

Abstract:

The abundance of low-density species like carnivores is logistically difficult to directly estimate at a meaningful scale. Predictive distribution models are often used as a surrogate for density estimation. But because density can continue to increase as occupancy asymptotes at 1, occupancy may have little value as an index, and home range expansion in marginal habitat may further confound the association. We sought to estimate bobcat population size at a landscape scale (14,286 km²) in central Wisconsin, which provided an opportunity to relate predicted occurrence to individual space use and population density. We sampled bobcats using motion-sensitive trail cameras at 9 arrays across central Wisconsin. We estimated bobcat site specific occupancy, and regressed these estimates as linear or asymptotic functions of site-specific density to determine the strength and shape of their association. We subsequently modeled both parameters relative to habitat covariates and repeated the regression process. A linear functional relationship between density and occupancy was most supported when detection parameters were held constant ($w_i=0.97$, $R^2=0.72$) and when detection, occurrence, and density were modeled as a function of habitat covariates ($w_i=0.99$, $R^2=0.95$). This suggests that repeated presence-absence data alone may be an efficient and reliable method for inferring spatial patterns in bobcat density or identifying habitat types with greater density potential in the northern parts of its range. Bobcat occupancy and density were both positively associated with surrounding woody cover and wetland edge density. Our most supported spatially explicit capture-recapture model estimated bobcat abundance as 362 adult individuals (95% CI 272–490) across the study area.

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