

# DEMOGRAPHY OF SNOWSHOE HARE CYCLES IN CANADA'S BOREAL FOREST

Madan K. Oli , Charles J. Krebs, Alice J. Kenney, Rudy Boonstra, Stan Boutin, and James E. Hines

## Study Description

For 45 yr in the undisturbed ecosystem of the Kluane boreal forest (Yukon, Canada) we have carried out mark–recapture studies on snowshoe hares in spring and fall to determine the mechanisms behind their classic 9–10-yr population cycles. Experimental manipulations of food, predators, and stress have shown that predation is the dominant mechanism behind these cycles, and that predators reduce hare reproduction by chronic stress associated with predator chases. Our attention has now turned to behavioral ecology of predator–predator and predator–hare interactions and the physiology and neurobiology of stress in female hares in a boreal forest affected by rapid climate change.

Oli, M. K., C. J. Krebs, A. J. Kenney, R. Boonstra, S. Boutin, and J. E. Hines. 2020. Demography of Snowshoe Hare Cycles in Canada's Boreal Forest. *Bull Ecol Soc Am* 101(2):e01678. <https://doi.org/10.1002/bes2.1678>



Photo 1. Coyote (*Canis latrans*). Coyotes are one of the major predators of snowshoe hares in the Yukon boreal forest. They have been spreading north in the Yukon since 1924, where they now interact with grey wolves and red foxes, as well as Canada lynx and wolverines. They have small feet and cannot cope well with deep snow, so climate change assists their northern expansion. Photo credit: Alice J. Kenney.



Photo 2. Canada lynx (*Lynx canadensis*). Lynx are the classic major predator of snowshoe hares because they are well adapted to cold and their large feet are effective snowshoes. They are territorial, but stop breeding when hares become scarce, and many then go walkabout for 800–1,000 km, looking for greener pastures (despite the large-scale synchrony of the snowshoe hare cycle). Photo credit: Alice J. Kenney.



Photo 3. Snowshoe hare (*Lepus americanus*). Snowshoe hares are aptly named for their ability to walk on snow easily. They are a major prey for many of the predators in the boreal forest. They can have four litters each summer, with 18 young in total, but their reproductive rate falls precipitously once they reach high density. Photo credit: Alice J. Kenney.



Photo 4. Radio-collared snowshoe hare: Radio collars are a critical technology for determining movements and causes of mortality in hares in summer and winter. GPS collars can provide detailed data on exact movements and locations in relation to foraging predators. Photo credit: Yasmine Majchrzak.



Photo 5. Summer snowshoe hare: Hares turn brown in summer and much interest centers on how changing climate will impact the timing of moult and thus the possible exposure to visual predators. Hares do not burrow but live above ground at all time. Photo credit: Alice J. Kenney.

These photographs illustrate the article “Demography of snowshoe hare population cycles” by Oli, Madan K., Krebs, Charles J., Kenney, Alice J., Boonstra, Rudy, Boutin, Stan, and Hines, James E. published in *Ecology*. <https://doi.org/10.1002/ecy.2969>.