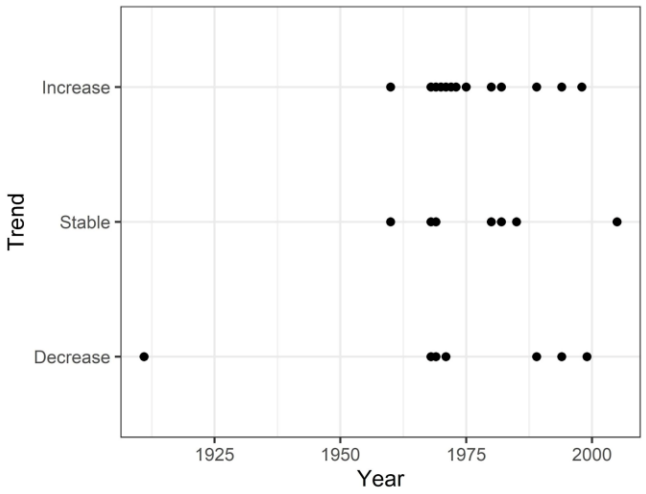
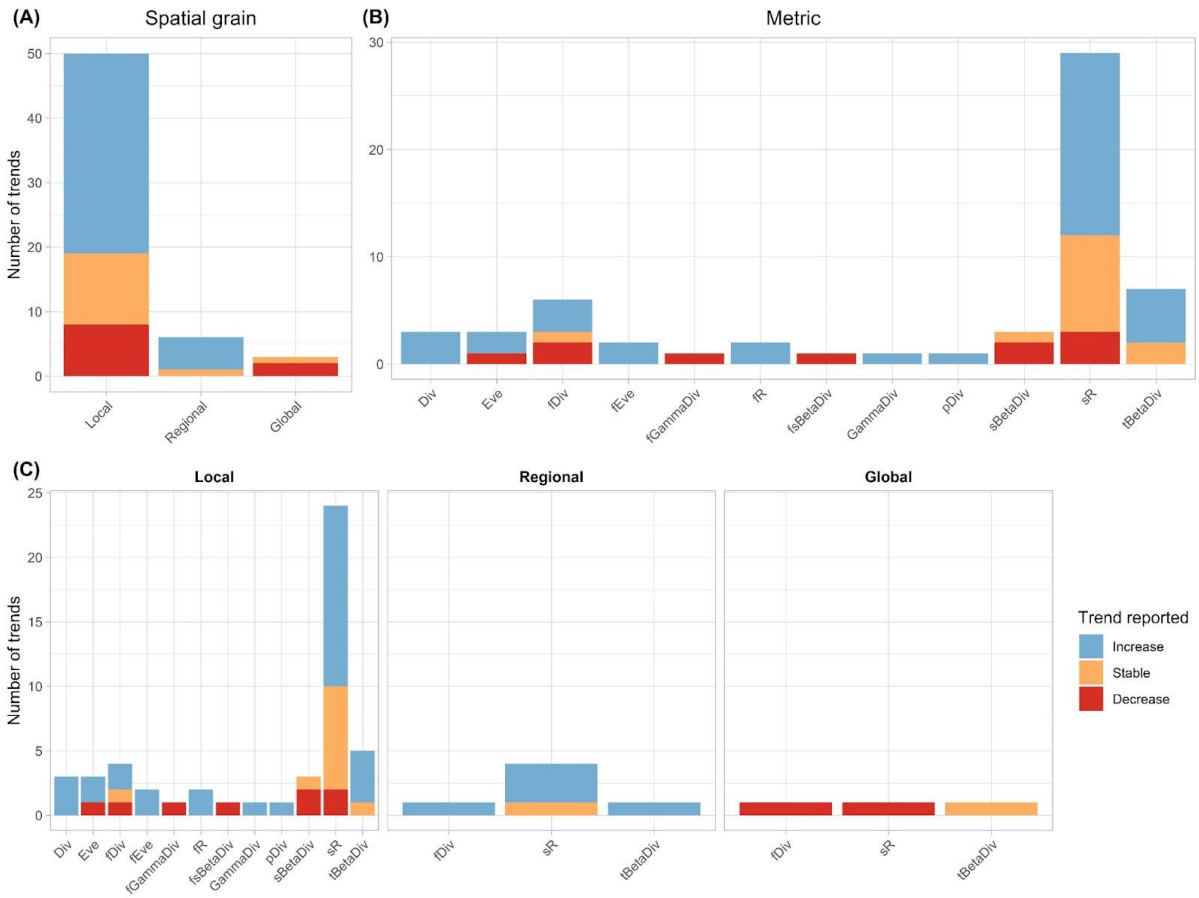
Appendix A



Supplementary Figure 1: *relationship between the starting year of a study and the sign of the temporal trend.*



Supplementary Figure 2 (in colours): *Numbers of trends in each category (increase, stable, decrease) for the 59 trends across 24 articles. Note that each trend is an average trend from a*

given study, scale, and for a given metric, calculated over multiple sites (i.e. spatial replicates). We also note that some trends reported here are based on the same dataset, but come from different studies; this is a potential source of pseudoreplication. For summary of trends that accounts for this pseudoreplication see Fig. 3. Abbreviations: species richness (sR), functional richness (fR), evenness (Eve), functional evenness (fEve), taxonomic diversity (Div), functional diversity (fDiv), temporal beta-diversity (tBetaDiv), spatial beta-diversity (sBetaDiv), functional spatial beta-diversity (fsBetaDiv), gamma-diversity (GammaDiv), functional gamma-diversity (fGammaDiv), phylogenetic diversity (pDiv).

Supplementary Table 1: *table containing the notes about the trends and articles used in this literature review. Abbreviations: BBS = Breeding Bird Survey, species richness (sR), functional richness (fR), evenness (Eve), functional evenness (fEve), diversity (Div), functional diversity (fDiv), temporal beta-diversity (tBetaDiv), spatial beta-diversity (sBetaDiv), functional spatial beta-diversity (fsBetaDiv), gamma-diversity (GammaDiv), functional gamma-diversity (fGammaDiv), phylogenetic diversity (pDiv).*

Reference	Metric	Spatial grain (km^2)	Note
Barnagaud *et al.* (2017)	fR	Local	North American BBS, there are 50 census points sampled for 3 minutes, Mean change of SR at the road scales. Area of the road = (40/0.8)*(pi*0.4^2) with a road of 40 Km with point counts spaced by 0.8 Km and a census radius of 400m
	fEve	Local	
	Eve	Local	
	sR	Local	
Chase *et al.* (2019)	sR	Local	North American BBS restricted to a rectangle between 95°W to 70°W and 30°N to 50°N. They binned by 5 years and by quadrats, so the temporal grain of the metric should be different than from the sampling plan
	sR	Regional	
Davey *et al.* (2012)	Div	Local	British BBS. Metric = Simpson. They predict the metric using a GAM with spatial resolution of 1 Km^2. Then they show the trend for the mean value of the metric per year
	Eve	Local	
	sR	Local	
Jarzyna & Jetz (2018)	sR	Local	North American BBS

	sR	Regional	
	sR	Global	Data from Szabo *et al.* 2012
	fDiv	Local	
	fDiv	Regional	
	fDiv	Global	Data from Szabo *et al.* 2012
	tBetaDiv	Local	
	tBetaDiv	Regional	
	tBetaDiv	Global	Data from Szabo *et al.* 2012
Pilotto *et al.* (2020)	Div	Local	Metric = Simpson
	sR	Local	
	tBetaDiv	Local	
Ram *et al.* (2017)	sR	Local	Swedish BBS, "The number of observations for each sampling route is the sum of observed pair equivalents of birds at the counting points (5 min counting period at each point) and while moving between counting points". SR for forest species meaned over roads, spatial grain = 8* .4 with road of 8 Km and census radius "no limitations" so assumed 200m.
Reif *et al.* (2013)	sBetaDiv	Local	Breeding Bird Monitoring Programme. Jaccard similarity index (pairwise comparisons between transects), first increase then decrease. "A census transect consists of 20 points, which are visited twice per breeding season to sample early and late breeders. Observers register all birds seen or heard for 5 min at each census point"
	sR	Local	"species richness on both the local and national scales did not show any clear temporal trend"
Schipper *et al.* (2016)	Div	Local	North American BBS. Metric = Shannon. The metric is meaned over each road. Area of the road = 50*(pi*400^2) with 50 census points per road and a census radius of 400m
	fDiv	Local	
	fEve	Local	

	fR	Local	
	sR	Local	
La Sorte & Boecklen (2005)	Eve	Local	North American BBS. The metric is meaned over each road. Area of the road = 50*(pi*400\^2) with 50 census point per road and a census radius of 400m.
	sR	Local	
Van Turnhout *et al.* (2007)	sR	Regional	Dutch BBS, " two census periods". For each region, the trend is computed using the mean number of species per atlas square
	sR	Local	Mainly increase of SR but the proportion of negative trend were higher than for the regional scale
Wretenberg *et al.* (2010)	sR	Local	"All sites were visited six times in 1994 and five times in 2004 during early morning". Looking at the trend through different environmental policies, " local species richness (i.e. at the scale of sites = 3 hectares) decreased significantly probably as a result of an overall reduced abundance of several species. "
Keller *et al.* (2020)	sR	Local	Change in number of species between EBBA1 (1972-1995) and EBBA2 (2013-2017), grid cell = 50*50 Km
Monnet *et al.* (2014)	sR	Local	French BBS, Metrics are modelled at the point and site scales with GAMMs, Beta-diversity at the point scale (no indications of the spatial scale so assuming a 200m radius so spatial scale = pi*0.2^2) and gamma-diversity at the site scale
	sBetaDiv	Local	
	fsBetaDiv	Local	
	GammaDiv	Local	
	fGammaDiv	Local	
Spasov *et al.* (2017)	sR	Local	Trend of the mean species richness per study plot, "The mean abundance of birds per sample declined over the years (Table 2, Fig. 3) but there was no significant trend in species richness (Table 2)." Unclear temporal grain: "All birds seen or heard while walking along the two line transects were counted"
Jarzyna & Jetz (2017)	sR	Local	American BBS, trend at the road scale. For taxonomic diversity trend: "35 years of significant increase and 7 years of significant decrease"
	fDiv	Local	Functional diversity resulting from summing the length of the branches of a pruned clustering tree
	pDiv	Local	

Tingley & Beissinger (2013)	sR	Local	Spatial grain: 10 counting points per site, with radius of observation assumed to 200m = 10x(pi x 0.2^2). "Modern species richness was significantly less than historical richness (i.e., 95% credible intervals of richness differences nonoverlapping with 0) at 21 sites (27%), while only seven sites (9%) gained a significant number of species. More generally, using mean posterior estimates of richness change, significantly more sites lost species than gained species (57% vs. 43%; $\chi 2$ test, P = 0.007)."
La Sorte *et al.* (2009)	sR	Local	North American BBS, "our findings indicate a general trend of increasing species richness"
La Sorte (2006)	sR	Local	North American BBS, "In general, the results indicate that, during the time of the survey, more species expanded their geographical ranges within the study area"
Ma *et al.* (2012)	sR	Local	New York State Breeding Bird Atlas
Dornelas *et al.* (2014)	sR	Local	For species richness, Fig. S5 shows the slope for birds. For the temporal beta-diversity, trends only for birds is not given so we took the global trend.
	tBetaDiv	Local	Index used Jaccard similarity index. In this review, temporal beta-diversity is assessed as dissimilarity.
García-Navas *et al.* (2020)	sBetaDiv	Local	Sørensen score
Blowes *et al.* (2019)	sR	Local	Temporal extent is the median time serie. Tropical realm is represented only by 5 trends, so we decided to not take it into account.
	sR	Local	
	tBetaDiv	Local	
	tBetaDiv	Local	
McGill *et al.* (2015)	sR	Regional	North American BBS, spatial grain of 5x5°
	sR	Local	
Petchey *et al.* (2007)	sR	Local	Summer (breeding) distribution of the British avifauna, 2298 grid cells of 10*10 Km. "Species richness [...] from [...] (mean ± 1 SD = 80·6 ± 13·1) in Atlas 1 and from [...] (80·0 ± 15·2) in Atlas 2. "
	fDiv	Local	"FD ranged from […](mean ± 1 SD = 0·58 ± 0·08) in Atlas 1 and from [...] (mean ± 1 SD = 0·59 ± 0·09) in Atlas 2"