



Altitudinal and topography selection of the Rock Ptarmigan in Switzerland

CLAIRE A. PERNOLLET^{1*}, FRÄNZI KORNER NIEVERGELT² & LUKAS JENNI²

¹ PhD Student, CNERA Avifaune Migratrice, Office National de la Chasse et de la Faune Sauvage, La Tour du Valat, Le Sambuc, 13200 Arles, France

² Swiss Ornithological Institute, CH-6204 Sempach, Switzerland

* Email: claire.pernollet@oncfs.gouv.fr

Aim

With an analysis of Alpine Rock Ptarmigan *Lagopus muta helvetica* observations in Switzerland during the last three decades, we assessed elevational movements over the seasons and the selection of topographic elements, and investigated whether this species is shifting upwards in its elevational distribution.

Methods

We used 5279 Ptarmigan observations collected mainly by volunteers between 1984 and 2012. We compared the utilization of topographic elements (elevation, slope steepness, slope exposure, Topographic Position Index) by Ptarmigans with those on offer in Switzerland. With linear mixed models, we examined whether observations of Ptarmigans shifted in elevation over the years in four different regions of the Swiss Alps and in four seasons of the year. We compared elevational shifts of Ptarmigan observations with those of all species recorded between 1700 and 3100 m to account for observational biases. Meteorological data were obtained from weather stations distributed throughout the subalpine and alpine area.

Results

The elevational distribution of the Alpine Rock Ptarmigan varies between different regions of the Alps and between seasons (lowest in December: mean 2161 m, highest in August: 2438 m). Ptarmigans favour middle or upper slopes and ridges. South-facing slopes tend to be avoided, whereas north-facing slopes are slightly preferred. Significant shifts in elevation over the years were detected in the Northern (1.5–2.9 m/year, depending on season, significant in summer and autumn only), Eastern (8.7–10.5 m/year, depending on season, significant in spring and summer only) and Southern Alps (8.2 m/year in all seasons). Over the same period, an increase in mean temperature and a decrease in snow duration were registered for Switzerland.

Discussion

Observations collected by volunteers provided a detailed picture about the elevational distribution of this Alpine species over the years and the selection of topographic elements. The observations indicate that recent changes in climate resulted in an upward shift of the distribution of the Alpine Rock Ptarmigan, most strongly in the Southern and Eastern Alps. The shift in distribution predicted by various authors with multi-scale modelling approaches has thus already begun and may result in a dramatic shrinkage of the distribution area of this subspecies.