

Grouse and Rock Partridge – herbivores at the mercy of the weather

The breeding success of grouse is extremely variable, mainly because of weather conditions during the rearing of the chicks. If the weather is cool and rainy, the population declines. Population fluctuations are a typical feature of all grouse and partridge species. In the case of the Rock Partridge in particular, this is also reflected in range losses and gains.

Four grouse species – Rock Ptarmigan, Black Grouse, Hazel Grouse and Western Capercaillie – and the Rock Partridge inhabit the Swiss mountains. Rock Ptarmigan and Rock Partridge are species of open landscapes, the Rock Ptarmigan being restricted to areas above the tree line in the Alps. The other three species rely on trees or forest, with the Black Grouse occupying only very open forest along the upper tree line.

Adapted to winter in the mountains

Grouse benefit from various anatomical and behavioural adaptations that allow them to remain in their mountain habitat even in winter. Their plumage provides particularly good insulation. The Rock Ptarmigan even has feathered toes. In addition, the birds adapt their behaviour to save energy. Apart from short periods of activity to feed, several species spend a lot of time in burrows they dig into the snow; here, temperatures are only slightly below zero, even when the outside temperature falls to almost -20°C ¹².

Adult grouse eat a vegetarian diet, favouring food that is easy to digest such as berries and seed, which they find in the low ground vegetation. Dwarf shrubs are particularly popular. Grouse find enough food even in winter, as they can subsist on shoots, buds and needles of dwarf shrubs, bushes and trees. In order to derive nourishment from these fibrous foods, grouse have a specially adapted digestive tract. They ingest grit to break up hard food, and they have two long caeca (intestinal pouches) in which cellulose is digested by bacteria. This high-fibre food with low nutrient content is challenging for the gastrointestinal system, and it can only process as much food as is necessary for survival. Extra energy expenditure caused by disturbance is hard to make up for.

The Rock Partridge, on the other hand, does not cope as well with the harsh conditions of Alpine winters. It depends on a year-round supply of herbaceous plants that are relatively easy to digest. If snow on the steep, southern slopes that constitute the Rock Partridge's habitat does not melt or break away quickly, it is forced to seek refuge at lower altitude, and may then be observed near mountain huts or even in villages in much lower-lying areas⁴.

Breeding success highly weather-dependent

Characteristic for all grouse and partridge species are the large clutch size (Rock Partridge lay up to 14 eggs) and the influence of weather on chick survival. In the first days after hatching, the chicks cannot maintain their body temperature and have to regularly return to the hen for brooding to keep warm. If the weather is cool and rainy, not much time remains for foraging⁷. Moreover,

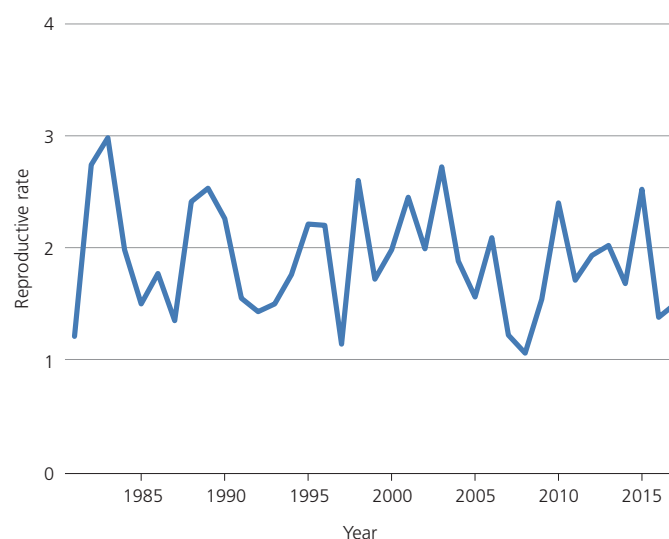
chicks rely on invertebrates (insects, spiders) for food. In prolonged periods of bad weather, they are unable to survive.

Therefore, the breeding success of grouse and partridge is heavily dependent on weather conditions during the nesting and chick-rearing periods and can vary greatly from year to year^{15, 16}. This in turn leads to large fluctuations in the following year, a phenomenon that is most pronounced in Black Grouse and Rock Partridge populations.

Rock Ptarmigan populations increase if July temperatures are around the long-term average. If July is too cool, however, the population will be smaller in the following year. Hot summer temperatures also appear to cause local declines².

Fluctuations in numbers and range

The population trend of Black Grouse in northern Ticino is parallel to the reproductive rate of the previous year. The population remains stable from one year to the next at a reproductive rate of about two chicks per hen¹⁵. In northern Ticino, the chicks hatch in the second half of July, when mean daily temperatures are at their highest. From 1981 to 2017, the reproductive rate in northern Ticino fluctuated widely with no visible long-term trend^{13, 15, 16}. In southern Ticino, on the other hand, reproductive



The reproductive rate of Black Grouse (number of chicks per hen) in northern Ticino (Ticino part of the biogeographical region «southern Alps») from 1981 to 2017 fluctuates widely with no visible long-term trend. Source: Ufficio caccia e pesca Canton Ticino.

success decreased, probably due to the abandonment of Alpine pastures^{15, 16}. A range contraction will ensue if the decline continues.

The Rock Partridge population is also subject to marked fluctuations caused by the annual variation in reproductive success. Peak populations were reached in Switzerland around 1945 and 1993, with a period of low numbers in between^{HVM, VdS, 3, 14}. More recently, 2006–2008 and 2015–2016 were years with large populations, whereas low numbers were recorded in 2001–2003 and 2010–2012. These fluctuations are reflected in the data from the common breeding bird monitoring scheme: In 2006–2008, a total of 71 Rock Partridge territories were recorded in 23 kilometre squares. In 2010–2012, in contrast, only 26 territories were found

Number of territories/km²

- 0
- irregular
- 1
- 2
- 3
- 4



Number of territories/km²

- 0
- irregular
- 1



Data from the common breeding bird monitoring scheme illustrate the fluctuations in Rock Partridge populations. In 2006–2008 (above), when numbers were on the rise, almost three times as many territories were recorded as in 2010–2012 (below), when the population trend was negative.



Christian Marti

Grouse chicks like these Rock Ptarmigans are initially unable to regulate their body temperature. They need to regularly nestle into the hen's plumage for warmth. When the weather is cold, the chicks can only venture out on brief forays and may not take in enough food to survive.

in 14 kilometre squares. These fluctuations affect the size of the breeding range, because the Alps constitute the northern limit of the species' distribution.

Many species face huge challenges

Among this group of birds, Western Capercaillie and Rock Ptarmigan give particular cause for concern. In the case of Capercaillie, the urgency of the situation and the need for action were recognised many years ago^{5, 6}. The necessary measures – thinning trees in overly dense stands and protecting the birds from disturbance – are being implemented via a national action plan⁸ as well as cantonal plans¹¹.

The Rock Ptarmigan exhibits varying regional trends, suggesting that different factors are at play in each locality². A decline of 13 % was recorded between 1995 and 2013. This situation is worrying, especially since the species' range is expected to shrink due to climate change¹⁰, with a marked shift of observations to higher altitudes already apparent⁹.

In the case of the Hazel Grouse, the range contraction in the central Jura is cause for concern¹. Besides climate change, Black Grouse and Rock Partridge are most threatened by changes in their habitat. Both the abandonment of farmland and intensified land use have a negative impact, as does the increase in tourism.

Pierre Mollet

¹ Blattner (1998); ² Furrer et al. (2016); ³ Lüps (2004a); ⁴ Lüps (2004b); ⁵ Marti (1986); ⁶ Marti (1995); ⁷ Marti & Bossert (1985); ⁸ Mollet et al. (2008a–b); ⁹ Pernollet et al. (2015); ¹⁰ Revermann et al. (2012); ¹¹ Stettler & Christen (2010); ¹² Stüwe (1989); ¹³ Ufficio caccia e pesca Canton Ticino, in litt.; ¹⁴ Zbinden & Salvioni (2003a–b); ¹⁵ Zbinden & Salvioni (2003c); ¹⁶ Zbinden & Salvioni (2010)