Scilight

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Mountain habitats influence bird songs and behaviors

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Numerical model illustrates the effects of mountain terrain on the audible range of birdsong, with implications for bird behavior.

Birds use their songs primarily to communicate with other birds about predators, food sources, territory, and mating availability. It is essential that these songs are actually heard by other members of the species, and the distance the songs can travel changes dramatically based on the surrounding terrain, soil type, weather conditions, and flora.

Guibard et al. developed a numerical model to calculate the range of birdsong based on terrain and environmental factors. They conducted experimental tests in the French Alps to confirm the validity of their model in mountain conditions.

“Comparisons with measurements on a mountain site show that acoustic levels are well reproduced by our model, even in the vicinity of a hill and over snow cover,” said author Arthur Guibard. “Numerical simulations allow us to predict the influence of the topography and wind and temperature changes on the spread of sound in complex environments like mountains.”

The researchers designed their study around the rock ptarmigan, a mountain bird found in the Alps. Male ptarmigans are incredibly territorial during mating season and defend their territory primarily through songs. The numerical model predicts that in their mountain habitat, ptarmigan songs are much more effective when performed from the air, a behavior often observed in wild ptarmigans. The authors hope their model can be used to better understand more of the ptarmigan’s behaviors.

“The idea is to combine GPS tracking data, meteorological data, and model calculations to understand how ptarmigans organize their communication network in space and time,” said Guibard. “The rock ptarmigan is a near-threatened species and understanding its behavior could lead to improved protective measures.”

Source: “Influence of meteorological conditions and topography on the active space of mountain birds assessed by a wave-based sound propagation model,” by Arthur Guibard, Frédéric Sèbe, Didier Dragna, and Sébastien Ollivier, *Journal of the Acoustical Society of America* (2022). The article can be accessed at https://doi.org/10.1121/10.0011545.