THE NEW BRUNSWICK MOOSE MODEL

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The following is a summary of the presentation given at the workshop session on the New Brunswick moose model.

To explore the role of hunting in population dynamics, a deterministic simulation model was built to mimic a real moose population in a 2400 km^2 area of southeastern New Brunswick. The deterministic model tracks a population of moose through an annual biological cycle over a 25 year period. The model assumes that natality and mortality factors operate independently of spatial variability in habitat quality both within the study area and over the 25 year period. In each simulation run, average habitat "quality" is expected to stay the same as present habitat disturbance patterns continue.

While the form of relationships linking reproductive performance and mortality to carrying capacity, sex ratio, range quality, and winter severity are known qualitatively, they are not well quantified in the literature. Data from moose population statistics in southeastern New Brunswick were used to initialize the model's variables of density, composition, productivity, mortality, and carrying capacity among others. In each iteration the model compares present moose density to the ecological carrying capacity (K) set in the initialization phase. The percentage difference is

stored in an array holding a moving four year history. A starting population of moose on 1 January of year 1 was estimated from aerial surveys in the study area in February of 1984 and 1985.

Harvest rate and composition are input variables and so any combination of rate and target cohorts can be tested. Since present exploitation is heavily biased towards adult males affecting adult sex ratio, the temporal juxtaposition of a hunting season and the peak of breeding is of consequence. Three options which vary hunting and poaching losses with respect to breeding times were included in the model. Graphs depicting response surfaces of six selected parameters (total population, total harvest, recruitment, number of calves, number of adult cows, and exponential rate of increase) to changing harvest rate and proportion antlered males in harvest were grouped into nomograms.

Harvest rates above 0.07, if no antlered males were shot, and 0.095, if only antlered males were shot, initiated a negative exponential rate of population change (r). Maximum sustained yield (MSY) is estimated to occur at 0.4 moose /km^2. Hunting after the rutting period allowed a harvest rate 10% higher than before or during the rut. At harvest rates below 0.05, time of harvest relative to the rut was inconsequential. There was little benefit in distorting harvest sex ratio above 60% antlered males (although maximum harvest occurred at 85-90%). Moose populations in southeastern New Brunswick appear to be

driven by natural mortality factors and/or poaching of the adult conort. Ultimately a selected harvest strategy will be tested in the field on the real moose population to test our ability to predict consequences of management interventions.