

## Trait choice affects our ability to detect patterns in community dynamics of functionally important birds

*Hordley, Lisbeth; Gillings, Simon; Petchey, Owen; Tobias, Joseph; Oliver, Thomas*

Species vary widely in their ecological and functional traits. Ecosystems containing a wide variety of different traits usually function better and provide more ecosystem services to humans than more homogeneous ecosystems. However, the choice of traits selected to represent diversity within a community can affect our ability to understand ecosystem processes. Some traits – called ‘effect traits’ – are associated with the effect a species has on an ecosystem. Beak size in birds, for example, is related to food size, such that higher beak diversity indicates wider consumption of different resources in the ecosystem, potentially supporting a higher total number of individuals. Other traits – called ‘response traits’ – are more informative about how species respond to changes in the environment. For example, birds which breed less frequently and lay fewer eggs are less able to recover from population crashes in fluctuating environments. A community with higher diversity in reproductive rate is thus more likely to withstand environmental changes, and therefore have more stable numbers of individuals over time.

In this study, we use long-term UK Breeding Bird Survey data to assess whether bird communities with a high diversity of effect traits (e.g. beak size) have higher community abundance over time and whether communities with a high diversity of response traits (e.g. reproductive rate) have more stable community abundance over time. To provide insight into key ecological processes, we quantified effect and response traits for



Robin (*Erithacus rubecula*) performing its role as an insect predator. Credit: Tony Cox/WTML

105 bird species supplying two key ecosystem services – seed dispersal and insect predation.

We found that communities with a high diversity of response traits had more stable community abundance over time in our study sites, in line with predictions. However, we found that communities with a diversity of effect traits had low total community abundance.

Our results show that effect and response traits provide different information on community abundance. In particular, to assess the stability of communities, it appears crucial to measure the diversity of response traits. This can help conservation practitioners to select the appropriate functional traits to inform upon the long-term stability of ecosystem functioning.