Harvest and density-dependent predation drive long term moose population decline

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Abstract

The relative effect of top-down versus bottom-up forces in regulating and limiting ungulate populations is an important theme in ecology. Untangling these effects is important for basic understanding of trophic dynamics and is critical for effective management. We integrated two independent sources of observations to compare the drivers of moose abundance across 55 replicated populations. Across populations, moose declined by nearly 20% over 20 years. At high density, moose were regulated by intraspecific competition. Predation primarily limited population growth, except at low density, where it was regulating. Harvest was largely additive and potentially contributed to population decline. Our results provide strong evidence for density dependent predation, highlighting that population dynamics are context dependent and vary strongly across gradients in climate, forest type and predator abundance. Consequently, management of moose would be optimized by taking different strategies across populations in accordance with their population trajectories and abundance of predators.

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