

PRELIMINARY RESULTS OF THE MAINE MOOSE SEASON (1980)

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Abstract: Maine's first moose hunt in 45 years was held 22-27 September 1980 in a 32,745 km² area with an estimated population of 20,000 moose. Holders of 700 permits harvested 636 moose. All successful hunters were required to present the entire moose for registration and the collection of biological data. Thirty-five calves, 450 bulls, and 151 cows were registered. Age of the animals examined ranged from ½ to 17½ years and averaged 4.8 years. Other information collected included size, weight, reproductive status, antler measurements, and observations on general condition. Ninety percent of the hunters returned questionnaires with information on moose observations, hunting techniques, handling techniques, and preference for sex and age of moose hunted.

Moose were common throughout Maine at the time of white settlement during the 17th century (Peterson 1955). By 1904 they were limited to the northern regions of the state and by the 1940's moose were more common in the southern half of the state and rare in the north (Aldous and Mendall 1941), and the population had declined. Changing habitat, an increasing deer herd (Banasiak 1961) and associated problems with the parasite Parelaphostrongylus tenuis (Gilbert 1974) and liberal hunting

seasons during much of the 1800's are likely reasons for the decline.

Prior to 1830 there were no closed seasons on moose in Maine. Although seasons gradually became more restrictive in the number of hunting days and the bag limit, the entire state was open to moose hunting until 1927. The area was gradually reduced to 3 southern counties by 1935 (Hodgdon 1961). There were no open seasons on moose from 1936 through 1979.

In the 1930's field personnel estimated the statewide population at 2,000 moose. By the mid 1970's aerial census data indicated a population of between 18,000 and 20,000 animals in Wildlife Management Units (WMU) 1 and 2 (Fig. 1) (Banasiak et al. 1980). Probable causes for the increase in the moose population include the expansion of clearcutting in northern Maine, a greater number of beaver flowages, climatic changes and a declining deer herd. The densest moose populations in the state are found in WMU 2 with estimated densities of 0.6 moose per km². The lowest estimated densities of 0.04 moose per km² are in WMU's 7 and 8.

Legislative authority to hold a moose season was sought in 1943, 1951, and at each session of the legislature from 1957 to 1975, but all were defeated. The bill introduced in 1977 passed both houses but was vetoed by the governor. In 1979 a moose hunting bill was passed and signed into law. This bill provided for a season in September of 1980, with a maximum of 700 permittees and their designated subpermittee to be selected by lottery to participate in the hunt.

Applicants for moose hunting permits had to hold a valid current Maine resident hunting license. Each applicant could name a subpermittee at the time of application; this subpermittee, who could be a nonresident, had to have a valid Maine big game hunting license to hunt. A person could make only 1 application for a permit but could be named as the sub-

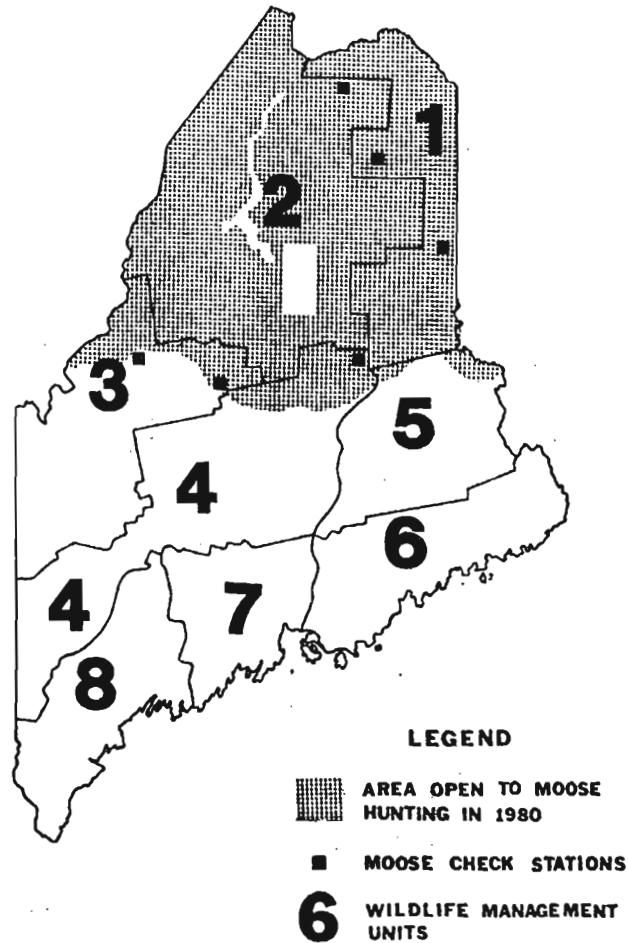


FIGURE 1. Map of Maine showing the moose hunting district, 6 moose checking stations and 8 wildlife management units.

permittee on more than 1 application. The permittees were selected from 32,269 applicants at a public drawing.

The season ran from September 22 through September 27, 1980, in the section of the state north of the Canadian Pacific Railroad mainline but excluded Baxter State Park and the Allagash Wilderness Waterway (Fig. 1). Moose of either sex and of any age could be taken with a limit of 1 per party. Hunters could hunt anywhere in the zone open to the taking of moose.

The application and permit fees were 5 and 10 dollars respectively. These fees were the same whether 1 or 2 hunters were involved. The bill mandated that at least one-half of the revenue generated by moose permit and application fees or 85,000 dollars, whichever was smaller, would be used for moose research and management.

METHODS AND MATERIALS

The law required that all moose taken during the 1980 season be presented at a check station for registration and the collection of biological and hunting data. Six check stations were set up at Department of Transportation and Department of Inland Fisheries and Wildlife facilities (Fig. 1). The stations were located to minimize travel distance for the successful hunter. A fee of \$10 was charged for registering a moose.

Records for individual animals which included sex, age, body measurements, antler measurements, date, time and location of kill were identified by registration seal number. Calves and yearlings were determined by tooth replacement, older animals were aged later by cementum annuli counts from collected primary incisors (Sergeant and Pimlott 1959). Hind

foot length, total body length and height at shoulder were measured and recorded using the technique outlined by Peterson (1974). Antler data recorded included antler type, mean diameter 2.5 cm above the burr, maximum spread and number of points longer than 2.5 cm. Weights of field dressed moose were obtained whenever possible. Cows were checked for lactation. Samples of hair, liver, kidney and rib were collected for Dr. P. F. Scanlon of Virginia Tech, Blacksburg, Virginia who will analyse them for heavy metals as part of his studies on environmental contamination.

All permittees and subpermittees were sent a questionnaire regarding the hunt (Fig. 2). In addition, hunters were supplied with vials and asked to collect blood samples. They were also requested to provide directions to the kill site and were given flagging tape to mark the spot where the moose was brought to the road so that ovaries could be collected by Department personnel.

RESULTS

A total of 700 permits were issued for the 1979 hunt, 636 moose were killed. The moose harvested consisted of 15 male calves, 20 female calves, 450 bulls and 151 cows. The age structure of the harvest is presented in Table 1. Average (\pm standard deviation) age for bulls was 5.0 ± 3.1 years and 4.3 ± 3.3 for cows. Bulls comprised 71.1% of the harvest, and cows 28.9%. Twenty-six moose were reported as being wounded and not recovered by 1,133 hunters.

Lactation was evidenced in 5 (36%) of the $2\frac{1}{2}$ year old cows examined, and 73% of the cows over $3\frac{1}{2}$ years old.



Moose Hunter's Report

Hunter's Name: _____
 Address: _____
 Permit Number: _____ License No. _____
 Year of Birth: _____ Sex: _____ Occupation: _____

1. Were you the ...PERMITTEE or SUBPERMITTEE? (Circle one) _____
 2. Did you hunt moose this season? YES ___ NO ___
 3. Did you scout your hunting area before the season? YES ___ NO ___
 4. Were you hunting for a particular sex and/or age of moose? YES ___ NO ___
 If yes, which one(s) _____
 5. How many moose did you wound that escaped? _____
 6. Total number of different moose shot at? _____
 7. What caliber (or gauge) weapon did you use? _____
 8. Record the percent of time spent hunting by each method you used, and check the method which was successful.

TOTAL HOURS HUNTED		HUNTING EFFORT COUNTRIES AND TOWNS HUNTED						
DATE	HOURS	STATE	COUNTY	TOWN	PERCENT	METHOD	PERCENT	
SEPT. 22								
SEPT. 23								
SEPT. 24								
SEPT. 25								
SEPT. 26								
SEPT. 27								

9. Were YOU successful in bagging a moose? YES ___ NO ___
 If YES:
 Did you transport your moose ___ INTACT ___ HALVED ___ QUARTERED ___
 Did you use mechanized equipment to haul your moose from the kill site to your road vehicle? YES ___ NO ___
 What type of equipment was used? _____
 How far was the moose kill-site from the nearest point you were able to drive your road vehicle? _____
 Which of the following best describes the location in which the moose was shot?
 ___ aquatic (pond, lake, stream, flowage)
 ___ bog
 ___ aquatic fringe (e.g. alders around pond)
 ___ softwood forest
 ___ hardwood forest
 ___ mixed hardwood and softwood forest
 ___ opening (e.g. clearcut, field)
 ___ other (describe below) _____

INDICATE THE TYPE AND NUMBER OF MOOSE SEEN EACH DAY

DATE	MOOSE SEEN						
	SEPT. 22	SEPT. 23	SEPT. 24	SEPT. 25	SEPT. 26	SEPT. 27	TOTAL
ADULT BULL							
JUVENILE BULL							
ADULT COW							
JUVENILE COW							
ADULT CALF							
JUVENILE CALF							
UNIDENTIFIED SEX OR AGE							

Total number of deer seen _____ Total number of bear seen _____
 COMMENTS: (use additional sheet if necessary) _____

FIGURE 2. Questionnaire sent to all moose hunters.

Table 1. Sex and Age Distribution of 1980 Maine Moose Kill.

Age	Number			%		
	Male	Female	Total	Male	Female	Total
½	15	20	35	2.6	3.5	6.1
1½	48	21	69	8.4	3.7	12.1
2½	67	24	91	11.8	4.2	16.0
3½	62	35	97	10.9	6.2	17.1
4½	45	19	64	7.9	3.3	11.2
5½	37	11	48	6.5	1.9	8.4
6½	39	6	45	6.8	1.1	7.9
7½	27	4	31	4.7	0.7	5.4
8½	22	7	29	3.9	1.2	5.1
9½	12	3	15	2.1	0.5	2.6
10½	8	4	12	1.4	0.7	2.1
11½	8	5	13	1.4	0.9	2.3
12½	7	1	8	1.2	0.2	1.4
13½	2	1	3	0.4	0.2	0.6
14½	5	1	6	0.9	0.2	1.1
15½	0	1	1	0	0.2	0.2
16½	0	0	0	0	0	0
17½	1	1	2	0.2	0.2	0.4
Totals	405	164	569	71.1	28.9	100.0

Hunting methods are shown in Table 2. The most common, and successful technique was to hunt from a vehicle driving on roads. Almost two-thirds of the hunters reported killing their moose within 100 meters of a road (Table 3). Some type of mechanical device was used by 54 percent of the hunters to remove the moose from the woods or load it on a vehicle.

Hunter distribution and harvest of moose was centered in the Moosehead Lake area in the southwestern portion of the hunt zone (Fig. 3). Thirty-six and 48 moose were killed in two townships of 92.5 and 87.1 km²

1980 MOOSE KILL

MOOSE PER SQUARE KILOMETER

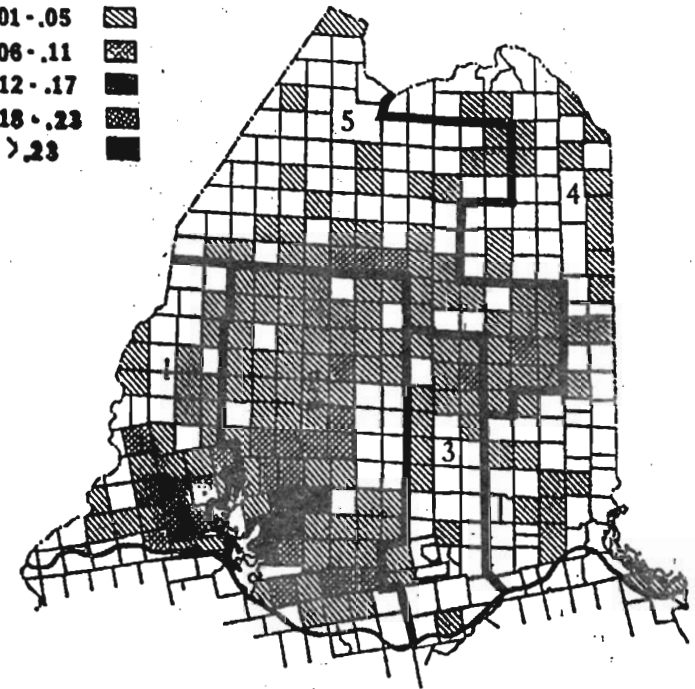


FIGURE 3. Density of 1980 moose kill by township and regions from which hunters reported observations of moose. 1 = Somerset County, 2 = Piscataquis County, 3 = Penobscot County, 4 = the eastern part of Aroostook County and 5 = the western part of Aroostook County.

Table 2. Percent of Hunters Using Seven Hunting Methods by Percentage of Hunting Time.

% of Hunting Time ¹	Hunt From Stand	Calling	Hunt From Boat	Search From Air	Stalk in Woods	Walking Roads	Driving Roads	Other
0	60.1	88.0	89.5	96.9	53.6	53.1	18.3	98.8
1-4	5.6	4.8	2.2	1.2	4.6	4.8	2.1	0.2
5-9	6.5	3.7	2.1	0.8	10.1	11.2	3.9	0.1
10-24	7.5	0.8	1.5	0.6	8.6	9.3	3.6	0.2
25-49	15.0	2.2	3.0	0.3	16.7	17.6	22.6	0.4
50-74	1.6	0	0.3	0.1	1.9	1.0	8.3	0
75-89	1.4	0.1	0.6	0	1.4	0.6	18.7	0
90-99	0.1	0	0.3	0	0.2	0.1	3.5	0
100	2.4	0.4	0.3	0.1	2.7	2.1	18.9	0.3
% of Hunters Using	39.9	12.0	10.5	3.1	46.4	46.9	81.7	1.2
% Moose Taken by Method ²	10.5	2.0	2.9	0.9	11.7	9.5	61.5	0.7

¹ 989 responding hunters.

² 640 responding hunters.

of land area. The northern areas of the hunt zone were hunted very lightly.

Table 3. Distances 927 Hunters Reported Transporting Moose Before Loading Them Onto a Vehicle or Trailer.

Distance	Percent of Hunters	Accumulated % of Hunters
0 m	19	19
1-10 m	9	28
11-50 m	18	46
51-100 m	15	61
101-400 m	24	85
400-800 m	7	92
> 800 m	8	100

Most of the moose (77%) were brought out field dressed (removal of viscera, heart and lungs) allowing us to obtain weights and body measurements (Table 4). The heaviest field dressed bull and cow were 485 and 331 kg., respectively.

Table 4. Mean Body Measurements (Body Size) of Maine Moose Harvested During the 1980 Season by Sex and Age.

		Calf	1½	2½	3½	4½	5½+
Dressed Weight (kg)	Males	115	204	270	331	362	396
	Females	108	206	241	252	264	271
Shoulder Height (cms)	Males	126	159	172	179	183	183
	Females	137	157	163	171	171	175
Body Length (cms)	Males	182	225	249	264	274	274
	Females	184	230	240	243	244	257
Hind Foot Length (cms)	Males	64.0	73.5	73.9	76.3	75.5	76.6
	Females	64.6	73.0	74.3	74.4	74.7	74.5

Antler measurements (Table 5) indicate bulls achieved maximum development between 6½ and 10½ years of age.

Table 5. Antler Characteristics of Maine Moose Harvested During the 1980 Season by Age.

Age	N	Average Beam Diameter (mms)	Spread (cms)		Points		% Without Palmate Antlers
			Mean	Range	Mean	Range	
1½	33	31.5	49.0	37.0-65.0	3.14	2-6	85.4
2½	63	41.9	73.1	49.0-116.0	7.55	2-23	36.4
3½	60	45.9	88.3	70.0-128.0	10.03	2-17	19.7
4½	44	51.2	103.2	50.0-139.0	11.96	4-19	7.0
5½	36	53.7	108.8	90.0-134.0	13.63	3-23	5.4
6½	39	59.6	123.1	113.5-160.0	15.77	6-23	2.6
7½	26	60.6	124.5	30.0-162.5	17.61	5-26	3.7
8½	22	58.8	122.1	38.0-159.0	16.04	2-30	13.6
9½	12	58.2	123.4	90.6-155.0	16.73	9-31	0
10½	8	61.0	125.9	105.0-153.0	16.00	11-20	0
11½	7	59.8	108.3	13.4-141.0	12.17	2-18	12.5
12½	7	55.3	114.1	78.0-135.0	13.86	10-17	0
13½	2	48.8	113.0	84.0-130.0	14.33	4-24	0
14½	5	58.9	121.0	116.0-128.0	9.46	8-13	0
17½	1	50.0	-	-	-	-	100.0

The amount of time hunters spent hunting ranged from less than half-an-hour to more than 60 hours and averaged 18 hours. This information is summarized in Table 6. Thirty-three percent of the respondents hunted for 1 day, 23% for 2 days, 18% for 3 days, 13% for 4 days, 5% for 5 days, and 5% for 6 days. Over one-half (57%) of the hunters reported that they scouted the area before hunting.

Table 6. Amount of Time Moose Hunters Spent Hunting during the 1980 Season (n=1118).

Hours Hunted	Percent of Hunters	Accumulated % of Hunters
Less Than 1	10	10
1-10	24	34
11-20	28	62
21-30	17	80
31-40	10	90
41-50	6	96
51-60	2	98
Over 60	2	100

Hunter Preference

Data taken from the questionnaires showed that almost one-half (48.2%) of the hunters said they preferred to shoot a specific sex or age class of moose. The categories by preference were bull 94%, (large or trophy bull 18.4% and young or yearling bull 5.1%). Only 1.3% of the hunters responding wanted to bag a cow, 0.4% of this number specified a young or yearling cow. Calves were preferred by 0.7% and the remaining respondents (4.7%) chose a combination of 2 or more of the above categories.

Moose Observations

Hunters' reports of the moose sighted during the hunt indicate some differences throughout the hunting district (Table 7). Five regions

were considered: 1) Piscataquis County, 2) Penobscot County, 3) Somerset County, 4) The eastern portion of Aroostook County, and 5) western Aroostook County (Fig. 3). The eastern portion of Aroostook County is a mixture of farmland and forest, and the other areas are primarily commercial forest.

Table 7. Moose Observations Reported by Hunters During the 1980 Moose Hunting Season by County.

County	Number of Moose	Moose Observations/ Hour	Calves/ 100 Cows ²	Bulls/ 100 Cows
Penobscot	192	.198	53.0	130
Piscataquis	1,681	.200	39.6	129
Somerset	470	.217	27.7	106
Aroostook (East)	150	.079	46.3	212
Aroostook (West)	433	.163	23.0	125
All Regions ¹	3,546	.174	38.7	133

¹Includes observations by hunters who hunted in several districts or in Washington County.

²Includes yearling cows.

Penobscot, Somerset and Piscataquis Counties were very similar in the number of moose sighted per hour of hunting but hunters in Aroostook County saw fewer moose per hour, especially in the eastern portion. In most areas slightly more bulls were seen than cows. In the eastern portion of Aroostook County more than twice as many bulls as cows were seen.

The overall calf:cow ratio reported by hunters was 38.7:100. Hunters reported lower calf:cow ratios in Somerset County and the western part of Aroostook County than the other areas.

DISCUSSION

Compared to New Brunswick's first moose season after a long closed period of more than 20 years there was a high percentage of older moose in the kill in Maine. Moose 8½ years old and older accounted for 15.7% of Maine's harvest compared to 3.9% of New Brunswick's 1960 harvest of antlered animals only (Carter 1965). The age distribution found for Maine's 1980 season is more similar to that of Nova Scotia's harvests for the past 15 years (Patton, 1979), but still shows a higher percentage of animals in the older age classes.

The field-dressed weights of Maine moose were comparable to those reported from Nova Scotia (Patton, 1979). The weights of calves and yearlings were slightly lower for Maine moose while the weights of adults were slightly higher, but Maine's season occurred earlier in the fall.

Although the 1980 moose season went smoothly, it showed a need for an effective means of distributing hunting pressure. Because the opportunity to view moose is an important tourist attraction for the town of Greenville and the Moosehead region, public concern about possible over-hunting in this region was great. These fears were increased by several factors that made the situation appear worse than it actually was. First, one of the main access points to the western half of the moose hunting zone was through this region so many moose that were shot to the north of this area were transported through it. Second, one of the check stations was in the town of Greenville so the moose that were brought through were in town longer and therefore more visible, and finally, the press coverage was concentrated in this area.

Several factors have helped reduce the opposition to moose seasons

in spite of several biased media reports. Hunter department was excellent and moose are still readily seen in even the most heavily hunted areas. Warden pilots took several groups of reporters on flights over the two most heavily hunted towns and their reports of moose sightings were widely printed.

While there is still much opposition to moose seasons, the resistance has decreased and a bill allowing annual seasons has passed by wide margins. This bill, effective in 1982, allows the Commissioner of Inland Fisheries and Wildlife to establish hunting districts and to set the number of permits to be issued in each district. While this makes it possible to prevent overharvest in the Moosehead area and allows for fuller use in other areas, it will not totally solve the public relations problems. The existing road network mandates that a high percentage of the harvested moose will be transported through this area and makes it a logical place for a checking station.

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