# MOOSE CONFERENCE WORKSHOP, ANCHORAGE, May 17
# REDUCING INCIDENTAL MOOSE MORTALITY: CONSIDERATIONS FOR MANAGEMENT

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Increased moose mortality on Alaska's roads and railroad in recent years has provoked public concern. Extreme snow depths during the winter of 1989-90 forced moose to seek cleared paths, resulting in a record number of kills along railroad tracks and road rights-of-way (Fig. 1). Moose mortality exceeded previous recorded levels by almost 100%. There were 731 moose killed along the railroad and an additional 665 killed along the roads in southcentral Alaska, including the Kenai Peninsula.

Aside from the public safety and policy issues generated by road and railroad mortality, there was evidence that the losses were biologically significant to certain populations along these major transportation corridors. For example, a February 1991 survey along the Parks Highway and parallel Alaska Railroad between Willow and Talkeetna revealed only 246 moose, a 70% reduction from a similar survey in 1984.

In an attempt to address the problems of road and railroad mortality, the state of Alaska, Department of Fish and Game, hosted the 27th North American Moose Conference, in Anchorage. The conference consisted of two days of formal papers and discussions in Anchorage, followed by a field trip where conference participants traveled the Alaska Railroad from Anchorage to Denali National Park and back. Several stops were made along the way to point out areas where the train kill was most severe and what has been tried to alleviate the problem.

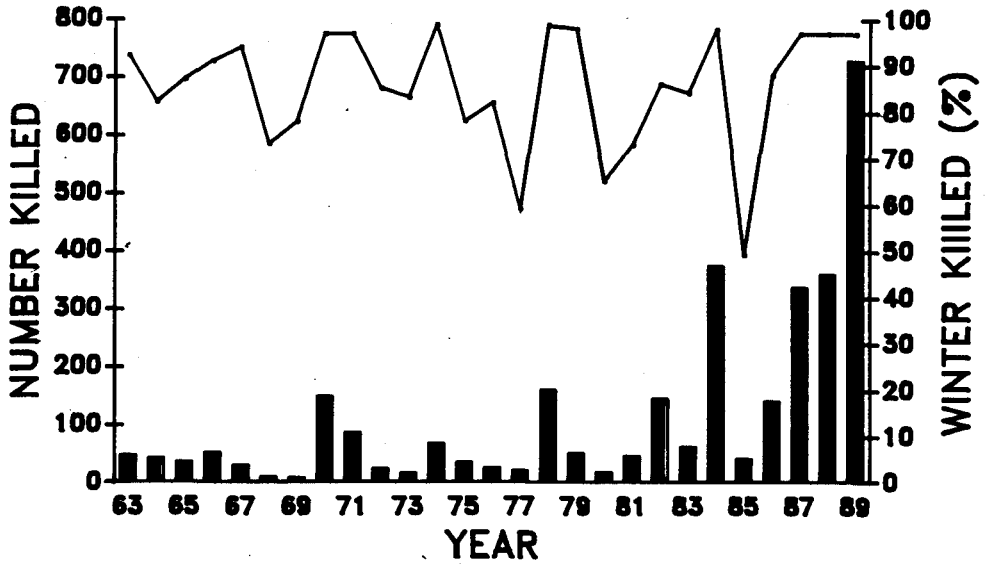


Fig. 1. Number of train killed moose (May-April) (n = 3075) by year in Alaska (bar graph) and the percentage of moose killed in winter (Dec-Mar) (line graph), 1963-90. Data from Modafferi (1992).

## BACKGROUND

The Alaska Railroad was built during the 1920's as a major transportation link between the interior city of Fairbanks and the port of Seward. The railroad was built in the valley bottom along the Susitna River and bisected some of the most important moose winter range in southcentral Alaska.

A government sponsored agricultural project during the Great Depression in the 1930's resulted in extensive development in the Susitna Valley. Subsequently a highway was built to link this important area with the cities of Fairbanks and Anchorage. Concurrent with the agricultural development was extensive land clearing associated with homesteading activity in the region. As homesteads and fields were abandoned, there was natural regeneration of dense stands of willow (*Salex* spp.), aspen (*Populus tremuloides*), and paper birch (*Betula papyrifera*). These stands, with their abundant forage resources, represented important winter habitat for moose in the Susitna Valley. Most homesteads were near roads and the railroad, putting wintering moose into close proximity with trains and automobiles. Hence development associated with increased human populations was a mixed blessing, providing quality winter range but accentuating incidental moose mortality.

Most road and railroad kills of moose occur during the winter months of December through March (Fig 2, and see Del Frate *et al.* 1991). Moose use the roads and rail corridor for easy travel through deep snow, seek regenerated deciduous browse along the rail and road rights-of-way, and frequently cross such corridors which intersect their migration routes. All these factors have led to varying degrees of moose mortality during winter (Fig. 1).

## THE FIELD TRIP

Participants on the field trip traveled on the Alaska Railroad from Anchorage to Denali National Park. The first stop was to view a moose wintering area on an abandoned homestead adjacent to the railroad. The area had been used extensively by a group of wintering

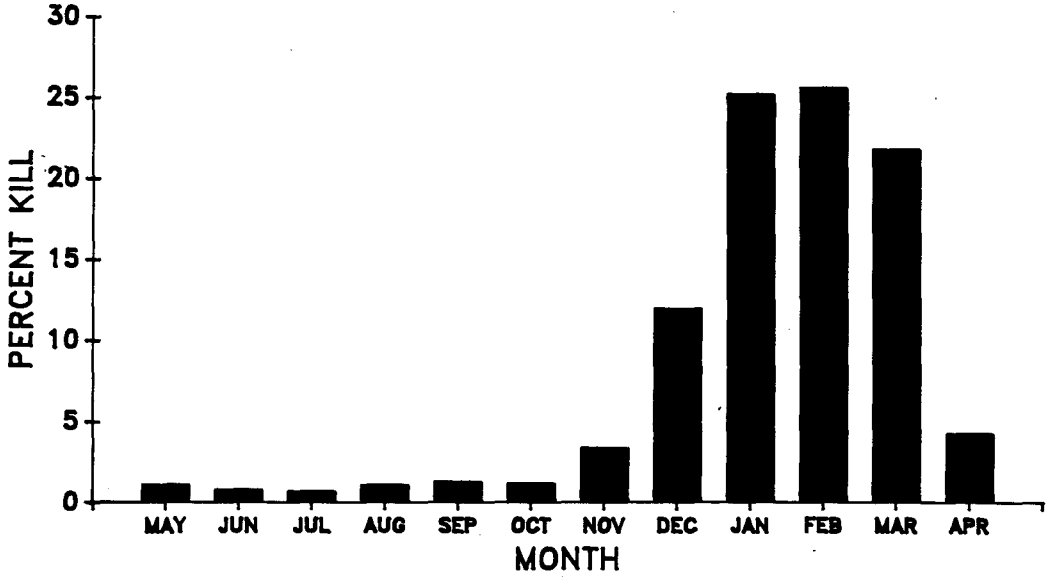


Fig. 2. Distribution of train killed moose by month (n = 3075) in Alaska, 1963-1990. Data from Modafferi (1991).

moose, judging by the amount of droppings and damage to browse species evident. The proximity of this excellent parcel of habitat to the tracks made it very apparent why train mortality occurred.

At the second stop we observed rights-of-way along the tracks that had been mechanically treated to remove the dense regrowth of deciduous browse. It was apparent that removal of this food source from the rights-of-way would result in reduced moose-train collisions.

Participants also were able to see the difficult terrain through which the rail corridor travels. In many locations the tracks were a narrow ribbon, traversing wetlands, stream sides or steep terrain. It was apparent to many participants that any fencing program to keep moose off the tracks would be potentially difficult and expensive.

Maintenance problems faced by the railroad also were pointed out. Maintaining a smooth railbed with the continuous freezing and thawing of the substrate requires constant leveling. The equipment requires an unobstructed railbed which precludes the use of any obstacles between the rails which might deter moose movements. At the conclusion of the two-day trip, participants reassembled in Anchorage to discuss what they had seen and to explore possible solutions.

## PANEL DISCUSSION

During a half-day panel session participants discussed possible solutions to the railroad problem. Additional ideas to alleviate moose-vehicle mortality also were considered.

The one idea which received consensus among participants was the need for some sort of economic survey that determined costs associated with train- or auto-moose accidents in Alaska. Participants agreed current cost estimates probably were underestimating what Alaskans were actually spending — both directly and indirectly. Preliminary surveys conducted by Alaska Department of Fish & Game (ADF&G) biologists (Del Frate *et al.* 1991) estimated more than $1.5 million in vehicle damage from moose collisions in a single year on the Kenai Peninsula. This estimate represented only actual losses associated with vehicle repairs from the collisions.

Total cost obviously included more than simple auto repair. To get a firm grasp on the true cost of moose vehicle accidents, the group suggested that ADF&G design and conduct a study which provided an estimates of all costs. The project should include the major geographic areas within the state with significant road systems where moose are present.. In addition to cost estimates for vehicle damage, the group suggested ADF&G document human injury and deaths attributable to moose collisions. These estimates should include the economics associated with lost income. Medical treatment and hospitalization costs should be calculated, as well as time lost from work due to injury. Because of Alaska's limited road system, a moose-vehicle collision often restricts or prevents traffic movement for a considerable period. This represents an additional economic impact in terms of work hours lost. Similar cost estimates are obtained when road improvements are planned. Data from such an economic survey would be useful for long-term planning associated with new road construction and road improvements and widening projects.

The economic impacts of moose-train collisions likewise should be assessed. An accurate accounting of railroad expenses incurred in dealing with moose collisions, as well as time and fuel loss factors should be considered.

The group also suggested that the economic impact study include an estimate of lost recreation time and the economic consequences represented by moose killed by trains and autos. Each moose has some intrinsic economic value associated with both consumptive and nonconsumptive uses. The potential loss of several hundred moose from the

southcentral moose population likely results in lost revenue to Alaska each year. An accurate economic assessment of the problem will make recommendations for actions to reduce or prevent moose-vehicle accidents easier to justify in a cost-benefit analysis.

Many participants suggested improved rights-of-way clearing and widening along both highways and railroads. Such work has been done sporadically in Alaska, and the results appeared promising. Reducing or eliminating available forage near travel corridors reduces the tendency for moose to remain in those areas. Clearing and maintaining rights-of-way is expensive and budget considerations have prevented wildlife managers from obtaining commitments for sustaining the work. With a solid economic impact assessment in hand, it would be easier to persuade transportation officials of the wisdom of such preventative work.

The proposed use of herbicides to kill deciduous browse was rejected because of strong public opposition, particularly in the United States, to any kind of chemical solutions. However, the possible use of steam to kill vegetation and discourage brush invasion along roads and rails was endorsed. The Alaska Railroad is experimenting with such a program.

A proposal that certain ground covers like red fescue might help control rights-of-way browse got a mixed reception. Arguments against the idea centered around the possibility that such vegetation might actually attract moose. The thought was that early green-up of these grass species might offer a source of highly nutritious materials during a period when other foods were limited. However, other participants pointed out that such plant species are used to reseed road shoulders with no apparent attraction to moose.

One participant recommended more consultation with road builders at the time of construction rather than trying to solve moose-vehicle collisions after the fact. Seasonal concentrations and movements of moose should be considered when route selection is under way.

In conjunction with eliminating browse adjacent to rights-of-way the group suggested development of alternative forage sites away from the transportation corridors. These sites would serve to replace existing forage associated with abandoned homesteads and regrowth along road and railroad rights-of-way.

Several participants suggested that the attraction/availability of road salt should be reduced by draining roadside ditches, reducing the amount of salt used on roads and placing alternative salt blocks well away from highways. Swedish participants said their research, with one salt block per square kilometer, indicated no attraction for moose. An ADF&G researcher also reported no utilization of alternative salt blocks in a similar study.

Fencing is another effective but extremely expensive measure. Participants agreed that it is cost-effective only on sections of road or rail with high traffic density. It also was pointed out that careful consideration needs to be given to possible effects of fencing on wildlife movements.

Reducing speeds of cars and trains seems to be an obvious theoretical solution but was deemed impractical. Convincing motorists to slow down during periods of darkness or icy road conditions has proven only marginally effective. Among the suggestions was addition of a wildlife awareness component to driver education courses and perhaps video productions highlighting the dangers.

Tests conducted by the Alaska Railroad to slow its trains while traveling through high impact zones demonstrated that reducing the speeds to effective levels is economically prohibitive. Reducing the train speed from 49 mph to 25 mph did not significantly reduce moose-train collisions (Becker and Grauvogel 1991). Additional research was suggested for a device attached to the front of engines which

cushioned the blow or otherwise diverted moose so collisions would not invariably be fatal. Relocation of the tracks was suggested as a long-term solution, although given the primitive state of Alaska's transportation system it was viewed as an unlikely prospect.

A spirited debate ensued when the issue of moose density was raised. It was suggested that wildlife managers may be setting themselves up for criticism by maintaining high densities of moose (at K-carrying capacity). High moose densities resulted in large die-offs and high moose-auto and -train collisions during severe winters. The premise was that by keeping moose densities low, it was unlikely that significant numbers would be lost during severe winters. There was vehement opposition to the low-density approach by some participants. They argued that it was inappropriate to maintain low densities to protect moose when such severe winters occur on average only about once every 20 years.

A variant of the moose density reduction idea was conducting a special "train hunt" during severe winters. It was suggested that in cooperation with the railroad, a permit hunt could be conducted along the railroad corridor. The recommendation was based on the premise that harvest was a wiser use of the moose resource than moose killed by trains. A major biological concern expressed by some participants centered around compensatory vs. additive mortality. Many participants felt the hunt mortality was additive as hunters would harvest "smart moose" which had learned to live safely along the railroad corridor.

Others argued that many moose found along the corridor during severe winters likely wintered elsewhere during normal winters. Harvest of these moose would represented compensatory mortality because if hunters did not kill these moose, the train likely would. There are, however, no data to support either position. Additional reservations focused on public reaction to such a hunt, although it generally was conceded that wildlife managers do not have a very good feel for public sentiments on such management issues. It was suggested that opinion surveys might be in order to assess public willingness to go along with such special hunts.

It was apparent from the technical sessions, the field trip, and the panel discussion that there was no easy, quick solution to incidental mortality of moose. The most plausible solutions likely will be a combination of the methods discussed. Continued research into more cost-effective programs should benefit humans and moose populations.

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