A SELECTIVE MOOSE HUNT IN SOUTH CENTRAL ONTARIO

Charlotte A. Hooper and Mike L. Wilton

Ontario Ministry of Natural Resources, Whitney, Ontario, Canada K0J 2M0

ABSTRACT: Sex-specific moose (*Alces alces*) hunting was instituted in Ontario in 1983-84. Eleven years of data collected at the Kearney moose check station in south central Ontario are analyzed and presented. Trend data indicate that, while adult harvest levels and population density have achieved stability in the study area, the calf component of the harvest has increased significantly and the adult sex ratio in the standing population is reversing in favour of females.

Concern for generally declining moose populations in Ontario led to the introduction of a selective harvest system for moose in 1983 (Euler 1983), with the goal of increasing the moose population in the province by providing greater protection to the breeding segment of the population, particularly cows. Bull and cow permits are issued through a draw program to maintain adult proportions in the population that enhance calf production, while providing quality recreational opportunities. There is no harvest restriction on calves. Moose are known to emigrate from western portions of Algonquin Park, Ontario, to the heavily hunted areas adjacent to the Park (Wilton and Bisset 1988). The importance of productivity of resident moose as well as immigration into managed areas must be understood if the selective harvest system is to attain its goal. The objective of this study was to monitor harvest and changes in population structure resulting from the combination of the selective harvest system and immigration in the Kearney area.

METHODS

Algonquin Provincial Park (45°39'N, 78°39'W) is located in south central Ontario, between Georgian Bay (Lake Huron) and the Ottawa River, and is approximately 7314 km² in area. The 269 km² study area is located between Kearney and the western boundary of Algonquin Park in WMU 50. The area is only road accessible by the Rain Lake Road that runs between Kearney and the Rain Lake access point to Algonquin Park (Fig. 1).

From 1984 to 1995, except 1989, a check station was operated on the Rain Lake Road, 1 km east of Kearney, during the 6-day annual moose hunt. Effort and success data were gathered from all moose hunters, and harvest characteristics were calculated (Table 1). Incisors were extracted from harvested moose, except calves and yearlings, for age estimation from cementum annuli counts.

Estimates of winter moose density and sex-age (i.e. adult vs. calf) structure of the population were obtained from aerial counts of plots that fell on the study area, using standardized aerial inventory methods (Bisset 1991). Inventories were conducted following each hunt, except in 1990 and 1994, using fixed-wing aircraft between 1985-1989, and rotary-wing aircraft between 1991-1996.

Linear regression was used to investigate trends in harvest data and aerial inventory data. Significance was assigned at $\alpha = 0.05$. Harvest data from 1984 were excluded from the testing, as 1983 had been a closed season for moose. While fixed-wing surveys yield representative sex-age data, rotary-wing surveys appear to provide more accurate densities (Timmermann 1993). We investigated trends in density by aircraft type.
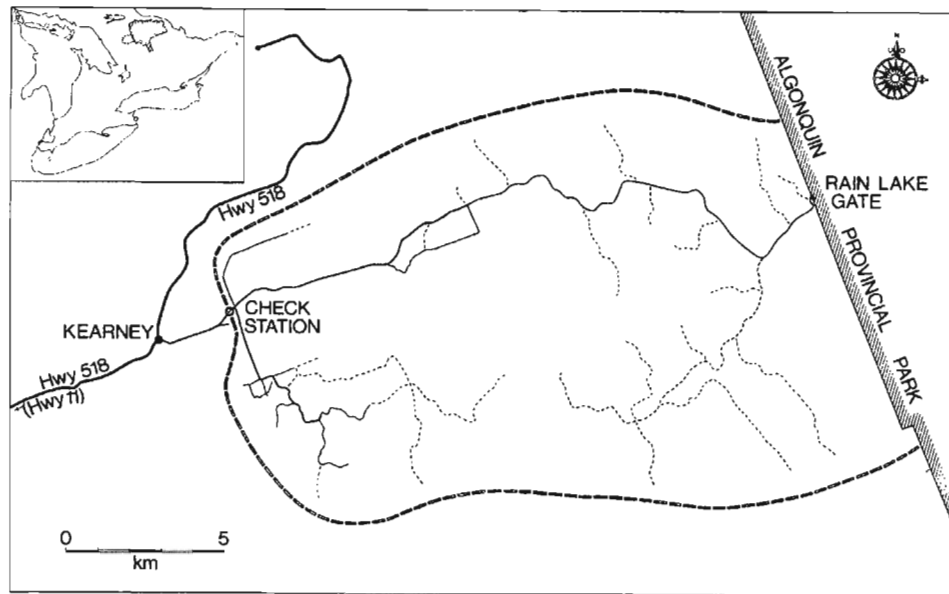
Alces

Fig. 1. Study area in WMU 50, south central Ontario, showing location of Kearney moose check station.

RESULTS

A total of 5414 hunters removed 601 moose from the Kearney Check Station Area (KCSA) during 1984-1988 and 1990-1995; a success rate of 11.1% (Table 1). The 10-year mean annual harvest (1985-1988, 1990-1995) was 50 moose (0.19 moose/km^2). No significant trend appeared in the bull (P = 0.954) or cow harvest (P = 0.457) from 1985 to 1995, but total calves (P = 0.001) and the percent calves in the harvest (P = 0.001) increased significantly. There was no discernible trend in male and female calf sex ratios (P = 0.563), for success rate (P = 0.109), or the mean age of bulls (P = 0.901) and cows (P = 0.475). Number of hunters (P = 0.397), moose harvested (P = 0.665), and hunter effort (P = 0.377) did not change significantly during 1985 to 1995, but from 1990 to 1995 number of hunters (P = 0.002) and harvest (P = 0.004) increased significantly, while hunter effort showed no significant trend (P = 0.414).

Aerial inventory data showed a signifi-cant increase in the percentage of cows, among adults (P = 0.015) (Table 2). There was no significant trend in the percentage of bulls, among adults (P = 0.092), or percentage of calves in the population (P = 0.757). There were no significant changes in the density of the winter population from 1985-1989 (P = 0.327), or from 1991-1996 (P = 0.558).

DISCUSSION

The moose population in the KCSA was stable but changed in composition, and was able to sustain the present level of harvest of 0.19 moose/km^2. Courtois and Jolicoeur (1993) suggested that in northern Quebec where predation is present, the optimal harvest must be less than 0.03 moose/km^2, but in eastern Quebec, south of the St. Lawrence River, moose populations can sustain a great-er harvest (0.05-0.09 moose/km^2), probably due to a very low predation rate. Primary predators such as black bear (*Ursus americanus*) and timber wolf (*Canis lupus*) are hunted in the KCSA, but not in adjacent

Alces

Table 1. Summary of moose harvest data from the Kearney check station area (269 km^2), WMU 50, south central Ontario.

	1984	1985	1986	1987	1988	1990	1991	1992	1993	1994	1995
Bull Permits	224	88	128	148	88	69	78	72	84	75	69
Cow Permits	103	28	21	32	21	14	20	16	18	20	24
No. of Non-Permit Holders	302	443	403	386	317	290	278	334	363	431	427
No. of Hunters	629	559	552	566	426	373	376	422	465	526	520
No. of Hunter-Days	1991	2011	1935	2045	1600	1391	1329	1688	1880	2070	1830
Hunters/km^2	2.3	2.1	2.1	2.1	1.6	1.4	1.4	1.6	1.7	2.0	1.9
Bulls Harvested	42	31	36	27	20	22	23	20	23	31	34
Cows Harvested	35	22	17	8	11	11	5	13	15	10	16
Male Calves Harvested	11	3	4	4	3	2	4	8	8	6	10
Female Calves Harvested	12	4	3	3	6	5	7	4	4	9	9
No. of Calves Harvested	23	7	7	7	9	7	11	12	12	15	19
No. of Moose Harvested	100	60	60	42	40	40	39	45	50	56	69
Harvest/km^2	0.37	0.22	0.22	0.16	0.15	0.15	0.14	0.17	0.19	0.21	0.26
% Bulls in Harvest	42.0	51.7	60.0	64.3	50.0	55.0	59.0	44.4	46.0	55.4	49.3
% Cows in Harvest	35.0	36.7	28.3	19.0	27.5	27.5	12.8	28.9	30.0	17.9	23.2
% Calves in Harvest	23.0	11.7	11.7	16.7	22.5	17.5	28.2	26.7	24.0	26.8	27.5
% Bulls among Adults Harvested	54.5	58.5	67.9	77.1	64.5	66.7	82.1	60.6	60.5	75.6	68.0
% Cows among Adults Harvested	45.5	41.5	32.1	22.9	35.5	33.3	17.9	39.4	39.5	24.4	32.0
Bull Permit Filling Rate (%)	18.8	35.2	28.1	18.2	22.7	31.9	29.5	27.8	27.4	41.3	49.3
Cow Permit Filling Rate (%)	34.0	78.6	81.0	25.0	52.4	78.6	25.0	81.3	83.3	50.0	66.7
Overall Success (%)	15.9	10.7	10.9	7.4	9.4	10.7	10.4	10.7	10.8	10.6	13.3
Non-Permit Holders Success Rate	7.6	1.6	1.7	1.8	2.8	2.4	4.0	3.6	3.3	3.5	4.4
Hunter Effort*	19.9	33.5	32.3	48.7	40.0	34.8	34.1	37.5	37.6	37.0	26.5
Mean Age of Bulls		4.0		2.9	2.6	3.4	4.0	3.6	3.5	2.9	
Mean Age of Cows		4.5		4.2	3.3	2.7	3.3	4.5	4.4	5.5	

* Hunter-Days/Moose Harvested

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Table 2. Post-hunt moose aerial inventory data from Kearney check station area, WMU 50, south central Ontario.

	Fixed-wing aircraft					Rotary-wing aircraft				
	1985	1986	1987	1988	1989	1991	1992	1993	1995	1996
Bulls	16	14	10	5	9	37	35	16	25	34
Cows	8	15	14	7	5	39	47	28	41	59
Calves	6	10	10	4	4	13	26	17	19	27
Unknown	1	2	7	0	7	0	1	0	0	0
Total	31	41	41	16	25	89	109	61	85	120
% Bulls	53.3	35.9	29.4	31.3	50.0	41.6	32.4	26.2	29.4	28.3
% Cows	26.7	38.5	41.2	43.8	27.8	43.8	43.5	45.9	48.2	49.2
% Calves	20.0	25.6	29.4	25.0	22.2	14.6	24.1	27.9	22.4	22.5
Density*	0.25	0.33	0.33	0.16	0.20	0.71	0.87	0.81	0.68	0.96
Area inventoried (km^2)	125	125	125	100	125	125	125	75	125	125

* moose/km^2

Algonquin Park. Our mean harvest rate indicated that present management techniques and habitat conditions are adequate to sustain a harvest up to double the level recommended for Quebec.

The short-term significant increase in harvest from 1990 to 1995 may be a reflection of herd restructuring from the selective harvest system. The increase in the adult female segment in the population appeared to result in increased calf recruitment. The calves produced by the increased number of adult females could be harvested while the total population did not change. This was confirmed by the significant increase in calf harvest coupled with no significant change in the calf component of the winter population, as well as increasing harvest and hunter numbers while hunter effort remained stable. The winter population density for the KCSA between 1991 and 1996 exceeds the selective harvest management goal of 0.39 moose/km^2 (OMNR 1982), but chances for increased herd size and possibly an increased allowable adult harvest are reduced unless a limit is placed on the allowable calf harvest.

The Kearney area moose population relies, in part, on immigration from Algonquin Park to maintain population numbers while sustaining a controlled hunt (Wilton and Bisset 1988; Garner et al. 1990). Young adult males are the largest component of this immigration. The male component of the adult winter population is below 40%; the level below which successful breeding within the herd may be impaired (Crête et al. 1981). The adult bull proportion of the winter population may indicate that immigration is not sufficient to overcome the harvest demands placed on that segment by the selective harvest system. Reduction in the number of bull tags issued may be necessary to allow optimum reproduction in the Kearney area.

ACKNOWLEDGEMENTS

Alces

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