

# Evolutionary clock ticks for snowshoe hares facing climate change

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White snowshoe hares stand out like "light bulbs" against a snowless background in Montana. The mismatched hares were part of study of climate change effects on snowshoe hares, which camouflage themselves by changing coat colors from brown to white in winter. Credit: L. Scott Mills

Snowshoe hares that camouflage themselves by changing their coats from brown in summer to white in winter face serious threats from climate change, and it's uncertain whether hare populations will be able to adapt in time, according to a North Carolina State University study.

Based on field research with radio-collared snowshoe [hares](#) in Montana, mismatched snowshoe hares suffer a 7 percent drop in their weekly survival rate when snow comes late or leaves early and white hares stand out to predators like "light bulbs" against their snowless backgrounds.

"This is one of the most direct demonstrations of mortality costs for a wild species facing [climate change](#)," says L. Scott Mills, professor at NC State's College of Natural Resources and study co-author. "In previous research we showed that climate change is causing snow duration to decrease, and that hares have little ability to adjust their molt timing or behaviors to compensate for the mismatch. Here we take the next step of showing that mismatch does indeed kill."

"This paper shows that the mismatch costs are severe enough to cause hare populations to steeply decline in the future unless they can adapt to the change," says Marketa Zimova, lead author of the journal article in *Ecology Letters* and doctoral student with Mills at NC State.





A mismatched snowshoe hare used in a study of climate change effects. Credit: L. Scott Mills

The good news for snowshoe hares is the finding that different individuals molt at different times, enabling natural selection to favor those better suited for the changing snow conditions. However, whether evolution through natural selection can save hares quickly enough is uncertain, especially given the rapid rate of change.

"Ultimately, to promote species persistence in the face of climate change induced mismatch, the reduction of its cause is essential and must be done via [climate change mitigation](#)," Zimova says. "But in the meantime,

we should maintain large and connected populations to foster evolutionary rescue and its ability to allow wild animals to adapt to the changing conditions."

Camouflage mismatch has the potential to impact at least 14 species worldwide that change coat colors seasonally, Mills says. His team of researchers is expanding the coat color research to other species globally, including mountain hares, white-tailed jackrabbits, weasels and arctic foxes.

**More information:** "High Fitness Costs of Climate Change Induced Camouflage Mismatch" *Ecology Letters*, Jan. 22, 2016.

Provided by North Carolina State University

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