DG-Sim: A software framework for developing demographic models of caribou populations

Presented at the 15th North American Caribou Workshop in Whitehorse, YT, May 12-16 2014

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Abstract: DG-Sim is a new software framework suitable for developing demographic simulation models of caribou (*Rangifer tarandus caribou*) populations. The software allows users to simulate population numbers, age structure and sex ratios forward in time under alternative "what-if" scenarios; the framework is general enough that it can easily be configured for any caribou population. Model inputs include initial population size, age structure, sex ratio, recruitment rates, mortality rates, harvest rates and, for retrospective analyses, past population census data. DG-Sim uses a Monte Carlo simulation approach whereby input parameters are optionally sampled stochastically from user-defined probability distributions. Model results include confidence estimates for population projections based on the uncertainty in input parameters and the degree of agreement of future projections with past census data. DG-Sim is a desktop application available for free download; it includes a straight-forward user interface with a simple graphical presentation of results and the ability to import and export model inputs and results from and to Excel. In this presentation we demonstrate the use of DG-Sim as it has been configured for the Finlayson herd of Northern Mountain ecotype of woodland caribou in the Yukon. As part of this case study we show how in combination with census data DG-Sim can be used to refine estimates of demographic parameters that have low certainty.