



## COMMENT

## Comment on Lima & Berryman (2006): the Alpine ibex revisited

Andrew R. Jacobson<sup>1,\*</sup>, Marco Festa-Bianchet<sup>2</sup>, Antonello Provenzale<sup>3</sup>,  
Achaz von Hardenberg<sup>4</sup>, Bruno Bassano<sup>4</sup>

<sup>1</sup>NOAA Earth System Research Laboratory, Global Monitoring Division, 325 Broadway, Boulder, Colorado 80305, USA

<sup>2</sup>Département de biologie, Université de Sherbrooke, Sherbrooke, Québec J1K 2R1, Canada

<sup>3</sup>Institute of Atmospheric Sciences and Climate, CNR, C.so Fiume 4, 10133 Torino, Italy

<sup>4</sup>Alpine Wildlife Research Centre, Gran Paradiso National Park, via della Rocca 47, 10123 Torino, Italy

With the goal of finding a more objective description of the interaction between population density and snow cover than the threshold model proposed by Jacobson et al. (2004), Lima & Berryman (2006, this issue) apply a novel technique to the reanalysis of the Gran Paradiso National Park (GPNP) ibex counts. This study confirms our finding that the interaction between population density and snow cover is the leading cause of changes in this population. Indeed, the signal of this interaction in the GPNP ibex counts is sufficiently strong that models with remarkably different structures can represent it. This is a valuable and interesting lesson in model identification, but we would offer a caution regarding interpretation of the results. None of the models explored so far can simultaneously represent the population peak of the early 1990s and the relatively stable and low population numbers after 1996, during a time of unusually low snow cover (see Lima & Berryman 2006, their Fig. 3).

Lima & Berryman (2006) attribute this modeling failure to the emergence of a previously unidentified exogenous forcing factor, such as disease, predation, or competition with chamois. While there is evidence that the chamois population responds to ibex density, no exogeneous factor controlling ibex dynamics has been observed during the ongoing monitoring of park wildlife, including census count campaigns and the tracking of marked individuals.

We contend that a more likely explanation for this fault is that none of the models include the effects of age structure on ibex population dynamics. The importance of age effects in ungulate populations is well

established (e.g. Gaillard et al. 2000, Coulson et al. 2001, Festa-Bianchet et al. 2003). We suggest that during the population increase of the 1980s, adult survival probability may have increased, leading to a general aging of the population. This could have led to the sharp population decline in the mid 1990s, as the number of very old and vulnerable ibex reached a maximum.

Our use of a simple threshold model could be interpreted as an invitation for more sophisticated analysis of the census data. We appreciate the effort of Lima & Berryman (2006), but it is clear that some aspects of the dynamics governing the GPNP Alpine ibex population in recent years remain uncertain.

## LITERATURE CITED

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