

Urbanization, climate and species traits shape mammal communities from local to continental scales

In the format provided by the
authors and unedited

Supplementary Table 1 | List of observed species and species groups. N_{obs} indicates the number of daily observations, the total camera trap-days in which the species was detected across all camera sites, out of a total of 20,206 camera trap-days. Average body mass (in kg) and carnivory (% vertebrates in diet) were derived from the EltonTraits 1.0 database. Due to limitations in the ability to distinguish congeneric mammal species based solely on wildlife camera photographs, seven ‘species’ used in the estimation of species presence, detection, and community composition are represented by groupings of multiple taxonomic species (Antelope Ground Squirrel, Chipmunks, Cottontail Rabbits, Flying Squirrels, Gray Squirrels, Jackrabbits, Weasels), with their species traits representing the mean values across each group.

Species Common Name	Species Binomial(s)	N_{obs}	Body Mass (kg)	Carnivory (%)
Antelope Ground Squirrel	<i>Ammospermophilus harrisi</i> , <i>A. leucurus</i>	52	0.11	0
Armadillo	<i>Dasypus novemcinctus</i>	82	4.20	0
Black Bear	<i>Ursus americanus</i>	8	99.95	20
Bobcat	<i>Lynx rufus</i>	73	8.90	100
California Ground Squirrel	<i>Otospermophilus beecheyi</i>	53	0.58	0
Chipmunks	<i>Tamias minimus</i> , <i>T. striatus</i>	285	0.12	0
Cottontail Rabbits	<i>Sylvilagus audubonii</i> , <i>S. bachmani</i> , <i>S. floridanus</i> , <i>S. nuttalli</i> , <i>S. palustris</i>	1211	0.99	0
Cougar	<i>Puma concolor</i>	7	51.60	100
Coyote	<i>Canis latrans</i>	1149	13.41	70
Douglas Squirrel	<i>Tamiasciurus douglasii</i>	42	0.26	30
Elk	<i>Cervus canadensis</i>	29	165.02	0
Flying Squirrels	<i>Glaucomys sabrinus</i> , <i>G. volans</i>	5	0.11	0
Fox Squirrel	<i>Sciurus niger</i>	693	0.76	0
Gray Fox	<i>Urocyon cinereoargenteus</i>	73	3.83	30
Gray Squirrels	<i>Sciurus griseus</i> , <i>S. carolinensis</i>	2230	0.62	0
Hooded Skunk	<i>Mephitis macroura</i>	2	0.80	30
Jackrabbits	<i>Lepus americanus</i> , <i>L. californicus</i> , <i>L. townsendii</i>	209	1.90	0
Javelina	<i>Pecari tajacu</i>	29	21.27	20
Kit Fox	<i>Vulpes macrotis</i>	23	4.50	70

Moose	<i>Alces alces</i>	32	357.00	0
Mountain Beaver	<i>Aplodontia rufa</i>	2	1.00	0
Mule Deer	<i>Odocoileus hemionus</i>	650	54.21	0
North American Badger	<i>Taxidea taxus</i>	25	7.11	90
North American Beaver	<i>Castor canadensis</i>	6	21.82	0
North American Mink	<i>Neogale vison</i>	23	1.15	90
North American Porcupine	<i>Erethizon dorsatum</i>	17	7.09	0
Raccoon	<i>Procyon lotor</i>	2900	5.52	20
Red Fox	<i>Vulpes vulpes</i>	516	5.48	70
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	86	0.20	30
Richardson's Ground Squirrel	<i>Urocitellus richardsonii</i>	2	0.41	0
Rock Squirrel	<i>Otospermophilus variegatus</i>	79	0.69	0
Round-tailed Ground Squirrel	<i>Xerospermophilus tereticaudus</i>	11	0.16	0
Striped Skunk	<i>Mephitis mephitis</i>	291	2.09	30
Virginia Opossum	<i>Didelphis virginiana</i>	1090	2.20	30
Weasels	<i>Mustela nivalis</i> , <i>M. erminea</i> , <i>M. frenata</i>	2	0.12	96.67
White-tailed Deer	<i>Odocoileus virginianus</i>	1999	55.51	0
Woodchuck	<i>Marmota monax</i>	119	3.80	0

Supplementary Table 2 | Effects of local (within-city) environmental predictors on species-level occupancy. We estimated effects using a Bayesian multi-city community occupancy modeling approach across 725 sites in 20 North American cities, depicting the modeled effect of each predictor on occupancy by calculating means (β_{mean}) and 95% Bayesian credible intervals (CRI) across each effect parameter's posterior distribution. We additionally represented the probability that a substantial relationship was detected between each predictor and response variable using the percentage of each effect parameter's Bayesian posterior distribution that shares a sign (positive or negative) with the mean of the distribution, with '**' highlighting "highly likely" relationships and '*' indicating "likely" relationships (see Online Methods for additional detail).

Species Common Name	Species Binomial(s)	Predictor Variable	β_{mean}	95% CRI	Probability of Relationship
Antelope Ground Squirrel	<i>Ammospermophilus harrisi</i> , <i>A. leucurus</i>	Local Urbanization	-0.01	-1.07, 0.97	49.4
		Local Patch Density	0.05	-0.37, 0.46	60.5
		Local Agricultural Footprint	-0.17	-0.66, 0.28	77.8
Armadillo	<i>Dasypus novemcinctus</i>	Local Urbanization	-0.67	-1.56, 0.15	94.8*
		Local Patch Density	0.02	-0.38, 0.41	56.1
		Local Agricultural Footprint	-0.19	-0.64, 0.24	81.3
Black Bear	<i>Ursus americanus</i>	Local Urbanization	-1.11	-2.12, -0.19	99.0**
		Local Patch Density	0.04	-0.38, 0.43	58.4
		Local Agricultural Footprint	-0.18	-0.64, 0.25	79.3
Bobcat	<i>Lynx rufus</i>	Local Urbanization	-0.81	-1.53, -0.14	99.1**
		Local Patch Density	0.16	-0.16, 0.5	84.4
		Local Agricultural Footprint	-0.15	-0.53, 0.21	79.0
California Ground Squirrel	<i>Otospermophilus beecheyi</i>	Local Urbanization	-0.07	-0.92, 0.71	56.9
		Local Patch Density	0.06	-0.33, 0.45	63.4
		Local Agricultural Footprint	-0.12	-0.56, 0.31	72.6
Chipmunks	<i>Tamias minimus</i> , <i>T. striatus</i>	Local Urbanization	-0.32	-0.85, 0.19	89.3*
		Local Patch Density	0.07	-0.25, 0.37	67.8
		Local Agricultural Footprint	-0.17	-0.51, 0.15	84.6

Species Common Name	Species Binomial(s)	Predictor Variable	β_{mean}	95% CRI	Probability of Relationship
Cottontail Rabbits	<i>Sylvilagus audubonii</i> , <i>S. bachmani</i> , <i>S. floridanus</i> , <i>S. nuttallii</i> , <i>S. palustris</i>	Local Urbanization	0.21	-0.12, 0.52	90.8*
		Local Patch Density	0.04	-0.18, 0.25	64.9
		Local Agricultural Footprint	-0.11	-0.38, 0.15	79.5
Cougar	<i>Puma concolor</i>	Local Urbanization	-0.85	-1.92, 0.14	95.5**
		Local Patch Density	0.07	-0.34, 0.47	63.8
		Local Agricultural Footprint	-0.17	-0.64, 0.27	77.8
Coyote	<i>Canis latrans</i>	Local Urbanization	-0.46	-0.77, -0.15	99.8**
		Local Patch Density	0.10	-0.11, 0.3	82.5
		Local Agricultural Footprint	-0.04	-0.26, 0.19	62.8
Douglas Squirrel	<i>Tamiasciurus douglasii</i>	Local Urbanization	-0.12	-1.25, 0.85	57.6
		Local Patch Density	0.05	-0.37, 0.46	61.7
		Local Agricultural Footprint	-0.18	-0.68, 0.27	79.1
Elk	<i>Cervus canadensis</i>	Local Urbanization	-1.32	-2.36, -0.39	99.6**
		Local Patch Density	0.05	-0.35, 0.44	61.6
		Local Agricultural Footprint	-0.11	-0.55, 0.32	70.6
Flying Squirrels	<i>Glaucomys sabrinus</i> , <i>G. volans</i>	Local Urbanization	-0.15	-1.04, 0.67	63.3
		Local Patch Density	0.09	-0.3, 0.48	68.3
		Local Agricultural Footprint	-0.19	-0.65, 0.24	81.2
Fox Squirrel	<i>Sciurus niger</i>	Local Urbanization	0.00	-0.47, 0.46	51.0
		Local Patch Density	0.04	-0.27, 0.35	60.7
		Local Agricultural Footprint	-0.19	-0.56, 0.16	86.2*
Gray Squirrels	<i>Sciurus griseus</i> , <i>S. carolinensis</i>	Local Urbanization	-0.43	-1.13, 0.23	89.9*
		Local Patch Density	0.02	-0.36, 0.38	55.2
		Local Agricultural Footprint	-0.15	-0.58, 0.24	77.4

Species Common Name	Species Binomial(s)	Predictor Variable	β_{mean}	95% CRI	Probability of Relationship
Gray Fox	<i>Urocyon cinereoargenteus</i>	Local Urbanization	0.04	-0.3, 0.37	61.3
		Local Patch Density	0.10	-0.15, 0.36	77.7
		Local Agricultural Footprint	-0.30	-0.62, 0	97.5**
Hooded Skunk	<i>Mephitis macroura</i>	Local Urbanization	-0.28	-1.29, 0.62	72.9
		Local Patch Density	0.07	-0.36, 0.49	63.9
		Local Agricultural Footprint	-0.16	-0.64, 0.3	76.1
Jackrabbits	<i>Lepus americanus</i> , <i>L. californicus</i> , <i>L. townsendii</i>	Local Urbanization	-0.45	-1.26, 0.33	88.1*
		Local Patch Density	0.07	-0.32, 0.44	64.7
		Local Agricultural Footprint	-0.12	-0.55, 0.29	72.4
Javelina	<i>Pecari tajacu</i>	Local Urbanization	-0.78	-1.74, 0.13	95.6**
		Local Patch Density	0.05	-0.38, 0.46	60.1
		Local Agricultural Footprint	-0.17	-0.66, 0.29	77.1
Kit Fox	<i>Vulpes macrotis</i>	Local Urbanization	-0.53	-1.59, 0.4	86.9*
		Local Patch Density	0.06	-0.38, 0.47	61.6
		Local Agricultural Footprint	-0.16	-0.64, 0.3	76.1
Moose	<i>Alces alces</i>	Local Urbanization	-1.30	-2.44, -0.23	99.0**
		Local Patch Density	0.12	-0.29, 0.55	72.8
		Local Agricultural Footprint	-0.14	-0.6, 0.3	74.4
Mountain Beaver	<i>Aplodontia rufa</i>	Local Urbanization	-0.50	-1.42, 0.36	87.9*
		Local Patch Density	0.03	-0.39, 0.43	57.2
		Local Agricultural Footprint	-0.17	-0.65, 0.26	78.5
Mule Deer	<i>Odocoileus hemionus</i>	Local Urbanization	-1.22	-1.98, -0.49	99.9**
		Local Patch Density	0.20	-0.13, 0.55	88.6*
		Local Agricultural Footprint	-0.11	-0.48, 0.23	73.9

Species Common Name	Species Binomial(s)	Predictor Variable	β_{mean}	95% CRI	Probability of Relationship
North American Badger	<i>Taxidea taxus</i>	Local Urbanization	-0.60	-1.68, 0.37	89.3*
		Local Patch Density	0.06	-0.36, 0.47	62.7
		Local Agricultural Footprint	-0.17	-0.64, 0.29	77.5
North American Beaver	<i>Castor canadensis</i>	Local Urbanization	-0.34	-1.18, 0.54	79.1
		Local Patch Density	0.11	-0.27, 0.49	72.5
		Local Agricultural Footprint	-0.16	-0.6, 0.25	77.9
North American Mink	<i>Neogale vison</i>	Local Urbanization	-0.20	-0.9, 0.49	71.4
		Local Patch Density	0.12	-0.25, 0.5	75.1
		Local Agricultural Footprint	-0.19	-0.61, 0.2	82.6
North American Porcupine	<i>Erethizon dorsatum</i>	Local Urbanization	-0.45	-1.33, 0.39	86.2*
		Local Patch Density	0.11	-0.26, 0.48	73.1
		Local Agricultural Footprint	-0.21	-0.65, 0.19	84.5
Raccoon	<i>Procyon lotor</i>	Local Urbanization	-0.05	-0.37, 0.27	62.5
		Local Patch Density	0.10	-0.13, 0.34	80.6
		Local Agricultural Footprint	-0.02	-0.29, 0.25	54.5
Red Fox	<i>Vulpes vulpes</i>	Local Urbanization	0.02	-0.51, 0.53	54.4
		Local Patch Density	0.18	-0.12, 0.48	88.5*
		Local Agricultural Footprint	-0.16	-0.52, 0.18	82.1
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	Local Urbanization	-0.15	-0.99, 0.64	63.7
		Local Patch Density	0.08	-0.29, 0.44	67.4
		Local Agricultural Footprint	-0.26	-0.77, 0.18	87.9*
Richardson's Ground Squirrel	<i>Urocitellus richardsonii</i>	Local Urbanization	-0.19	-1.2, 0.74	64.9
		Local Patch Density	0.10	-0.32, 0.52	68.8
		Local Agricultural Footprint	-0.18	-0.66, 0.27	78.4

Species Common Name	Species Binomial(s)	Predictor Variable	β_{mean}	95% CRI	Probability of Relationship
Rock Squirrel	<i>Otospermophilus variegatus</i>	Local Urbanization	-0.23	-1.12, 0.59	71.1
		Local Patch Density	0.09	-0.31, 0.48	68.8
		Local Agricultural Footprint	-0.13	-0.57, 0.3	72.2
Round-tailed Ground Squirrel	<i>Xerospermophilus tereticaudus</i>	Local Urbanization	0.14	-0.79, 1.04	63.2
		Local Patch Density	0.10	-0.31, 0.5	69.3
		Local Agricultural Footprint	-0.18	-0.66, 0.25	80.0
Striped Skunk	<i>Mephitis mephitis</i>	Local Urbanization	-0.26	-0.74, 0.2	87.3*
		Local Patch Density	-0.04	-0.37, 0.27	59.3
		Local Agricultural Footprint	-0.15	-0.51, 0.19	79.9
Virginia Opossum	<i>Didelphis virginiana</i>	Local Urbanization	-0.12	-0.53, 0.26	73.4
		Local Patch Density	0.08	-0.19, 0.35	72.2
		Local Agricultural Footprint	-0.08	-0.35, 0.19	71.6
Weasels	<i>Mustela nivalis</i> , <i>M. erminea</i> , <i>M. frenata</i>	Local Urbanization	0.03	-1.04, 1.06	53.0
		Local Patch Density	0.05	-0.36, 0.45	61.4
		Local Agricultural Footprint	-0.13	-0.58, 0.32	72.0
White-tailed Deer	<i>Odocoileus virginianus</i>	Local Urbanization	-1.25	-1.7, -0.8	100.0**
		Local Patch Density	0.12	-0.15, 0.39	81.4
		Local Agricultural Footprint	0.01	-0.34, 0.36	51.8
Woodchuck	<i>Marmota monax</i>	Local Urbanization	-0.27	-0.9, 0.35	80.8
		Local Patch Density	0.03	-0.31, 0.36	57.5
		Local Agricultural Footprint	-0.13	-0.51, 0.24	76.8