



Jacobson, A.R., Provenzale, A., von Hardenberg A., Bassano B. and M. Festa-Bianchet. (2004). Climate forcing and density dependence in a mountain ungulate population. *Ecology*, 85(6): 1598-1610.

Population models in ecology are rarely validated by comparing their predictions to long-term observations of changes in population size. We have used a variety of analytical tools to examine a 45-year time series of annual censuses of Alpine ibex (*Capra ibex*) in the Gran Paradiso National Park in northwestern Italy. This ibex population grew from about 3300 to almost 5000 individuals in the 1980s during a decade of anomalously mild winters, and then began to decline in the 1990s. By 1997, the population size had returned to previous levels. Adult survival apparently increased and adult sex ratio may have changed to slightly favor males during the increase in population density. Yearly changes in total population were correlated with seasonal average snow depth and population density over the 39 years for which climate data were available. Our results show that the ibex population size was limited by both density dependence and deep snow. A model based on these factors fit to the first 19 years of data was used to forecast subsequent changes in total population based on initial population size and yearly snow depth. The model was able to predict the increase and subsequent decline in total population size over the final 20 years of the study but failed to reproduce population levels after the eruption. Our results suggest that the 1980s episode of population growth was primarily driven by increased adult survival, rather than increased recruitment.

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