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Distance- versus patch-based movements of woodland caribou during spring dispersion in northern Quebec

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Habitat selection studies are widespread in the scientific literature on woodland caribou (*Rangifer tarandus caribou*). Knowledge of habitat selection informs our understanding of caribou biology and life history requirements. Recent innovations in GPS telemetry have allowed us to track animal locations over space and time with remarkable accuracy, greatly enhancing our understanding of space use patterns and allowing us to more closely examine the role of scale and landscape heterogeneity in movements of woodland caribou. In conjunction, new spatial statistics and mechanistic approaches to resource selection analysis serve to reduce error in model selection and explain how landscape covariates influence caribou behaviour. With a view to maximizing functional connectivity between winter and summer ranges in managed landscapes of Northern Quebec, we first distinguished between biologically relevant seasonal phases in caribou movement by modeling distance moved over time using polynomial regression (Ferguson & Elkie, 2004a), identifying seasonal cut-off periods where the second derivative equals zero. We were interested in understanding how caribou perceive and respond to the heterogeneous landscape so we first tested for the presence of scalar activity in caribou movements. For each study animal (n=25) we fit a broken stick model to the ln frequency of movement rates recorded during spring dispersion, where appropriate establishing a unique rate criterion (r_c) per animal (Johnson *et al.*, 2002a) in order to differentiate between intrapatch and interpatch movements. Intrapatch movements are thought to represent foraging or resting phases whereas interpatch movements are associated with distance-based migratory activity; therefore we treated the two processes differently. We used kernel density estimates (plug-in method) for all points associated with patch-based movements during spring dispersion to define use-intensity levels for resource patches. Polytomous logistic regression was used to model patch resource selection by woodland caribou (Rittenhouse *et al.*, 2008). In contrast, conditional logistic regression was used to model interpatch (i.e. distance-based) movements and a Step Selection Function (SSF) was built describing where a given animal was most likely to be found from one relocation to the next (Fortin *et al.*, 2005b). Candidate models included covariates for road density, distance to forest cutovers, recent burns, terrestrial lichen abundance, coniferous forest, open wetlands, and distance to waterways. Results will be presented and application of models to connectivity analyses will be discussed.