

Snowshoe Hare and Their Population Cycles

Carol McIntyre, Denali National Park and Preserve, 2001

Many species of northern animals depend heavily on snowshoe hares as prey. These include lynx, northern goshawks, and great horned owls. Other species including red fox, coyotes, red-tailed hawks, northern hawk owls, golden eagles, and marten also prey on snowshoe hares. In Denali, snowshoe hares are one of the important prey sources for golden eagles in late winter and early spring.

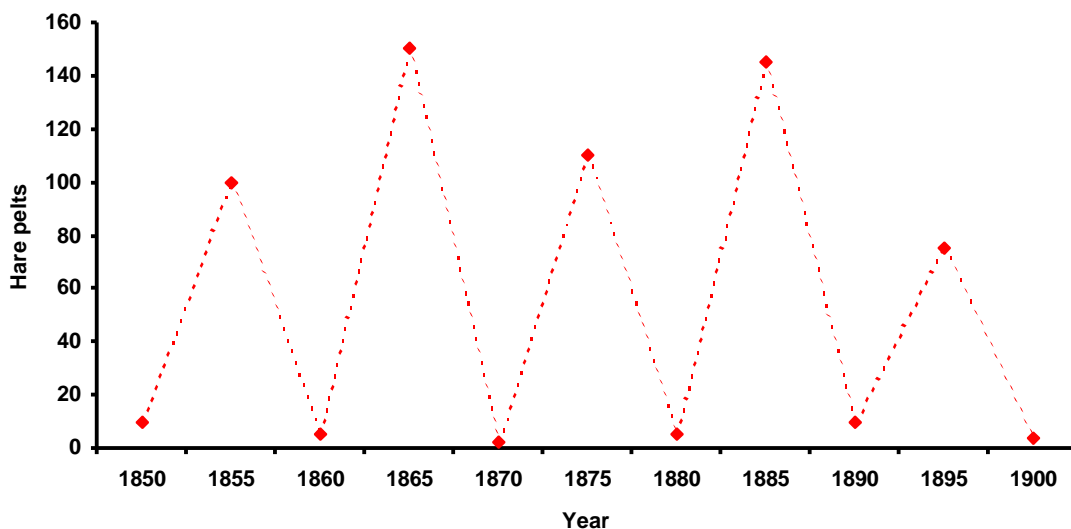
What is a “Population Cycle”?

Populations of all organisms change over time. Some of these changes occur on a schedule (they are predictable) and repeat themselves over and over again. These population changes are known as cycles.

The Snowshoe Hare Cycle

The snowshoe hare is one of the northern mammals that go through periodic cycles of changes in their populations. Over a period of years, their population will increase in numbers and then suddenly crash to very low numbers, only to rise again. Snowshoe hare tend to cycle about once every ten years. The snowshoe hare cycle is one of the best known and fur trappers and traders working in northern Canada first described it. In 1865, traders with the Hudson's Bay Company were flooded by hare pelts brought in by trappers. But, by 1870, only a few hare pelts trickled in. This pattern of high and low abundance of hare pelts repeated itself over and over, roughly every ten years.

Hudson's Bay Trading Company, Hare Pelt Purchase Records, 1850 to 1990



Snowshoe hares are a dominant herbivore in northern forest ecosystems. In Alaska and western Canada, their populations cycle over 8 to 11 years. The difference in densities and abundance during the cycle are extreme. Densities as high as 4,000 hares per square kilometer (or 10,000 hares per square mile) have been estimated at the peak (or high point) of the cycle. These populations can "crash" to densities of less than one hare per square kilometer (or 2.6 hares per square mile) within a period of one year. The populations slowly increase to peak densities over the next 6 to 13 years. The densities during peak years, however, are not always the same.

What Causes the Snowshoe Hare Cycle

Just what is it that drives the snowshoe hare cycle? This question has puzzled people living in northern areas and scientists for many years. On a broad scale, it may be the 22-year sunspot cycle and its effects on boreal forest weather patterns or forest fires. On a smaller scale, the cycles may be affected by over browsing the food supply, predators, shock disease due to stress, parasites, or a combination of these.

The primary theory pertaining to the snowshoe hare population cycle describes the mechanics as a combination of predators and browse (food) availability. During the peak of their cycle, hares eat a large proportion of the shrubs available in their area. They can also kill many of the shrubs in their area by chewing through the outer layer of bark. Over-browsing of shrubs results in a food-shortage that causes malnourishment, starvation, and reduced reproduction. This leads to the start of the population crash or decline. Also, as food supplies decrease, the health of hares declines and makes many individuals more vulnerable to predators and disease. In the western Yukon, scientists believe that the hare cycle is caused by changes in food supply and predation. The declines and increases in the population of hares were influenced by the reproductive rates of adult hares and the survival rates of all ages of hares.

Resources:

For upper level students (junior and seniors in high school):

Web Sites:

Snowshoe hare research at the University of Alaska:
http://mercury.bio.uaf.edu/~bjorn_flora/hareweb/harecycle.html

Population cycles in Mammals: <http://two.ucdavis.edu/~aking/mam99/>

Yukon Department of Renewable Resources: Yukon Mammals
<http://www.renres.gov.yk.ca/wildlife/snhare.html>

Books:

Banfield, A. W. F. 1974. The mammals of Canada. Toronto: University of Toronto Press. 438 p

Keith, L. 1963. Wildlife's ten-year cycle. University of Wisconsin Press, Madison.

Keith, L. 1990. Dynamics of snowshoe hare populations. 119-195 in H.H. Genoways, editor. *Current Mammalogy*. Plenum Press, New York.

Charles J. Krebs, Stan Boutin, and Rudy Boonstra, Editors. 2001. *ECOSYSTEM DYNAMICS OF THE BOREAL FOREST: THE KLUANE PROJECT*. Oxford University Press.

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