Macroecología y la dinámica temporal de la biodiversidad a nivel global

Seminario ISCB-RSG Uruguay: Por los barrios más remotos 2

Flo Grattarola | Modelling of Biodiversity Lab, Czech University of Life Sciences Prague

Agenda

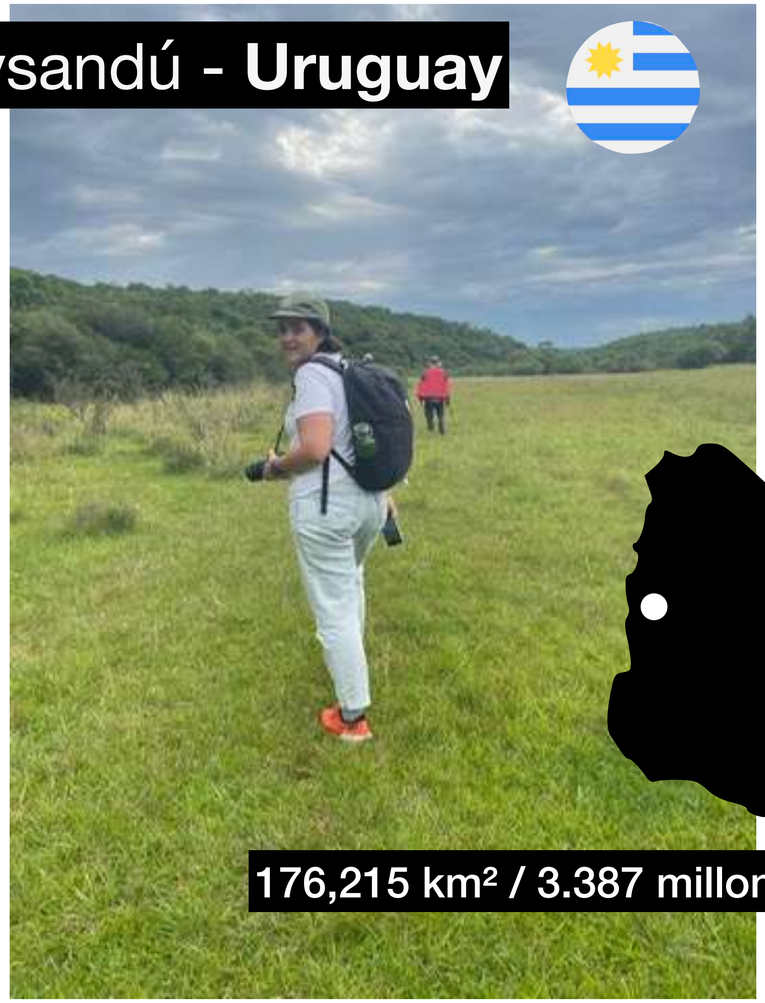
* Mi recorrido: Uruguay > UK > República Checa

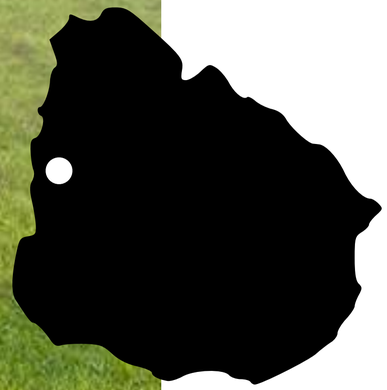
Estudios de **cambios temporales:**

1. en el rango de distribución de mamíferos **carnívoros** en la **región Neotropical**
2. en la diversidad de **aves** a nivel **(casi) global**

Mi recorrido

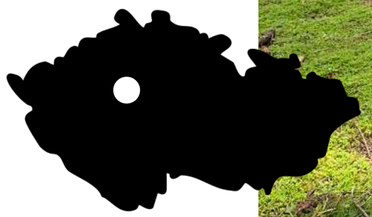
Paysandú - **Uruguay**





176,215 km² / 3.387 millones

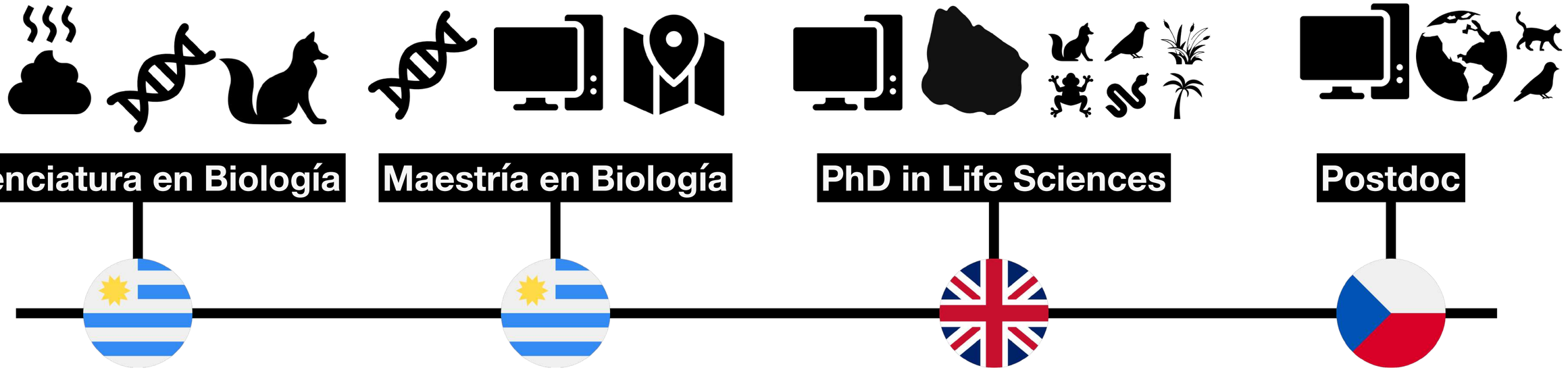
Praga - **República Checa**



78,871 km² / 10.88 millones

BIODIVERSIDATA
CONSORCIO DE DATOS DE BIODIVERSIDAD DEL URUGUAY

NaturalistaUY



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INSTITUTO DE INVESTIGACIONES BIOLÓGICAS CLEMENTE ESTABLE

UNIVERSITY OF LINCOLN

ANII

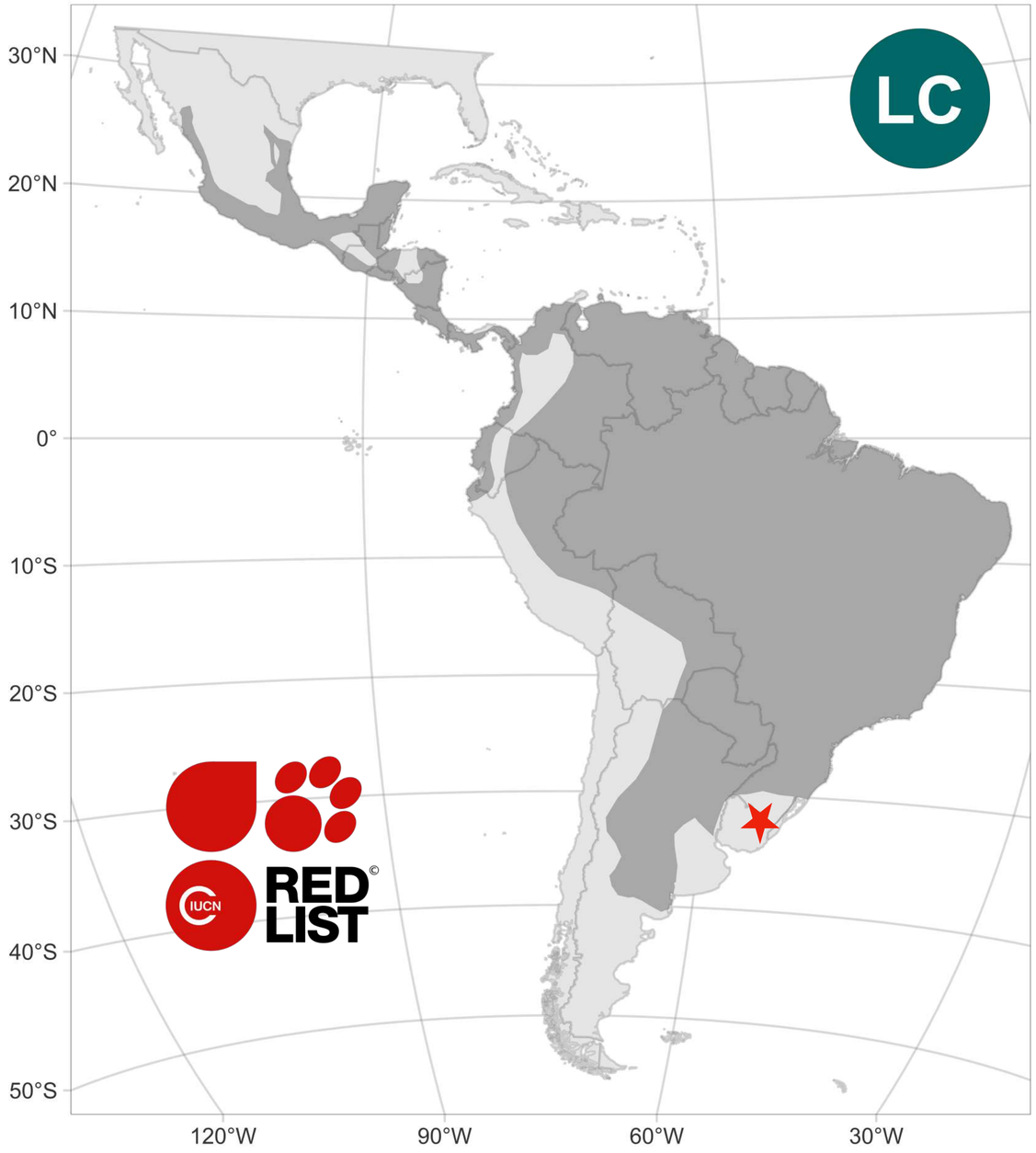
Czech University of Life Sciences Prague

MOBI Lab

taxa: mamíferos carnívoros

región: Neotropical

Cambios temporales en en el rango de distribución de mamíferos carnívoros en la región Neotropical

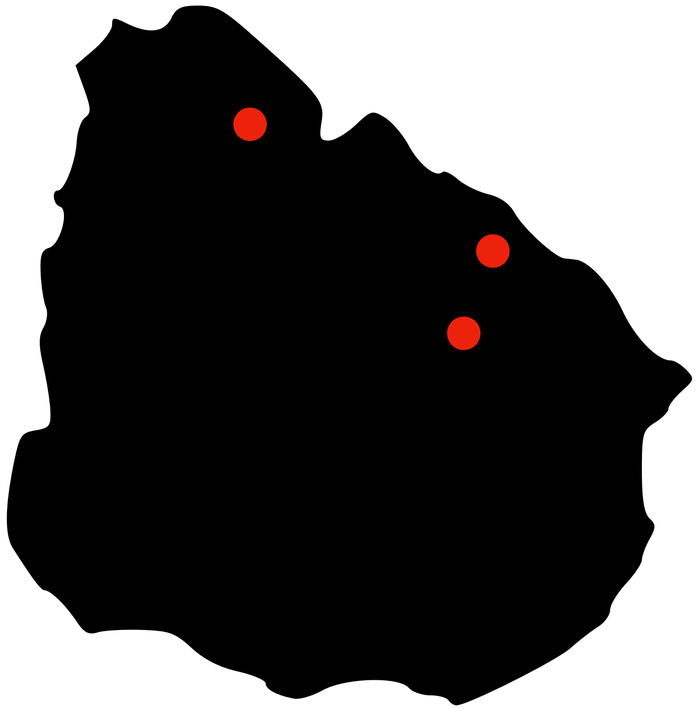


@hhulsberg

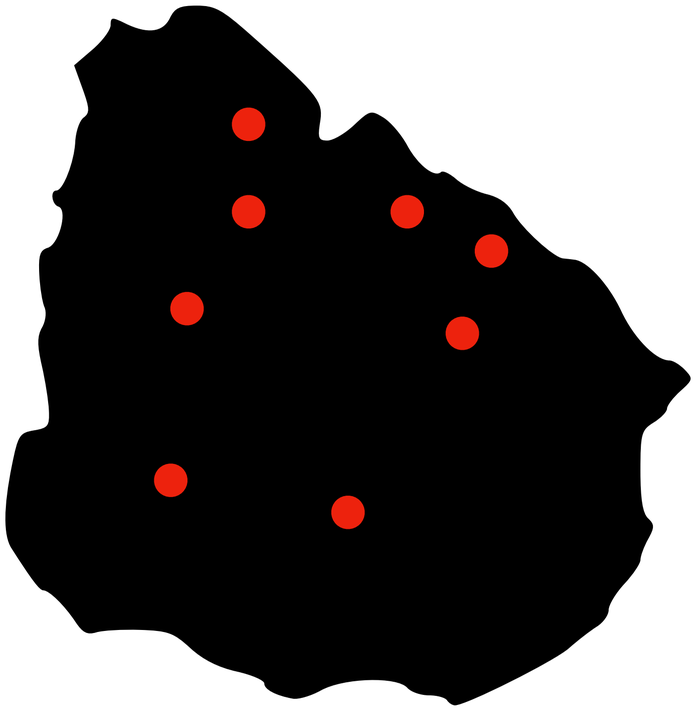
@albamaya

datos de sólo presencia

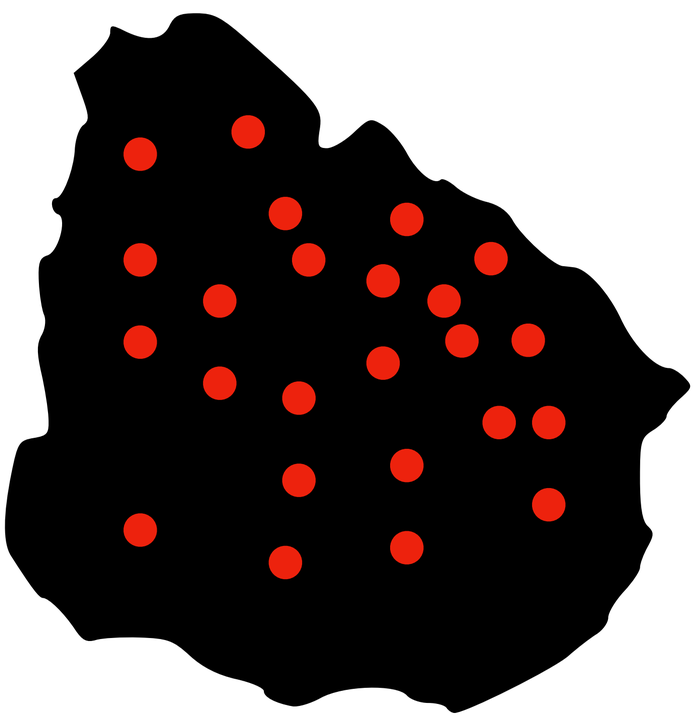
¿Se expandió al sur?



2000



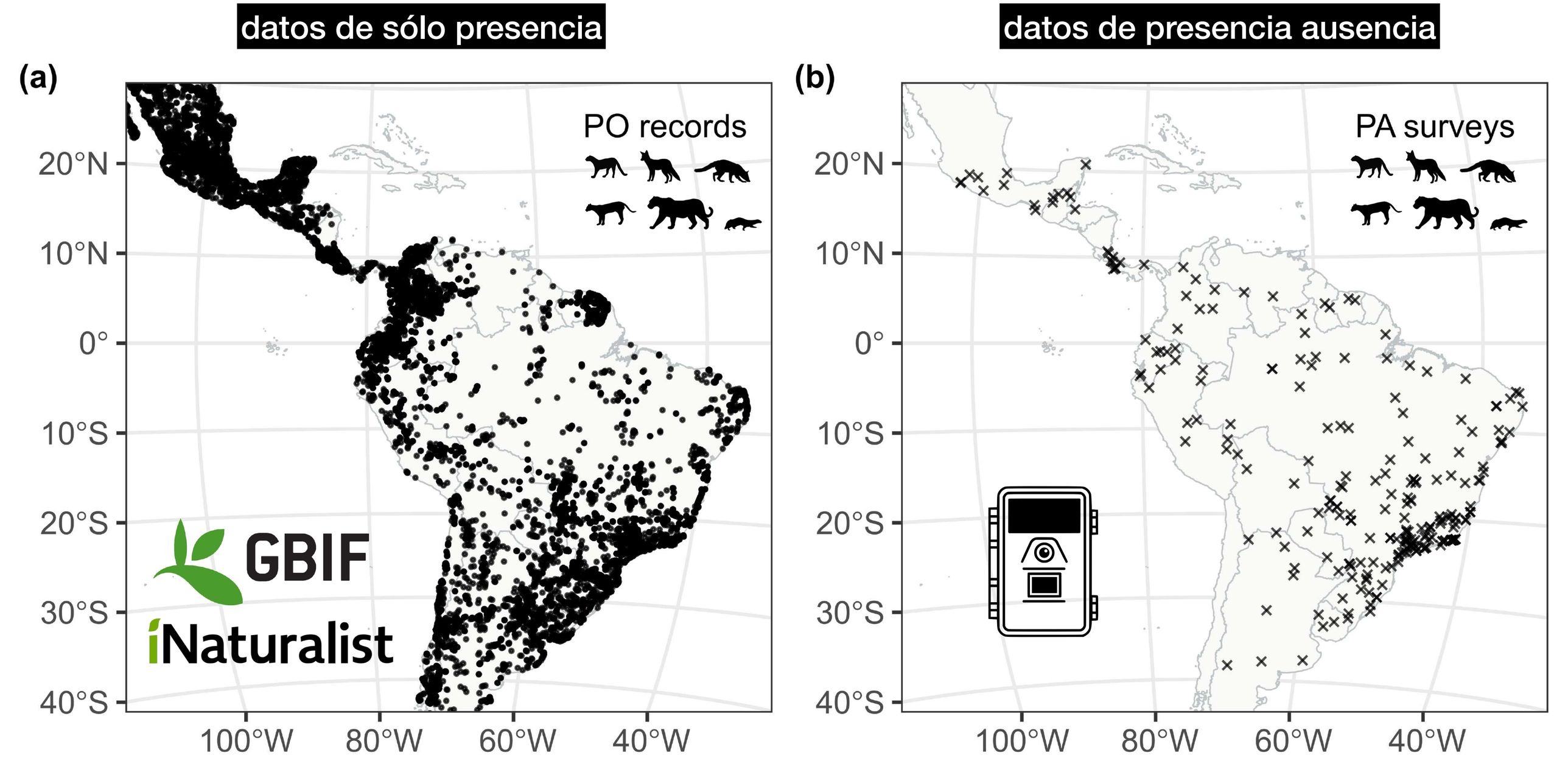
2010



2020

Si no existen datos estandarizados para esta especie a lo largo de su rango geográfico,

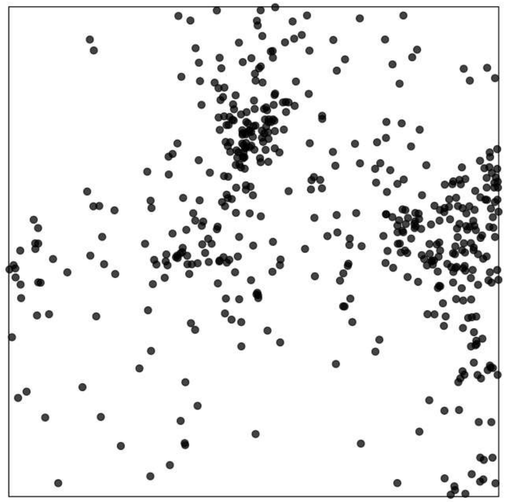
¿cómo podemos estudiar cómo cambia su distribución en el tiempo?


datos de sólo presencia
datos de presencia ausencia
(a)
(b)
PO records
PA surveys
GBIF
iNaturalist
20°N
10°N
0°
10°S
20°S
30°S
40°S
100°W
80°W
60°W
40°W

Modelo ISDM

Bayesiano

localización real de los individuos



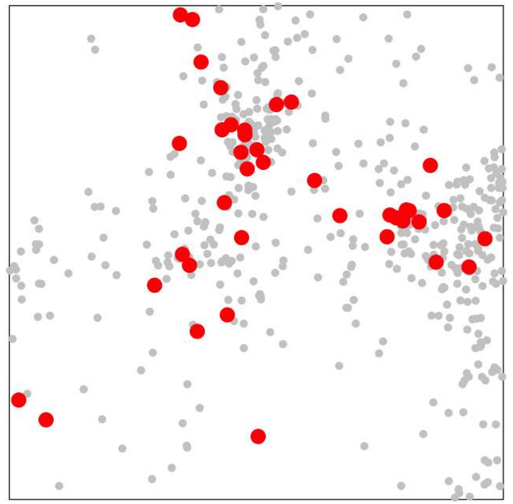
ESTADO LATENTE

thinning espacial

detección imperfecta de especies

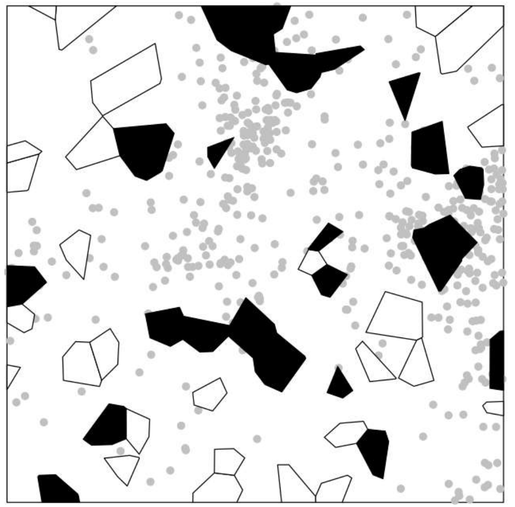
PROCESO DE OBSERVACIÓN

sólo presencias observed locations

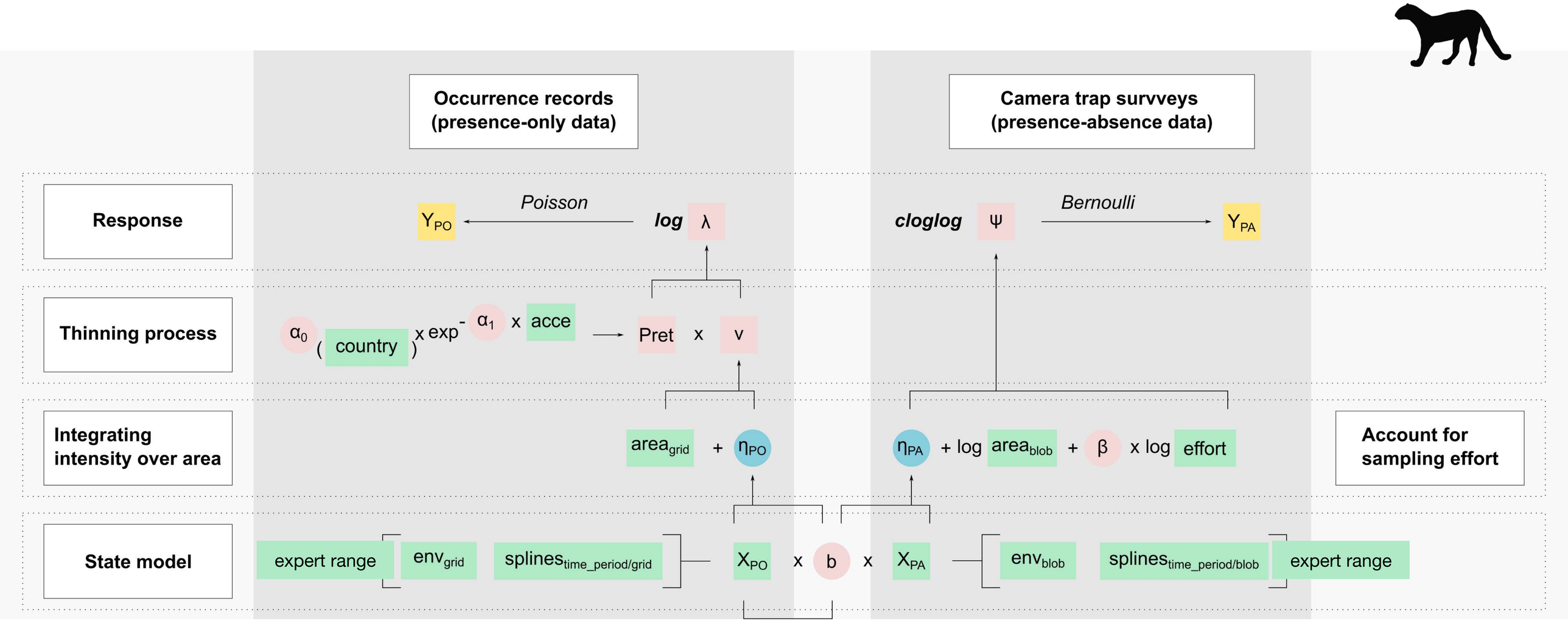


GBIF

presencia-ausencia observed site occupancy

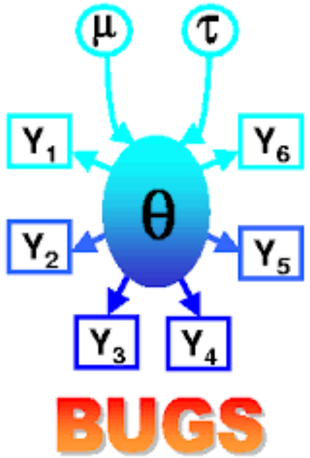


DATOS OBSERVADOS

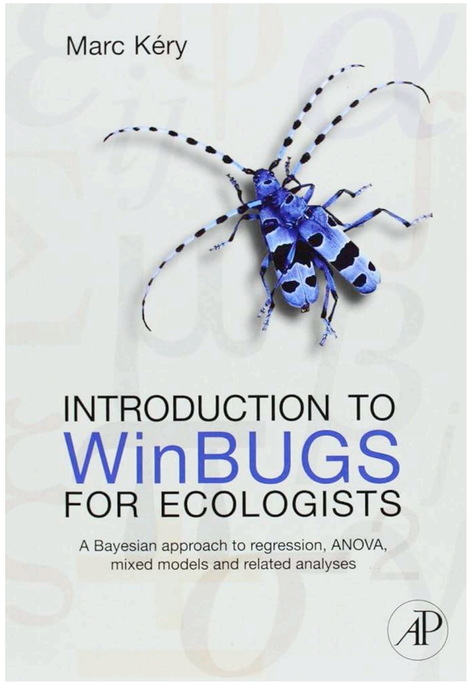

Occurrence records
(presence-only data)
Camera trap survveys
(presence-absence data)
Response
Thinning process
Integrating
intensity over area
State model
Poisson
log
λ
Y_PO
cloglog
ψ
Bernoulli
Y_PA
α_0
(country)
x exp
-
α_1
x
acce
Pret
x
v
area_grid
+
η_PO
η_PA
+ log
area_blob
+
β
x log
effort
Account for
sampling effort
expert range
env_grid
splines_time_period/grid
X_PO
x
b
x
X_PA
env_blob
splines_time_period/blob
expert range
estimated parameters
estimated variables
linear predictors
data
response

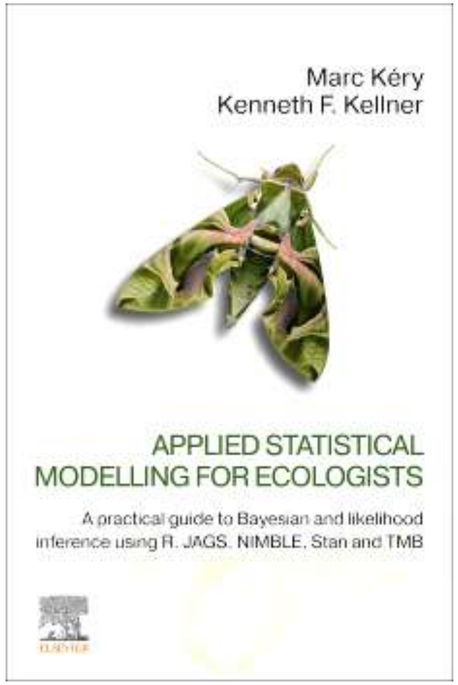
Modelos Jerárquicos Bayesianos

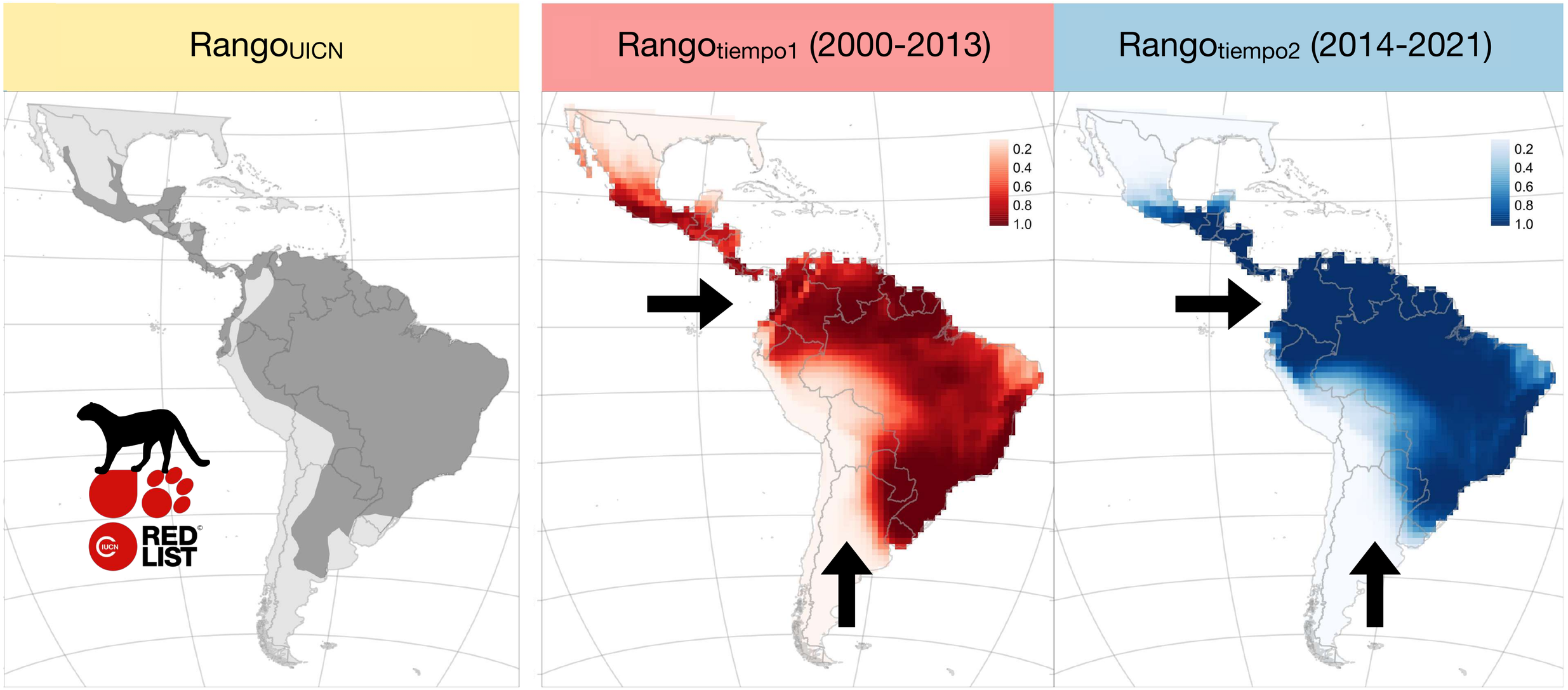
Herramientas

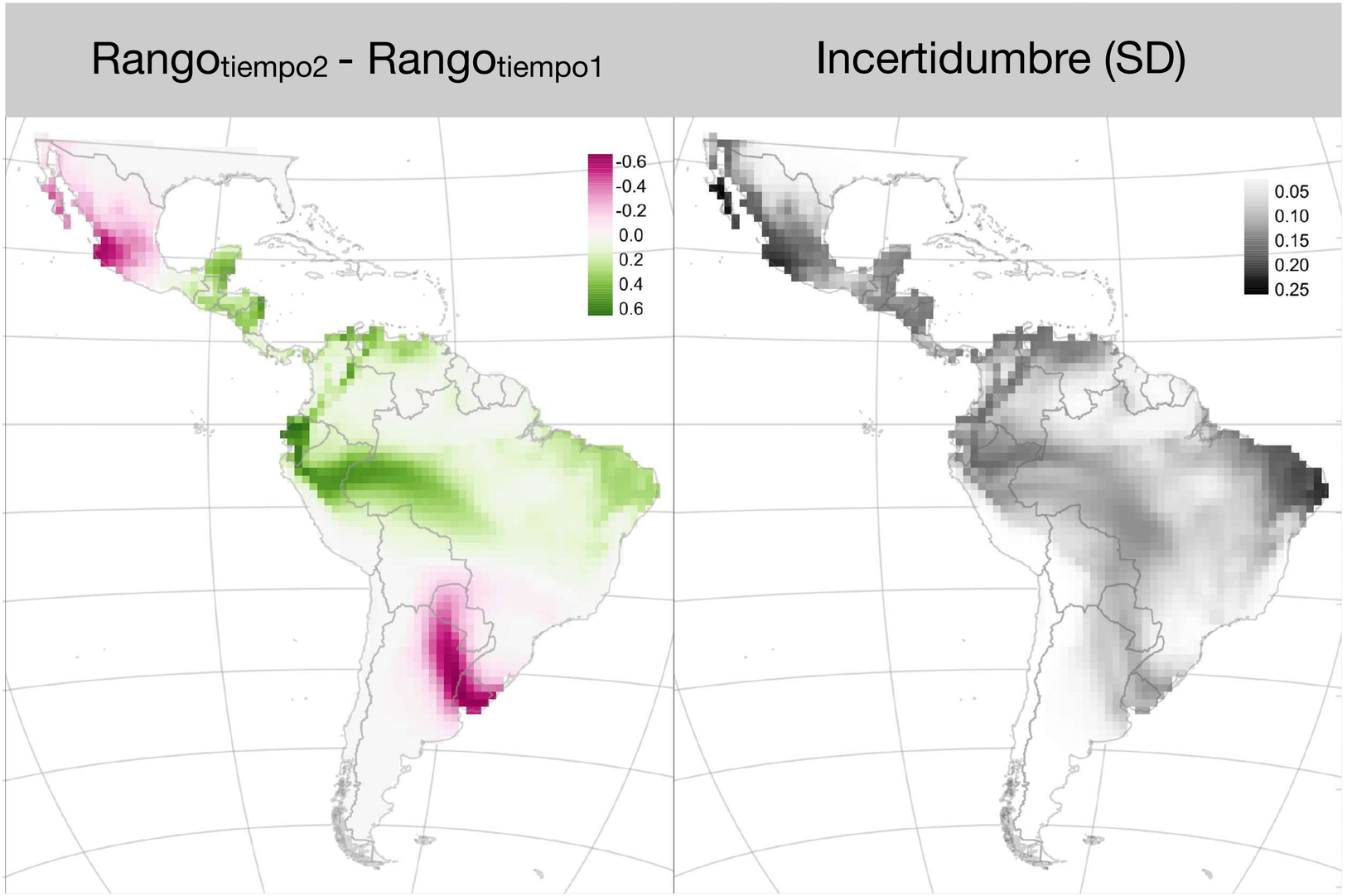


JAGS

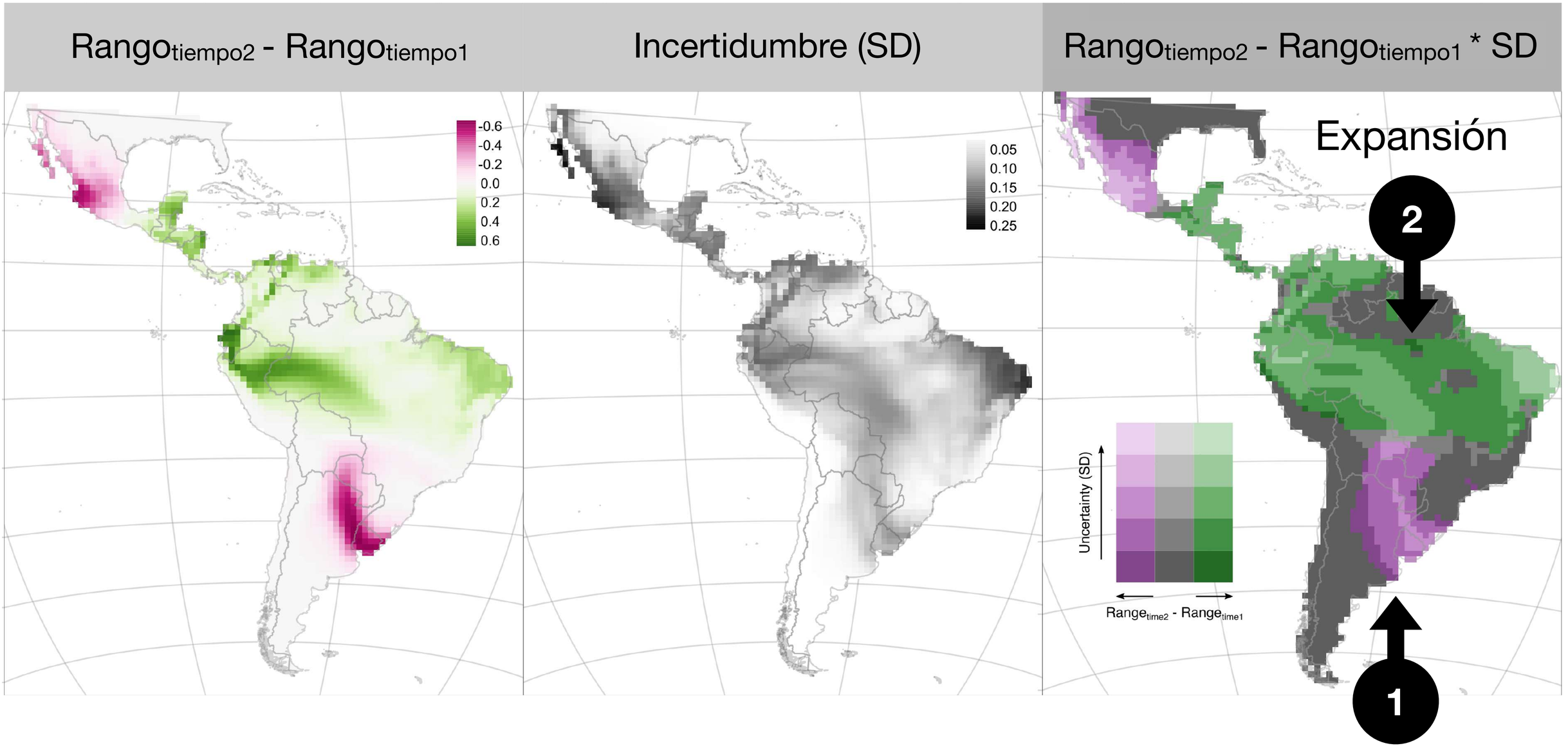


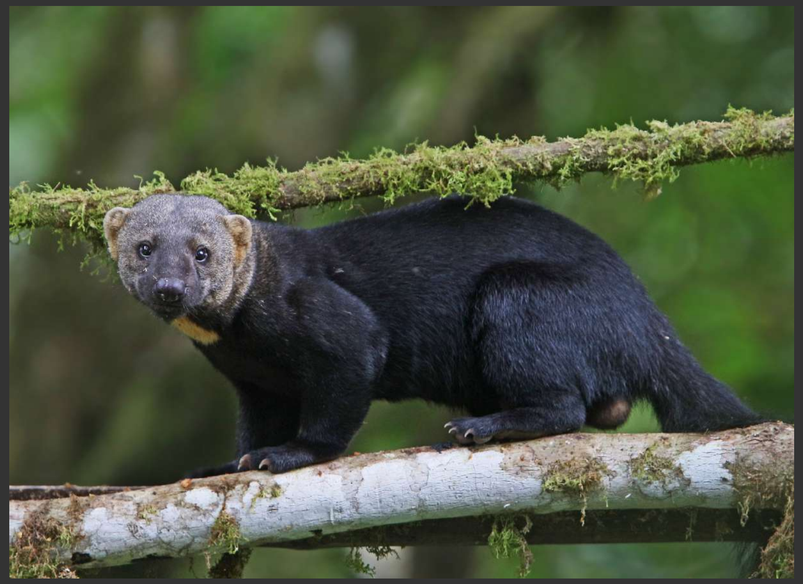


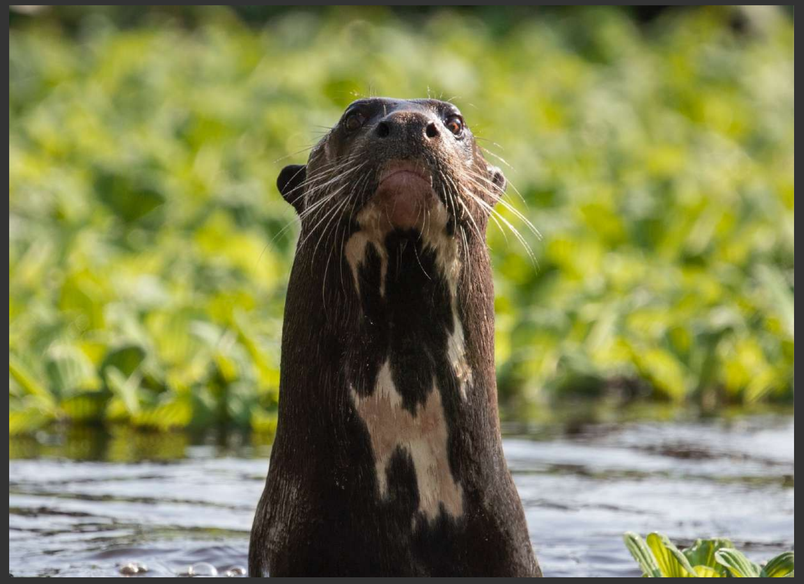

Rango$_{UICN}$
Rango$_{tiempo1}$ (2000-2013)
Rango$_{tiempo2}$ (2014-2021)
0.2
0.4
0.6
0.8
1.0
0.2
0.4
0.6
0.8
1.0
IUCN
RED LIST


Rango$_{tiempo2}$ - Rango$_{tiempo1}$
-0.6
-0.4
-0.2
0.0
0.2
0.4
0.6

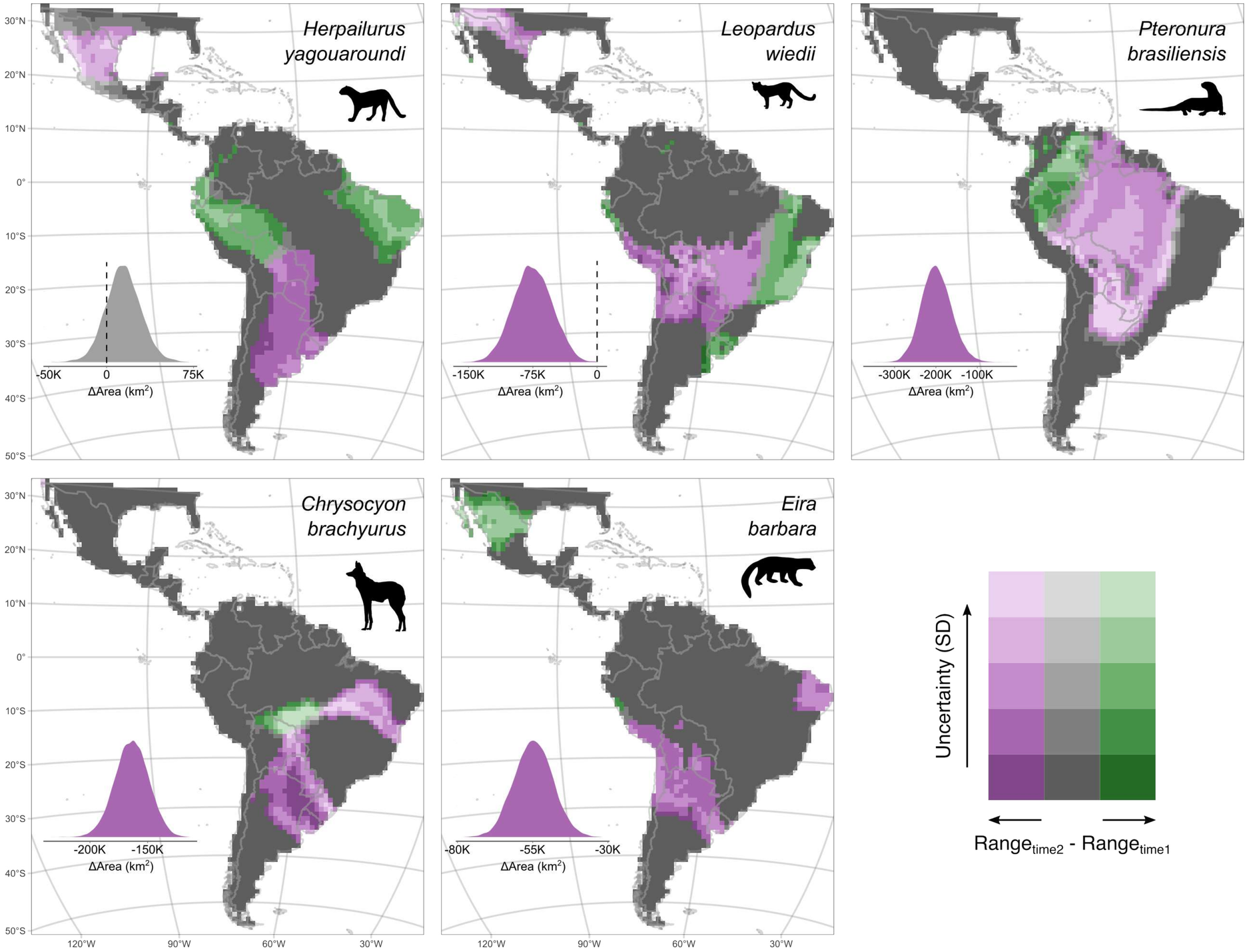
Incertidumbre (SD)
0.05
0.10
0.15
0.20
0.25


Rango$_{tiempo2}$ - Rango$_{tiempo1}$
Incertidumbre (SD)
Rango$_{tiempo2}$ - Rango$_{tiempo1}$ * SD
-0.6
-0.4
-0.2
0.0
0.2
0.4
0.6
0.05
0.10
0.15
0.20
0.25
Expansión
2
1
Contracción
Uncertainty (SD)
Range$_{time2}$ - Range$_{time1}$



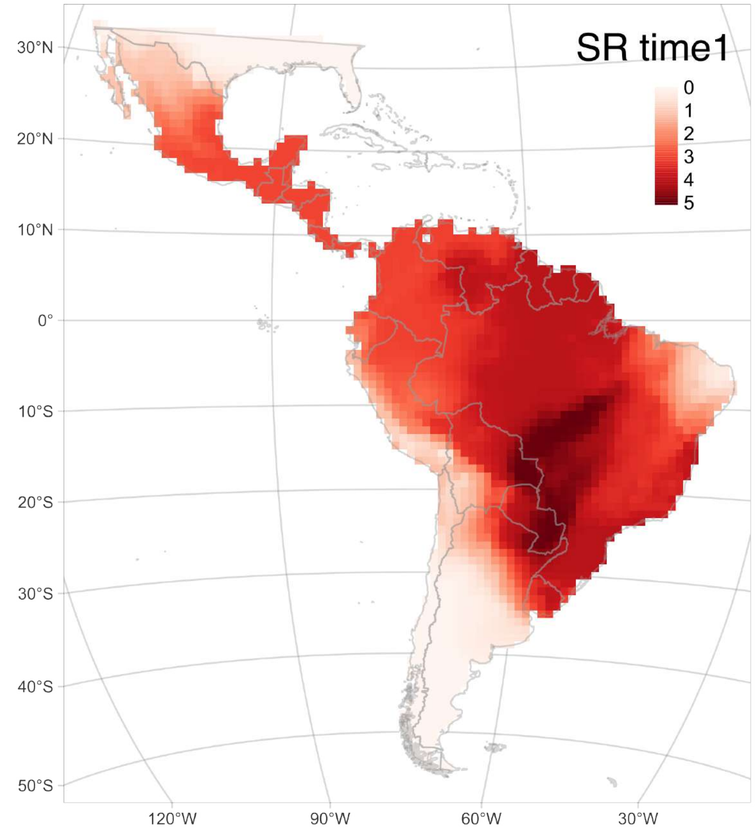


yaguarundí (*Herpailurus yagouaroundi*) por @hhulsberg, aguará guazú (*Chrysocyon brachyurus*) por @constanzamcl, eira (*Eira barbara*) por @christoph_moning, margay (*Leopardus wiedii*) por @bigsam, and lobo de río gigante (*Pteronura brasiliensis*) por @npdowling (iNaturalist.org).

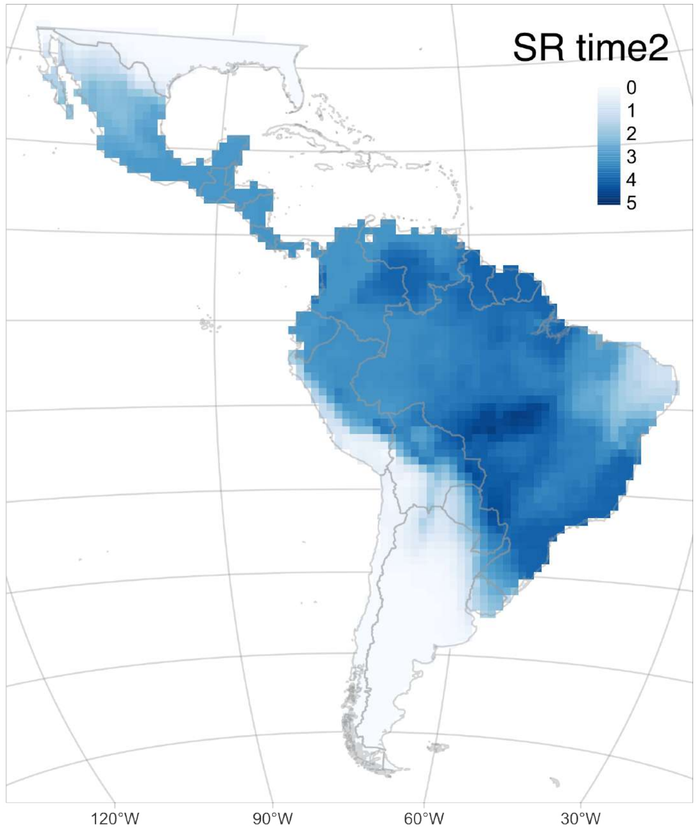

Herpailurus yagouaroundi
-50K
0
75K
ΔArea (km²)
Leopardus wiedii
-150K
-75K
0
ΔArea (km²)
Pteronura brasiliensis
-300K
-200K
-100K
ΔArea (km²)
Chrysocyon brachyurus
-200K
-150K
ΔArea (km²)
Eira barbara
-80K
-55K
-30K
ΔArea (km²)
30°N
20°N
10°N
0°
10°S
20°S
30°S
40°S
50°S
120°W
90°W
60°W
30°W
Uncertainty (SD)
Range time2 - Range time1

Cambio temporal en la riqueza de especies

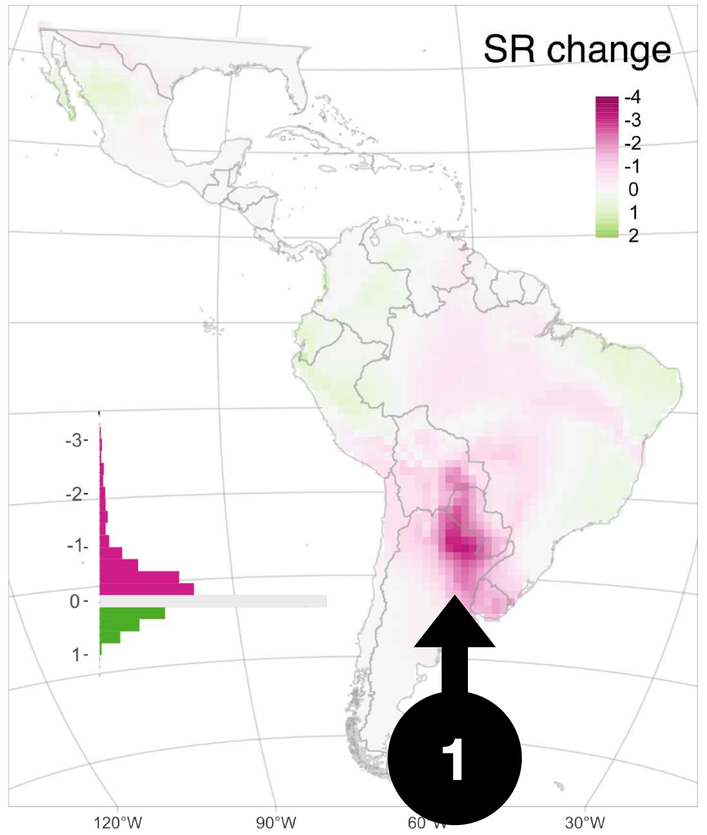
A



B



D



Pérdida

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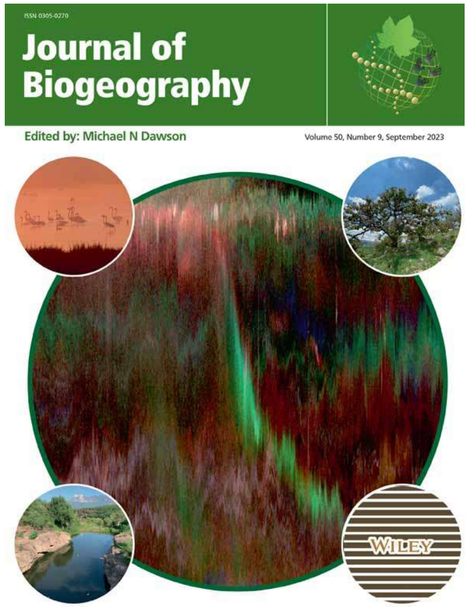
DOI: 10.1111/jbi.14622

Journal of Biogeography

WILEY



RESEARCH ARTICLE

Integrating presence-only and presence–absence data to model changes in species geographic ranges: An example in the Neotropics

Florencia Grattarola[1] | Diana E. Bowler[2,3,4] | Petr Keil[1]

https://doi.org/10.1111/jbi.14622

Global Ecology and Conservation 55 (2024) e03226

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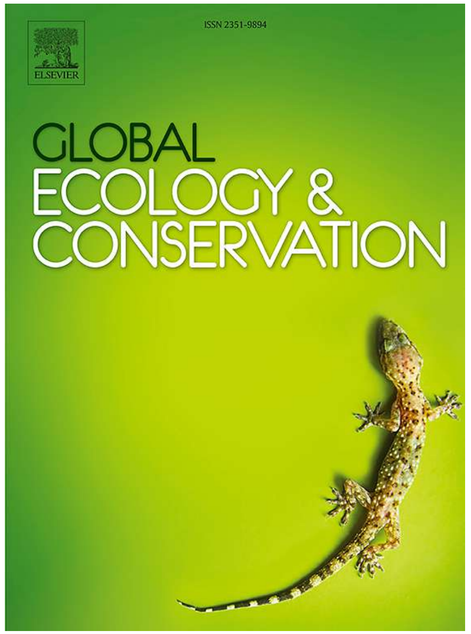


A continental-wide decline of occupancy and diversity in five Neotropical carnivores

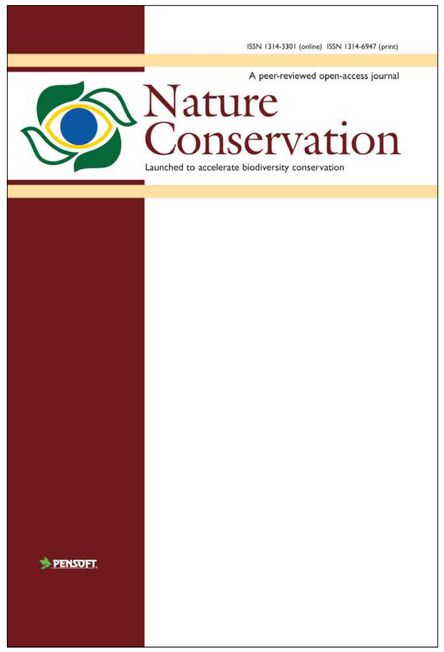
Florencia Grattarola [*,1], Kateřina Tschernosterová [2], Petr Keil

Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Praha – Suchdol 16500, Czech Republic

https://doi.org/10.1016/j.gecco.2024.e03226

Nature Conservation

Nature Conservation 58: 11–30 (2025)
DOI: 10.3897/natureconservation.58.140644



Data Paper

MIAU: An analysis-ready dataset on presence-only and presence-absence data of Neotropical carnivores (Mammalia, Carnivora) from 2000 to 2021

Florencia Grattarola[1], Kateřina Tschernosterová[1], Petr Keil[1]

1 *Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Praha - Suchdol, 16500, Czech Republic*
Corresponding author: Florencia Grattarola (flograttarola@gmail.com)

https://doi.org/10.3897/natureconservation.58.140644

taxa: aves

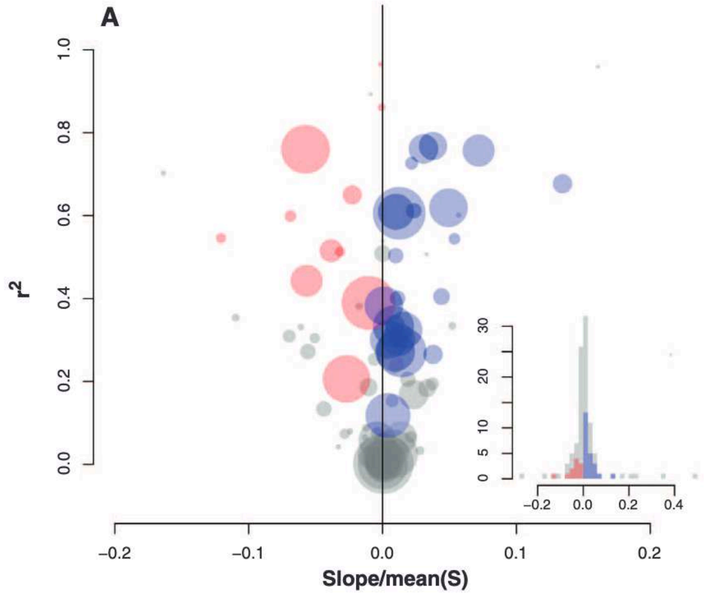
region: global

Cambios temporales en la diversidad de aves a nivel (casi) global

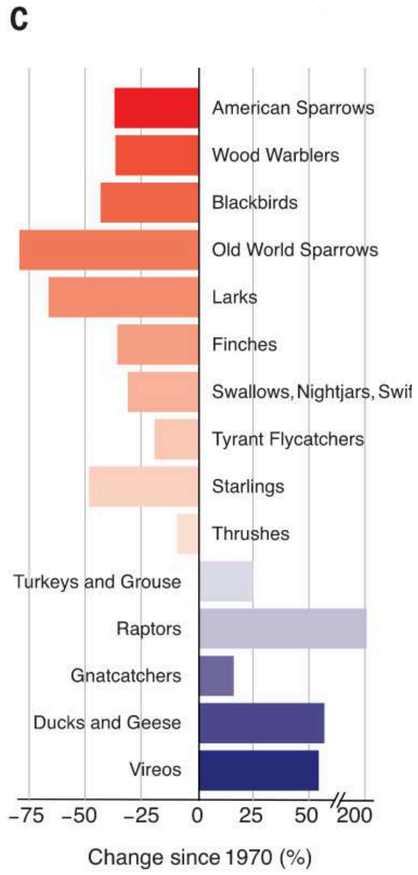
2

La biodiversidad está disminuyendo

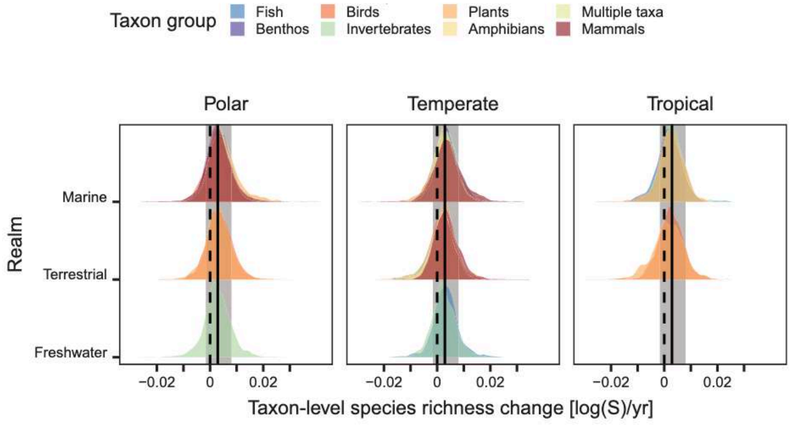
¿La biodiversidad está disminuyendo?



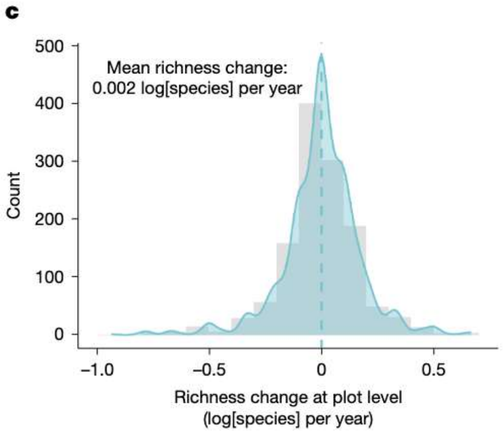
(Dornelas et al. 2014)



(Rosenberg et al. 2019)



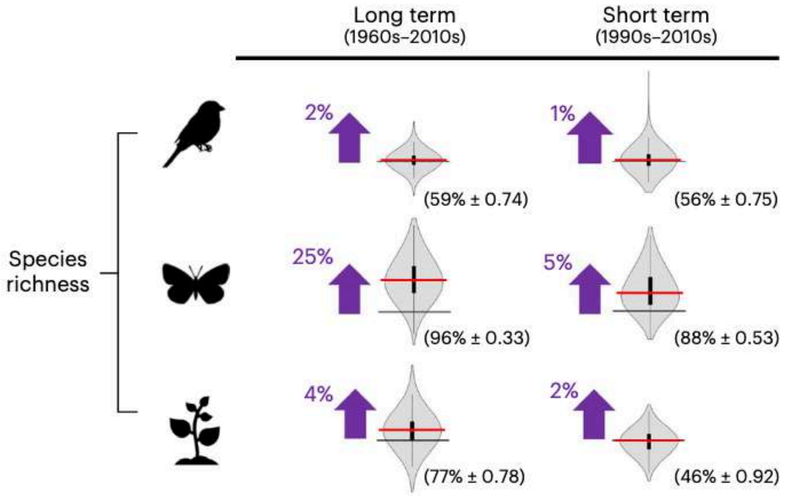
(Blowes et al. 2019)



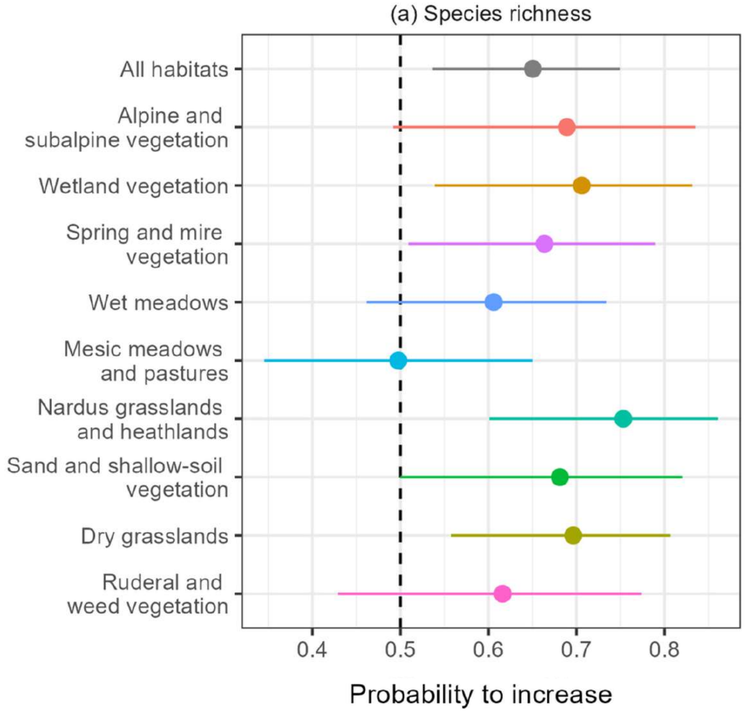
(García Criado et al. 2025)

escala local

¿La biodiversidad está disminuyendo?



(Montràs-Janer et al. 2024)



(Klinkovská et al. 2025)

gran escala

La biodiversidad parece disminuir a escalas espaciales pequeñas y aumentar o mantenerse a grandes escalas,

¿pero qué pasa a escalas medias?

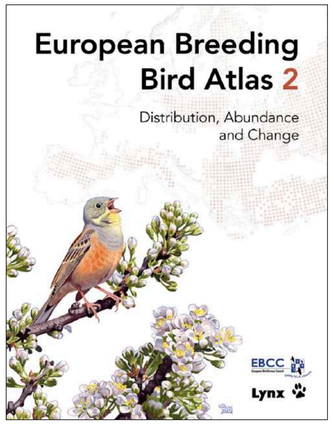
datos de presencia ausencia

atlas de aves anidando

1 1 0

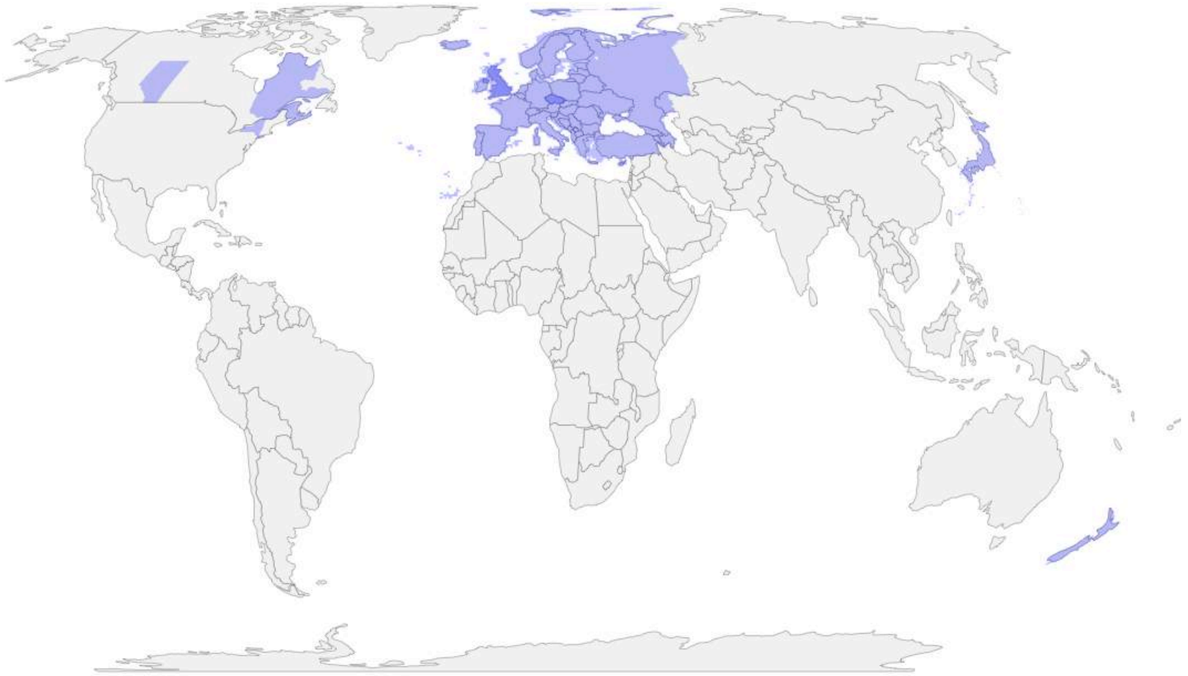
1 hora

10x10km

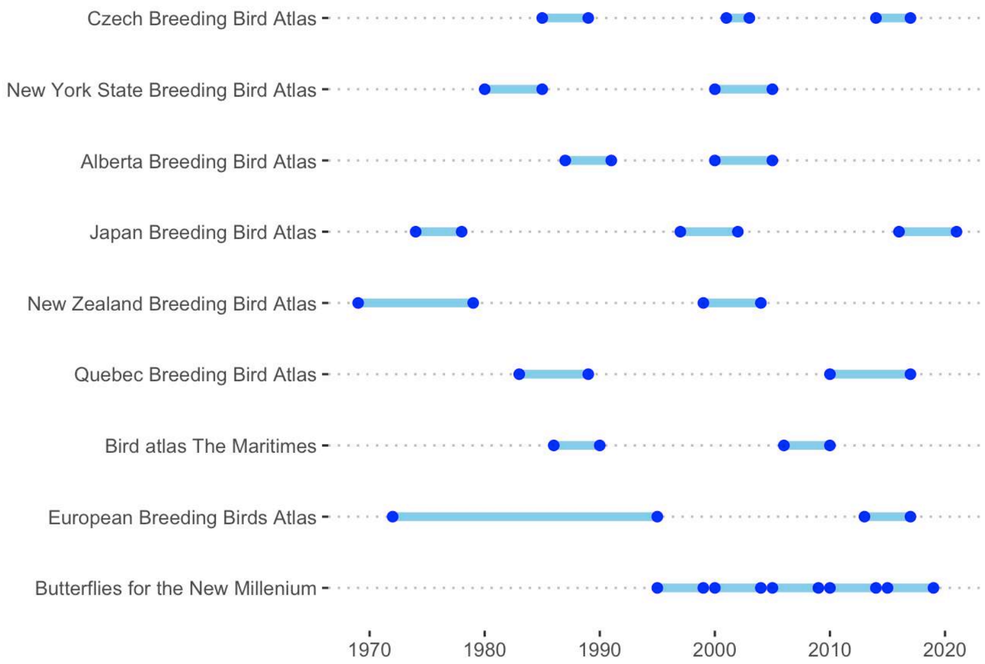


BEAST Project

distribución espacial



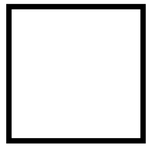
distribución temporal



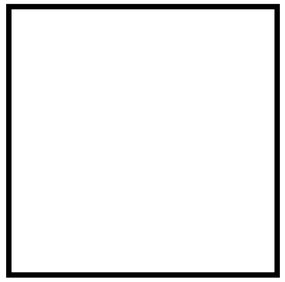
resolución

10x10km

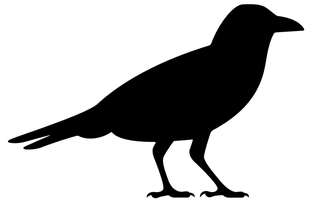
20x20km

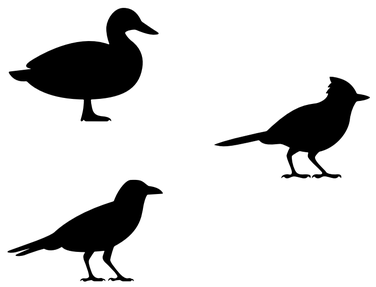


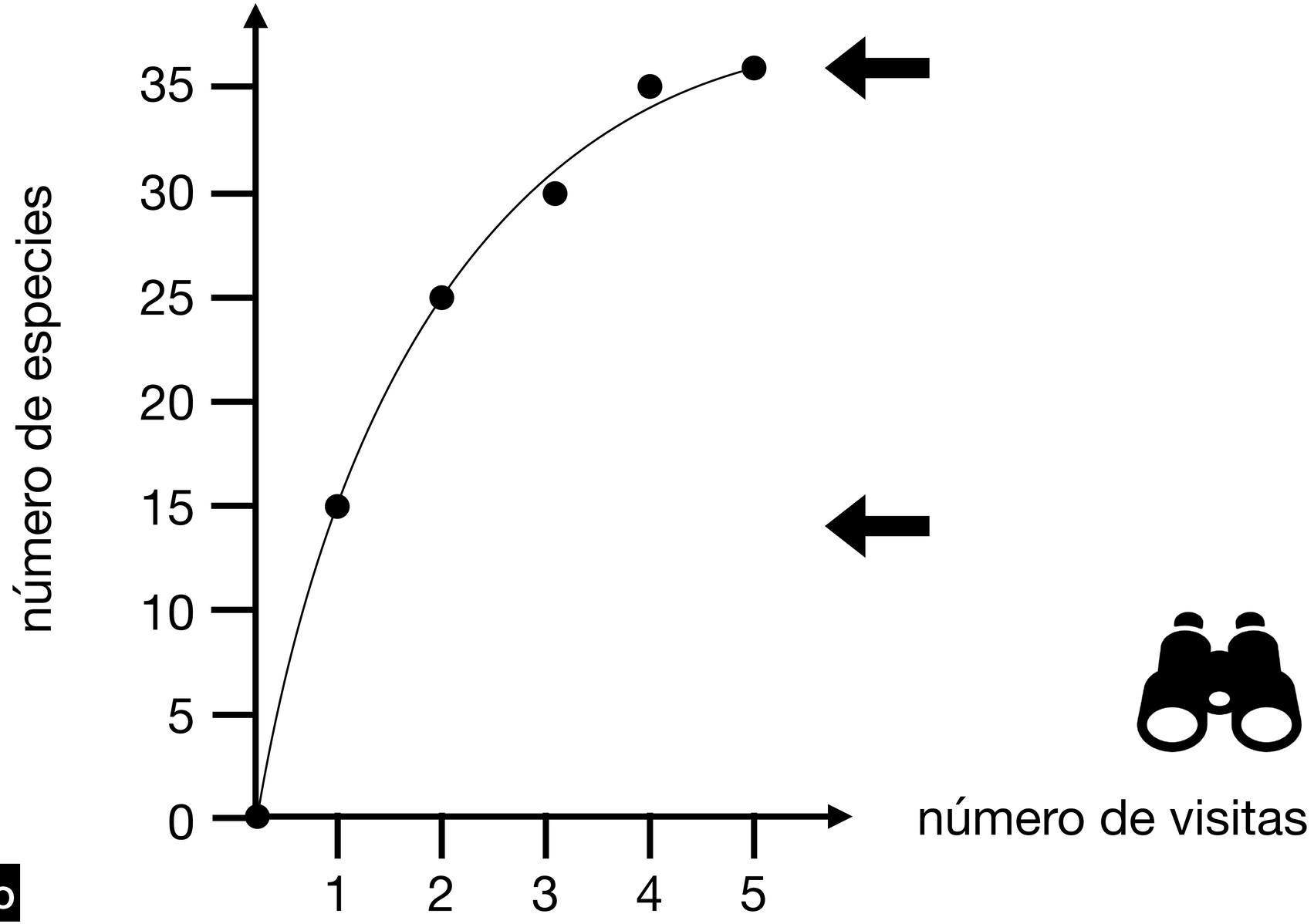
50x50km



taxa





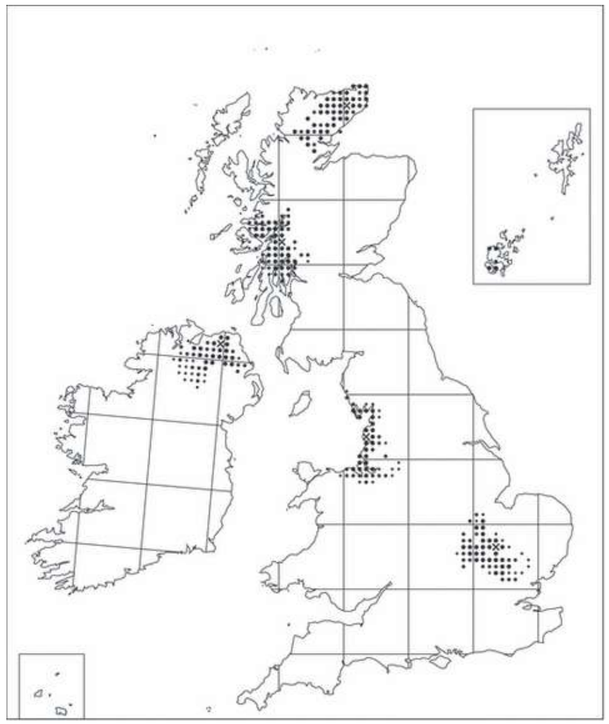


esfuerzo de muestreo

Frescalo (local frequency scaling) + Modelo de ocupación Bayesiano

SPARTA

frescalo()



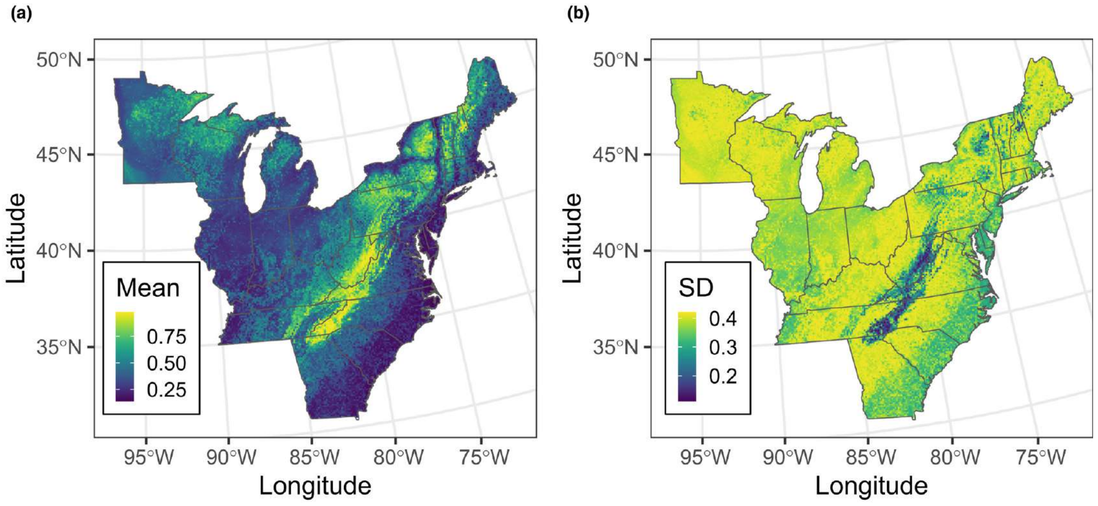
Hill (2012)

+

spOccupancy

spPGOcc()

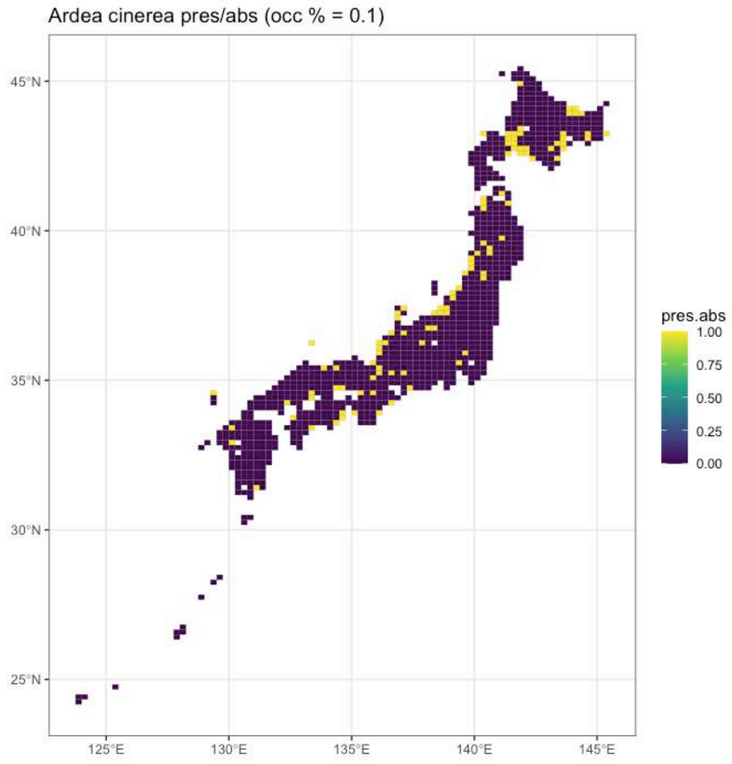
*Single-species **spatial** occupancy*



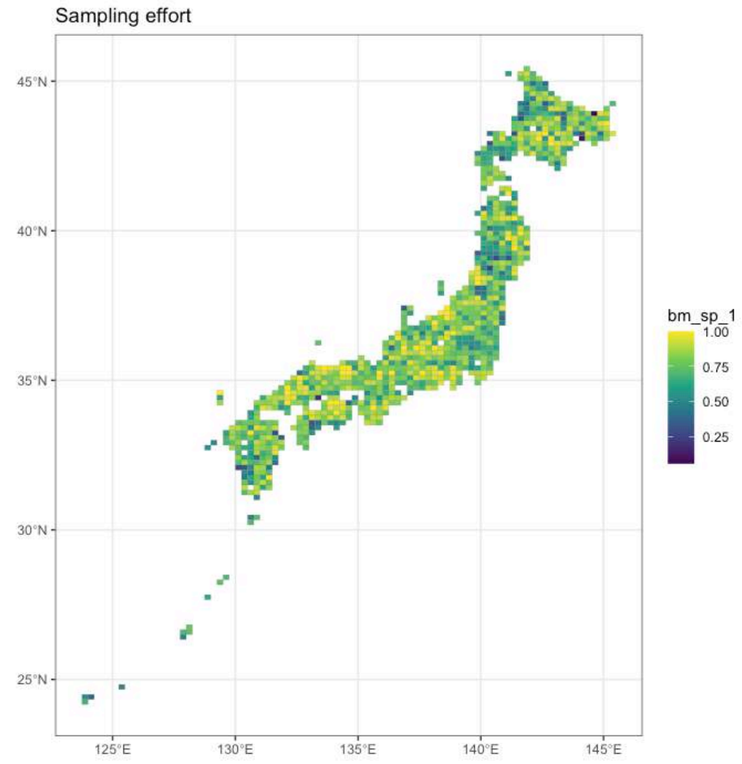
Doser et al. (2022)

Japón
Ardea cinerea

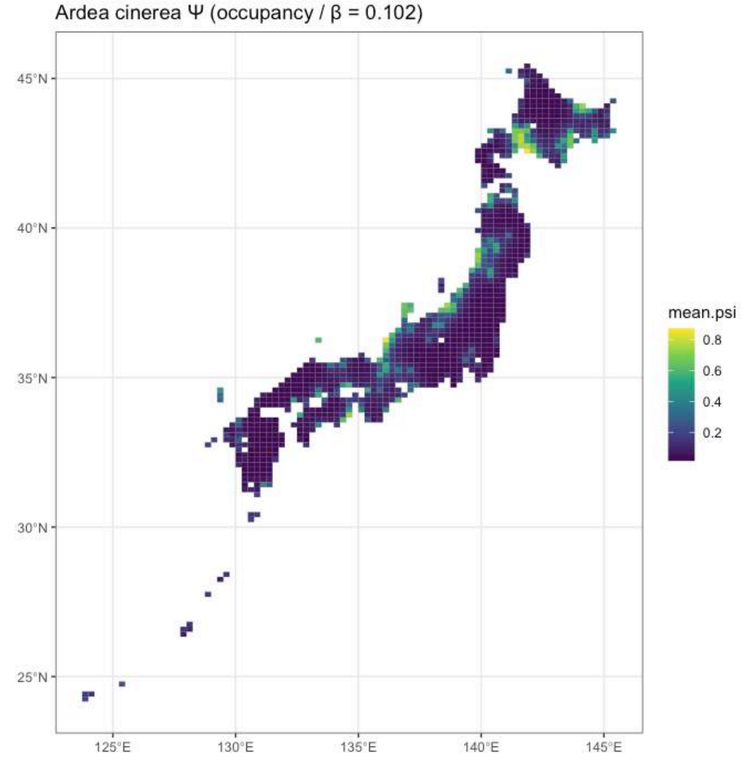
@leaf0605



presencia ausencia



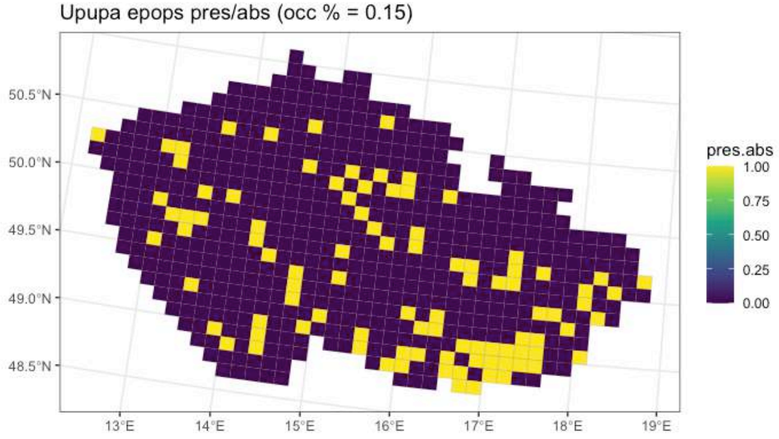
esfuerzo de muestreo



probabilidad de ocupación

República Checa
Upupa epops

@radek-oslejsek



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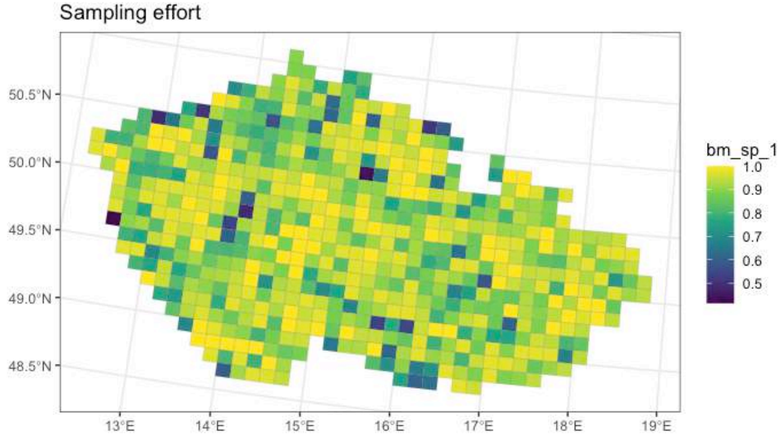

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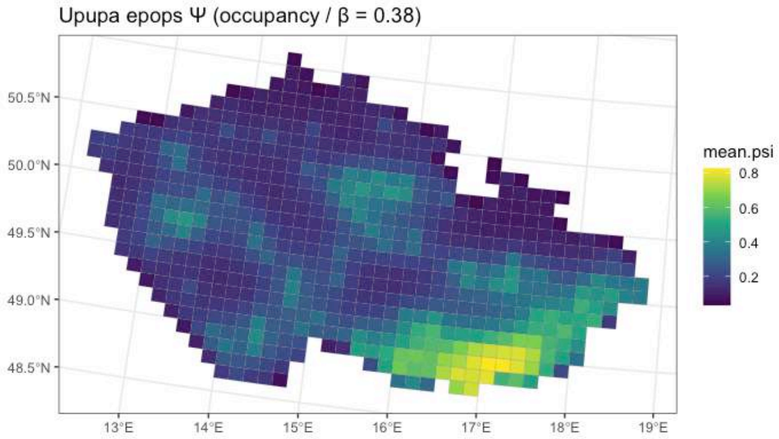
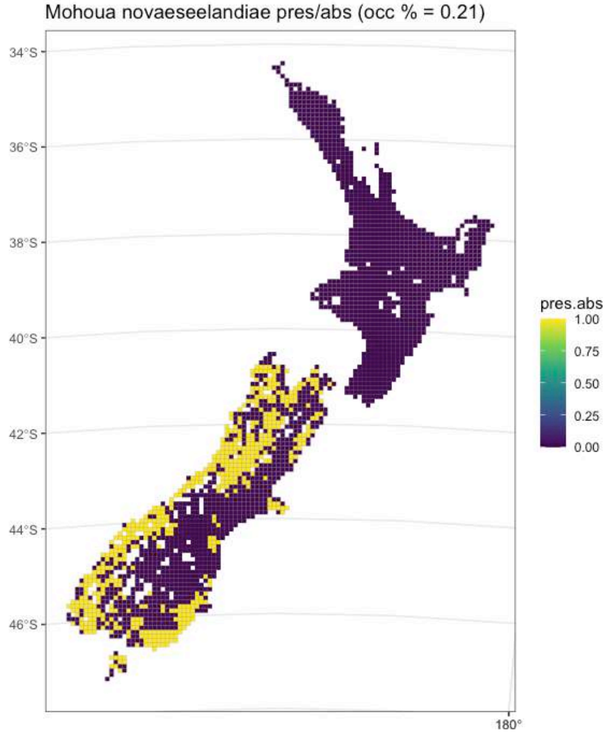


probabilidad de ocupación

Nueva Zelanda
Mohoua novaeseelandiae

@possumsend



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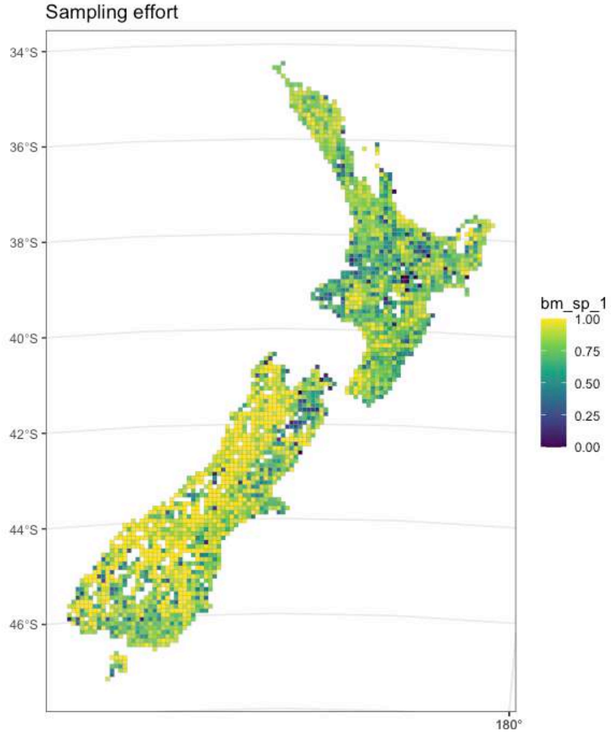
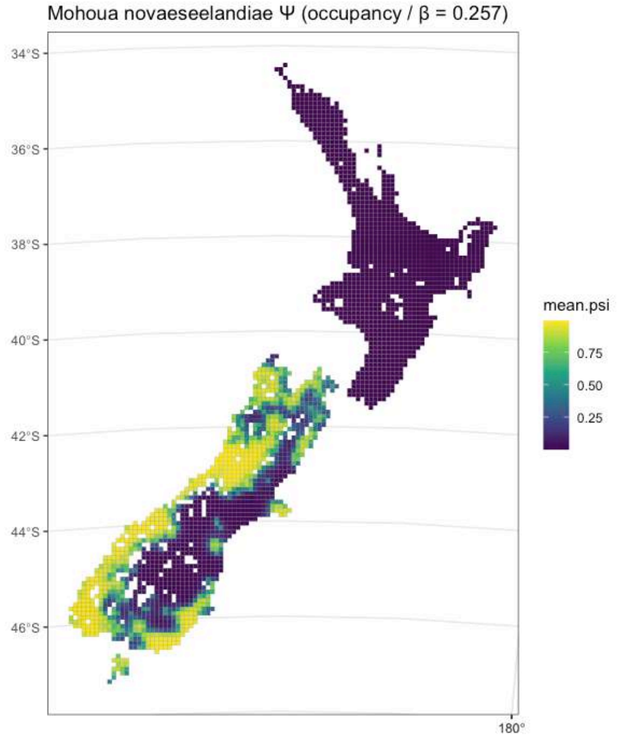


esfuerzo de muestreo



probabilidad de ocupación

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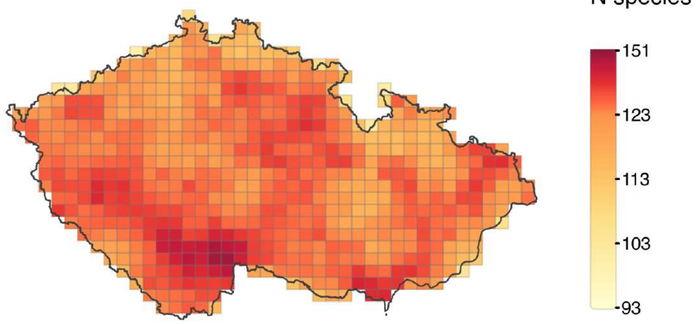
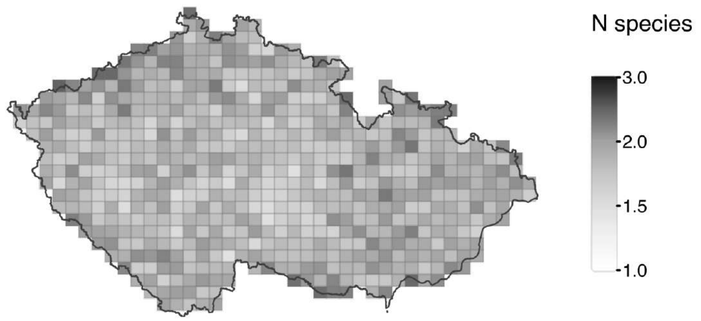
riqueza de especies por período

fortaleza de los modelos Bayesianos

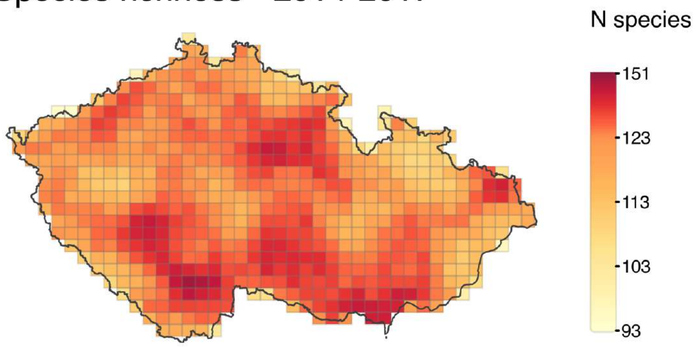
Species richness - 1985-1989



uncertainty



Species richness - 2014-2017



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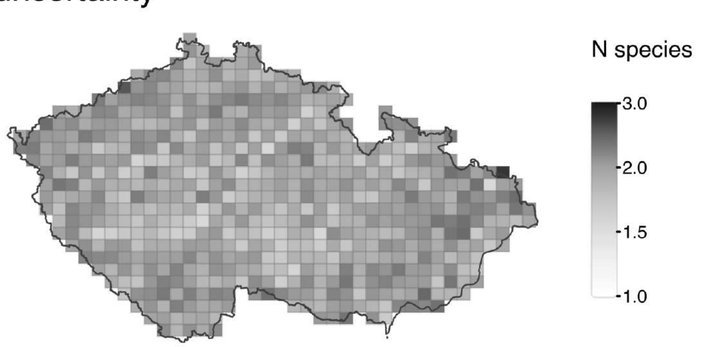

incertidumbre

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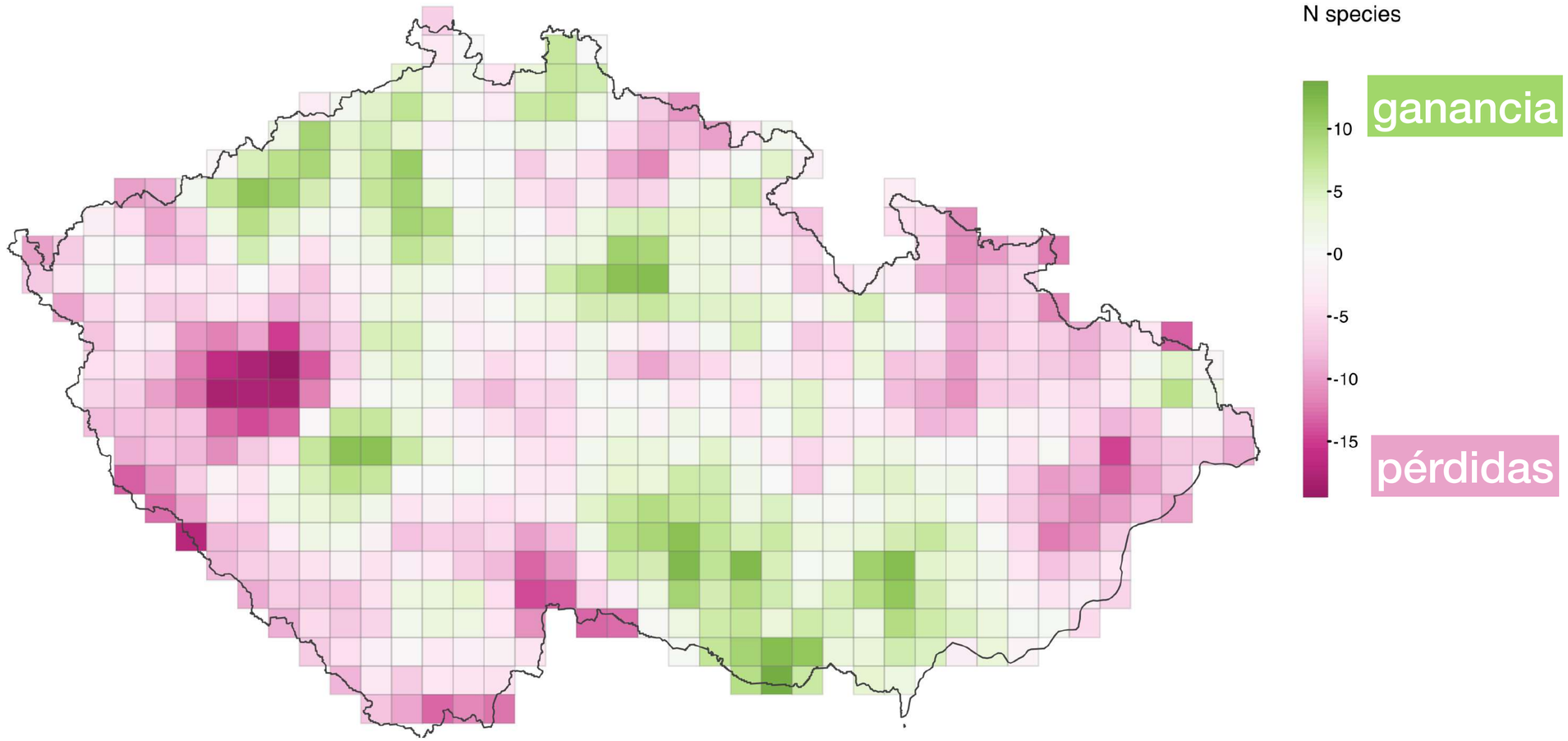
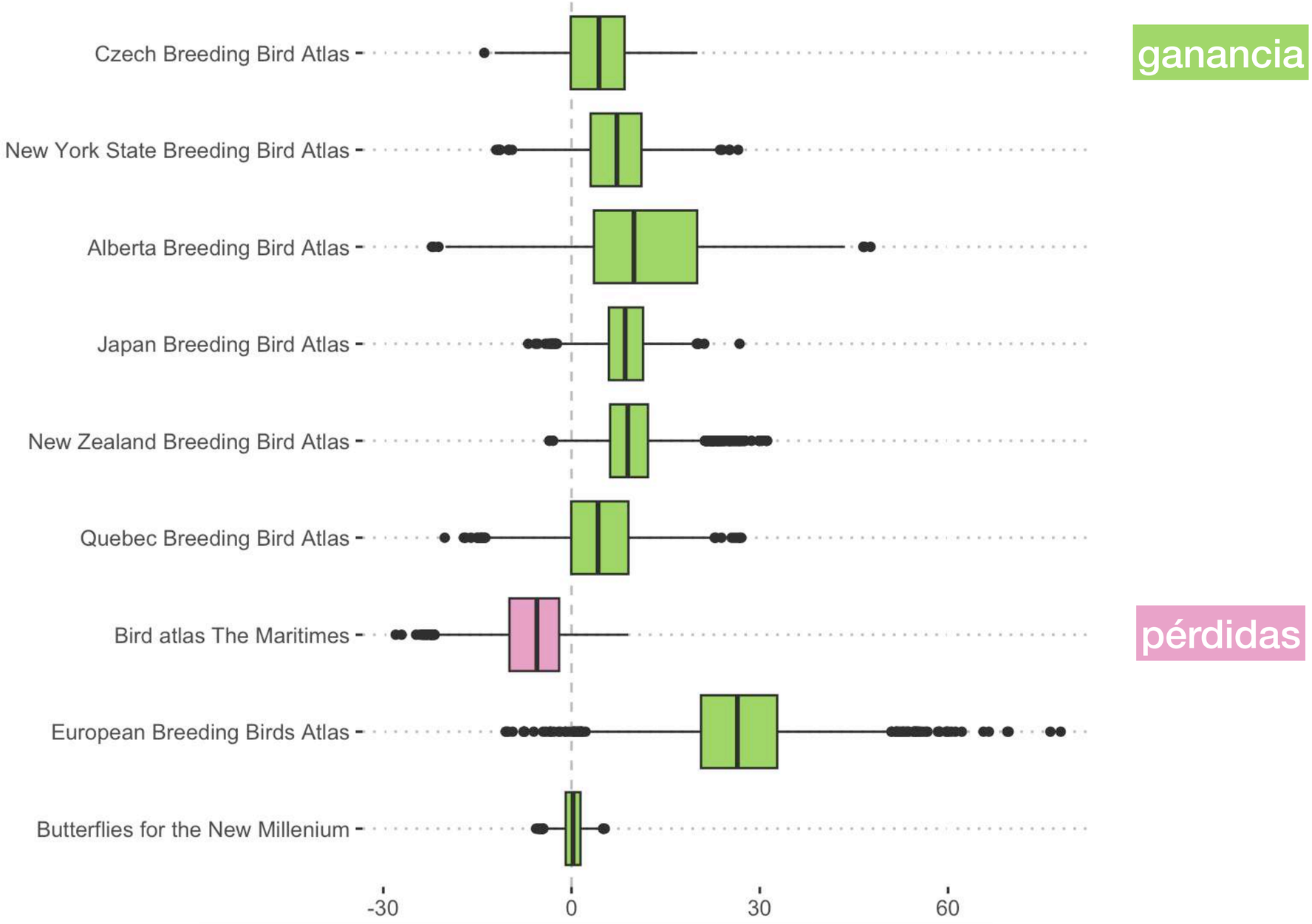
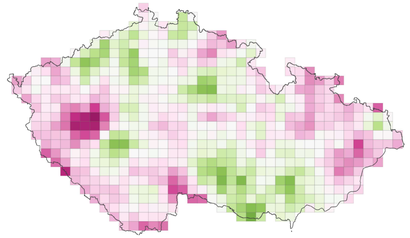
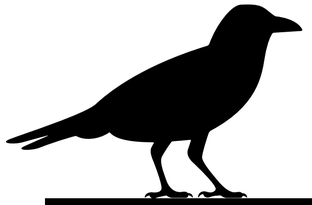


cambio temporal en la riqueza de especies


Czech Breeding Bird Atlas
New York State Breeding Bird Atlas
Alberta Breeding Bird Atlas
Japan Breeding Bird Atlas
New Zealand Breeding Bird Atlas
Quebec Breeding Bird Atlas
Bird atlas The Maritimes
European Breeding Birds Atlas
Butterflies for the New Millenium
-30
0
30
60
ganancia
pérdidas
cambio temporal en la riqueza de especies

¿Cómo podemos explicar estos cambios?





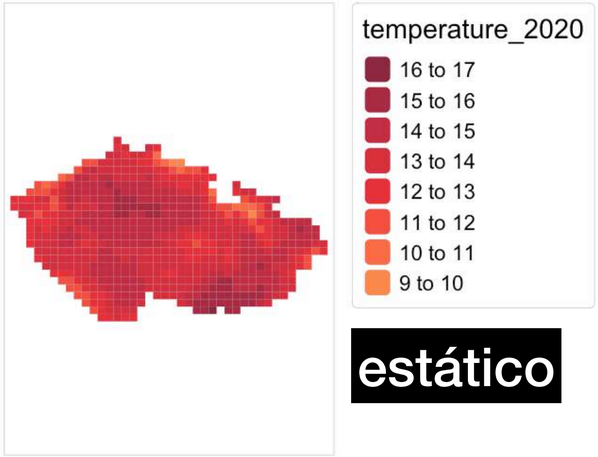
predictores

	Static	Dynamic
temperature	2020	1970-2021
precipitation	2020	1970-2021
human footprint	2009	1993-2009
cropland area	2019	2003-2019
tree coverage	2020	2020-2022

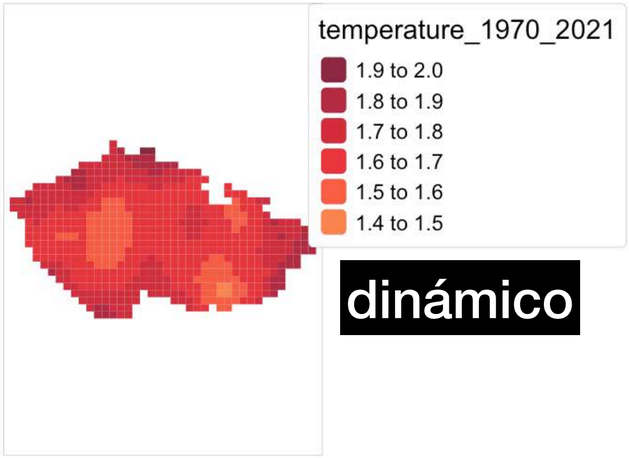
clima

humanos

uso de suelo



estático



dinámico

Continuará…

GRACIAS

Czech University
of Life Sciences Prague

MOBI
Lab

BEAST
Project

Funded by
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European Research Council
Established by the European Commission

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