

A WINTER ENERGETICS MODEL FOR BOBCATS IN A DEEP SNOW ENVIRONMENT

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Understanding basic energetic requirements of wildlife species is critical to evaluate how individuals persist in their current environments as well as to forecast responses to changed climates or habitats. Indeed, northern range limits are often thought to reflect harsh abiotic conditions that exceed the capacity of individuals to stay in energetic balance. Bobcats (*Lynx rufus*) occur across much of North America; at northern latitudes, they face winter challenges such as deep snows, cold temperatures, and possible food scarcity. We developed an energetics model from field data on movements, body mass, and observed diet of bobcats in mountains of northwest Montana, then evaluated overwinter prey requirements that would enable bobcats to stay in energy balance in this difficult environment. Our model indicated average daily energy expenditures were $\sim 1.41 \times$ basal metabolic rate. For 90 days from December-February, a 10.5 kg bobcat consuming prey items in proportion with the observed diet for bobcats in this area would need about 2.1 kg of deer (*Odocoileus* spp.), 7 snowshoe hares (*Lepus americanus*), 155 red squirrels (*Tamiasciurus hudsonicus*), 9 woodrats (*Neotoma cinerea*), and 250 small rodents (Cricetidae). Bobcats have considerable flexibility in diet, movements, and both timing and duration of daily activity to adjust their energetic expenditures in winter.