PROPOSED MOOSE TRANSLOCATION TO NORTHERN NEW YORK

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ABSTRACT: Public interest has prompted the New York State Department of Environmental Conservation (DEC) to consider accelerating the increase of the moose (Alces alces) population in northern New York. The biological feasibility and social acceptability of the project are the key considerations. Increasing the moose population appears to have a reasonable chance of success based on experiences in New England, Michigan and New York. Collisions with vehicles are likely to be the most serious negative consequence of having more moose. The DEC believes that moose numbers should be increased through a translocation program but is soliciting public opinion before making a decision. The size and distribution of the subsequent population will have to be controlled. Restrictions in the population should be based on the desires of the residents of the region and the likelihood of conflicts with human activities. Controls should eventually be affected through recreational hunting.

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The 1980 immigration to northern New York of a small number of moose marked the beginning of this species reoccupation of the State. It is the longest period of occupation since the species was extirpated in the 1860's. The number of moose, currently 15-30, has not noticeably increased in recent years.

Public reactions towards moose in the State, the attitudes of New Hampshire residents (Donnelly *et al.* 1988) and the popularity of the Michigan moose restoration program (E. Langenau Jr., Mich. Dept. Nat. Res., pers. commun.) all suggest that many New Yorkers would enjoy having more moose. Encouraging more moose would also be consistent with the DEC's desire to provide New Yorkers with all the benefits of the States wildlife.

For those reasons, the DEC is considering a trap and transfer program to accelerate the increase in the numbers of moose. The proposal has the following three goals: (1) To provide New Yorkers the opportunity to enjoy all the benefits of having moose. (2) To provide these benefits faster than would otherwise occur. (3) To keep moose numbers within levels acceptable to the affected publics.

The area under consideration for sustaining moose is the 14 northern most counties of the state referred to as Northern New York (NNY). The region is a contiguous block of roughly 47,800 km^2 that includes both the historic range of the species and the area with the lowest likelihood of human conflicts.

NNY is an ecologically diverse region (Will *et al.* 1982). Elevations range from 29 m to 1629 m (Rand McNally and Company 1990). Forests, primarily northern hardwood and spruce/fir (*Pices/Abies* spp.), dominate the central portion and cover 75% of the entire area (Smith 1990). Fifty-four percent of the land is commercial forests and 20% is forest preserve lands on which logging is prohibited (Considine and Frieswyck 1982). Agriculture is most prominent on the margins of the region, especially in the St. Lawrence and Black River valleys. The core of the region is the Adirondack Park, a combination of 60% private and 40% public lands that covers half of NNY.

Roughly 1.2 million people live in the region. Human population densities range from roughly 1.1/km^2 in Hamilton County to about 85/km^2 in Saratoga County (N.Y. State Dept. Econ. Devel. undated).

The DEC will base the decision to translocate moose on both the biological feasibility and social acceptability of the pro-

posal. The primary biological concern that might limit the success of a translocation program is infection of moose by brainworm (*Parelaphostrongylus tenuis*), a roundworm parasite of white-tailed deer (*Odocoileus virginianus*) that can be fatal to infected moose (Anderson 1965).

Severinghaus and Jackson (1970) believed that this parasite would doom any moose stocking in New York. More recent information suggests this may not be the case as deer densities and the prevalence of the parasite in NNY are similar to areas where moose are successful.

Garner (1989) found *P. tenuis* in 61% of NNY white-tailed deer pellet groups. Similar rates were found in Ontario (Bindernagel and Anderson 1972, Garner 1989) and in Nova Scotia (Brown 1983) where moose populations exist. They are also similar in Michigan (Garner 1989) where a recent translocation of moose is succeeding.

Garner (1989) also found that the prevalence of the adult worms in the craniums of NNY deer was 46%. This was lower than rates found in Maine by Behrend and Whitter (1968), Gilbert (1973), and Bogaczyk (1990) of 84%, 72%, and 76% respectively.

Estimates of the minimum deer densities based on legal harvest vary across NNY and range from 1.2 to 6.5 deer per km^2. Estimates of the minimum deer densities for some portions of Maine, New Hampshire and Vermont where moose have increased in recent decades fall within that range (Hicks and McGowan 1990).

We compared deer densities in NNY to those in the area of the Michigan Moose release using an index based on buck take, and yearling male frequency in the harvest. We also used yearling male antler beam diameter to estimate the percent yearlings in the female population (Moen *et al.* 1986). NNY index values for 1990 ranged from 0.8 to 4.8 deer/km^2 as compared to 9.1 deer/km^2 for the Michigan release area at the time of translocation in 1985-87 (Hicks and McGowan 1992). Moose continue to increase in Michigan despite some losses to *P. tenuis* (Aho and Hendrickson 1989).

The only infection of a moose in New York by *P. tenuis* was recorded in 1971. Eight moose have been necropsied since 1980 by the DEC Pathologist without finding evidence of infection (Ward Stone, N.Y. State Dept. Environ. Cons., pers commun.).

Based on this information, DEC staff believe there is a reasonable chance of a moose translocation program succeeding in New York. Therefore social considerations should be the determining factor in the restoration decision.

Unlike other species restored to New York, moose, by virtue of their size, have the potential for creating conflicts with society. Under the requirements of the State Environmental Quality Review Act, the DEC has prepared a Draft Environmental Impact Statement to examine the consequences of releasing moose in NNY (Hicks and McGowan 1992). The Department presented 4 alternatives for moose management in the state: (1) Active elimination of moose if the DEC decides having moose is undesirable. (2) No action beyond current monitoring and problem abatement. (3) Translocate moose and manage the population, allowing the full range of uses of moose and all options for population control. (4) Translocate moose and provide total protection. The last option would not allow hunting or the killing of moose as a means of population control.

The DEC's alternative of choice is to translocate moose and manage the population. Specific details will depend on the Commissioners decision. The draft proposal suggests a 5-year program conducted in 2 stages. In stage one, the DEC would translocate up to 40 moose to determine if moose can survive. DEC staff would monitor these animals and their offspring for 2 years. If successful, the DEC would translocate up to 60

more in year 3. All animals would be monitored until the end of year 5. Informing and educating the public about moose will be a major focus throughout the program.

Based on population parameters in Garner (1989) and the population growth rates in Michigan (Aho and Hendrickson 1989), DEC staff expect roughly 1,300 moose in 20 years after the translocation.

DEC staff held a series of public meetings to identify issues of concern associated with restoring moose. They also sent copies of a news release requesting public input to over 3,000 organizations and individuals. Prominent issues of public concern included the effects of moose on forestry, on agriculture and on white-tailed deer. Aspects of funding and public safety were also major concerns.

We have investigated each of these concerns to determine the likely effects of releasing moose in New York. DEC staff do not anticipate widespread problems at the 20-year (1,300 moose) level with any aspect of society. However, local conflicts might develop sooner. This level would represent less than one third the current combined moose populations of Vermont (Alexander et al. 1992) and New Hampshire (K. Bontaites, N.H. Fish and Game, pers commun.), where the demand for relief from moose related problems has only become an important issue in recent years.

If all 1,300 moose resided in one third of NNY, the average density would be roughly 0.08/km^2. Biologists believe current densities in both Maine (K. Morris, Me. Dept. Inland Fish and Wildl., pers. commun.) and New Hampshire (K. Bontaites, N.H. Dept. Fish and Game, pers. commun.) are considerably higher than 0.08/km^2 over much of the northern halves of those states. Discussions with representatives of the forest products industry in those regions indicate little concern over forest damage by moose.

Studies of moose populations at densities higher than 0.08/km^2 have not suggested forest damage is a problem (Peek *et al.* 1976, Hamilton *et al.* 1980, Crête and Bèdard 1975).

We do not expect moose to create widespread or intolerable problems with agriculture or deer at the 20-year level. DEC staff do expect occasional problems with agriculture in localized areas.

Concerns about threats to human safety involve both physical attacks and vehicle collisions. To determine the risk of injury from moose attacks we contacted 10 parks in the US and Canada that contain moose. We received only one report of human injury for roughly 61 million persons visiting these parks over the years for which data are available.

Our conversations with New England residents, the New Hampshire survey by Donnelly *et al.* (1988), and public meeting comments in Vermont (Alexander *et al.* 1992) all suggest that moose-vehicle collisions represent the greatest single risk associated with increasing moose numbers in New York. Keeping accidents within acceptable levels will likely require the NNY moose population being low enough to preclude most other problems.

To predict the number of future NNY moose-vehicle collisions, we contacted 56 jurisdictions that have moose. These included all North American states, provinces, and major parks as well as European countries. From each we requested moose density, road density, traffic level and moose-vehicle collision records as well as an opinion of the accuracy of the data provided.

We received 190 complete data sets providing all requested information from a single location and year. Although it was the best information available, the quality of data often varied within and between jurisdictions. Contributors often lacked confidence in their estimates of moose densities. A regression analysis indicated the strongest relationship existed between moose collisions/vehicle mile traveled and moose density using data from Maine, New Hampshire and Vermont (r^2=0.836, n=142). Collision data from those

states included only accidents in which the moose was killed.

Applying NNY traffic data suggests about 42 collisions in which the moose is killed (25-142, p=0.05) in year 20 after a translocation. Data from Vermont, New Hampshire and Algonquin Park (n=851) indicate that 0.9% of those collisions will result in a human fatality. This is slightly lower than the 1.1% human fatality rate experienced for all vehicle accidents in NNY during 1988-89 (n=39,704) (N.Y. State Dept. Motor Vehicles undated).

At 42 collisions per year the relative risk of hitting and killing a moose will be minor compared to the current risk of being in a vehicle accident in NNY. The chances of hitting a bicyclist, pedestrian or other vehicle will be 10, 12, and 285 times greater, respectively, than the chances of hitting and killing a moose (N.Y. State Dept. Motor Vehicles undated). Based on 1989 traffic levels the 42 moose-vehicle collision rate will result in 1 human fatality every 2.6 years. During this time, 561 people would die in other motor vehicle accidents in NNY.

DEC staff expect that the public will accept the comparatively low risks associated with the infrequency of moose-vehicle collisions at the 20-year (1,300 moose) population level. Staff also expect that the public will want the number of moose-vehicle accidents to stay within levels acceptable to them.

The DEC does not want the people of NNY to bear unfair and unnecessary costs for all New Yorkers to have moose. As part of the restoration process, the DEC proposes to keep all conflicts with moose within limits tolerable to the people in the affected region. Although DEC staff do not expect widespread conflicts, localized problems will undoubtedly occur. When the population is low and the number of conflicts few, the DEC proposes to deal with them on a case by case basis. This could include moving or destroying the offending animal. When the population increases and conflicts become widespread the DEC will need to implement widespread population control.

The DEC does not want moose where they would clearly be in conflict with human activities. Therefore, the Department proposes three management zones: a core, buffer, and exclusion zone based on the likelihood of conflict. Within the core the DEC would encourage moose to the extent tolerated by the residents and the carrying capacity of the land. In the buffer it would manage the population to keep problems comfortably below the public tolerance threshold and to discourage moose from occupying the exclusion zone. Acceptable densities would vary in both zones based on local conditions and the desires of the residents.

The remainder of the state outside of the buffer would be the exclusion zone. In it, the DEC would prevent moose from becoming established because of the high probability of conflict.

The proposed boundary between the buffer and exclusion zones includes large areas of high human population densities and major highways with traffic volumes exceeding 8,000 vehicles per day.

The DEC considers regulated recreational hunting to be the most practical and cost effective method to control moose numbers and distribution. With about 655,000 big game hunters in New York, DEC has the means of implementing control in areas likely to need control. Although population control, including the hunting option, is a necessary component of the plan, DEC does not have the authority to conduct moose hunting. Department staff believe it would be irresponsible to release moose without some assurance that it will have all options available to provide relief from future problems. Therefore, the DEC proposes having the legal authority to hunt moose as a necessary element of any translocation program.

If undertaken, the DEC proposes to fund the moose translocation through public con-

tributions to an independent corporation. The corporation would be a means of receiving contributions and paying for the project. There are advantages to using public contributions: (1) There is no impact on existing programs. (2) There is no need for tax money. (3) The public is not obligated to contribute. (4) It reflects public interest in the project. Broad public support for the proposal will result in the funds necessary for a translocation. If support is lacking DEC will not release moose.

This draft proposal will be released for public review during the summer of 1992. Following public hearings and comment period a final EIS will be prepared. The DEC's Commissioner will then decide the future direction of moose management in New York State.

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