Considering common species in measuring and monitoring biodiversity and turnover

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Rare species have historically been the focus of most conservation attention, and still dominate national conservation policy in many parts of the world. However, increasingly it is becoming apparent that there are species that were once common that are now undergoing rapid declines (such as the House Sparrow in Europe and bumblebees in the USA) (Gaston 2011, Inger et al. 2015). At the same time there are some species that are rapidly expanding there ranges and becoming more common. This includes species responding positively to climate change and increasing temperatures at their pole-wards range boundaries and expanding their ranges. It also includes human-mediated range expansions in the form of alien invasive species. Finally, abundant or dominant species are often functionally very significant, and responsible for driving multiple ecosystem services (McGeoch and Latombe 2016). It is clear that measuring and monitoring the dynamics of common species is at least as important as doing so for rare species. Spatially explicit presence-absence (occurrence) records are the basic unit for quantifying the geography, movements and diversity of species and monitoring range expansion, changes in species conservation status and biodiversity per se. A range of typological and continuous approaches can be taken to studying species dynamics, and drawing on the full suite of perspectives from spread ecology and macroecology is necessary to understand and forecast the dynamics of common species (McGeoch and Latombe 2016). The Essential Biodiversity Variable initiative (`http://geobon.org/essential-biodiversity-variables/what-are-ebvs/`) has also re-focussed attention on the value of abundance and occurrence observations for monitoring biodiversity dynamics (Latombe et al. 2016). In addition to drawing attention to the importance of measuring and monitoring common species, examining existing biodiversity metrics and their adequacy for common species is also important. One central biodiversity measure is beta diversity, or turnover, which

captures the essence of variation in diversity in space and time. However, beta diversity metrics have been shown to be unduly influenced by the rare species in an assemblage. Zeta-diversity, which provides the average number of shared elements across n systems, was recently proposed as an alternative for measuring compositional turnover in plants and animal assemblages (Hui and McGeoch 2014). It is also valuable for application to any system that can be characterised by an RxQ matrix. It provides a significant advance over previous pairwise approaches by capturing the contribution of the full suite of narrow, intermediate and wide-range elements to turnover. In so doing it provides additional insights on the role of common species in driving patterns of biodiversity (e.g. (Latombe et al. in press)). Changes in the distribution of common and range expanding species deserve further attention, not only to better understand their dynamics, but also as the basis for monitoring range expansions and their consequences. Managing common species relies on good global coverage of species occurrence records, metrics that are sensitive to common species and their dynamics, as well as models that are able to estimate and forecast range expansion and range contraction trajectories.

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