LETTERS

A balance of inne and lo e in he An h opocene

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Abstract

Scientists disagree about the nature of biodiversity change. While there is evidence for widespread declines from population surveys, assemblage surveys reveal a mix of declines and increases. These conflicting conclusions may be caused by the use of different metrics: assemblage metrics may

biodiversity change emerging from assemblage-level and population-level analyses be reconciled?

Differing conclusions about biodiversity trends at population and assemblage levels may be driven by contrasts in the

defined a population extinction as a species presence in year (t) followed by the species absence in the following year (t + 1), and a population colonisation as a species absence in

multiple colonisations and extinctions. The remaining 79.80% sequences (random runs test) were classified as persistent. Population trends for these populations were remarkably variable, with all categories having both increasing and decreasing populations (Fig. 3). Nevertheless, there were clear and significant differences between the categories: both multiple colonisations and extinctions, and persistent populations centred on zero; populations going extinct had a higher proportion of

emerges from studies of biodiversity change in the recent past (Dornelas et al. 2014). In terms of population trends, the proportions of significantly increasing and decreasing populations were both around 3%, therefore being infrequent and approximately balanced among all populations. We could not detect population change in the vast majority of species. Therefore, using population-level metrics on assemblage-sampled data sets, we found population-level results that are consistent with the previously reported assemblage-level metrics. We previously found no net change in total assemblage abundance and species richness (Dornelas et al. 2014; Gotelli et al. 2017), here we report balanced increases and decreases in population trends.

These somewhat surprising results are in fact consistent with studies of a single group of organisms that report population-level metrics on assemblage-sampled data. These primarily come out of long-term monitoring studies such as national breeding bird surveys. For example, an analysis of long-term trends in the North American Breeding Bird Survey, which is one of 158 data sets included in our analysis, revealed a balance in which 49% of the populations of the species were increasing and the remaining 51% were decreasing (Sauer et al. 2003; Schipper et al. 2016). This paper explicitly analysed spatial and temporal heterogeneity of population trends within species and also found such heterogeneity to be very

example, government and conservation agencies are often man-

of publication bias. The step from a researcher collecting to analysing and writing-up the data contains many filters on what is considered surprising, interesting and publishable. Even if an author deems a paper worth writing and submitting, journals may have filters on what is considered worth publishing. The occurrence and possible magnitude of publishing bias is widely recognised and many meta-analyses go to considerable effort to control for this problem (Parmesan

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