
Large-scale decline of bats and bush-crickets revealed thanks to automatic acoustic monitoring scheme.

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Abstract

Vigie-Chiro, an acoustic monitoring program based on both car transects and point counts carried out by volunteers, was launched in France in 2006. Standardized data gathered on 3560km car transects and 1270 point counts revealed a negative trend for three common bat species whose decline was previously unsuspected: Common Pipistrelle, Leisler's Bat and Serotine Bat. Useful data were also serendipitously collected on several species of bushcrickets (*Orthoptera Tettigonioidea*) thanks to their nocturnal ultrasonic songs. Using an automatic identification process on the recordings, these data also revealed unexpected decline for two common species of bushcrickets: Great Green Bush-Cricket (*Tettigonia viridissima*) and Large Conehead (*Ruspolia nitidula*). During this same period, new technologies appeared that multiplied sampling efficiency, especially for elusive species of both groups. This led us to propose in 2014 a third protocol taking advantage of these long duration continuous recordings. Using available data to simulate long-term data, we compared the three different types of acoustic data collection (car transect, short point counts, and fullnight point recordings), and their statistical power to detect alarming species trends (30 % over 10 years). Results showed that car transects were optimal for monitoring most bushcricket species, and some of the most mobile and large bat species, while fullnight recordings would provide a better monitoring for most bat species, especially those which have a high activity rate along the night. The protocols therefore showed a very good complementarity and keeping up them should help avoiding any representativeness bias.

Keywords: Passive acoustics, Biodiversity monitoring, Insect conservation, Automatic classification, Citizen science.

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