

Stay connected: forest corridors promote Hazel grouse (*Tetrastes bonasia*) occurrence in a mountainous landscape

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Forest fragmentation decreases the size of subpopulations and the probability of successful individual dispersal between subpopulations, and is therefore considered a major threat for Hazel grouse (*Tetrastes bonasia*) in central Europe. Identifying the corridors connecting their habitat and evaluating to what extent these corridors favour habitat suitability would provide insights for its conservation. We developed a habitat quality index for 29 study sites (~50 ha each) in the Western Swiss Prealps by mapping and quantifying the density of conifers identified as potential roosting sites during winter and the presence of food resources. In addition, we used published telemetry data, information on forest cover and circuit theory to quantify the relative resistance to dispersion of open areas compared to forests. These analyses allowed us to quantify the connectivity of each study site using the program CIRCUITSCAPE, and highlight dispersal corridors spreading within the study area. We assessed the influence of habitat quality, measured as the area of suitable habitat within study sites, and connectivity, measured as the relative resistance to dispersal between study sites, on the occurrence of Hazel grouse in the 29 study sites. Factors affecting habitat quality were tested separately and in combination using logistic regressions and included indices of species presence collected during winter prospecting as response variable. Because other grouse species occurred in the study area, we analysed the samples collected (faeces) using molecular tools to confirm the species and identify individuals.

The study emphasized that a threshold density of low-branched coniferous trees was a reliable predictor of habitat suitability for Hazel grouse. Moreover, two dispersal corridors spreading within the Western Prealps were identified and mostly contributed to the connectivity among study sites. We also observed that study sites characterized by a high index of connectivity and an area of suitable habitat above the estimated threshold were more frequently occupied than isolated forest patches showing the same index of habitat quality. Our results suggested that habitat quality and connectivity are key factors explaining Hazel grouse occurrence and should be taken into consideration in forest management actions. Further research will assess whether Hazel grouse disperse along the predicted corridors by comparing genetic relatedness among individuals and landscape resistance to dispersal computed between sites.

**Keywords:** circuit theory; connectivity; habitat fragmentation; *Hazel grouse*; heterogeneous landscape; mountain forests; Swiss Prealps Tetraonidae

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