nature portfolio

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Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our Editorial Policies and the Editorial Policy Checklist.

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed	
☐	☒	The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
☐	☒	A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒	The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☐	☒	A description of all covariates tested
☐	☒	A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒	A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☒	☐	For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted *Give P values as exact values whenever suitable.*
☐	☒	For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☐	☒	For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☐	☒	Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated

Our web collection on statistics for biologists contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection	No software were used for collection of original data. Any additional data used to conduct the analyses featured in this study (i.e., covariate data) were obtained from various online, open-access sources and are cited in the manuscript where appropriate.
Data analysis	All data and code that support the findings of this study and that were used in the production of all figures are publicly available on Zenodo at https://doi.org/10.5281/zenodo.8083504.

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our policy

All data and R code that support the findings of this study and that were used in the production of all figures are stored in Github and can be made available to reviewers upon request. Pending acceptance of this manuscript, all data and code will be archived with a DOI and made publicly available on Zenodo. Additional

data used to conduct the analyses featured in this study (i.e., covariate data) were obtained from various online, open-access sources and are cited in the manuscript where appropriate.

Human research participants

Policy information about studies involving human research participants and Sex and Gender in Research.

Reporting on sex and gender	N/A
Population characteristics	N/A
Recruitment	N/A
Ethics oversight	N/A

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☐ Life sciences ☐ Behavioural & social sciences ☒ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Ecological, evolutionary & environmental sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	Analyses included a Bayesian multi-species, multi-region (hierarchical) occupancy model and accompanying Bayesian meta-analysis models. All models included covariates on occupancy, species richness, and species diversity at multiple levels (site, region, species), as well as interactions among covariates (site*region, site*species). We analyzed data points from 725 sites across 20 regions (cities), each of which was sampled repeatedly for 35 days. A full description of the analyses in this study can be found in the Methods section of the manuscript.
Research sample	Motion-triggered wildlife cameras were used to take photographs recording occurrences of endothermic, vertebrate wildlife species at sites distributed across North American cities/metropolitan regions. We included only mammal species in this study as they were the taxon most reliably detected and identifiable in wildlife cameras photos. A full list of 35 species included in this study is reported in the Extended Data section of the manuscript.
Sampling strategy	Full description of the sampling strategy can be found on the Resources page of the Urban Wildlife Information Network (UWIN) website (https://www.urbanwildlifeinfo.org/gettingstarted), specifically in the Camera Trapping Design Overview document (https://www.dropbox.com/s/cuex75fuw3igaep/Design%20Overview.pdf?dl=0). Sampling was conducted by UWIN partners, who included university faculty and students and wildlife professional in governmental and non-governmental organizations. Wildlife camera sites in each city were located across an urbanization gradient within each city following a stratified pseudo-random sampling design (based on strata representing levels of urbanization). Based on minimum sample sizes typically necessary for fitting occupancy models, each UWIN partner city aimed to sample a minimum of 25 camera sites, though sample sizes (number of camera sites) varied among cities due to logistical limitations (equipment availability, camera failures, etc.).
Data collection	Wildlife camera photos were collected by UWIN members and uploaded to UWIN's online database for processing (species identification). Photos processed into tagged species observation data within the online database by trained personnel, including university students and faculty, community member volunteers, and wildlife professionals in governmental and non-governmental organizations.
Timing and spatial scale	Since 2016, UWIN partner cities have been regularly sampling during four distinct seasons during which data were continuously collected for a minimum of one calendar month: summer (July), fall (October), winter (January), and spring (April). Different UWIN cities began at and ended sampling during different years (e.g. Fort Collins stopped sampling in 2017, Salt Lake City started sampling in 2019).
Data exclusions	Due to the objectives our analysis (single-season occupancy modeling) and the availability of data from different cities, we included only data from a single 35-day summer sampling season (June 29th-August 2nd) from each city in this study.
Reproducibility	All code and data necessary for replicating the results of this study will be archived with a DOI and made publicly available on Zenodo, pending acceptance of the manuscript.
Randomization	Allocation of sampling sites among cities was non-random. City-level (regional) covariates were used to control for variation among cities. Allocation of sampling sites within each city followed a stratified pseudo-random sampling design (briefly described above) and variation among sites was controlled for using site-level covariates.

Blinding	Use of wildlife cameras allowed for the collection of study species occurrence data in the absence of researchers, minimizing impacts of the researchers on the behaviors of the study species.

Did the study involve field work? ☒ Yes ☐ No

Field work, collection and transport

Field conditions	Field conditions have varied wildly across the multi-year, multi-season sampling effort of UWIN. This study includes data from the summer sampling season, during which conditions at all sites were relatively warm, though temperatures varied across cities located within different climate zones.
Location	Sampling in all 20 cities occurred across a gradient of human development from natural environments to highly urbanized city centers. Cities ranged across North America, between roughly -122.4 and -75.5 degrees W longitude and 28.8 to 53.5 degrees N latitude, including sites in hot, dry cities (e.g. Phoenix, Arizona) and cold, wet cities (e.g. Seattle, Washington).
Access & import/export	In establishing each study site, all UWIN partners were responsible obtaining the necessary permission or permits from all public and private owners and/or managers whose land on which wildlife cameras were to be located and accessed.
Disturbance	No significant disturbance was caused to each site

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☐	☒ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Animals and other research organisms

Policy information about studies involving animals; ARRIVE guidelines recommended for reporting animal research, and Sex and Gender in Research

Laboratory animals	This study did not involve laboratory animals.
Wild animals	This study involved the use of motion-triggered wildlife cameras to observe (i.e., photograph) all detectable mammal species. The full list of 35 species included in this study is reported in the Extended Data section of the manuscript. No wild animals were caught or transported during this study.
Reporting on sex	This information was not collected.
Field-collected samples	Field-collected samples consisted of only photographs, which were stored within the UWIN online database.
Ethics oversight	No ethical approval or guidance was required, due to the use of minimally-invasive observation methods.

Note that full information on the approval of the study protocol must also be provided in the manuscript.