

Snowshoe Hare Abundance Affects Survival of Dall's Sheep Lambs in Alaska

STEPHEN M. ARTHUR, Alaska Department of Fish and Game, 1300 College Road, Fairbanks, AK 99701, USA

LAURA R. PRUGH, Department of Environmental Science, Policy and Management, 137 Mulford Hall, University of California, Berkeley, CA 94720, USA

Abstract: We estimated annual survival of Dall's sheep (*Ovis dalli*) lambs in the central Alaska Range during the peak and subsequent decline of a cyclic snowshoe hare (*Lepus americanus*) population to test whether changes in abundance of hares affect Dall's sheep either negatively by subsidizing predators (apparent competition), or positively by diverting predation (apparent commensalism). The main predators of lambs were coyotes (*Canis latrans*) and golden eagles (*Aquila chrysaetos*), which rely on hares as their primary food but utilize lambs as an alternate prey. These predators were implicated in 78% of 65 deaths of radiocollared lambs for which cause of death was identified. Annual survival of lambs ranged from 0.15–0.63, and lamb survival was negatively related to hare abundance during the previous year, supporting the hypothesis of predator-mediated apparent competition between hares and sheep. However, because coyote and eagle predation affected lambs but not adult sheep, we observed a positive relationship between abundance of adult sheep and hares. Thus, support for different indirect effects can be obtained from differing types of data, demonstrating the need to determine the mechanisms that create indirect interactions. Long-term survey data suggest that predation by coyotes is limiting this sheep population below levels typical when coyotes were rare or absent. However, periods of reduced predation during years of low hare abundance appear sufficient to prevent a continuing decline in sheep abundance.

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Email: steve.arthur@alaska.gov