

Supplementary Information

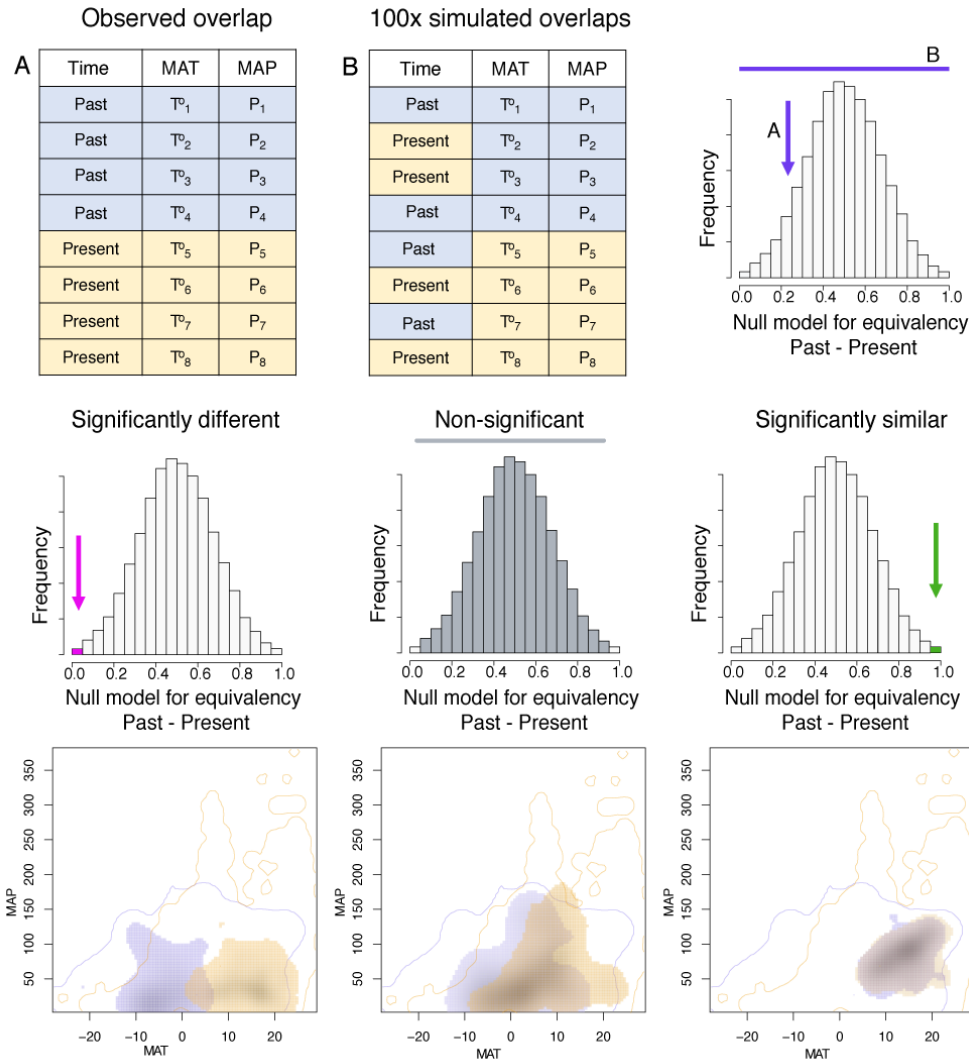


Figure S1.

Graphic representation of the niche equivalency test as described by Warren et al. (2008). For a species in two different time bins T_1 (past) and T_2 (present) with N_{T1} and N_{T2} number of occurrences, respectively, it first calculates the observed overlap. Overlap is calculated calculating the proportion of cells that are common across two different time intervals using the Kernel densities from their realized niches. Then, it creates a pseudoreplicate dataset by randomly shuffling the time category while holding the number of pairs in each time interval constant. It then calculates the overlap D metric for this pseudoreplicated data (A). It repeats this process 100 times to create a null distribution of D values (B). The observed D value is compared to the null distribution. As described in Warren et al. (2008) and Di Cola et al. (2017), if the observed D value of a species falls below the lower 5th percentile (pink arrow), the species has a non-equivalent niche across two time periods. If it falls over the 95th percentile (green arrow), the species is considered to have a higher equivalency between two time intervals than expected from the null model.

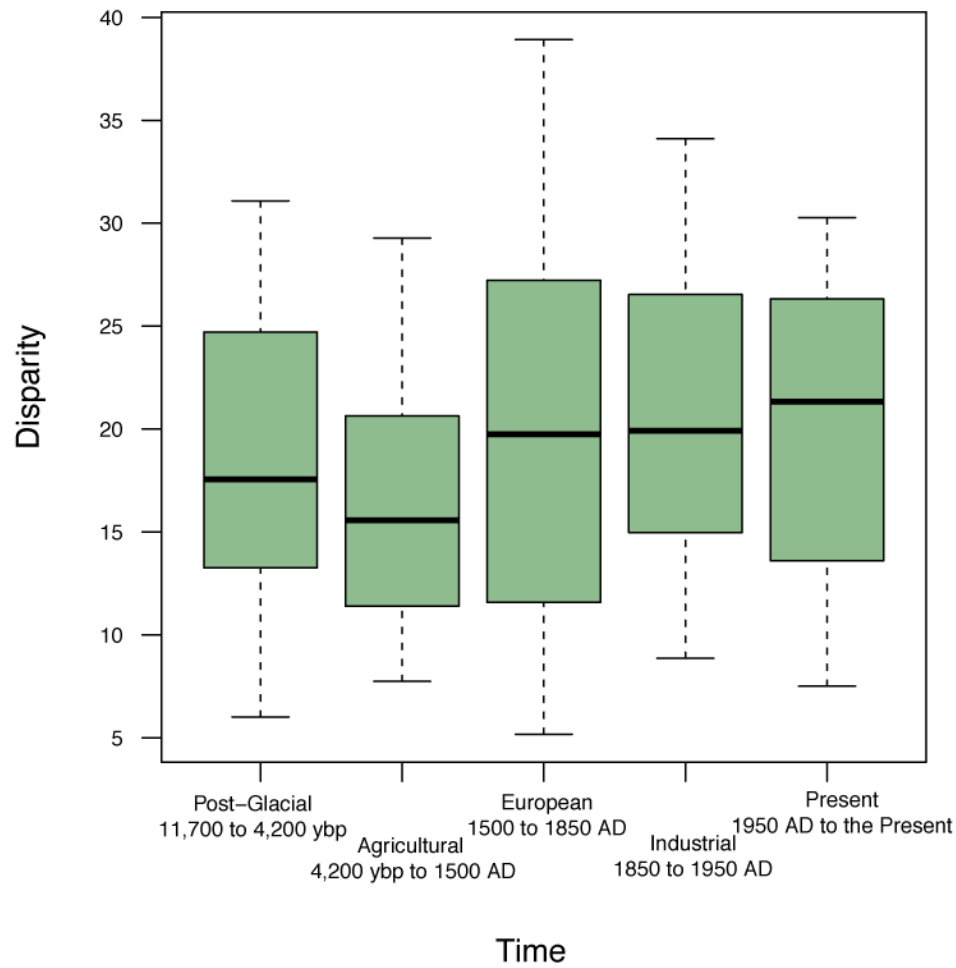


Figure S2.

Niche disparity of the 46 species in the analysis for 5 different time intervals. Note that Time intervals with the longer time extents do not display higher disparity, for what we can conclude that time averaging is not driving the results in our analysis.

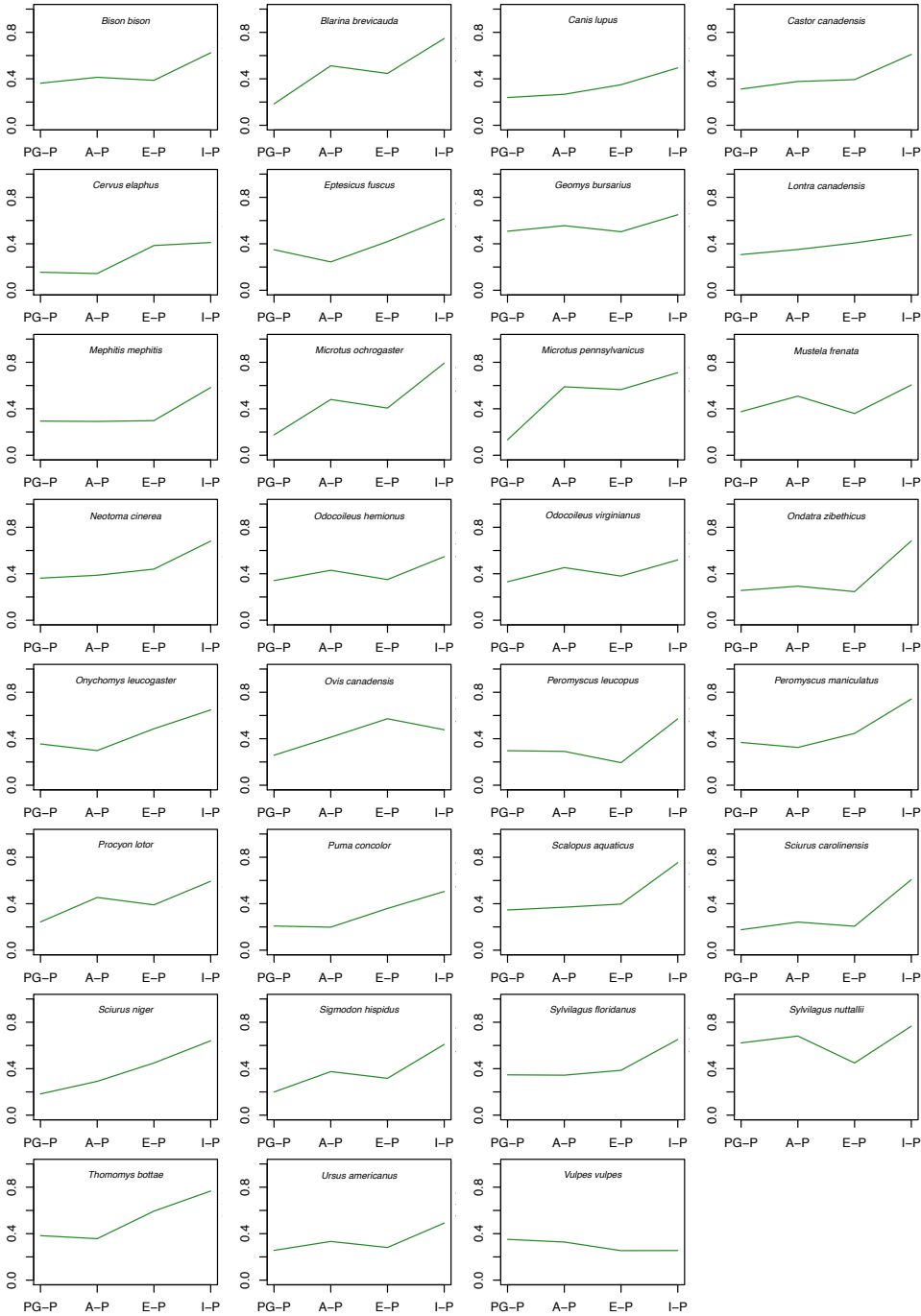


Figure S3.

Overlap between past time intervals and the present for the 31 species of mammals that significantly changed their niche after the Industrial Revolution in North America. Y axes represent overlap (D). PG: Post-Glacial; A: Agricultural; E: European; I: Industrial; P: Present (see methods).

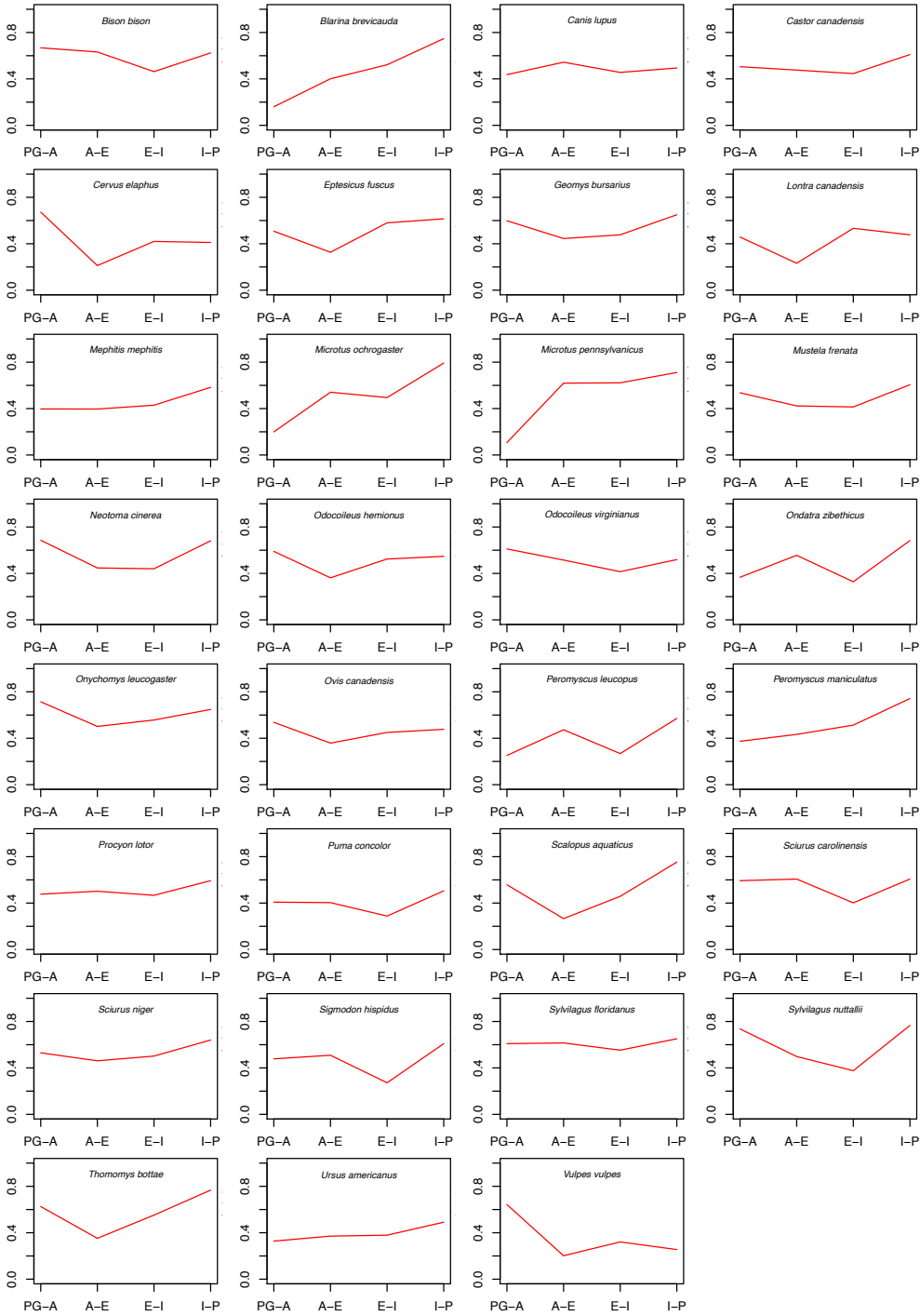


Figure S4.

Overlap between sequential time intervals from the Post-Glacial to the Present for the 31 species of mammals that significantly changed their niche after the Industrial Revolution in North America. Y axes represent overlap (D). PG: Post-Glacial; A: Agricultural; E: European; I: Industrial; P: Present (see methods).

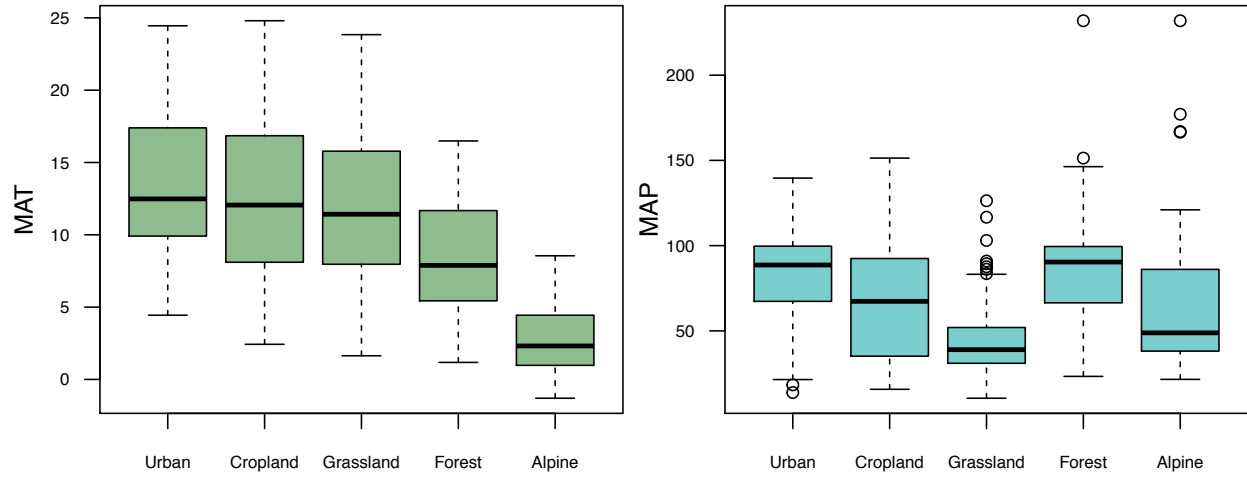


Figure S5.
MAT and MAP for the 5 habitats studied in the land use analysis.

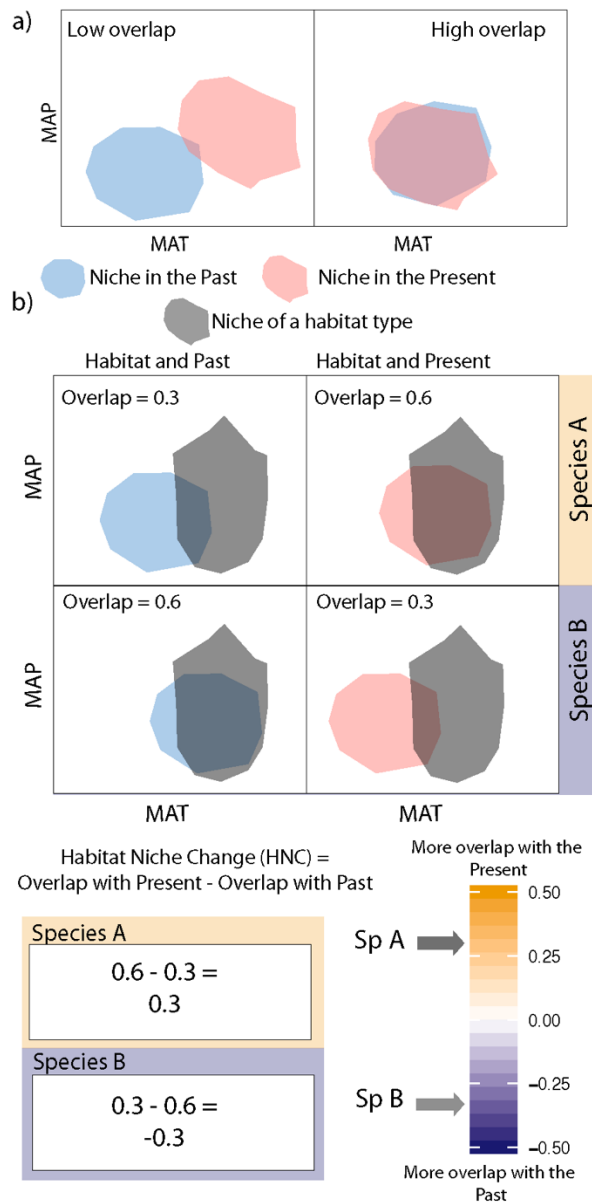


Figure S6.

a) Low versus high niche overlap. b) Calculating Habitat Niche Change (HNC; overlap difference). Species A expands into climates represented by this habitat type; whereas Species B contracts away from those climates. Niches are represented by polygons instead of Kernel densities for simplification purposes.

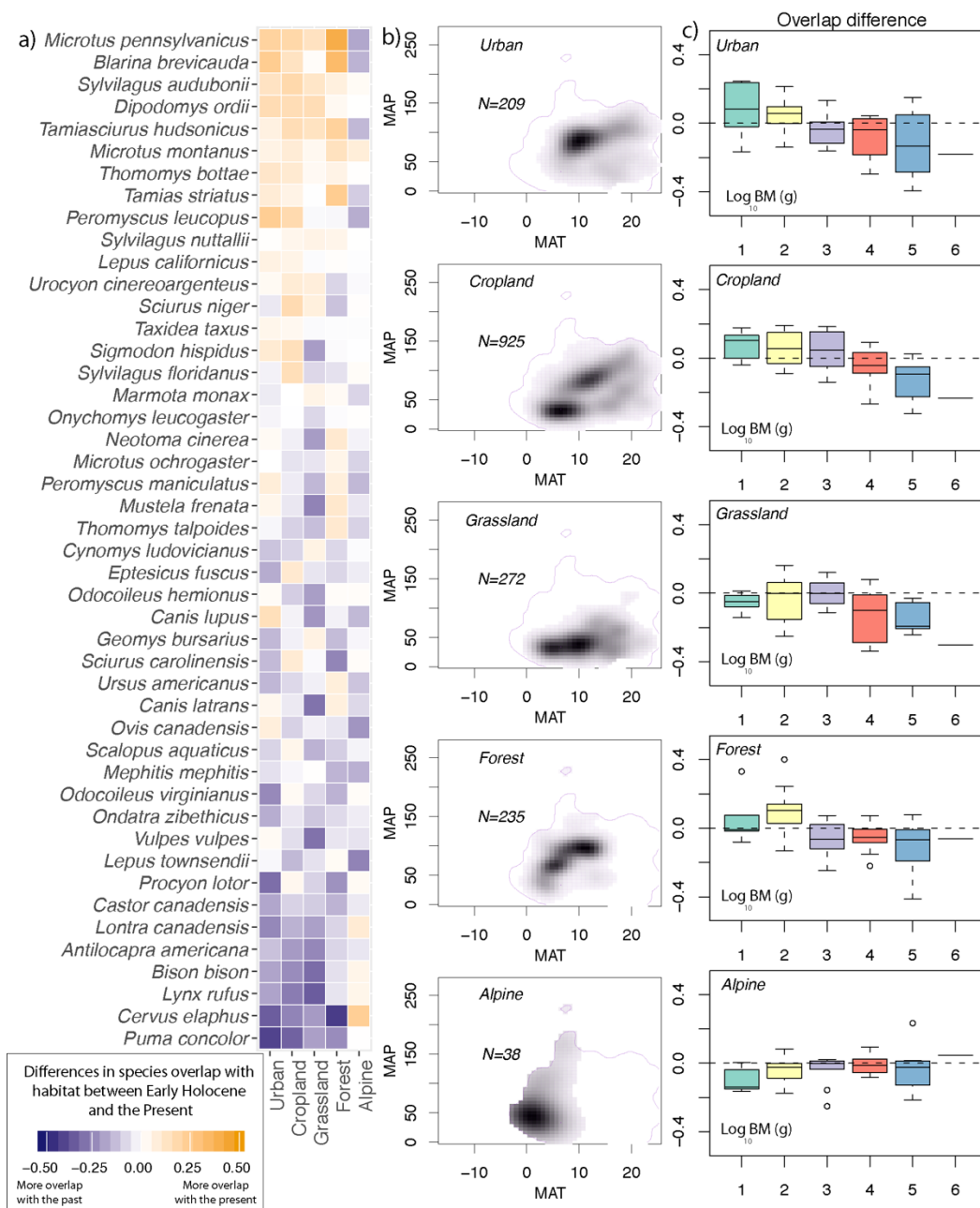


Figure S7.

a) Habitat Niche Change (HNC) between Post-Glacial and the Present time intervals for the 46 mammal species in the study and for 5 different land-cover (habitat) types. Species are ordered by average HNC value. b) Climatic niche described from MAT and MAP for 5 different habitat types. c) Average overlap difference (HNC) for each body mass category (log₁₀ body mass in grams) for the 46 species in the study and for each habitat type.

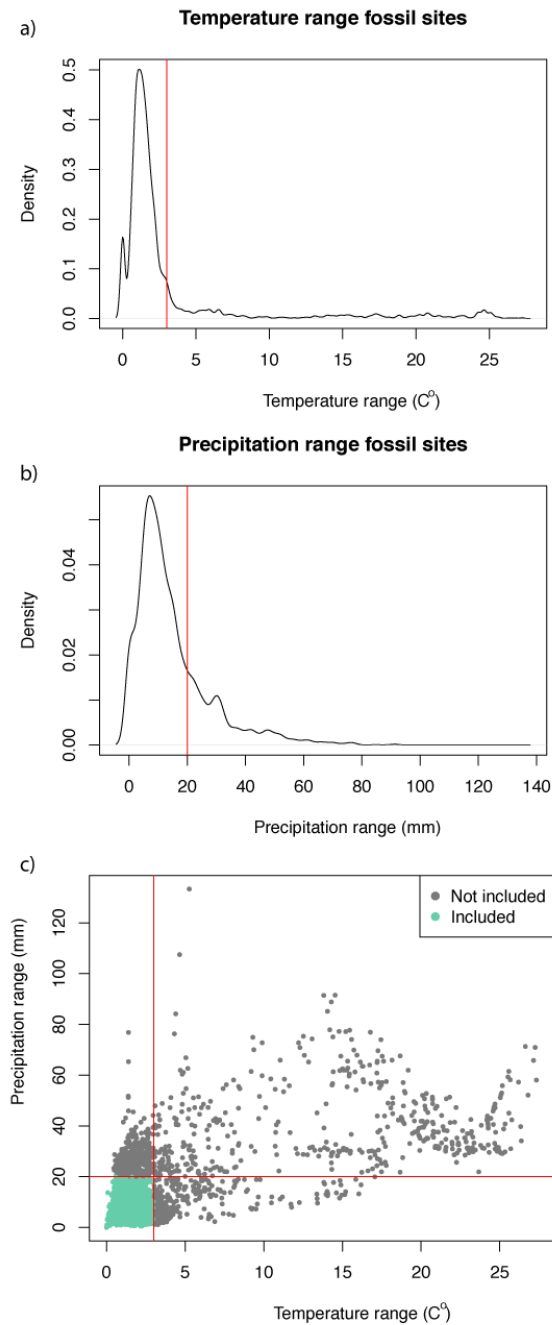


Figure S8.

Climatic range of the studied fossil sites. A) Temperature range. Red line indicates the 3oC threshold for excluding localities based on their temperature range. B) Precipitation range. Red line indicates the 20mm threshold for excluding localities based on their precipitation range. C) Temperature and precipitation range for the studied fossil localities. Green localities were included in the analysis, while grey localities were excluded for having temperature and/or precipitation ranged beyond the established threshold.

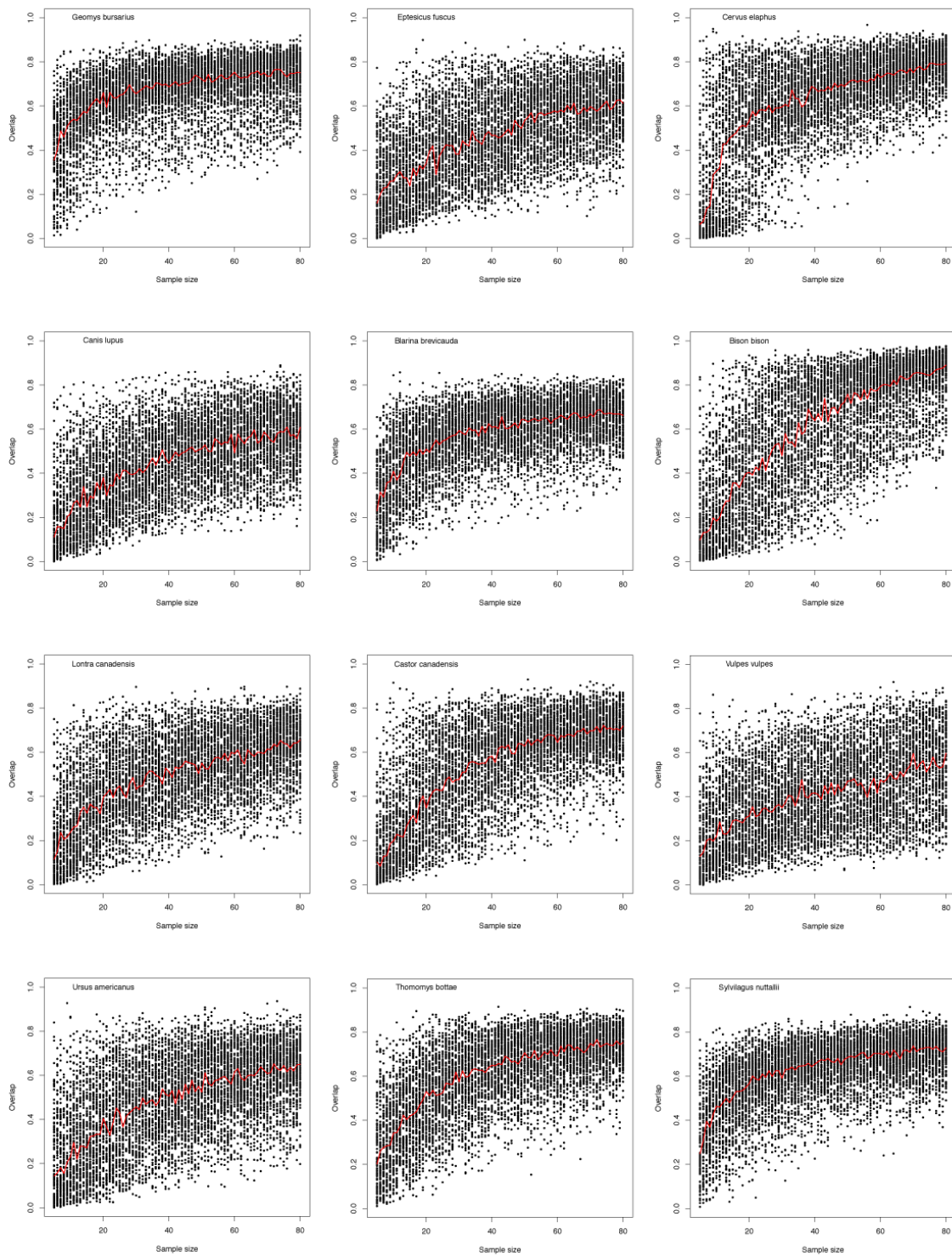


Figure S9.

Minimum sample size analysis for 12 species in the analysis. Red line indicates the medium for each sample size iteration from 5 to 80.

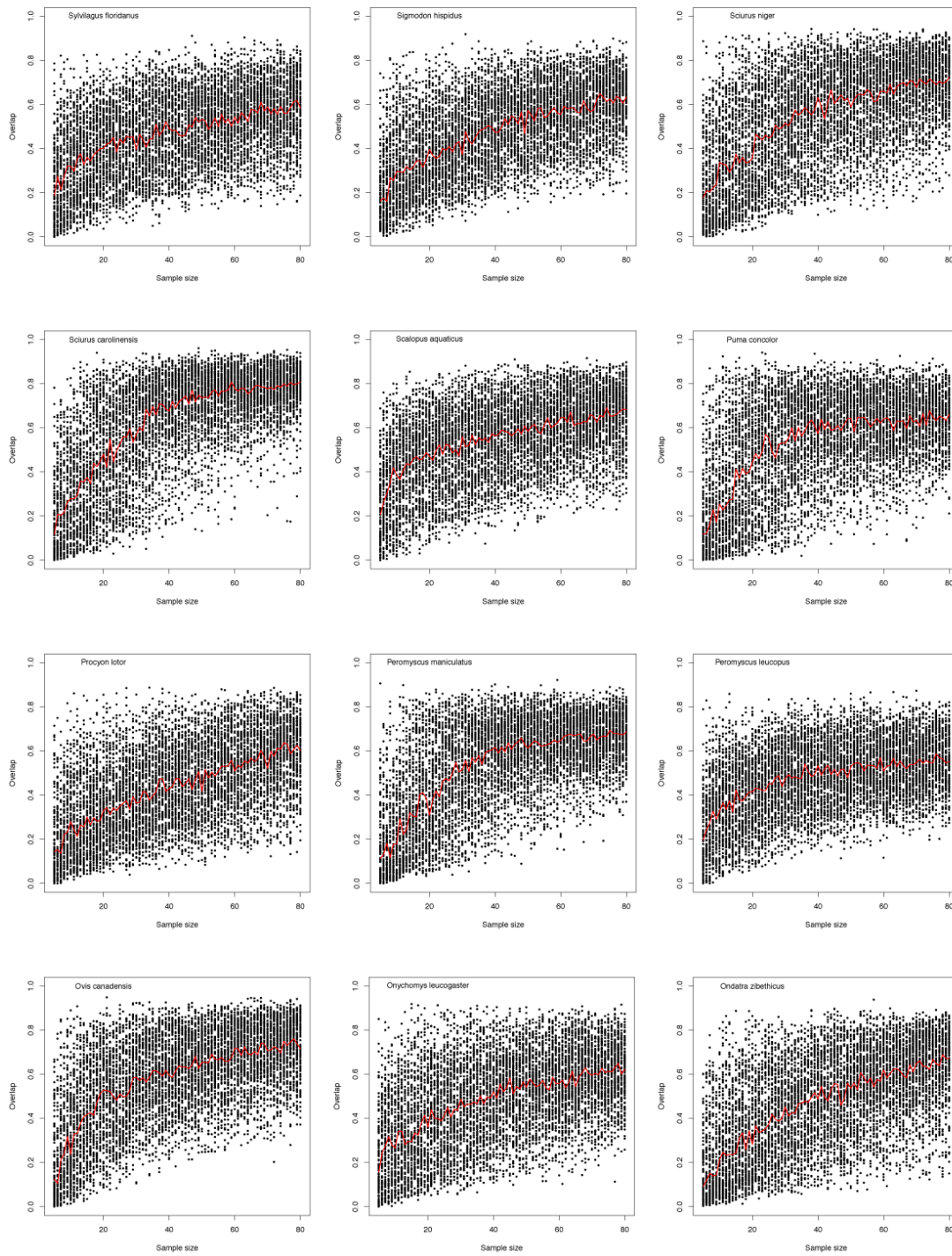


Figure S10.

Minimum sample size analysis for 12 species in the analysis. Red line indicates the medium for each sample size iteration from 5 to 80.

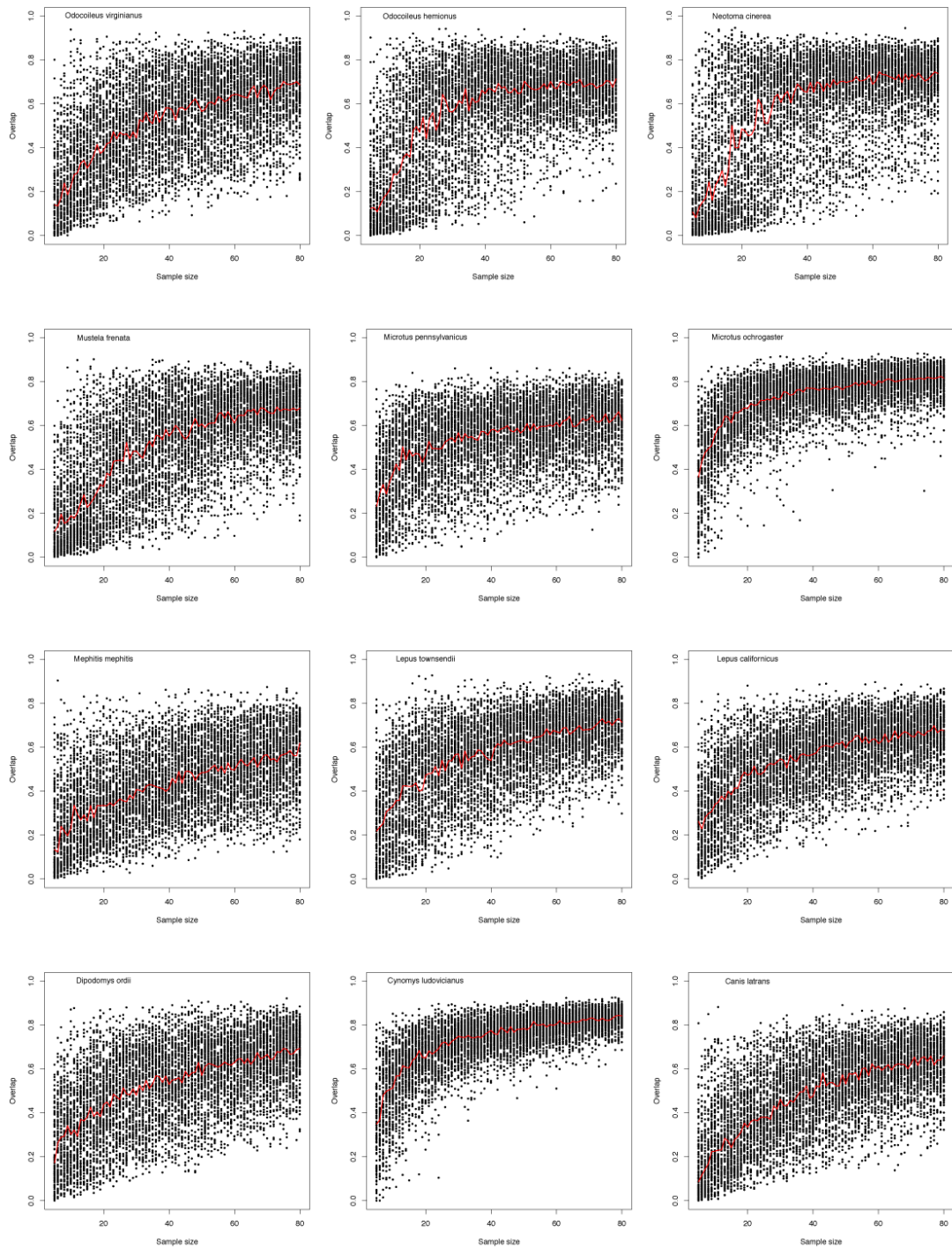


Figure S11.

Minimum sample size analysis for 12 species in the analysis. Red line indicates the medium for each sample size iteration from 5 to 80.

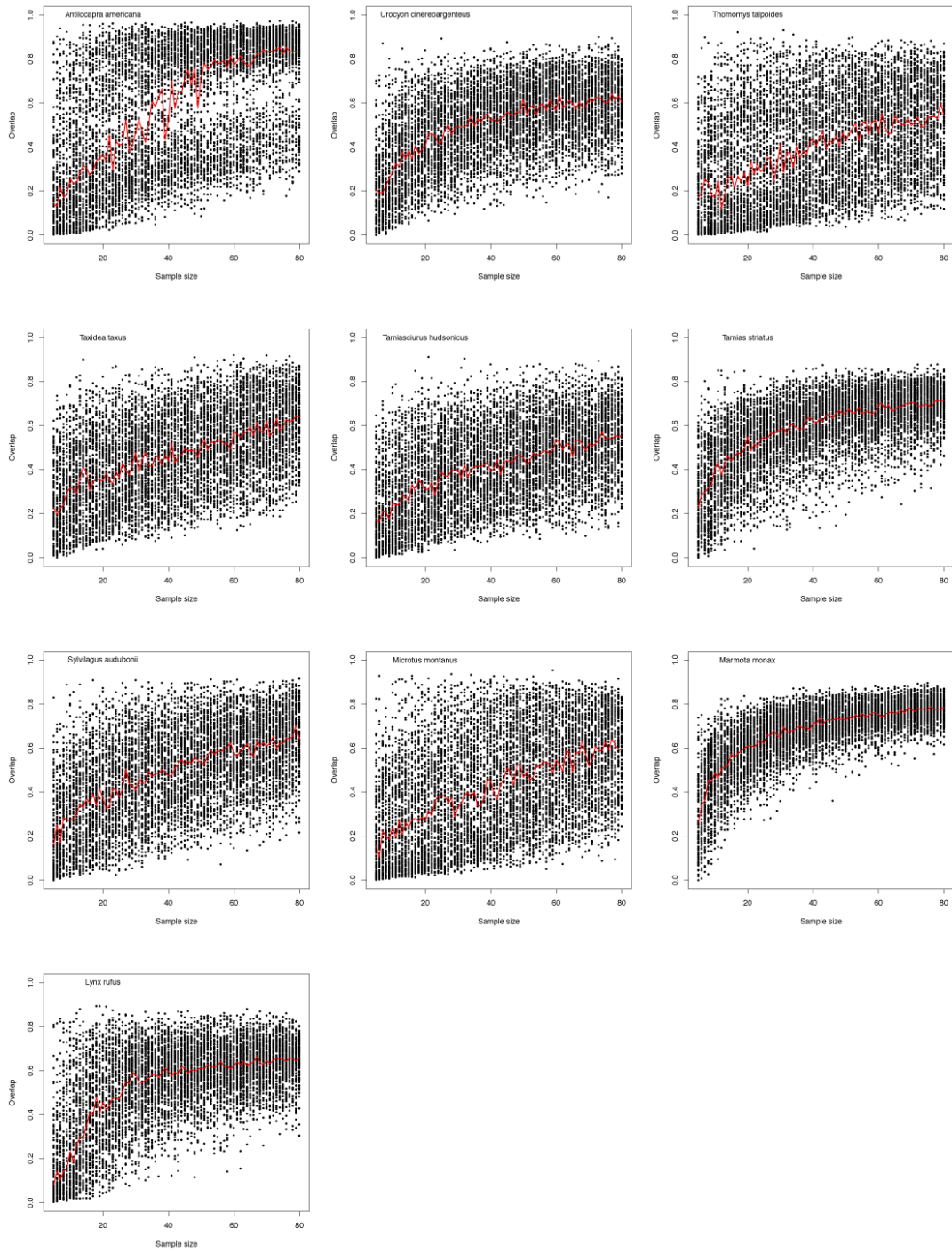


Figure S12.

Minimum sample size analysis for 12 species in the analysis. Red line indicates the medium for each sample size iteration from 5 to 80.

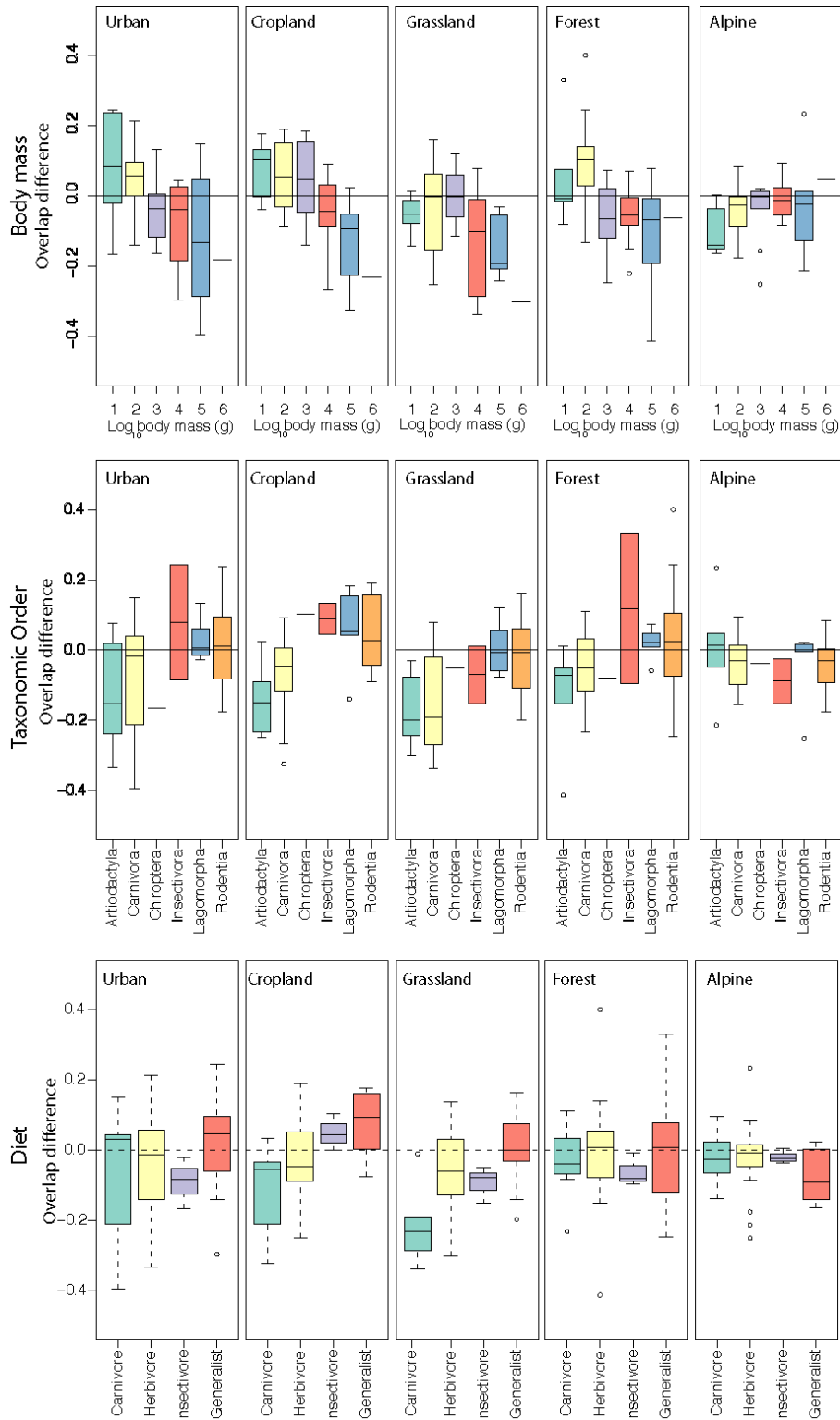


Figure S13.

Average overlap difference (Habitat Niche Change, HNC) for each body mass category (\log_{10} body mass in grams), taxonomic Order and dietary category for the 46 species in the study and for each habitat type. Horizontal dashed lines were added as a reference for where no overlap difference occurs (overlap difference = 0).

Table S1.

Land cover (habitat) categories used in the study. Land Use Cover (LUC) refers to the original dataset from the U.S. Geological Survey, Department of the Interior (catalog.data.gov). Our nomenclature indicates the name we gave it in our dataset. Used in the study indicates whether that particular land-cover was used in the present study.

LUC-ID	LUC – Nomenclature in the original dataset	Our classification	Used in study
1	Mostly cropland;	Cropland	Yes
2	Cropland with grazing land;	Cropland	Yes
3	Cropland with pasture, woodland, and forest;	Cropland	Yes
4	Irrigated land;	Irrigated	No
5	Woodland and forest with some cropland and pasture;	Woodland cropland	No
6	Forest and woodland mostly grazed;	Grazed forest	No
7	Forest and woodland mostly ungrazed;	Forest	Yes
8	Subhumid grassland and semiarid grazing land;	Grassland	Yes
9	Open woodland grazed (pinon, juniper, aspen groves, chaparral and brush);	Woodland grazed	No
10	Desert shrubland grazed;	Desert grazed	No
11	Desert shrubland mostly ungrazed;	Desert	No
12	Alpine meadows, mountain peaks above timber line, sparse dry tundra, lava flows, and barren land;	Alpine	Yes
13	Swamp;	Swamp	No
14	Marshland;	Marshland	No
15	Moist tundra and muskeg;	Tundra	No
16	Urban areas;	Urban	Yes
17	Open water;	Open water	No
99	Great Lakes, Canada.	Lakes	No

Table S2.

Species counts (number of occurrences) for each time interval and as total

	Post-Glacial	Agricultural	European	Industrial	Present	Total
<i>Antilocapra americana</i>	99	302	76	141	191	809
<i>Bison bison</i>	130	387	108	104	94	823
<i>Blarina brevicauda</i>	41	71	58	712	1304	2186
<i>Canis latrans</i>	97	193	90	991	1179	2550
<i>Canis lupus</i>	43	116	79	271	466	975
<i>Castor canadensis</i>	109	485	126	355	469	1544
<i>Cervus elaphus</i>	78	365	116	105	186	850
<i>Cynomys ludovicianus</i>	27	69	41	203	288	628
<i>Dipodomys ordii</i>	28	60	65	704	1386	2243
<i>Eptesicus fuscus</i>	52	27	55	876	1716	2726
<i>Geomys bursarius</i>	61	187	25	229	734	1236
<i>Lepus californicus</i>	94	192	30	726	729	1771
<i>Lepus townsendii</i>	26	66	29	274	244	639
<i>Lontra canadensis</i>	30	121	53	142	481	827
<i>Lynx rufus</i>	79	255	118	701	1129	2282
<i>Marmota monax</i>	65	172	55	385	351	1028
<i>Mephitis mephitis</i>	74	233	101	862	898	2168
<i>Microtus montanus</i>	22	38	28	489	812	1389
<i>Microtus ochrogaster</i>	43	67	50	255	636	1051
<i>Microtus pennsylvanicus</i>	54	70	95	655	1143	2017
<i>Mustela frenata</i>	45	76	74	1031	868	2094
<i>Neotoma cinerea</i>	93	98	41	494	619	1345
<i>Odocoileus hemionus</i>	80	208	81	502	545	1416
<i>Odocoileus virginianus</i>	143	559	117	365	650	1834
<i>Ondatra zibethicus</i>	106	299	102	737	770	2014
<i>Onychomys leucogaster</i>	55	72	52	477	1109	1765
<i>Ovis canadensis</i>	107	259	88	168	185	807
<i>Peromyscus leucopus</i>	20	41	88	868	2729	3746
<i>Peromyscus maniculatus</i>	45	115	220	2651	4932	7963
<i>Procyon lotor</i>	118	445	123	648	1289	2623
<i>Puma concolor</i>	23	59	58	243	358	741
<i>Scalopus aquaticus</i>	86	148	59	538	572	1403
<i>Sciurus carolinensis</i>	55	149	94	621	930	1849
<i>Sciurus niger</i>	29	142	46	648	1165	2030
<i>Sigmodon hispidus</i>	72	100	51	433	1482	2138
<i>Sylvilagus audubonii</i>	23	114	41	678	885	1741
<i>Sylvilagus floridanus</i>	82	245	46	684	1111	2168
<i>Sylvilagus nuttallii</i>	57	119	22	335	338	871

Table S3.

Summary of variables calculated in the study and their correspondent R function.

Variable	Statistic name	R function	Package	Description
Overlap	D	<code>ecospat.niche.overlap()</code>	<code>ecospat</code>	Calculates the overlap metric D based on two species or populations occurrence density grids. Density grids are calculated with the function <code>ecospat.grid.clim.dyn()</code>
Equivalency	Niche equivalency	<code>ecospat.niche.equivalency.test()</code>	<code>ecospat</code>	Runs a niche equivalency test (Warren et al. 2008) between two species based on their density grids. Density grids are calculated with the function <code>ecospat.grid.clim.dyn()</code>
Disparity	Data disparity	<code>centroid()</code>	<code>disparRity</code>	Average Euclidian distance between each data point (specimen) and the centroid for their environmental niche space

Table S4.

Test for niche overlap (mean overlap for 100 iterations and standard deviation) between different time intervals for the 46 species of mammals in the study.

Species	Post Glacial to Agricultural	Agricultural to European	European to Industrial	Industrial to Present	Post Glacial vs Present	Agricultural vs Present	European vs Present	Pre-vs Post-Industrial
<i>Antilocapra americana</i>	0.644 +/- 0.03	0.546 +/- 0.055	0.483 +/- 0.048	0.627 +/- 0.026	0.389 +/- 0.029	0.491 +/- 0.022	0.36 +/- 0.023	0.524 +/- 0.006
<i>Bison bison</i>	0.671 +/- 0.025	0.631 +/- 0.035	0.463 +/- 0.007	0.622 +/- 0.019	0.36 +/- 0.017	0.379 +/- 0.082	0.387 +/- 0.014	0.471 +/- 0.019
<i>Blarina brevicauda</i>	0.158 +/- 0.015	0.403 +/- 0.009	0.514 +/- 0.06	0.75 +/- 0.02	0.18 +/- 0.029	0.523 +/- 0.101	0.453 +/- 0.049	0.349 +/- 0.018
<i>Canis latrans</i>	0.531 +/- 0.037	0.492 +/- 0.034	0.433 +/- 0.055	0.546 +/- 0.013	0.371 +/- 0.046	0.367 +/- 0.052	0.34 +/- 0.056	0.473 +/- 0.03
<i>Canis lupus</i>	0.43 +/- 0.054	0.548 +/- 0.027	0.468 +/- 0.077	0.5 +/- 0.02	0.236 +/- 0.055	0.269 +/- 0.044	0.335 +/- 0.075	0.309 +/- 0.032
<i>Castor canadensis</i>	0.505 +/- 0.033	0.477 +/- 0.056	0.444 +/- 0.031	0.612 +/- 0.014	0.312 +/- 0.03	0.378 +/- 0.009	0.391 +/- 0.03	0.34 +/- 0.013
<i>Cervus elaphus</i>	0.671 +/- 0.044	0.211 +/- 0.038	0.417 +/- 0.022	0.412 +/- 0.02	0.153 +/- 0.023	0.135 +/- 0.035	0.385 +/- 0.015	0.156 +/- 0.019
<i>Cynomys ludovicianus</i>	0.492 +/- 0.105	0.661 +/- 0.037	0.619 +/- 0.067	0.805 +/- 0.013	0.486 +/- 0.057	0.71 +/- 0.03	0.7 +/- 0.054	0.607 +/- 0.031
<i>Dipodomys ordii</i>	0.652 +/- 0.062	0.462 +/- 0.022	0.256 +/- 0.084	0.758 +/- 0.014	0.358 +/- 0.141	0.434 +/- 0.119	0.238 +/- 0.091	0.398 +/- 0.094
<i>Eptesicus fuscus</i>	0.502 +/- 0.062	0.331 +/- 0.081	0.579 +/- 0.083	0.608 +/- 0.027	0.346 +/- 0.111	0.282 +/- 0.156	0.427 +/- 0.111	0.329 +/- 0.09
<i>Geomys bursarius</i>	0.604 +/- 0.042	0.443 +/- 0.102	0.486 +/- 0.068	0.65 +/- 0.049	0.523 +/- 0.048	0.579 +/- 0.062	0.515 +/- 0.063	0.582 +/- 0.045
<i>Lepus californicus</i>	0.69 +/- 0.032	0.525 +/- 0.086	0.532 +/- 0.076	0.814 +/- 0.002	0.665 +/- 0.064	0.674 +/- 0.03	0.535 +/- 0.107	0.684 +/- 0.027
<i>Lepus townsendii</i>	0.185 +/- 0.037	0.574 +/- 0.041	0.48 +/- 0.126	0.678 +/- 0.012	0.253 +/- 0.062	0.48 +/- 0.097	0.372 +/- 0.12	0.634 +/- 0.056
<i>Lontra canadensis</i>	0.443 +/- 0.07	0.228 +/- 0.051	0.536 +/- 0.033	0.463 +/- 0.047	0.316 +/- 0.098	0.359 +/- 0.053	0.401 +/- 0.059	0.318 +/- 0.046
<i>Lynx rufus</i>	0.574 +/- 0.051	0.39 +/- 0.037	0.463 +/- 0.034	0.615 +/- 0.016	0.346 +/- 0.04	0.442 +/- 0.035	0.403 +/- 0.03	0.46 +/- 0.031
<i>Marmota monax</i>	0.47 +/- 0.032	0.45 +/- 0.052	0.572 +/- 0.085	0.575 +/- 0.017	0.471 +/- 0.032	0.792 +/- 0.015	0.428 +/- 0.059	0.629 +/- 0.039
<i>Mephitis mephitis</i>	0.392 +/- 0.032	0.401 +/- 0.028	0.431 +/- 0.044	0.583 +/- 0.006	0.301 +/- 0.038	0.295 +/- 0.034	0.302 +/- 0.054	0.381 +/- 0.031
<i>Microtus montanus</i>	0.582 +/- 0.059	0.225 +/- 0.039	0.192 +/- 0.109	0.694 +/- 0.023	0.34 +/- 0.145	0.32 +/- 0.155	0.229 +/- 0.153	0.355 +/- 0.117
<i>Microtus ochrogaster</i>	0.204 +/- 0.031	0.541 +/- 0.048	0.49 +/- 0.052	0.793 +/- 0.022	0.176 +/- 0.028	0.482 +/- 0.031	0.406 +/- 0.046	0.292 +/- 0.026
<i>Microtus pennsylvanicus</i>	0.106 +/- 0.016	0.618 +/- 0.036	0.622 +/- 0.076	0.713 +/- 0.019	0.138 +/- 0.02	0.597 +/- 0.122	0.583 +/- 0.071	0.276 +/- 0.034
<i>Mustela frenata</i>	0.537 +/- 0.031	0.424 +/- 0.009	0.407 +/- 0.052	0.606 +/- 0.008	0.362 +/- 0.039	0.497 +/- 0.056	0.355 +/- 0.04	0.452 +/- 0.043
<i>Neotoma cinerea</i>	0.683 +/- 0.033	0.452 +/- 0.185	0.441 +/- 0.063	0.678 +/- 0.015	0.382 +/- 0.05	0.387 +/- 0.049	0.439 +/- 0.046	0.389 +/- 0.038
<i>Odocoileus hemionus</i>	0.597 +/- 0.048	0.359 +/- 0.038	0.513 +/- 0.058	0.546 +/- 0.011	0.341 +/- 0.042	0.422 +/- 0.04	0.344 +/- 0.049	0.402 +/- 0.032
<i>Odocoileus virginianus</i>	0.607 +/- 0.059	0.52 +/- 0.034	0.417 +/- 0.033	0.519 +/- 0.017	0.327 +/- 0.05	0.452 +/- 0.008	0.375 +/- 0.067	0.41 +/- 0.01
<i>Ondatra zibethicus</i>	0.364 +/- 0.034	0.561 +/- 0.033	0.322 +/- 0.072	0.683 +/- 0.007	0.25 +/- 0.041	0.29 +/- 0.026	0.236 +/- 0.056	0.326 +/- 0.018
<i>Onychomys leucogaster</i>	0.713 +/- 0.021	0.501 +/- 0.019	0.557 +/- 0.075	0.64 +/- 0.054	0.35 +/- 0.082	0.293 +/- 0.078	0.49 +/- 0.122	0.269 +/- 0.049
<i>Ovis canadensis</i>	0.536 +/- 0.051	0.34 +/- 0.078	0.449 +/- 0.035	0.479 +/- 0.029	0.254 +/- 0.04	0.413 +/- 0.056	0.57 +/- 0.028	0.383 +/- 0.005
<i>Peromyscus leucopus</i>	0.252 +/- 0.041	0.481 +/- 0.037	0.27 +/- 0.08	0.573 +/- 0.034	0.29 +/- 0.072	0.288 +/- 0.108	0.193 +/- 0.068	0.34 +/- 0.099
<i>Peromyscus maniculatus</i>	0.385 +/- 0.081	0.43 +/- 0.047	0.514 +/- 0.043	0.745 +/- 0.013	0.363 +/- 0.029	0.326 +/- 0.047	0.446 +/- 0.044	0.419 +/- 0.033
<i>Procyon lotor</i>	0.469 +/- 0.072	0.494 +/- 0.027	0.478 +/- 0.039	0.595 +/- 0.019	0.226 +/- 0.046	0.45 +/- 0.025	0.387 +/- 0.05	0.467 +/- 0.026
<i>Puma concolor</i>	0.423 +/- 0.102	0.402 +/- 0.009	0.287 +/- 0.049	0.493 +/- 0.055	0.216 +/- 0.069	0.2 +/- 0.034	0.355 +/- 0.045	0.252 +/- 0.059
<i>Scalopus aquaticus</i>	0.555 +/- 0.027	0.262 +/- 0.051	0.458 +/- 0.067	0.755 +/- 0.017	0.347 +/- 0.083	0.354 +/- 0.079	0.399 +/- 0.066	0.361 +/- 0.042
<i>Sciurus carolinensis</i>	0.587 +/- 0.04	0.604 +/- 0.031	0.411 +/- 0.099	0.604 +/- 0.021	0.174 +/- 0.052	0.243 +/- 0.039	0.207 +/- 0.04	0.274 +/- 0.037
<i>Sciurus niger</i>	0.522 +/- 0.078	0.459 +/- 0.077	0.502 +/- 0.066	0.64 +/- 0.022	0.184 +/- 0.091	0.288 +/- 0.047	0.423 +/- 0.102	0.345 +/- 0.044
<i>Sigmodon hispidus</i>	0.491 +/- 0.054	0.517 +/- 0.066	0.263 +/- 0.055	0.602 +/- 0.025	0.201 +/- 0.073	0.368 +/- 0.078	0.325 +/- 0.129	0.355 +/- 0.04
<i>Sylvilagus audubonii</i>	0.517 +/- 0.13	0.383 +/- 0.101	0.377 +/- 0.123	0.741 +/- 0.024	0.326 +/- 0.162	0.528 +/- 0.062	0.308 +/- 0.134	0.525 +/- 0.055
<i>Sylvilagus floridanus</i>	0.607 +/- 0.028	0.623 +/- 0.054	0.525 +/- 0.109	0.642 +/- 0.024	0.328 +/- 0.089	0.348 +/- 0.06	0.35 +/- 0.123	0.408 +/- 0.046
<i>Sylvilagus nuttallii</i>	0.733 +/- 0.033	0.482 +/- 0.072	0.412 +/- 0.107	0.766 +/- 0.003	0.633 +/- 0.071	0.674 +/- 0.064	0.437 +/- 0.095	0.521 +/- 0.074
<i>Tamias striatus</i>	0.268 +/- 0.034	0.579 +/- 0.026	0.586 +/- 0.083	0.73 +/- 0.015	0.324 +/- 0.045	0.605 +/- 0.078	0.594 +/- 0.057	0.609 +/- 0.064
<i>Tamiasciurus hudsonicus</i>	0.08 +/- 0.008	0.261 +/- 0.119	0.482 +/- 0.047	0.717 +/- 0.026	0.144 +/- 0.03	0.223 +/- 0.141	0.404 +/- 0.053	0.313 +/- 0.038
<i>Taxidea taxus</i>	0.622 +/- 0.042	0.484 +/- 0.048	0.511 +/- 0.03	0.711 +/- 0.016	0.449 +/- 0.063	0.54 +/- 0.056	0.46 +/- 0.049	0.508 +/- 0.036
<i>Thomomys bottae</i>	0.63 +/- 0.063	0.346 +/- 0.023	0.552 +/- 0.056	0.767 +/- 0.009	0.393 +/- 0.118	0.359 +/- 0.069	0.591 +/- 0.059	0.405 +/- 0.066
<i>Thomomys talpoides</i>	0.259 +/- 0.051	0.582 +/- 0.085	0.441 +/- 0.146	0.745 +/- 0.016	0.316 +/- 0.029	0.248 +/- 0.095	0.357 +/- 0.147	0.443 +/- 0.038
<i>Urocyon cinereoargenteus</i>	0.472 +/- 0.102	0.437 +/- 0.061	0.357 +/- 0.101	0.713 +/- 0.015	0.403 +/- 0.076	0.503 +/- 0.065	0.336 +/- 0.11	0.486 +/- 0.043
<i>Ursus americanus</i>	0.329 +/- 0.035	0.373 +/- 0.026	0.385 +/- 0.032	0.499 +/- 0.024	0.257 +/- 0.045	0.339 +/- 0.043	0.281 +/- 0.039	0.357 +/- 0.029
<i>Vulpes vulpes</i>	0.642 +/- 0.034	0.21 +/- 0.034	0.315 +/- 0.06	0.258 +/- 0.021	0.355 +/- 0.083	0.334 +/- 0.077	0.252 +/- 0.059	0.395 +/- 0.052

Table S5.

Test for niche equivalency between different time intervals for the 46 species of mammals in the study. In grey: Significant differences between time intervals as described in Warren et al. (2008) and Di Cola et al. (2017)

Species	Post-Glacial to Agricultural	Agricultural to European	European to Industrial	Industrial to Present	Post-Glacial vs. Present	Agricultural vs. Present	European vs. Present	Before vs. After Industrial revolution
<i>Antilocapra americana</i>	0.871	0.95	0.881	0.168	0.911	0.287	0.356	0.901
<i>Bison bison</i>	0.97	0.99	0.317	0.347	0.545	0.05	0.287	0.040
<i>Blarina brevicauda</i>	0.01	0.347	0.871	1	0.02	0.069	0.98	0.010
<i>Canis latrans</i>	0.485	0.069	0.03	0.01	0.564	0.01	0.01	0.386
<i>Canis lupus</i>	0.861	0.644	0.099	0.02	0.02	0.01	0.04	0.010
<i>Castor canadensis</i>	0.822	0.861	0.376	0.406	0.158	0.01	0.515	0.010
<i>Cervus elaphus</i>	0.812	0.01	0.158	0.03	0.01	0.01	0.178	0.010
<i>Cynomys ludovicianus</i>	0.267	0.634	0.337	0.98	0.05	0.663	0.564	0.139
<i>Dipodomys ordii</i>	0.426	0.01	0.01	0.98	0.02	0.327	0.01	0.337
<i>Eptesicus fuscus</i>	0.158	0.02	0.168	0.01	0.059	0.01	0.04	0.010
<i>Geomys bursarius</i>	0.198	0.287	0.337	0.782	0.03	0.04	0.109	0.010
<i>Lepus californicus</i>	0.683	0.455	0.832	1	1	1	0.683	1.000
<i>Lepus townsendii</i>	0.03	0.594	0.188	0.168	0.347	0.01	0.069	0.950
<i>Lontra canadensis</i>	0.545	0.04	1	0.168	0.208	0.04	0.931	0.020
<i>Lynx rufus</i>	0.812	0.059	0.891	0.218	0.257	0.03	1	0.178
<i>Marmota monax</i>	0.139	0.356	0.673	0.228	0.198	1	0.406	0.535
<i>Mephitis mephitis</i>	0.248	0.257	0.238	0.921	0.139	0.01	0.059	0.010
<i>Microtus montanus</i>	0.842	0.01	0.01	0.584	0.465	0.109	0.02	0.139
<i>Microtus ochrogaster</i>	0.01	0.01	0.01	0.307	0.01	0.01	0.01	0.010
<i>Microtus pennsylvanicus</i>	0.01	0.762	0.96	0.97	0.01	0.149	0.95	0.010
<i>Mustela frenata</i>	0.782	0.04	0.436	0.505	0.584	0.099	0.475	0.030
<i>Neotoma cinerea</i>	1	0.653	0.287	0.95	0.366	0.05	0.743	0.020
<i>Odocoileus hemionus</i>	0.663	0.05	0.604	0.139	0.396	0.05	0.257	0.020
<i>Odocoileus virginianus</i>	0.327	0.059	0.02	0.02	0.02	0.01	0.089	0.010
<i>Ondatra zibethicus</i>	0.04	0.96	0.01	0.99	0.03	0.01	0.01	0.010
<i>Onychomys leucogaster</i>	0.624	0.069	0.772	0.733	0.119	0.01	0.277	0.010
<i>Ovis canadensis</i>	0.505	0.069	0.248	0.059	0.01	0.059	0.99	0.020
<i>Peromyscus leucopus</i>	0.158	0.366	0.01	0.96	0.574	0.01	0.01	0.020
<i>Peromyscus maniculatus</i>	0.238	0.05	0.545	1	0.723	0.01	0.713	0.010
<i>Procyon lotor</i>	0.01	0.356	0.475	0.624	0.01	0.01	0.495	0.010
<i>Puma concolor</i>	0.733	0.366	0.02	0.248	0.109	0.02	0.634	0.010
<i>Scalopus aquaticus</i>	0.158	0.01	0.02	0.99	0.01	0.01	0.03	0.010
<i>Sciurus carolinensis</i>	0.515	0.762	0.01	0.089	0.01	0.01	0.01	0.010
<i>Sciurus niger</i>	0.436	0.228	0.554	0.861	0.01	0.01	0.248	0.010
<i>Sigmodon hispidus</i>	0.03	0.158	0.01	0.96	0.01	0.149	0.04	0.010
<i>Sylvilagus audubonii</i>	0.257	0.059	0.01	0.98	0.139	0.673	0.04	0.772
<i>Sylvilagus floridanus</i>	0.416	0.515	0.139	0.733	0.01	0.01	0.01	0.010
<i>Sylvilagus nuttallii</i>	0.782	0.069	0.04	0.376	0.277	0.228	0.04	0.020
<i>Tamias striatus</i>	0.01	0.931	0.594	1	0.129	0.069	1	0.178
<i>Tamiasciurus hudsonicus</i>	0.01	0.01	0.634	1	0.119	0.01	1	0.139
<i>Taxidea taxus</i>	0.99	0.515	0.663	0.881	0.713	0.752	1	0.772
<i>Thomomys bottae</i>	0.624	0.02	0.03	0.891	0.04	0.01	0.267	0.010
<i>Thomomys talpoides</i>	0.089	0.574	0.267	0.931	0.525	0.01	0.267	0.099
<i>Urocyon cinereoargenteus</i>	0.851	0.01	0.01	1	0.198	0.257	0.01	0.119
<i>Ursus americanus</i>	0.465	0.416	0.079	0.01	0.327	0.01	0.119	0.010
<i>Vulpes vulpes</i>	1	0.02	0.02	0.01	0.347	0.05	0.406	0.040

Table S6.

Disparity for each studied time interval. Disparity described as the average Euclidian distance from the centroid (see Methods)

Species	Post-Glacial	Agricultural	European	Industrial	Present
<i>Antilocapra americana</i>	14.265	11.297	9.029	10.621	7.508
<i>Bison bison</i>	15.300	16.823	15.857	10.826	11.742
<i>Blarina brevicauda</i>	19.341	12.663	11.578	13.906	16.056
<i>Canis latrans</i>	22.918	19.106	22.175	21.874	29.997
<i>Canis lupus</i>	22.382	24.447	28.955	26.270	26.913
<i>Castor canadensis</i>	25.701	20.640	31.029	24.943	28.599
<i>Cervus elaphus</i>	26.536	20.474	38.917	33.453	29.600
<i>Cynomys ludovicianus</i>	17.428	7.824	9.040	8.864	9.854
<i>Dipodomys ordii</i>	8.578	10.499	5.876	10.089	10.641
<i>Eptesicus fuscus</i>	21.318	16.729	32.099	26.537	26.072
<i>Geomys bursarius</i>	18.530	13.534	18.828	15.486	17.460
<i>Lepus californicus</i>	14.007	13.954	13.448	18.494	13.609
<i>Lepus townsendii</i>	12.185	7.741	7.051	10.158	8.592
<i>Lontra canadensis</i>	24.712	18.547	23.589	22.494	23.695
<i>Lynx rufus</i>	31.086	28.911	37.250	28.307	28.488
<i>Marmota monax</i>	10.866	11.400	11.924	13.458	13.039
<i>Mephitis mephitis</i>	26.989	20.966	28.533	27.424	25.400
<i>Microtus montanus</i>	7.601	13.838	5.772	16.019	13.867
<i>Microtus ochrogaster</i>	15.628	16.065	19.415	20.305	21.084
<i>Microtus pennsylvanicus</i>	28.342	20.833	21.680	21.946	21.588
<i>Mustela frenata</i>	23.036	25.120	30.550	26.512	28.073
<i>Neotoma cinerea</i>	19.530	11.597	21.321	27.093	20.522
<i>Odocoileus hemionus</i>	13.263	11.353	29.552	26.846	20.572
<i>Odocoileus virginianus</i>	13.672	15.471	18.504	22.373	26.604
<i>Ondatra zibethicus</i>	26.865	20.814	24.504	27.181	28.231
<i>Onychomys leucogaster</i>	11.687	12.984	8.467	9.913	10.689
<i>Ovis canadensis</i>	11.355	9.342	12.489	15.466	12.137
<i>Peromyscus leucopus</i>	21.337	14.266	23.139	18.779	25.247
<i>Peromyscus maniculatus</i>	22.351	16.660	24.460	26.274	25.018
<i>Procyon lotor</i>	16.052	17.558	26.820	26.891	28.307
<i>Puma concolor</i>	28.759	29.277	35.435	34.109	24.254
<i>Scalopus aquaticus</i>	16.426	11.042	16.839	18.926	20.879
<i>Sciurus carolinensis</i>	9.862	11.645	13.127	17.863	20.472
<i>Sciurus niger</i>	10.991	12.608	19.532	21.251	26.283
<i>Sigmodon hispidus</i>	13.274	26.425	32.429	28.391	30.271
<i>Sylvilagus audubonii</i>	7.348	10.055	8.772	11.873	9.452
<i>Sylvilagus floridanus</i>	16.175	15.664	19.959	19.531	24.297
<i>Sylvilagus nuttallii</i>	6.015	8.681	5.175	10.140	8.016
<i>Tamias striatus</i>	15.822	11.853	10.842	14.973	14.903
<i>Tamiasciurus hudsonicus</i>	27.902	20.010	27.928	22.243	22.646
<i>Taxidea taxus</i>	20.466	18.659	12.569	16.652	16.350
<i>Thomomys bottae</i>	7.902	10.530	10.492	18.897	13.098
<i>Thomomys talpoides</i>	17.687	8.849	11.302	14.265	14.212
<i>Urocyon cinereoargenteus</i>	27.984	26.375	25.863	28.905	29.393
<i>Ursus americanus</i>	26.618	21.105	26.132	30.461	26.320
<i>Vulpes vulpes</i>	25.999	24.216	27.234	16.497	25.728

Table S7.

Habitat Niche Change (HNC) values for the 46 species in the study and different land-cover categories between the Present and the Post-Glacial time intervals.

Speices	Urban	Cropland	Grassland	Forest	Alpine
<i>Antilocapra americana</i>	-0.1226	-0.2018	-0.2427	-0.0916	-0.2081
<i>Bison bison</i>	-0.1804	-0.2316	-0.3012	-0.1023	-0.1568
<i>Blarina brevicauda</i>	0.2437	0.1332	0.0124	0.1054	-0.1174
<i>Canis latrans</i>	0.0366	-0.0426	-0.2866	0.0829	-0.2405
<i>Canis lupus</i>	0.149	-0.0252	-0.2121	0.185	-0.1594
<i>Castor canadensis</i>	-0.1767	-0.0879	-0.1012	0.0637	-0.1626
<i>Cervus elaphus</i>	-0.3347	-0.2498	-0.2025	-0.0599	0.0888
<i>Cynomys ludovicianus</i>	-0.1164	-0.0831	0.0595	-0.0061	-0.1566
<i>Dipodomys ordii</i>	0.1664	0.1615	0.1621	0.0979	-0.064
<i>Eptesicus fuscus</i>	-0.1658	0.1036	-0.0511	0.1362	-0.148
<i>Geomys bursarius</i>	-0.1402	-0.0284	0.0621	0.0594	-0.2331
<i>Lepus californicus</i>	0.0618	0.0522	-0.0077	0.044	-0.1556
<i>Lepus townsendii</i>	-0.0142	-0.139	-0.0597	-0.0524	-0.1363
<i>Lontra canadensis</i>	-0.2417	-0.1536	-0.1896	0.0257	-0.2196
<i>Lynx rufus</i>	-0.1835	-0.2672	-0.3376	-0.0359	-0.2399
<i>Marmota monax</i>	-0.0392	0.0012	0.0519	-0.0047	-0.1569
<i>Mephitis mephitis</i>	-0.0595	-0.0181	0.0038	0.0555	-0.3047
<i>Microtus montanus</i>	0.0578	0.0891	0.0319	0.1343	0.0392
<i>Microtus ochrogaster</i>	-0.0007	-0.0552	-0.053	-0.001	-0.2318
<i>Microtus pennsylvanicus</i>	0.2129	0.1896	0.1375	0.0986	-0.0934
<i>Mustela frenata</i>	0.0426	-0.0468	-0.2517	0.0782	-0.0974
<i>Neotoma cinerea</i>	0.0246	-0.0307	-0.1992	0.0573	-0.0511
<i>Odocoileus hemionus</i>	0.0189	-0.0971	-0.1944	0.0209	-0.0909
<i>Odocoileus virginianus</i>	-0.2371	0.0248	-0.0769	0.142	-0.2813
<i>Ondatra zibethicus</i>	-0.1631	-0.0482	-0.1135	0.095	-0.1815
<i>Onychomys leucogaster</i>	-0.0204	-0.0012	-0.0786	0.0184	-0.1529
<i>Ovis canadensis</i>	0.078	-0.089	-0.0298	-0.047	-0.1513
<i>Peromyscus leucopus</i>	0.2374	0.1768	-0.0125	0.1947	-0.1904
<i>Peromyscus maniculatus</i>	0.0832	-0.0381	-0.1421	0.0893	-0.099
<i>Procyon lotor</i>	-0.2975	0.0357	-0.0869	0.1861	-0.2509
<i>Puma concolor</i>	-0.3953	-0.3241	-0.1918	-0.1796	-0.2819
<i>Scalopus aquaticus</i>	-0.0845	0.0443	-0.1525	0.21	-0.2268
<i>Sciurus carolinensis</i>	-0.1355	0.0952	-0.0106	0.2315	-0.1377
<i>Sciurus niger</i>	-0.0451	0.1714	0.0737	0.2653	-0.1601
<i>Sigmodon hispidus</i>	0.0965	0.1508	-0.1979	0.2511	-0.1482
<i>Sylvilagus audubonii</i>	0.1331	0.1834	0.1207	0.1491	-0.0267
<i>Sylvilagus floridanus</i>	-0.0271	0.1538	-0.0775	0.2192	-0.2135
<i>Sylvilagus nuttallii</i>	0.0061	0.0428	0.0547	0.0617	-0.0502
<i>Tamias striatus</i>	0.0904	0.0554	-0.0031	0.0282	-0.2162
<i>Tamiasciurus hudsonicus</i>	0.066	0.1619	0.1362	0.1393	0.0316
<i>Taxidea taxus</i>	0.0435	0.0322	-0.0103	0.06	-0.1733
<i>Thomomys bottae</i>	0.1171	0.0999	0.0266	0.0804	-0.0604
<i>Thomomys talpoides</i>	-0.0176	-0.089	-0.1276	0.0075	-0.0722
<i>Urocyon cinereoargenteus</i>	0.0251	0.0926	0.0783	0.1256	-0.256
<i>Ursus americanus</i>	-0.1424	-0.0765	-0.0311	0.0229	-0.0579
<i>Vulpes vulpes</i>	0.0244	-0.0643	-0.2891	0.1491	-0.1764

Table S8.

Habitat Niche Change (HNC) values for the 46 species in the study and different land-cover categories between the Pre-Industrial and Post-Industrial time intervals.

Species	Urban	Cropland	Grassland	Forest	Alpine
<i>Antilocapra americana</i>	-0.0964391	-0.106533	-0.2815058	-0.0341236	-0.0111757
<i>Bison bison</i>	-0.1117405	-0.133613	-0.2932733	-0.0553899	0.05028194
<i>Blarina brevicauda</i>	0.03909034	0.03977105	-0.0358994	0.25750733	-0.0502662
<i>Canis latrans</i>	0.0489894	0.03199618	-0.2140209	0.02254272	0.00055247
<i>Canis lupus</i>	0.0816038	0.0144175	-0.1553488	-0.1393561	-0.040311
<i>Castor canadensis</i>	-0.2864205	-0.1937894	-0.186109	-0.2723274	0.11217055
<i>Cervus elaphus</i>	-0.3229195	-0.2546163	-0.2851885	-0.4062268	0.25484628
<i>Cynomys ludovicianus</i>	-0.0288382	0.0101602	0.08248428	-0.025241	-0.0070019
<i>Dipodomys ordii</i>	0.07813356	0.0901783	0.01444186	-0.0363338	-0.007805
<i>Eptesicus fuscus</i>	-0.0986645	0.15982289	-0.027604	-0.1405921	-0.0013023
<i>Geomys bursarius</i>	-0.0003157	0.10267251	0.01921876	-0.0940993	0.0010197
<i>Lepus californicus</i>	0.05258913	0.06631996	-0.0122192	0.00137132	-0.0088565
<i>Lepus townsendii</i>	-0.0070471	-0.0247111	-0.0362774	-0.0109427	-0.0404546
<i>Lontra canadensis</i>	-0.2469601	-0.0944339	-0.0776924	-0.0355835	0.12684524
<i>Lynx rufus</i>	-0.1806857	-0.2194602	-0.1990806	-0.0611865	0.07069741
<i>Marmota monax</i>	-0.0249903	0.0270296	0.00653243	0.07830072	-0.0003973
<i>Mephitis mephitis</i>	-0.1738114	-0.0646318	-0.0956314	-0.2282775	-0.0215362
<i>Microtus montanus</i>	0.02085895	0.06064415	-0.0296731	0.02933894	0.07449624
<i>Microtus ochrogaster</i>	0.0120085	-0.0964063	-0.1670152	-0.0312862	-0.0951581
<i>Microtus pennsylvanicus</i>	0.08049763	0.04218523	0.06085025	0.24717015	-0.1351304
<i>Mustela frenata</i>	0.02000544	-0.0448917	-0.2163291	0.0256724	0.00484948
<i>Neotoma cinerea</i>	0.02314936	-0.0125145	-0.1742216	0.03937506	0.03737153
<i>Odocoileus hemionus</i>	0.02540739	-0.0165922	-0.2288761	0.01556584	0.02689595
<i>Odocoileus virginianus</i>	-0.2445225	-0.0562807	-0.0840724	-0.1032155	0.07019702
<i>Ondatra zibethicus</i>	-0.1721541	-0.0744511	-0.1607788	-0.1578898	0.05003672
<i>Onychomys leucogaster</i>	-0.0230841	0.04406757	-0.1009476	-0.0556201	-0.0004082
<i>Ovis canadensis</i>	-0.0080099	-0.0828078	-0.1972726	-0.0587813	-0.0288468
<i>Peromyscus leucopus</i>	0.11964822	0.14353838	-0.1608249	-0.0718064	-0.0420368
<i>Peromyscus maniculatus</i>	0.03677335	-0.0245578	-0.1860927	0.0040279	0.01629183
<i>Procyon lotor</i>	-0.2437066	-0.0585507	-0.015927	-0.1216729	0.02367722
<i>Puma concolor</i>	-0.4429465	-0.3248287	-0.1116821	-0.1605663	0.03483109
<i>Scalopus aquaticus</i>	0.067798	0.17282646	-0.1227129	-0.0751306	-0.0010937
<i>Sciurus carolinensis</i>	-0.0727335	0.12112253	-0.0289161	-0.2252364	0.01568803
<i>Sciurus niger</i>	-0.0819041	0.11356813	0.00397794	-0.1167843	0.01095544
<i>Sigmodon hispidus</i>	0.00991641	0.09490078	-0.1694461	-0.0017033	0.00044933
<i>Sylvilagus audubonii</i>	0.034249	0.06012661	-0.0047254	-0.0096628	0.00027343
<i>Sylvilagus floridanus</i>	0.03448203	0.16032327	-0.104828	-0.0789717	0.01158025
<i>Sylvilagus nuttallii</i>	0.02546628	0.07425549	0.11660958	0.04236157	0.01143265
<i>Tamias striatus</i>	-0.0566015	0.04097295	-0.0303442	0.05610846	0.0208472
<i>Tamiasciurus hudsonicus</i>	-0.0241222	0.02197177	0.03867663	0.05409335	-0.1231638
<i>Taxidea taxus</i>	-0.0599288	0.00388477	-0.1250615	-0.0460776	0.01672422
<i>Thomomys bottae</i>	0.09698781	0.08309097	-0.0677113	-0.0178512	-0.017104
<i>Thomomys talpoides</i>	0.00495795	-0.013219	-0.0904473	0.07323052	0.00568724
<i>Urocyon cinereoargenteus</i>	-0.0889567	0.04303273	-0.0420706	-0.1281508	0.00026295
<i>Ursus americanus</i>	-0.3640542	-0.2194448	-0.0382934	-0.0839384	0.14477862
<i>Vulpes vulpes</i>	0.05708824	-0.0069102	-0.2180686	0.01529878	0.02244121

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