ANTLER CASTING IN AN UNHUNTED MOOSE POPULATION IN NORTHEASTERN ONTARIO

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Abstract: As part of an aerial survey of winter habitat utilization by moose (Alces alces) in northeastern Ontario, 8 standard 25 km^2 census plots were flown an average of once per month over 5 winters from 1976 to 1981. During this time, 422 known male moose were observed and data regarding the presence and type of antlers was recorded. The duration and rate of antler cast differed with each antler class (palmate, cervicorn, spike-fork). No period of accelerated rate of antler cast was noted. Yearlings accounted for a disproportionately high number of single antler observations. Since aerial moose inventories take place after antler cast has commenced, the presence or absence of antlers cannot be used as the sole indicator of sex.

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The timing of antler cast in moose has been the subject of only limited research (Peterson 1955, Timmerman 1971, Hauge and Keith 1981, Novak 1981, Van Ballenberghe 1983).

From 1976 to 1981, the O.M.N.R. and the Canadian Wildlife Service conducted a co-operative research program to study the effect of forest cutting on winter moose distribution (Welsh et al, 1980). At the conclusion of the aerial survey program, it was apparent that a stable moose population had been studied. Each winter, densities decreased

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uniformly over time. The age structure of the male component appeared to approach the theoretical ideal, with a high proportion of older bulls. Consequently, this population seemed to be an excellent subject for studying the characteristics of antler cast timing.

Since the presence or absence of antlers is the most easily observed of the criteria used in sexing moose, both the timing and rate of antler cast can affect the accuracy of aerial moose surveys. The first objective was to explore the possibility that there was a "safe" date up to which sex could be determined by presence of antlers only.

There is a general belief among many moose observers that, while antlers are cast all through the winter, most moose lose their antlers during January. Calculations could be made to determine if there were periods of accelerated rates of antler casting.

In a presentation of top-priority research projects, Bubenik (1981) posed two questions: Does the timing schedule of antler cast in moose change with maturation? Is asynchronous antler cast typical for moose of any age or particular class, or is it an effect of distress? These questions are partially answered.

STUDY AREA

All of the observations used in this study were made on eight standard (2.5 x 10 km) moose survey plots, located in Mildred and Makawa Townships in the Algoma Territorial District of Ontario (Figure 1). These adjacent townships are within the Chapleau Crown Game Preserve, where hunting has been prohibited since 1922. The

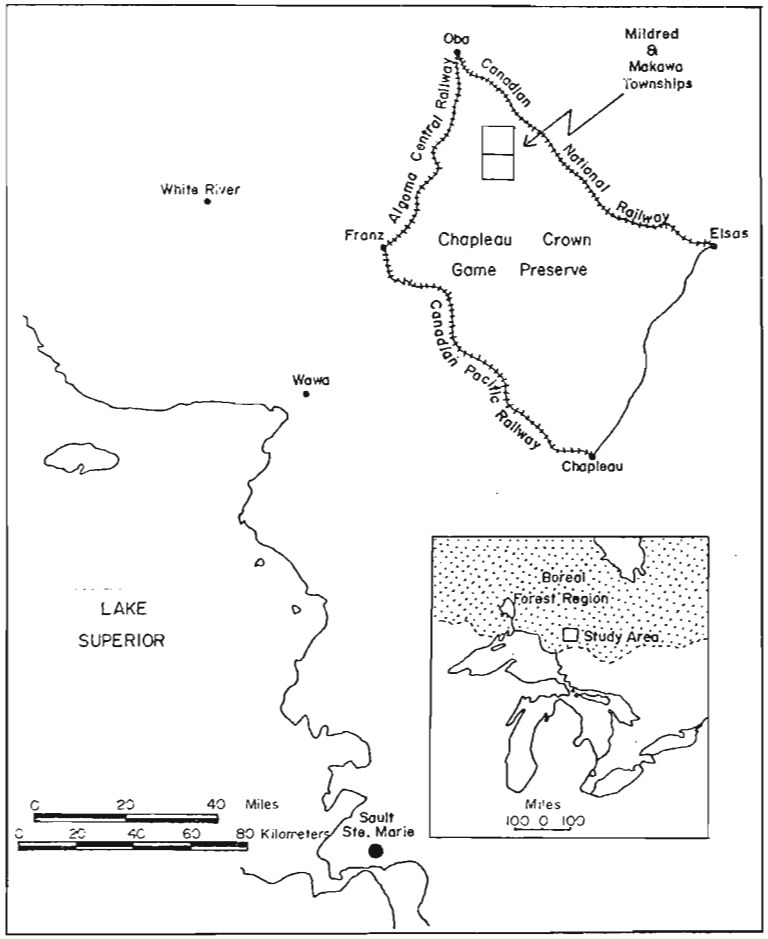


FIGURE 1. Location of the study area.

land is moderately rolling with elevations ranging from 335 metres to 440 metres, covered with silty to sandy till soils.

Before logging, the forest cover consisted mainly of mixed stands of balsam fir, (Abies balsamea), black spruce (Picea marina), and white birch (Betula papyrifera). Logging has occurred in Mildred Township since 1952, and Makawa Township since 1976, resulting in a patchwork of various sizes of cuts and residual stands. Most of Mildred Township has been left to reforest naturally. (Welsh et al, 1980).

METHODS

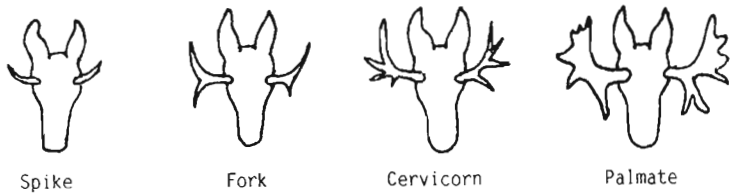
A variety of light aircraft, usually a Cessna 185, but including Cessna 170-B, C.172, C.180 and a DeHaviland Turbo Beaver, were used over the five (5) winters. We normally attempted to fly a complete series of eight (8) plots every three or four weeks, with various degrees of success due to inclement weather or other aircraft use priorities. (Welsh et al, 1980).

All moose observed on the survey plots were classed as bulls, cows, calves, unsexed adults, or unknown age and sex, based on a variety of sexing and ageing techniques including: presence of antlers, presence of vulva patch, presence of calf, face colour, bell shape and size, body shape and size, and behavior.

Antlers were classified as spike, fork, cervicorn (multipointed) and palmate (Figure 2). No attempt was made to classify the size of antlers. Spike and fork antlers were later grouped into the same category.

Data for the five years was pooled and then divided into 10-day periods, to obtain larger sample sizes. The percentage of known males (antlered and unantlered) of all adults was graphed, to indicate the periods during which sex determination was consistent. Early and late winter observations were then eliminated from subsequent calculations, under the assumption that data points not fitting the linear regression reflected a low degree of accuracy in determining sex.

The percentage of each antler class of known males was calculated for each 10-day period to determine rates of antler casting. These values were graphed and linear regression analysis was performed.



Adapted from Bubenik et al, 1977.

FIGURE 2. Antler classifications.

All observations of single antlers over the five winters were pooled, and assigned to one of the three antler classes (palm, cervicorn, spike-fork). Due to the small sample size, there was no attempt made to relate this phenomena to time of year.

Table 1. Moose antler presence by type in Mildred and Makawa Townships from November to April, 1976-1981.

Period	No. of Adults	Known Males		With Antlers		Palmate Ant.		Cervicorn Ant.		Spike and Fork Antlers		Unk.
	n	#	%	#	%	#	%	#	%	#	%	
Nov. 21-30	82	27	(32.9)	27	(100.0)	20	(74.1)	1	(3.7)	4	(14.8)	2
Dec. 01-10	39	17	(43.6)	16	(94.1)	12	(70.6)	1	(5.9)	3	(17.6)	0
11-20	78	34	(43.6)	34	(100.0)	21	(61.8)	9	(26.5)	4	(11.8)	0
21-31	42	16	(38.1)	13	(81.3)	8	(50.0)	4	(25.0)	1	(6.3)	0
Jan. 01-10												
11-20	234	94	(40.2)	50	(53.2)	29	(30.9)	13	(13.8)	7	(7.4)	1
21-31	96	41	(42.8)	23	(56.1)	9	(22.0)	7	(17.1)	5	(12.2)	2
Feb. 01-10	176	68	(38.6)	23	(33.8)	4	(5.9)	9	(13.2)	8	(11.8)	2
11-20	102	32	(31.4)	5	(15.6)	1	(3.1)	0		4	(12.5)	0
21-29	89	29	(32.6)	5	(17.2)	0		2	(6.9)	3	(10.3)	0
Mar. 01-10	74	23	(31.1)	1	(4.3)	0		0		1	(4.3)	0
11-20	63	22	(34.9)	2	(9.1)	0		0		2	(9.1)	0
21-31	78	15	(19.2)	1	(6.7)	0		0		1	(6.7)	0
Apr. 01-10	34	4	(11.8)	1	(25.0)	0		0		1	(25.0)	0
TOTAL	1 187	422		201 (incl. 7 unk. antler type)		104		46		44		7

RESULTS

A total of 1,187 adult moose, including 422 males, were observed between 12 December 1976 and 22 March 1981. The earliest date flown in any year was 28 November (of 1978) and the latest was 09 April (of 1978) (Table 1).

The earliest date on which a bull without antlers was observed was 01 December (1978). The last observation date of palmate antlers was on 11 February (of 1979), cervicorn antlers on 21 February (of 1978), and spike-fork antlers on 09 April (of 1978).

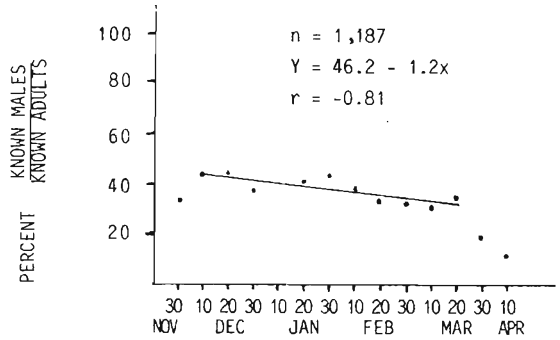


FIGURE 3. Sexing consistency over the study period.

A graph illustrating the percentage of known males of all adults over time (Figure 3) showed a period of apparently consistent sexing from 01 December to 20 March. These dates then provided the limits within which the rates of antler cast were calculated. A regression line fitted between those dates (Y = 46.2 - 1.2x; r = -0.81) confirmed this consistency.

A graph illustrating the percent antlered males in various categories, over time, indicated a strong relationship between antler classification and rate of antler cast (Figure 4).

Asynchronous antler cast was observed in 40 cases, with 50 percent of 44 spike and fork antler observations being of only one antler, while only 7.7 percent of 104 palmate-antlered bulls exhibited asynchronization (Table 2).

Table 2. Asynchronous antler cast, by antler type, in Mildred and Makawa Townships, Ontario, 1976-1981.

Antler type	Palmate	Cervicorn	Spike-Fork	Total
No.antlered moose observations	104	46	44	194
No.moose with a single antler	8	10	22	40
% with 1 antler	7.7	21.7	50.0	20.6

DISCUSSION

The rate of antler cast of all males was linear: there were no periods of accelerated or decelerated rate of antler cast. Thus, there was no "slow start" just after the commencement of antler cast permitting sexing by the presence or absence of antlers alone. Other sex indicators, especially the vulva patch and face colour, should be used to sex unantlered animals in all winter surveys.

The timing and rate of antler cast differed with antler classification, so the timing schedule does change with maturation. Spike and fork antlers are a feature of yearlings (Peterson 1955, Croskery 1975,

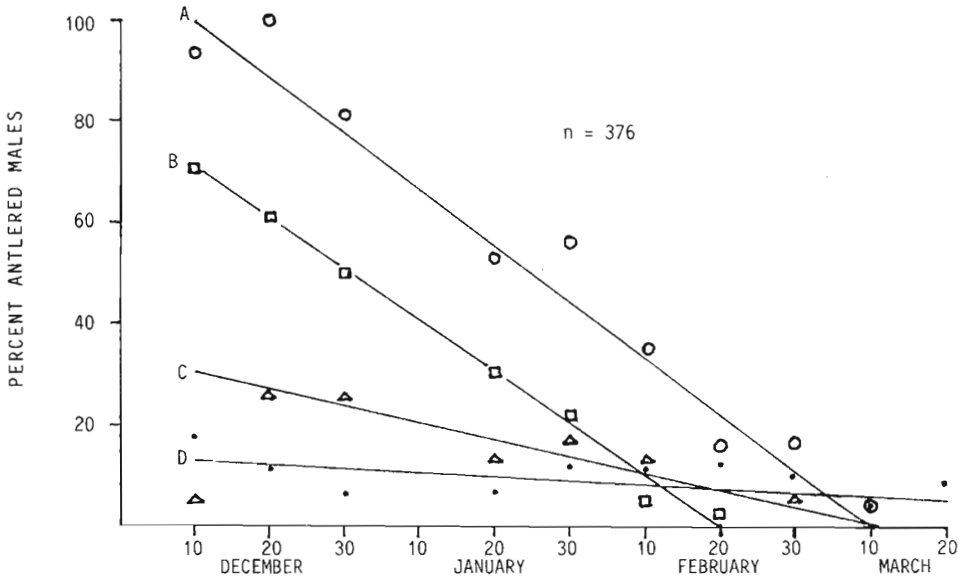


FIGURE 4. Rates of moose antler fall by antler type, in Mildred and Makawa Townships, Ontario, 1976-1981.

o	A	all antlered males of known males	Y = 124.1 - 11.0x; r = -0.98
□	B	palmate " " " " "	Y = 91.0 - 10.1x; r = -0.996
△	C	cervicorn " " " " "	Y = 37.1 - 3.3x; r = -0.91
•	D	spike-fork " " " " "	Y = 13.9 - 0.5x; r = -0.44

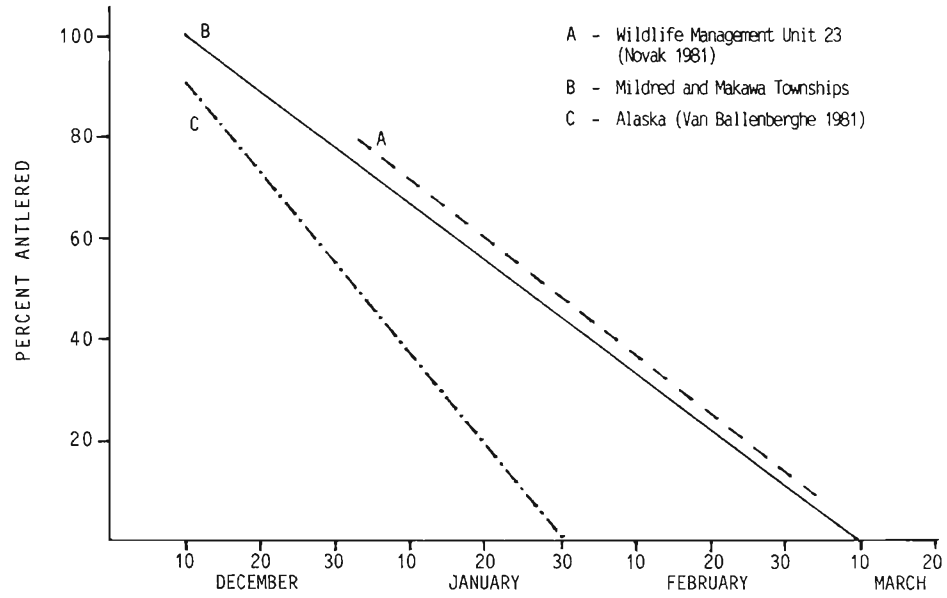


FIGURE 5. Rates of moose antler fall in Wildlife Management Unit 23, Mildred and Makawa Townships, and Alaska.

Bubenik et al. 1977), and cervicorn antlers indicate either two-year-olds (Bubenik et al. 1977) or yearlings in a more advanced state of maturity than those carrying spike or fork antlers.

Based on the observations in this study, the frequency of asynchronous antler cast changes with maturity, being greatest in yearlings and least in mature bulls. Since this is an unhunted and stable population, the high (50%) incidence of this condition in yearlings may be the norm.

In a moose study on Wildlife Management Unit 23, located just to the north of the Chapleau Crown Game Preserve, Novak (1981), produced a graph showing the rate of antler cast of that hunted moose population, with values Y= 85.5 - 1.2x (r = -0.9, P 0.0005) (Figure 5). The moose population in Unit 23 was overharvested; there was a low bull:cow ratio and the age distribution was skewed to younger animals (Lucking 1984, Novak 1984, Vukelich 1984). Of 29 antlered bulls recorded at a check station (Management Unit 23 Check Station Report 1977), the percentages of spike-fork, cervicorn, and palmate antlers were, respectively, about 41, 35, and 24. In the Mildred-Makawa study area, these percentages are estimated at 10, 25, and 65. Despite these differences, there were similar rates of antler cast in each population (Figure 5).

A moose population (Alces alces gigas) in Alaska exhibited a faster rate of antler cast (Figure 5) than the study population (Van Ballenberghe 1983). Moose in Mildred and Makawa Townships are probably A.a.amerciana (Peterson 1955), and in addition to the effect of short growing seasons in Alaska (Van Ballenberghe 1983) there may be inherent subspecific differences in rates of antler

shedding.

Excluding those bulls which drop their antlers as early as October due to injury or wounding (Timmerman, pers. comm. 1983), antler cast in the study area probably commenced about mid-November. Excluding those yearlings which carry antlers into April, antler cast ended about mid-March. This is similar to the duration of antler cast reported by Timmerman (1971) and Novak (1981) in Ontario, and Hauge and Keith (1981) in Alberta.

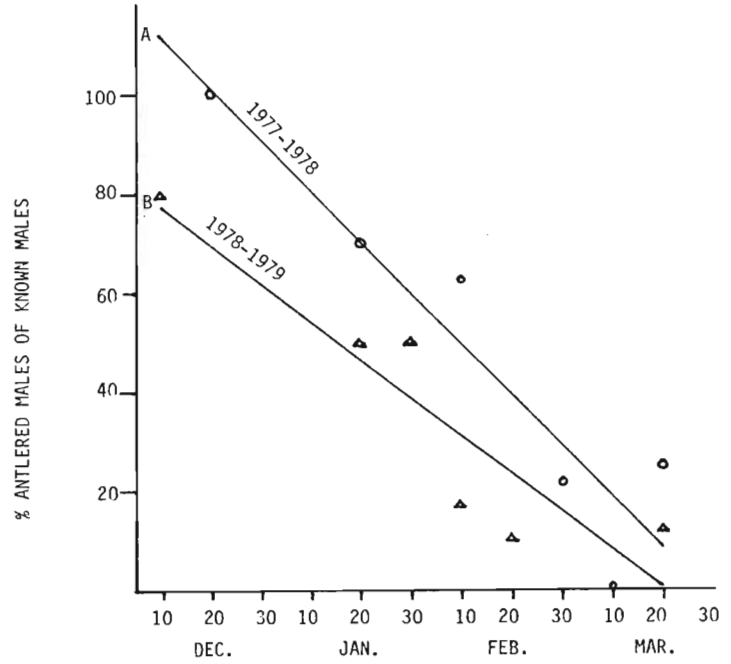


Figure 6. Annual variation in timing of antler cast in Mildred and Makawa Townships, Ontario, 1977-1979

A 1977-1978 (n=103) Y=122.38-10.31X; r=-0.94
B 1978-1979 (n=96) Y=85.09-7.62X; r=-0.91

The timing of antler cast appeared to vary annually, as has been shown to occur in red deer (Cervus elaphus) (Watson 1971). Because the highest sample sizes were available in those years, the data from the winters of 1977-78 and 1978-79 were chosen to illustrate this (Figure 6). Data from the remaining 3 winters exhibited similar variations. These annual differences in timing of antler cast do not affect the general premises discussed above. It is possible that these variations are artifacts of observer accuracy in sex determination, and of observing different individual moose during succeeding flights within a year, or different individual moose from year to year. Undoubtedly, individual moose have their own time schedule of antler casting, due to a variety of physiological reasons.

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