Population Dynamics and Harvest Potential of Mountain Goat Herds in Alberta

SANDRA HAMEL,[1] Département de Bbiologie, Université Laval, Sainte-Foy, QC G1K 7P4, Canada
STEEVE D. CÔTÈ, Département de Biologie, Université Laval, Sainte-Foy, QC G1K 7P4, Canada
KIRBY G. SMITH, Alberta Fish and Wildlife Division, 111 - 54 St., Edson, AB T7E 1T2, Canada
MARCO FESTA-BIANCHET, Département de Biologie, Université de Sherbrooke, Sherbrooke, QC J1K 2R1, Canada

Abstract: Understanding population dynamics is a central issue for managing large mammals. Modelling allows population ecologists to increase knowledge about complex systems and better predict population responses to diverse perturbations. Mountain goats (*Oreamnos americanus*) appear sensitive to harvest, but the relative influences of survival and reproductive rates on their population dynamics are not well understood. Using longitudinal data on age- and sex-specific survival and reproduction from a marked mountain goat population in Alberta, we built a stage-class matrix model and used it to predict short-term numerical changes for 11 other goat populations in Alberta for which only data from aerial surveys were available. Overall, the model provided an acceptable fit to changes in population size for 8 of 12 populations. Temporal trends in population size were underestimated in 2 populations and overestimated in another 2, suggesting that these populations had different vital rates than those of the intensively studied population. Sensitivity analyses revealed that survival of mature females (5 yr and older) had the greatest elasticity for population growth. Modelled management scenarios indicated that non-selective yearly harvest rates above 1% of goats aged 2 yr and older were not sustainable over the short-term for most populations. The simulations also revealed that small (n = 25) and medium-size (n = 50) populations, which correspond to the majority of goat populations in Alberta, had high extinction risk (18 to 82% over 40 yr) even in the absence of harvest. Our results confirm that mountain goat populations are very sensitive to harvest, indicate that female harvest should be prevented, and suggest that even though there is a high demand for goat hunting in Alberta, most populations in this province, and probably small populations elsewhere, cannot withstand any exploitation.

BIENN. SYMP. NORTH. WILD SHEEP AND GOAT COUNC. 15: 2006

Key words: Alberta, management, mountain goat, *Oreamnos americanus*, population dynamics.

[1] *E-mail: Sandra.Hamel@bio.ulaval.ca*