
SPATIAL SEARCH AND EFFICIENCY RATES AS COMPONENTS OF WOLF PREDATION RISK

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Anthropogenic linear features are hypothesized to increase wolf (*Canis lupus*) predation risk for a threatened ungulate, woodland caribou (*Rangifer tarandus caribou*). Previous research has shown that these features are selected by wolves while searching for prey, but their effect on the net efficiency of predation, measured in kills per day, has not been addressed. We use resource selection and proportional hazards modeling to assess the spatial drivers of both search and efficiency rates of wolf predation in a multi-prey system. Topographic variation consistently affected wolf search rates and the predation efficiency of wolves while searching. However, the effects of anthropogenic footprint upon the total predation risk imposed by wolves were mediated solely by changes to wolf search rate; wolf predation efficiency generally did not change with proximity to anthropogenic linear features as previously hypothesized. Predicted models of the cumulative hazard encountered by wolves validated well with among-pack variation in kill rates, suggesting that spatial hazard models allow the scaling up of local heterogeneity to population-level dynamics. Lastly, we estimated an integrated spatial model of relative predation risk as the product of both search and efficiency rates, which captured the distinct contributions of spatial heterogeneity to each component of risk.