

CONSERVATION REQUIREMENTS FOR THE BAT COMMUNITY IN THE MALTESE ISLANDS

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Islands offer unique ecosystem characteristics due to their small size, however, additional pressures are introduced as a result of limited resources and reduced gene flow and consequently such bat communities require special conservation considerations. The order Chiroptera on the Maltese Islands is a significant contributor to the local mammalian species diversity, yet, previous records show inconsistencies with respect to the identity of certain bat species. During this study such irregularities were addressed and species-specific ecological requirements were explored with the aim to introduce measures for effective bat conservation management within the Maltese Islands.

A recording bat detector system allowed analyses of echolocation calls. 36 sites, selected by stratified random sampling, were studied during multiple seasons by recording echolocation calls along a 1 km line transect and simultaneously recording environmental variables. An automated signal parameter extraction algorithm and artificial neural networks (ANNs), allowed the identification of seven species: *Hypsugo savii*, *Pipistrellus kuhlii*, *Pipistrellus pipistrellus*, *Myotis punicus*, *Plecotus austriacus*, *Rhinolophus hipposideros* and *Tadarida teniotis*. The detection of each species in a specific time interval allowed the formulation of an activity index used to investigate seasonal distribution and habitat use.

Using manual identification and ANNs, 94% of the bat passes recorded were identified to species level, while *Pipistrellus* spp. accounted the other 6%. By means of the activity index it is indicated that *P. pipistrellus* is the most common bat species in the study area followed by *P. kuhlii* and *H. savii* highlighting the different adaptation capabilities of bat species to the anthropogenic and semi-natural habitats of the Maltese Islands. Further analyses using distribution maps have shown all species recorded to have a widespread distribution across the Maltese Islands except for *R. hipposideros* and *Pl. austriacus* highlighting the conservation priorities for the habitats used by these two species.

Primarily, this study has shown that bat species conservation management needs to be species-specific. Additionally, acoustic methods used for bat species identification and quantitative analyses, such as those used during this study can be used to elucidate species-specific patterns and ecological requirements and hence may be integrated for future long-term monitoring programmes of bat population trends in the Maltese Islands.