

MOOSE-VEHICLE COLLISIONS IN NEWFOUNDLAND - MANAGEMENT CONSIDERATIONS FOR THE 1990'S

Sebastian M. Oosenbrug, Eugene W. Mercer and Steven H. Ferguson

Newfoundland and Labrador Wildlife Division, Department of Environment and Lands, P.O. Box 8700, St. John's, Newfoundland. A1B 4J6

ABSTRACT: Collisions between moose and vehicles on Newfoundland highways have increased considerably since the early 1980's. Recorded collisions went up from 228 in 1983 to 432 in 1989, increasing from 2.3% to 2.9% of total accidents between these years. The increase in moose-vehicle collisions has been partially attributed to greater traffic speeds, more vehicles, and an increase in truck transport brought on by the closing of the Newfoundland railway in 1987. The largest contributing factor however is perceived to be an increase in moose numbers, especially in areas traversed by roadways. Hunter trend data suggest that moose numbers island-wide increased 26% between 1983 and 1989, while the number of registered vehicles grew by 46% and total accidents increased by 49%. Moose-vehicle collisions increased by 89% during this time. In June and July 1990, 4 people were killed in collisions with moose, and the Department subsequently assigned 3400 additional moose licenses for Moose Management Areas traversed by, or adjacent to the Trans-Canada Highway. At the same time public information pamphlets were circulated, and steps taken to upgrade moose warning signs along the highway. Various harvest options, mitigation techniques, and driver education programs are discussed which might more effectively reduce moose-vehicle collisions.

ALCES VOL. 27 (1991) pp.220-225

Moose-vehicle collisions on roadways in Newfoundland have increased during the last 10 years (Oosenbrug *et al.* 1986). More public attention has focused on these collisions because more people have been directly or indirectly involved in accidents with moose (Rathey and Turner 1991). Over the years the public, in combination with the media, have put considerable pressure on politicians to act. Appeals for the construction of more and better warning signs, information brochures, and reduction of moose populations were received. Some steps have been taken to address the public's concern, however little information exists about what factors are ultimately responsible for these increasing collisions. This paper examines some implications in an environment of public perception that maximum sustainable yield may no longer be the most important operating principle for moose management in Newfoundland.

BACKGROUND - 1983-1990

The Newfoundland Wildlife Division, in cooperation with the Department of Works, Services and Transportation, has kept records of the number of moose-vehicle collisions since the early 1980's. Records of accidents since 1983 indicate that reported moose-vehicle collisions increased from 228 in 1983 to 432 in 1989 (Table 1), increasing from 2.3% to 2.9% of total accidents between these years (Fig 1.).

Although the increase in moose-vehicle collisions has been partially attributed to greater traffic speeds and more vehicles (including truck transport), the public perceived that the increase in moose numbers was the largest contributing factor, especially in areas traversed by roadways. This perception led to calls for an increase in license sales to curb population growth in those Moose Management Units traversed by, or adjacent to the Trans-Canada Highway.

Hunter return information (moose seen per day hunted) indicated that the island moose

Table 1. Motor-vehicle accident data for 1983-1990 from Department of Works, Services and Transportation (Wildlife Division records in brackets).

Year	Human Deaths*	Injuries*	Total Accidents	Total Deaths	Moose-Vehicle Collisions	Registered Vehicles	Total Moose Licenses
1983	1(6)	10	10,013	103	63(228)	230,380	9,895
1984	0(1)	14	10,213	61	79(168)	241,898	11,325
1985	1	43	10,863	68	116(217)	263,182	11,775
1986	0	22	10,629	61	125(168)	296,746	12,440
1987	2	34	11,700	59	303(258)	316,145	13,057
1988	1(2)	70	12,867	58	358(412)	337,831	15,470
1989	4	120	14,891	89	458(432)	335,389	18,077
1990	4	87	13,641		460(337)	366,412	23,980

* Due to moose

Moose-Vehicle Accident Statistics 1983-1989

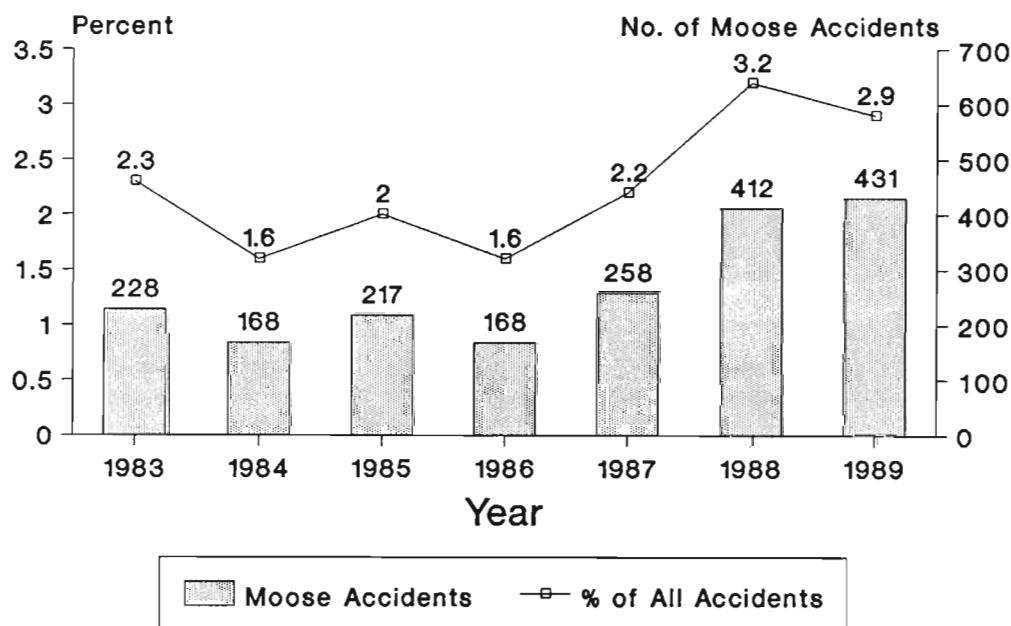


Fig. 1. Number of moose-vehicle collisions in Newfoundland from 1983 to 1989.

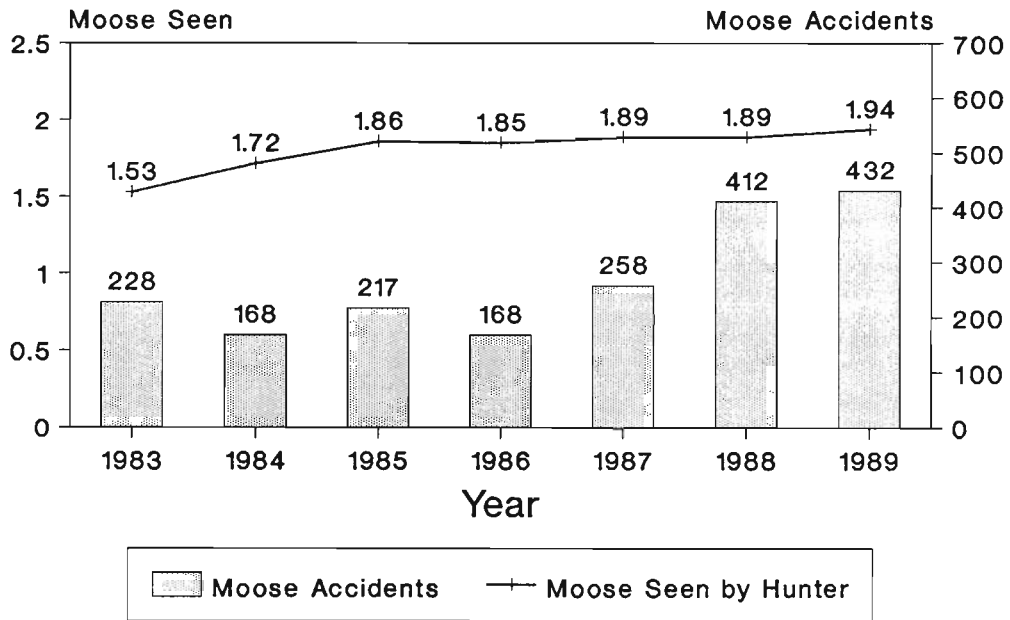
population increased by 26% between 1983 and 1989 (Fig. 2), while the number of registered vehicles grew by 46% and total accidents increased by 49%. The best predictor of moose-vehicle collisions was the number of registered vehicles (Fig. 3), accounting for 58% of the variation. There was a weaker correlation between moose seen per day hunted and moose-vehicle collisions (Fig. 2).

We used Wildlife Division records to base our conclusions about moose-vehicle collisions and population trends as Department of Transportation records were incomplete for the years 1983-1986. We believe that although variable, Wildlife Division record-keeping of moose deaths over the years accurately reflects the trend of 6% annual increase in moose-vehicle collisions ($r^2 = 0.84$, $prob.=0.003$).

Moose license quotas in Newfoundland have risen dramatically since 1988 (Table 1). This increase occurred, in some part, as a result of political pressure to assure the public of government concern about moose-vehicle collisions. In the summer of 1990, 4 people died in traffic accidents involving moose. Due to these fatalities, the Department responded by issuing an additional 3400 licenses for 17 Management Units traversed by, or adjacent to the Trans-Canada Highway.

The Newfoundland public saw the 3400 extra moose licenses as a viable solution to the problem of moose-vehicle collisions although the Newfoundland government enacted other initiatives. Information brochures outlining the danger of moose to drivers were circulated later in the summer, and some improvements were made to moose-crossing signs. Many of

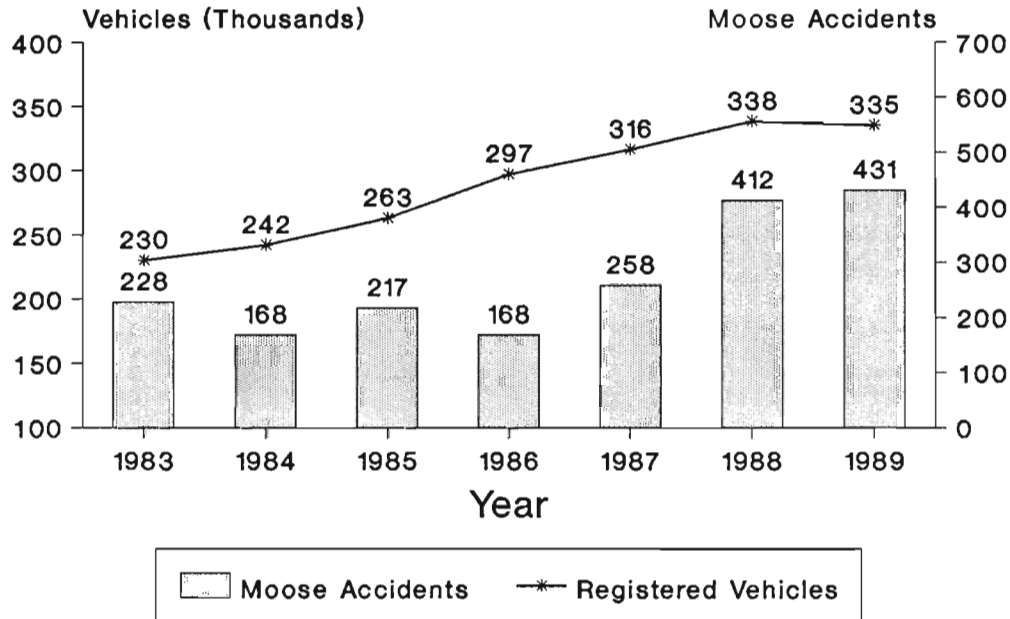
Moose-Vehicle Accident Statistics 1983-1989



r -square=0.24, Prob.=0.26

Fig. 2. Moose seen per day hunted compared to moose-vehicle collisions from 1983 to 1989 in Newfoundland.

Moose-Vehicle Accident Statistics 1983-1989



$r\text{-square}=0.58$, $\text{Prob.}=0.048$

Fig. 3. Registered vehicles compared to moose-vehicle collisions from 1983 to 1989 in Newfoundland.

the warning signs have still not been erected, and another round of license increases may occur next year.

MANAGEMENT CONSIDERATIONS

We estimate the value of the moose resource in Newfoundland at nearly \$160 million based on a population of 120,000 moose each valued at approximately \$1320 meat value. The legal kill and poaching losses equal about \$41 million per year in meat value, and another \$600,000 is lost in vehicle-destroyed moose. We estimate vehicle damage at more than \$1 million annually. The cost of human injuries and loss of life cannot, of course, be evaluated in dollars.

The dramatic nature of moose-vehicle collisions and the potential political outfall resulting from these collisions have some

profound implications for moose management in Newfoundland despite their few occurrences. Moose-vehicle collisions currently comprise less than 3% of total traffic accidents, and human deaths attributable to collisions with moose over the years have averaged about 4% of all traffic deaths. Moose have very long legs and the undersurface of the abdomen is at or above the level of the hood of the automobile. When hit, the automobile knocks the legs out from under the moose, and the momentum causes the body of the moose to fly up and hit the windshield and roof causing potential serious injury to the head and neck of occupants (Eriksson *et al.* 1985).

The management of moose in Newfoundland is based on principles of maximum sustainable yield. Annual harvest quotas are set

to extract a number of moose from populations to maximize moose production and sustain a viable supporting habitat. To date little consideration has been given to manage moose numbers with objectives other than to maximize moose production. Moose-vehicle collisions, farm depredation, and forest damage however are new variables in the yield equation used to evaluate acceptable moose densities in the future.

We do not support a policy of reducing moose populations over large areas to deal with moose-vehicle collisions. This policy does not consider the value of the resource and it will be largely ineffective unless moose numbers are decreased drastically. This is not to say that local high-density pockets of moose along highways cannot be reduced. These pockets occur in areas of commercial forest regeneration with declining accessibility for hunters, or in areas of domestic cutting, or in dense forest with low hunter success.

We propose removing moose from a 5-10 km corridor in troublesome sections along major roadways using a spring hunt during April-June. We think removing moose from long sections of highway is impractical. A regular fall hunt would be largely ineffective since spring dispersal of yearlings, and to some degree other age cohorts, would reoccupy these areas of prime habitat. A useful predictive test would be to monitor changes in population trends (e.g. moose seen per day) in those Management Units where additional hunting licenses are applied.

POTENTIAL MITIGATION

In 1990 an information brochure was designed and printed by the Wildlife Division and Department of Transportation outlining the dangers of moose on roadways, driver techniques, and locations of 32 "moose crossing areas" along the Trans-Canada Highway. These locations were to be signed appropriately as soon as possible, however to date many of them have not been erected. We

believe a major public education campaign and reduced speed limits at night would result in a significant decrease in moose-vehicle collisions. In addition appropriate moose warning signs, much larger than the federally approved logos, should be installed at all major intersections of roads with a traditionally high number of moose accident locations.

In Newfoundland no studies or experiments with habitat alteration have been attempted. Widening of roadway corridors has been suggested by the Wildlife Division as one potential measure to improve driver visibility and reduce the moose's inclination to use wooded areas near roads. Sodium chloride is used in copious quantity during the winter on Newfoundland roads, although the bulk of collisions with moose occur during the summer and most roads on the island run close to saltwater. Obstructions, and road modifications to allow moose crossings have also not been studied for use in Newfoundland.

CONCLUSIONS

An expanding moose population, coupled with more vehicles and roads have put increasing pressure on managers to provide a rationale for maintaining populations according to a policy of maximizing the annual harvest within limits of sustainable moose habitat. Unfortunately, limited funds have not allowed a study of the factors responsible for moose-vehicle collisions, moreover to implement mitigation measures other than reducing population densities. At present it appears we must rely on dialogue between agencies and jurisdictions to provide the best source of information on viable options for accommodating moose and motorists in Newfoundland.

REFERENCES

- ERIKSSON, A., U. BJORNSTIG and J. THORSON. 1985. Collisions between cars and moose (*Alces alces alces* L). An

- analysis of collisions with fatal personal injuries. *Travel Med. Internat.* 3:130-137.
- OOSENBRUG, S.M., R.W. MCNEILY, E.W. MERCER and J.F. FOLINSBEE. 1986. Some aspects of moose-vehicle collisions in eastern Newfoundland, 1973-1985. *Alces*. 22:377-393
- RATTEY, T.E. and N.E. TURNER. 1991. Vehicle-moose accidents in Newfoundland. *J. Bone and Joint Surgery*. 73-A(10):1487-1491.