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SYNTHESIS OF SURVIVAL RATES AND CAUSES OF MORTALITY IN NORTH AMERICAN WOLVERINES

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Understanding population vital rates is fundamental to the evaluation of conservation options for wolverines (*Gulo gulo*). We estimated survival rates and causes of wolverine mortality in trapped and untrapped populations within montane, boreal, and tundra environments using data from 12 North American radiotelemetry studies conducted between 1972 and 2001. Rates were based on data for 62 mortalities of 239 radiomarked wolverines. Mortalities included 22 wolverines that were trapped or hunted, 3 road or rail killed, 11 that were predated, 18 that starved, and 8 deaths of unknown cause. Annual survivorship rates were estimated for sex and age class using Kaplan-Meier staggered-entry techniques. Survival was substantially lower in trapped (<0.75 for all age–sex classes) than in untrapped (>0.84 for all age–sex classes) populations. Human-caused mortality was mostly additive to natural mortality for wolverines in a management context. Logistic growth rate estimates indicated that trapped populations would decline ($\lambda \cong 0.88$) in the absence of immigration from untrapped populations ($\lambda \cong 1.06$). We recommend a system of spatial harvest controls in northern, continuous populations of wolverines and reduction of harvest along with more spatially explicit conservation measures in southern metapopulations.

Keywords: *Gulo gulo*, harvest management, mortality sources, North America, refugia, survival rates,