Integrating movement cost with a spatial-graph based approach to assessing the landscape connectivity of Woodland Caribou Habitat

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Woodland caribou (*Rangifer tarandus caribou)* is a subspecies endemic to Canada, and is currently designated as threatened by the Committee on the Status of Endangered Wildlife in Canada. Conservation of remaining woodland caribou populations requires land management strategies that not only maintain caribou habitat, but also favor connectivity of critical habitat patches in order to facilitate movement within the habitat mosaic. To analyze Woodland Caribou habitat connectivity at the landscape level, we integrated movement cost into a multi-scale graph approach. The movement cost surface was derived from a resource selection function and was used to identify least-cost paths representing functional links between resource patches. We found a strong relationship between distributions of GPS telemetry points for two herds in Manitoba, Canada and the structural connectivity of the landscape. Not only were caribou more closely associated with high quality habitat patches, there was also a strong relationship between the distribution of caribou and highly connected clusters of patches. This relationship was further strengthened when the cost surface was used to define linkages between patches. Our results indicate a strong link between distribution of caribou and the structural connectivity of the landscape, and provide support for the use of these methods for assisting in defining the spatial characteristics of woodland caribou habitat, including critical habitat patches, movement corridors and cores areas, based on their contribution to connectivity at various scales.