Evaluating Density-Weighted Connectivity of Black Bears in Glacier National Park with Spatial Capture-Recapture Models

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Recent spatial-capture recapture (SCR) models provide a framework to formally connect inference about individual movement, connectivity, and population density, but few studies have applied this approach to empirical data to support connectivity planning. We used 924 genetic detections of 598 American black bears (*Ursus americanus*) from 2004 with SCR ecological distance models to simultaneously estimate density, landscape resistance to movement, and population connectivity in Glacier National Park northwest Montana, USA. The mean density estimate was 16.08 bears/100 km2 (95% CI = 12.52 – 20.6) for females and 9.27 bears/100 km2 (95% CI = 7.70 – 11.14) for males. Density increased with forest cover for both sexes. For male black bears, density decreased at higher grizzly bear (Ursus arctos) densities. Drainages, valley bottoms, and riparian vegetation decreased landscape resistance to movement for male and female bears. For males, forest cover also decreased estimated resistance to movement, but the US2 transportation corridor bisecting the study area strongly increased resistance to movement presenting a barrier to connectivity. Density-weighed connectivity surfaces highlighted areas important for population connectivity that were distinct from areas with high potential connectivity. For black bears in Glacier and surrounding landscapes, consideration of both vegetation and valley topography could inform the placement of underpasses along the transportation corridor in areas characterized by both high population density and potential connectivity. Our study demonstrates that the SCR ecological distance model can provide biologically realistic, spatially explicit predictions to support connectivity planning across large landscapes.