

Counting in the dark: non-intrusive laser scanning for population counting and identifying roosting bats

Abstract

Population surveys and species recognition for roosting bats are either based on capture, sight or optical-mechanical count methods. However, these methods are intrusive, are tedious and, at best, provide only statistical estimations. Here, we demonstrated the successful use of a terrestrial Light Detection and Ranging (LIDAR) laser scanner for remotely identifying and determining the exact population of roosting bats in caves. LIDAR accurately captured the 3D features of the roosting bats and their spatial distribution patterns in minimal light. The high-resolution model of the cave enabled an exact count of the visibly differentiated *Hipposideros larvatus* and their roosting pattern within the 3D topology of the cave. We anticipate that the development of LIDAR will open up new research possibilities by allowing researchers to study roosting behaviour within the topographical context of a cave's internal surface, thus facilitating rigorous quantitative characterisations of cave roosting behaviour.