loss

studies versus other sources of information are largely due to comparisons of apples with oranges. Specifically, we argue that brief review of what is currently known about each of these 15 types of biodiversity trend. To help with navigation, *Temporal re d i turnover (temporal β diversity)*

β-L: There is growing evidence that temporal turnover is unexpectedly high at local scales. Dornelas . [12] quantified the temporal

20 years, attributed to forest disturbance and forest regeneration.

β-B: Turnover rates are clearly scale dependent. For example, Thuiller . [34] documented high turnover in plant community composition in the fynbos at the local scale, with 74% of sites experiencing >50% turnover between 1966 and 1996, but found no significant turnover at the regional (all-sites) scale. Ultimately, turnover is due to colonization and extinction, which may be 'natural' or anthropogenic such as human-driven homogenization [35,36].

β-L: Perhaps the most extreme form of turnover is regime shifts, often attributed to climate and over-harvesting [37]. Data from various taxa, often in marine [38] or freshwater [39] systems experiencing regime shift, suggest that temporal turnover rates have increased in recent decades.

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vary among taxa, regions of the globe, relative balance of different anthropogenic influences, and time period measured. However, much of the variability is uncertainty due to the difficulty of measuring biodiversity at multiple spatial scales. For example, as mentioned above, uncertainty about increases in Anthropocene global extinction rates over background rates varies by orders of magnitude, largely because of uncertainty about current extinction rates: the IUCN lists fewer than 850 documented extinctions [IUCN (2014) *I CN R L* , *2014.2* (http://www.iucnredlist.org)] over 500 years (i.e., less than two extinctions/year), but others have imputed extinction rates as high as 100 000 species/year [62] – and this is one of our best-studied biodiversity trends. Because both the natural variability and the uncertainty of our measurements are so high, reporting means for the 15 biodiversity trends without providing estimates of variability or error bars would be misleading. It is also important to note that even flat (zero-slope) trends in community biodiversity can mask enormous variation in species-level patterns, to the extent that communities trending upward can still contain many species trending downward and vice versa (Figure 3 and Boxes 2 and 3).

changes. Many trends are almost completely unstudied, including temporal and spatial β diversity and changes in net abundance at the community level. Additionally, for the credibility of future generations of biodiversity scientists, we also believe it is important to communicate the currently very large error bars in estimates of biodiversity trends.

A second striking fact that emerges is that, even faced with dramatic environmental change, species richness (α) can remain, on average, constant (see discussion of α-L and α-B and Box 3). However, this apparent constancy hides enormous acknowledge areas of ignorance (e.g., spatial and temporal β diversity) and report error bars and to begin discussions on defining and measuring the quality of biodiversity. We strongly believe that in the long term this will strengthen rather than weaken the position and credibility of biodiversity science in the policy arena and engender public engagement as we more accurately describe the changes everyone is

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