Briefing Note:
Evaluation of Alternative Moose Harvest Strategies in Game Management Zone 5B; East Cariboo

Summary:

In 2010 the Ministry of Natural Resource Operations, now the Ministry of Forests, Lands and Natural Resource Operations, committed to an evaluation of alternative harvest strategies for moose in the east Cariboo area, Game Management Zone 5B (GMZ 5B), for the 2012-2016 allocation period. The alternative harvest strategies included examples from other regions within the province, suggestions from stakeholders, and several novel harvest strategies. Alternative harvest strategies were evaluated using a population model to determine the likely outcomes of implementing each strategy. The modelling results will be brought to stakeholders in a structured decision making process to determine a suitable harvest strategy for GMZ 5B.

GMZ 5B Moose Population Assessment:

A Stratified Random Block (SRB) survey was conducted in the winter of 2011 in MU 5-02C to update the current status of the GMZ 5B moose population. The survey estimated a moose population of 1619 moose in MU 5-02C, down 16.7% from the 2001 SRB survey estimate of 1943. The GMZ 5B moose population estimate for 2011 is 6265 down 6.9% from the 2008 population estimate of 6727. Hunter harvest data from 2001-2009 supports the declining population estimate. Average hunter success in GMZ 5B has declined from approx. 50% in the early 2000s to under 30% in the late 2000s. Average hunter days/kill has increased from under 15 days/kill in the early 2000s to over 25 days/kill in the late 2000s.

Alternative Harvest Strategies and Estimated Harvest:

A total of 11 alternative harvest strategies were chosen to be evaluated, they included the "status quo" bull only LEH model, the full Omineca model, LEH Bulls and open spike fork season model, as well as several other combinations of seasons (see below for full list of alternative harvest strategies evaluated). The likely moose harvest under each alternative harvest strategy was estimated using the best data available including spike-fork harvest data from Region 3, calf harvest data from Region 7, and historic harvest and effort data from Region 5. Updated First Nations needs estimates were made for each of the bands in the Region and First Nations Harvest is included in the modelling.

Population Modelling and Evaluation of Alternative Harvest Strategies:

A stage structured stochastic model was used to forecast the moose population through the 2012-2016 allocation period. Monte Carlo analysis was used to assess the probability, under each alternative harvest strategy, that key moose population performance targets would not be met in 2016. The key performance targets included: a) bull/cow ratio above 30 bulls/100 cows, b) moose density above 40 moose/100km^2, and c) moose population size in 2016 that is at least 80% of the 2011 population size. The average expected growth rate (λ) was also evaluated. A separate model run was conducted for each tested alternative harvest strategy. The Monte Carlo procedure ran 10,000 iterations of the stochastic population model. The procedure counted the number of times that the outcome values were less than the threshold values thereby calculating the probability that the population objective would not be met. A consequence table was constructed to summarise the Monte Carlo analysis and portray the tradeoffs between alternative harvest strategies and the associated risks of not meeting population objectives.

Modelling Results:

Table 1 lists the estimated annual total moose harvest under each alternative harvest strategy, the probability of not meeting three moose population performance targets in 2016, and the expected average yearly growth rate (λ). As an example, alternative harvest strategy 1 (status quo) has an expected annual total moose harvest of 640 animals. The modelling estimates that the Status Quo harvest strategy has a 51% probability of having less than 30 bulls per 100 cows in 2016, a 62% probability that the moose density will be less than 40 moose per 100 km^2 in 2016, and a 41% probability that the 2016 moose population will be less than 80% of the starting 2012 moose population. The status quo moose harvest strategy has an expected average growth rate (λ) of 0.959. λ is a measure of the annual rate of change for a population. If λ is less than 1 the population is declining, if λ is greater than 1 the population is increasing.

Because the population model is fitting a decreasing moose population, very few alternative harvest strategies are forecasted to have a positive growth rate (λ>1.0). The exact percentages produced from the modelling exercise should not be taken as definite probabilities of not achieving a particular population target. Instead, the calculated percentages should be used as a relative evaluation of the risks associated with each alternative harvest strategy.

Table 1: Consequence Table; expected average growth rate and probabilities of not meeting moose population targets under alternative harvest strategies in GMZ 5B

Harvest Strategy	Description	Total Annual Moose Harvest (Res+NR+FN)	Probability Bull/Cow <30/100	Probability Density <40/100km^2	Probability Final Pop <80% of Starting Pop	Expected Average Annual Growth Rate (lambda)
1. Status Quo	Maintain LEH bull moose only. Typically 4 authorization time periods: Sept 10-30, Oct 1-14, Oct 15-31, Nov1-15.	640	51.4%	62.0%	41%	0.959
2. Status Quo plus 10%	" " " "	684	63.7%	64.9%	47%	0.950
3. Status Quo plus 20%	" " " "	728	72.8%	67.9%	52.8%	0.944
4. Status Quo minus 10%	" " " "	596	38.5%	59.1%	35.3%	0.967
5. Status Quo minus 20%	" " " "	552	27.0%	56.4%	29.3%	0.975
6. Full Omineca Model	Reduce LEH Bull authorizations. Add open spike-fork season **Sept 10-Nov 5** Add open calves from **Oct 10- Oct 25** Add LEH antlerless **Oct 10-Oct 25**	1045	66.5%	85.9%	87.9%	0.843
7. Omineca Model minus LEH antlerless harvest	Reduce LEH Bull authorizations. Add open spike-fork season **Sept 10-Nov 5** Add open calves from **Oct 10- Oct 25**	940	70.6%	80.4%	78.6%	0.887
8. LEH Bulls plus pre-rut open Spike-fork	Reduce LEH Bull authorizations. Add open spike-fork season **Sept 10-Oct 14**	640	52.3%	63.6%	42.7%	0.957
9. LEH Bulls plus post-rut open Spike-fork	Reduce LEH Bull authorizations. Add open spike-fork season **Oct 15-Nov 15**	640	50.9%	61.7%	40.8%	0.959
10. Spike-fork open season only	Eliminate LEH bull authorizations, add open spike-fork season **Sept 10 – Nov 15**	400	2.1%	45.5%	11.7%	1.004
11. Spike-fork open season and calf open season only	Eliminate LEH bull authorizations, add open spike-fork season **Sept 10-Nov 15** Add open calf season **Oct 10-Oct 25**	600	9.5%	68.3%	52.7%	0.938
Test: No R/NR Harvest	Test: no resident or non-resident harvest	200	0%	28.8%	1.4%	1.040