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No net insect abundance and diversity declines across US Long Term Ecological Research sites

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Supplementary Materials for

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Research sites

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Supplementary Tables 1-3

Supplementary Tables

Supplementary Table 1. Attributes of LTER sites included in analyses. (File attached separately)

Supplementary Table 2. Comparison of overall trends among sites included in this study and sites included in van Klink et al. (2020). Overall trends from this study represent median trends among all taxa at an LTER, estimated per species with an autoregressive model fit using restricted maximum likelihood. Overall trends from van Klink et al. (2020) represent estimates of insect assemblage size change from a hierarchical Bayesian model.

LTER	Trend (this study)	Trend (van Klink et al.)
Harvard Forest (ants)	+	+
Konza Prairie (grasshoppers)	+	-
Georgia Coastal (plant hoppers)	+	n/a
Harvard Forest (ticks)	+	n/a
Sevilleta (grasshoppers)	+	n/a
Phoenix (sweep)	+	n/a
Baltimore (mosquitoes)	0	n/a
Phoenix (pitfall)	0	-
Georgia Coastal (grasshoppers)	-	-
Sevilleta (pitfall)	-	-
Cedar Creek (sweep)	-	-
Cedar Creek (grasshoppers)	-	-
Hubbard Brook (Lepidoptera)	-	-
Bonanza Creek (bark beetles, leaf miners)	-	n/a
Konza Prairie (gall insects)	-	n/a
Midwest Farmland (aphids)	-	n/a
New Mexico (ants)	n/a	+
Michigan (insects)	n/a	0
Ohio (butterflies)	n/a	0
Minnesota (ground beetles)	n/a	+
Montana (grasshoppers)	n/a	-
Wisconsin (butterflies) 1	n/a	-
Wisconsin (butterflies) 2	n/a	-
Wisconsin (butterflies) 3	n/a	-
Total (+/-)	+6 / -8	+3 / -11

Supplementary Table 3. One Sample T-test results. Summary of results of One Sample T-tests evaluating the null hypothesis that mean time trends (among LTERs or site-taxa groups) in arthropod abundance and diversity were equal to zero.

Time trend	Grouped by	Overall mean trend	df	t value	p value
	<u>LTER (n=13)</u>				
Abundance	All trends	-0.06	12	-0.40	0.70
	LTER (Herbivores)	-0.02	10	-0.11	0.92
	LTER (Carnivores)	-0.24	5	-0.73	0.50
	LTER (Omnivores)	0.29	6	0.86	0.42
	LTER (Detritivores)	-0.24	3	-0.90	0.44
	LTER (Parasites)	0.39	5	1.80	0.13
	LTER (Parasitoids)	-0.35	1	-0.97	0.51
	<u>LTER (n=9)</u>				
Richness (rarefied)	All trends	0.46	8	1.06	0.32
Evenness	All trends	-0.03	8	-0.07	0.95
β_{Jaccard}	All trends	-0.75	8	-1.14	0.29
β_{-2}	All trends	-0.14	7*	-0.53	0.61
Bray-Curtis dissimilarity	All trends	-0.07	8	-0.11	0.92
	<u>Site-taxa group (n=22)</u>				
Abundance	Start year < 1990	-0.13	7	-0.61	0.56
	Start year 1990-2000	0.08	4	0.19	0.86
	Start year 2000-2010	-0.19	6	-0.64	0.55
	Start year > 2010	0.10	1	0.33	0.79
	Final year 1990-2000	0.22	1	0.36	0.78
	Final year 2000-2010	-0.40	3	-1.80	0.17
	Final year > 2010	-0.04	15	-0.22	0.83

*The β_{-2} time trend was not calculated for Baltimore mosquitoes, because β_{-2} was equal to zero in all year comparisons (all 12 mosquito species were present throughout the time series).