and to show sex ratios for the population as a whole.

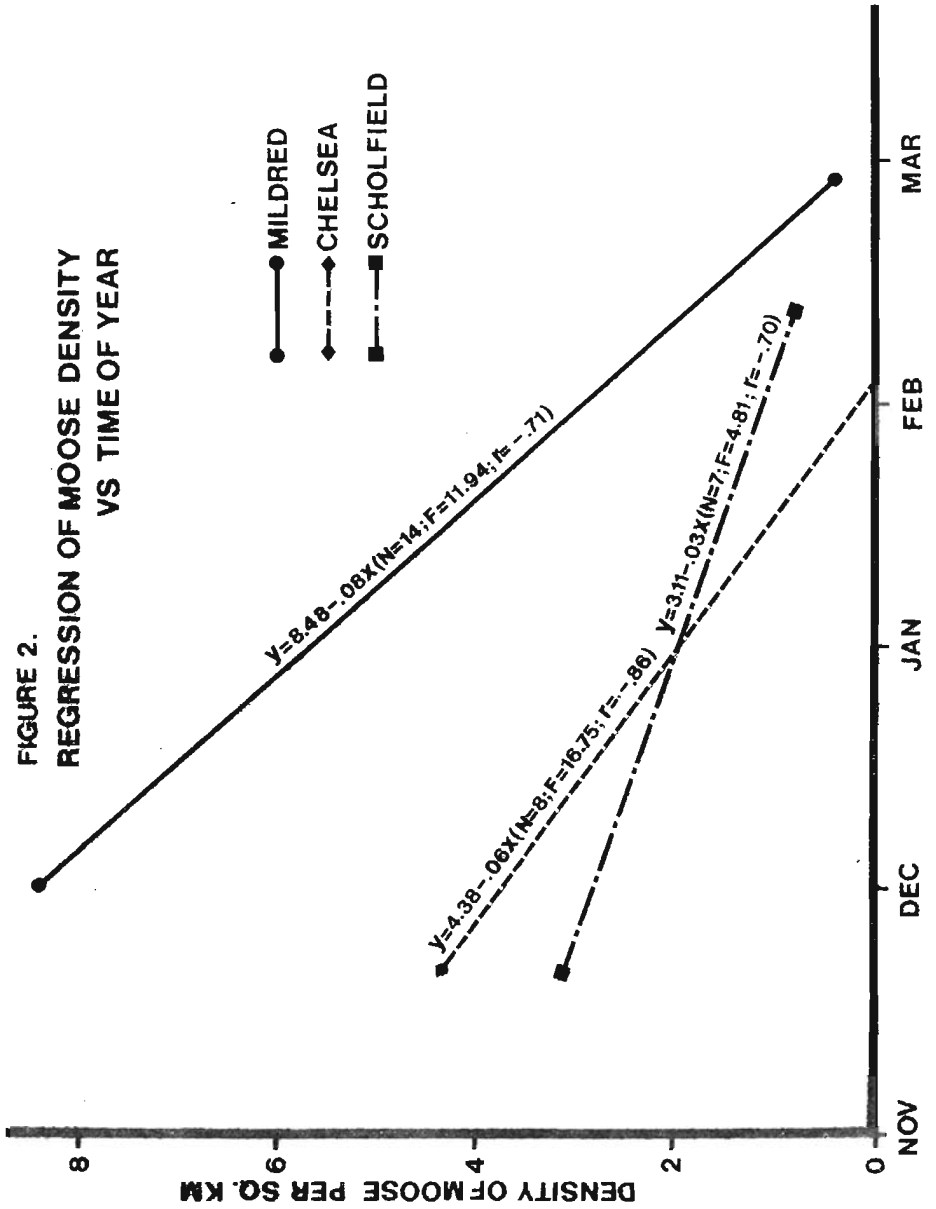


FIGURE 2. REGRESSION OF MOOSE DENSITY VS TIME OF YEAR

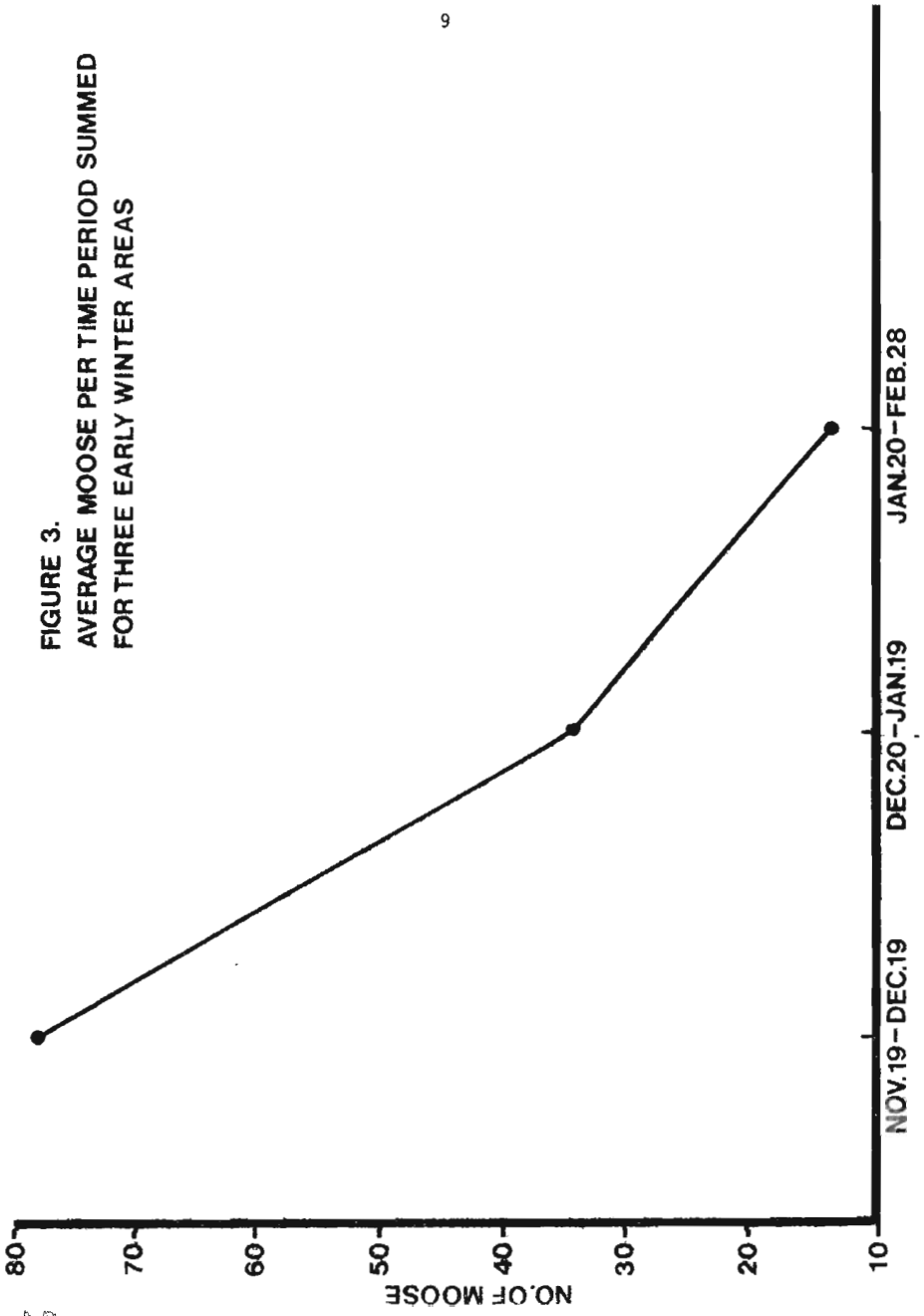


FIGURE 3.
AVERAGE MOOSE PER TIME PERIOD SUMMED
FOR THREE EARLY WINTER AREAS

Table 2. Aerial survey statistics for management units surrounding the early winter concentration areas.

Area (Management Unit)		Average Density (per km^2)	Density High Stratum (per km^2)	M : 100F
Chelsea	(22)	.19 (1978)	.24	99: 100
Scholfield	(23)	.14 (1977)	N/A	84: 100
Mildred	(32)	.20 (1976)	.32	81: 100

Average snow depths between 1975 and 1979 for surveys in November, December, January, and February were 24.2, 41.4, 61.4 and 70.3 cm respectively.

DISCUSSION

Our procedure used surveys from several years with a few censuses in each year. While it may have been preferable to survey more frequently for a number of years, we feel combining data over five years presents an accurate general representation of use by moose. These areas are used traditionally and in a similar manner each year. The high correlation constants for all three curves (Figure 2) indicate little between year variation.

Early winter concentration areas showed a recurring pattern of use. Moose concentrated in these areas before the middle of November, remained there until mid to late December and then dispersed during late December and early January. Concentration of moose in late winter is well-known (Brassard et al. 1974, Novak and Gardner 1975). However, at that time concentration is usually attributed to heavy snow which restricts movements by the animals. Snow depth during the period when moose concentrated in our early winter areas was only 20-40 cm, not enough to hinder movement (Des Meules 1964, Kelsall and Prescott 1971). Our surveys could only be done once snow was on the ground. Movement into these areas obviously occurred prior to mid November, that is during the immediate post-rut period. Movement out of the sites appeared variable in terms of timing. Clearly most moose had left by late December, but in some years they may stay later. For

example a high density of 9.4/km^2 occurred on 17 January 1978, at Mildred, although a survey 17 days later found only 1.7/km^2. During this period the snow depth had only increased slightly. In spite of this apparent exception we feel that some combination of weather variables such as rapidity of snow accumulation, snow depth, temperature or crust may be the cause of dispersal.

Generally, at the times of highest density many of the moose using these areas were cows without calves. This indicates some social segregation of moose during the post-rut period. Certain exceptions to this were observed (Table 1).

All areas are topographically discrete as either hilly areas or in the case of Scholfield, an upland area surrounded by black spruce swamp. Habitat is open and qualitative information indicates considerably heavier growth of browse species in these areas than in surrounding locations. Studies are continuing to determine amount and nutrient content of browse in these areas.

The importance of these sites is indicated by the traditional use by many moose. As such they constitute an important component of moose habitat and should be located in advance of planned timber harvest and protected during logging operations by local managers. We do not recommend exclusion of logging entirely but rather some modified cutting which will open the area and not eliminate the clumped distribution of cover.

A further consideration is the effects such areas have on population censuses, especially where a stratified sample is used and the survey flown during an extended period. Change in distribution of moose, local density and sex composition of aggregates will occur

between late December/early January and February/March. The manager must be aware of these changes in order to produce a valid stratified aerial census.

REFERENCES

BRASSARD, J.M., E. AUDY, M. CRETE, and P. GRENIER. 1974. Distribution and winter habitat of moose in Québec. Naturaliste Can. 101: 67-80.

COADY, J.W. 1974. Influence of snow on behaviour of moose. Naturaliste Can. 101: 417-436.

DES MEULES, P. 1964. The influence of snow on the behaviour of moose. Trans. Northeast Wildl. Conf. 21: 138-160.

KELSALL, J.P. and W. PRESCOTT. 1971. Moose and deer behaviour in snow. Can. Wildl. Serv. Rept. Ser. No. 15. 25 pp.

LE RESCHE, R.E. 1974. Moose migrations in North America. Naturaliste Can. 101: 393-415.

MITCHELL, H.B. 1970. Rapid aerial sexing of antlerless moose in British Columbia. Journ. Wildl. Manage. 34: 645-646.

NOVAK, M. and J. GARDNER. 1975. Accuracy of moose aerial surveys. Proc. N. Amer. Moose Conf. 11: 154-180.

PEEK, J.M., D.L. URICH, and R.J. MACKIE. 1976. Moose habitat selection and relationships to forest management in northeastern Minnesota. Wildl. Monogr. No. 46. 65 pp.

POLIQUIN, A., B. SCHERRER, and R. JOYAL. 1977. Characteristics of winter browsing areas of moose in western Québec as determined by multivariate analyses. Proc. N. Amer. Moose Conf. 13: 128-143.

PULLIAINEN, E. 1974. Seasonal movements of moose in Europe. Naturaliste Can. 101: 379-392.

ROWE, J.S. 1972. Forest Regions of Canada. Can. For. Serv. Publ. No. 1300. 172 pp.