

Expectation vs. reality: does spatial modeling require field work at continental scale?



Sonia Illanas

PhD Student at IREC-CSIC-UCLM

MSc in Ecology (UAM-UCM)

BSc Environmental Engineer (UPM)



sonia.illanas@ucm.es



[@sonia.illanas](https://twitter.com/sonia.illanas)



<https://github.com/robinilla>

IX Simposio de Novedades en
Investigación Zoológica

22 de abril de 2022

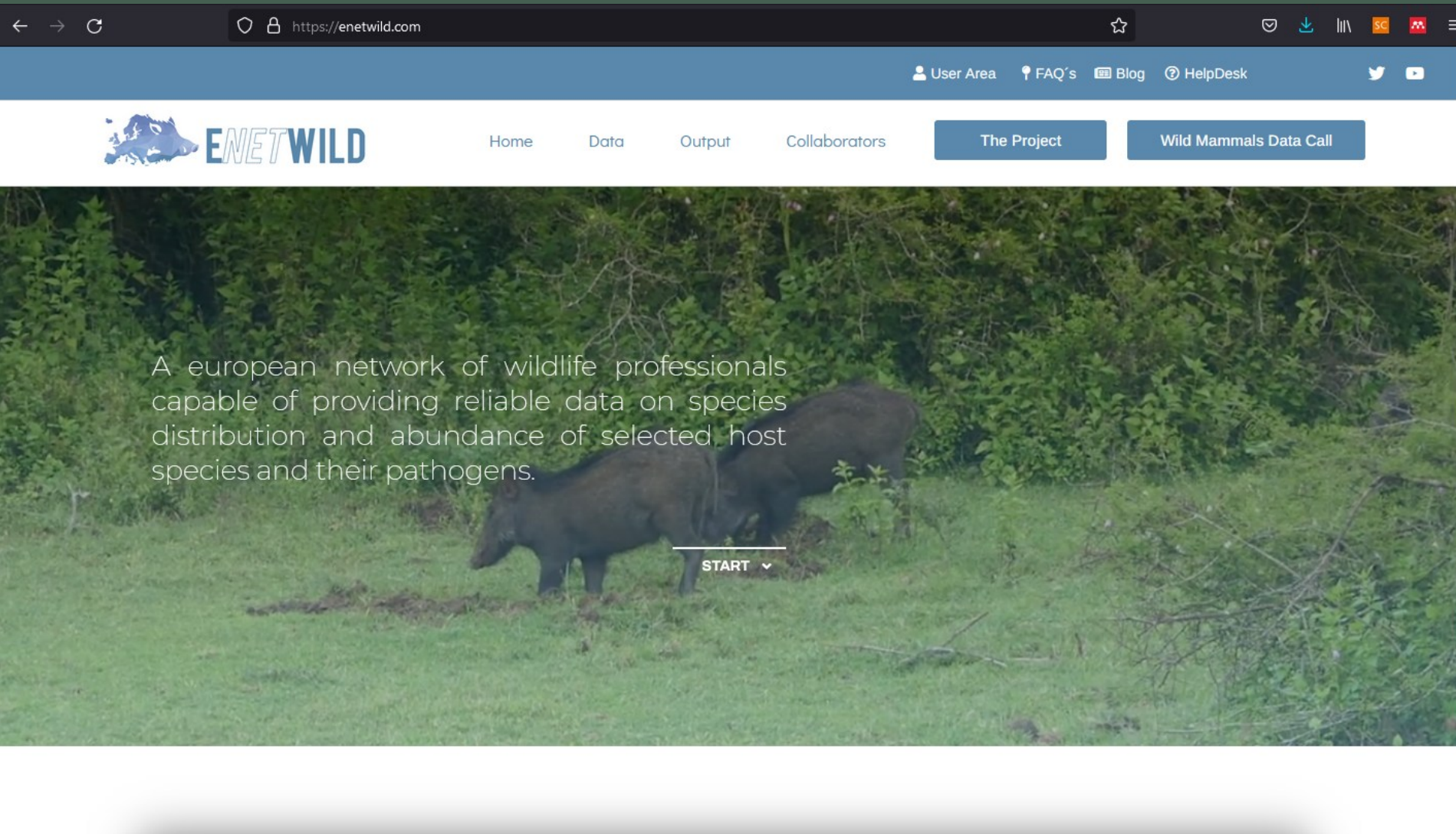
Existe un **creciente interés** por parte de las **administraciones públicas** y una **demanda social** en resolver problemas derivados de la distribución y abundancia de especies silvestres.

Crecimiento/
decrecimiento
de especies
silvestres

Accidentes de
tráfico

Transmisión de
enfermedades





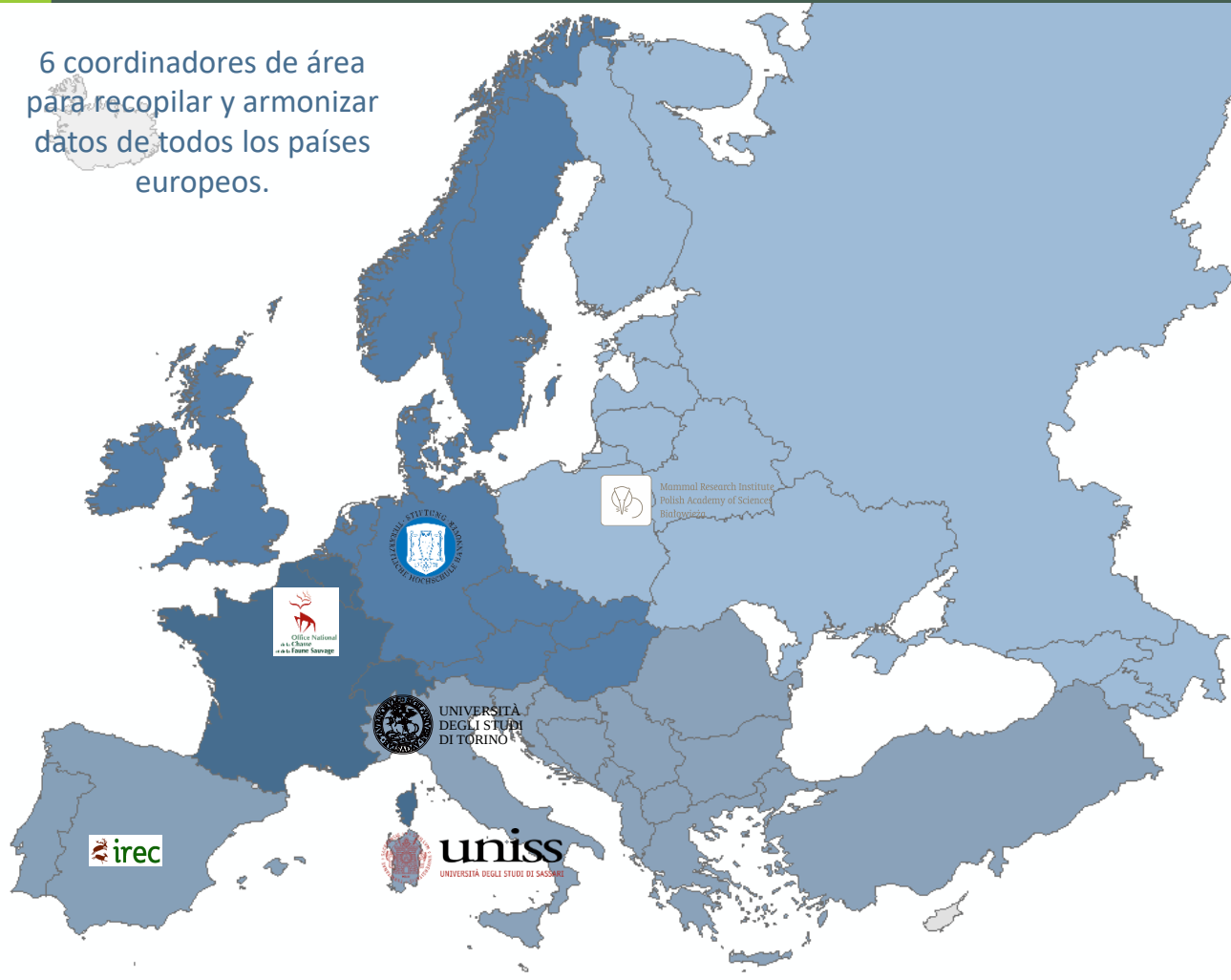
Principales objetivos:

- 1) Guía para hacer estimas de poblaciones silvestres.
- 2) Armonización de datos.
- 3) Estimación de la distribución, abundancia y densidad de especies.
- 4) Interfaz silvestre-ganadera



1) Armonización de datos: recolección

6 coordinadores de área
para recopilar y armonizar
datos de todos los países
europeos.



Distribución, abundancia y densidad
para ungulados y carnívoros.



Heterogeneidad de datos
según cada país



Imprescindible
estandarización de datos.

1) Armonización de datos: Wildlife Data Model (WLDM)

Sigue las recomendaciones de los estándares de Darwin Core.

Identificadores únicos

FIELD NAME	datasetID	eventID	occurrenceID	measurementID	parentEventID	parentOccurrenceID	parentMeasurementID	eventName	originalID	recordedBy
FIELD CONTENT	The identifier of the dataset, as found in the metadata		An identifier for the set of information associated with an Occurrence (a biological record at a place and time). May be a global unique		The identifier of the event in which the occurrence was recorded	An identifier for the main occurrence subdivided in this occurrence	An identifier for the main occurrence subdivided in this occurrence	The common name of the event	The identifier of the record in the producer system	A person, group, or organization responsible for recording the original Occurrence.
EXAMPLE			IT002A1000002		IT001A1000004			Manoria	N2918203	INF

Resolución espacial

locality	locationType	xyType	x	y	xyUncertainty	footPrintWKT	locationID	locationAccordingTo	referenceSyst	country	areaType	areaSize	areaSizeUnit
The specific description of the place. This term may contain information modified from the original to correct perceived errors or standardize the description.	Type of delineation of the geographic information	Nature of the X,Y values (real or estimated) to be reported	Geographic Longitude (in decimal degree, using the spatial reference system in "Reference	Geographic Latitude (in decimal degree, using the spatial reference system in "Reference	The horizontal distance class (in meters) from the given X and Y describing the smallest circle containing the whole of the	A Well-known Text (WKT) representation of the shape that defines the location	Identifier of the line in the provided shapefile or Code corresponding to the cell of the	The name for the shape file provided (assigned by data provider) or to the reference grid or reference NUT	The ellipsoid, geodetic datum, or spatial reference system (SRS) upon which the X,Y coordinates or	Country where data were collected	Type of the area which data refer.	Size of this area	Unit of the area
San Luigi	polygon	estimated	7.210178	45.520042	100m-1km	POLYGON((5 5,28 7, 44 14,	ID3525	10kmE283N285	EPSG: 23030	IT	hunting ground	3250	hectare

Resolución temporal

timeLevel	dayBeginID	monthBeginID	yearBeginID	dayEndID	monthEndID	yearEndID	dateTime
Level of temporal aggregation of data.	Day of observation or starting day of data collection (if interval).	Month of observation or starting month of data collection (if interval).	Year of observation or starting year of data collection (if interval).	Ending day of data collection (if interval).	Ending month of data collection (if interval).	Ending year of data collection (if interval).	Original representation of the date-time or interval during which an Event occurred. It
day	14	10	2017	12	11	2019	2017/2019

1) Armonización de datos: Wildlife Data Model (WLDM)

Sigue las recomendaciones de los estándares de Darwin Core.

Los estadísticos de caza son el principal recurso de información ampliamente distribuido y potencialmente comparable a escala europea.

Especie registrada

species	recordStatus	recordType	sex	lifeStage	individualCount	individualID
The full scientific name as used by the consortium.	A statement about the presence or absence of a Taxon at a Location.	Type of sightings recorded in the database.	The sex of the individual(s) represented in the Occurrence.	The age class of the individual(s) at the time the Occurrence was recorded	The number of individuals represented present at the time of the Occurrence	The identification of the individual
Capreolus capreolus	present	alive	female	adult	5	Or73

Bolsas de caza

harvTot	harvMal	harvFem	harvJuv	harvIndet	inspectFem	inspectUteri	pregnFem	fetuses	individualCo	huntingMethod	baiting	numHunters	numBeaters	numDogs	huntArea	numHuntDays
Overall number of harvested individuals	Overall number of harvested males (adults and subadults)	Overall number of harvested females (adults and subadults)	Overall number of harvested juveniles (< 1 year)	Overall number of harvested indeterminate heads. Sex, age or both can be indeterminate	Selection of females inspected for reproductive status See Data catalogue	Number of harvested females whose uterus was inspected to ascertain pregnancy and litter	Number of pregnant females	Total count of fetuses (i.e. litter size) for all inspected uteri	Total amount of individuals observed. It is the number of individuals observed during a	Hunting method See Data catalogue	Use of baits as attractant See Data catalogue	Number of hunters (for cooperative hunting only). For monitoring data (e.g. a complete season	Number of beaters (for drive hunt only). For monitoring data (e.g. a complete season composed	Number of dogs (for hunting with dogs only). For monitoring data (e.g. a complete season composed of different hunting days), indicate the total	Area beaten during cooperative hunt for event data, or total sum of areas during the season for monitoring data (in hectares)	Number of hunting days spent during a hunting season (for a single event indicate 1)
4	1	2	1	1	andom choic	1	1	2	6	fixed point		1				1

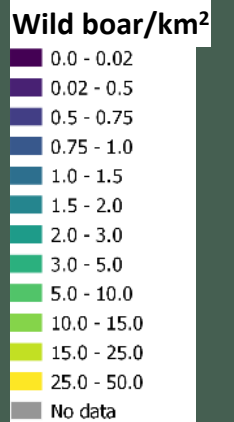
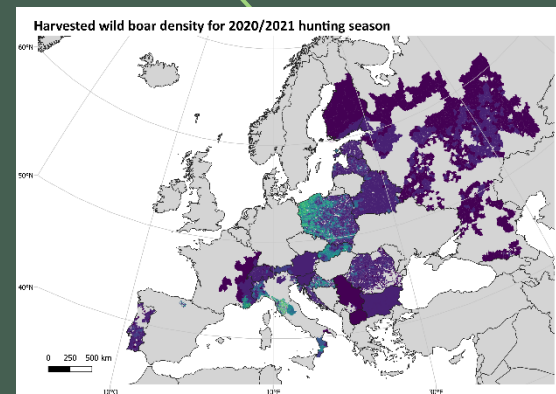
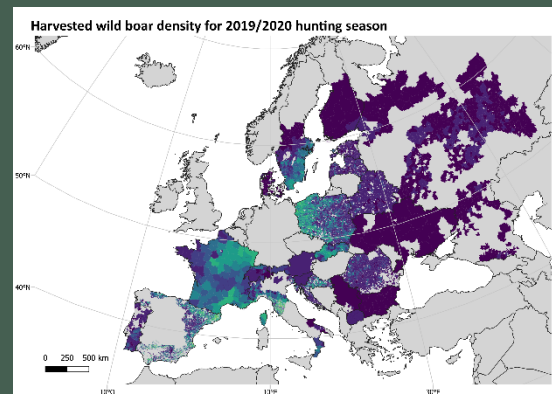
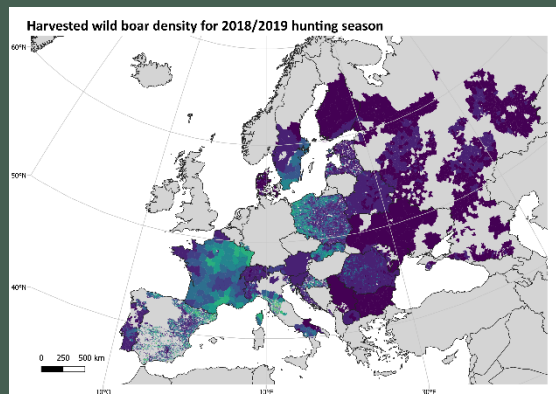
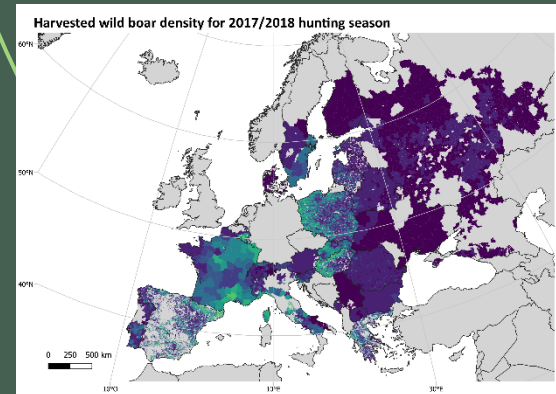
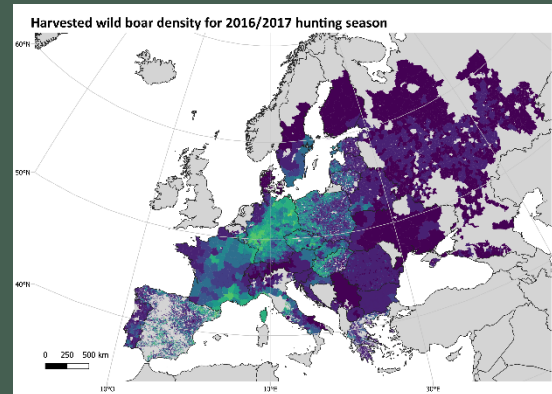
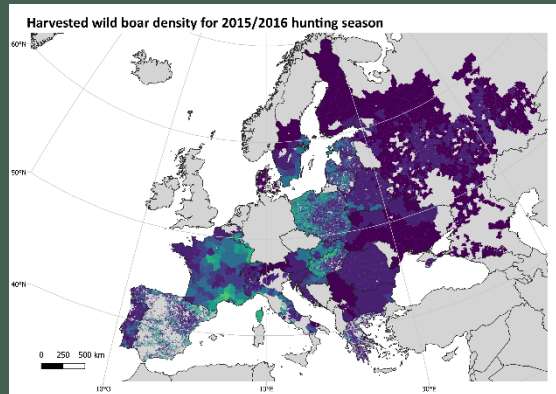
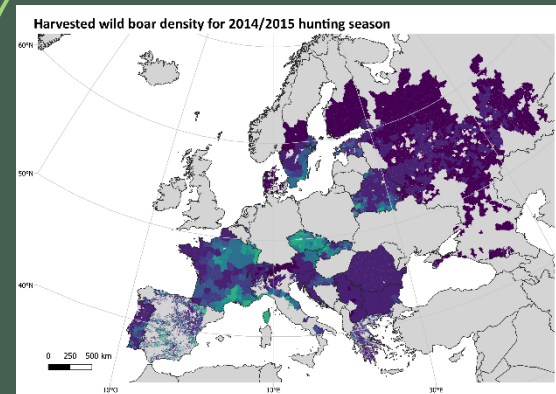
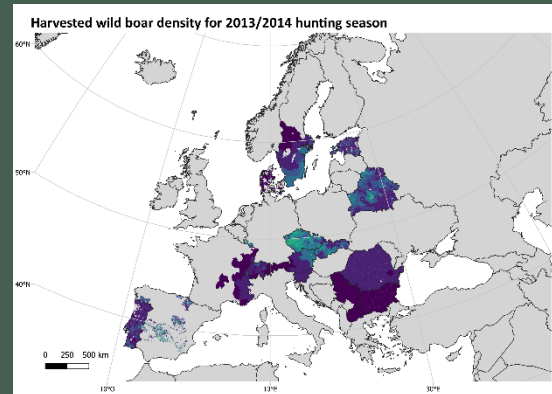
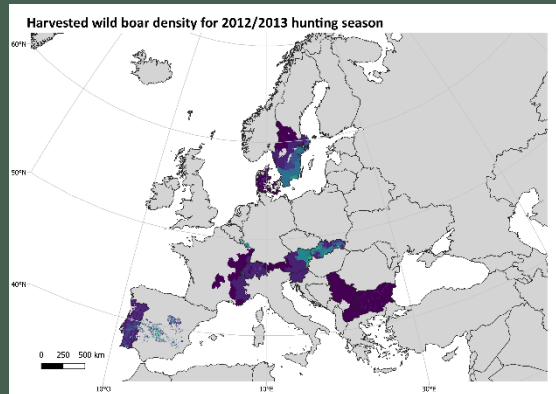
Densidad/abundancia

samplingSizeValue	samplingSizeUnit	countingMethod	measValue	measAccuracy	measAccuracyType
Sampling effort spent during the event (e.g. number of counts, or km walked or driven along a transect, nº of camera traps)	Unit of measurement of the effort (e.g. hunting days, number of repetitions, km walked, battued surface, days of camera activation.	Method for counting the animals in the survey area See Data catalogue	Estimated density in the survey area (number of individuals /100ha)	The description of the potential error associated with the measurementValue	The description of the name of the method used to assess the measurement accuracy.
		pellet count			

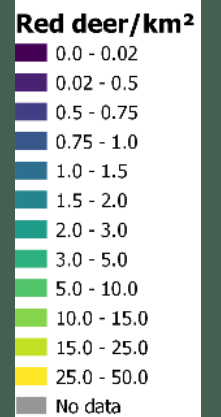
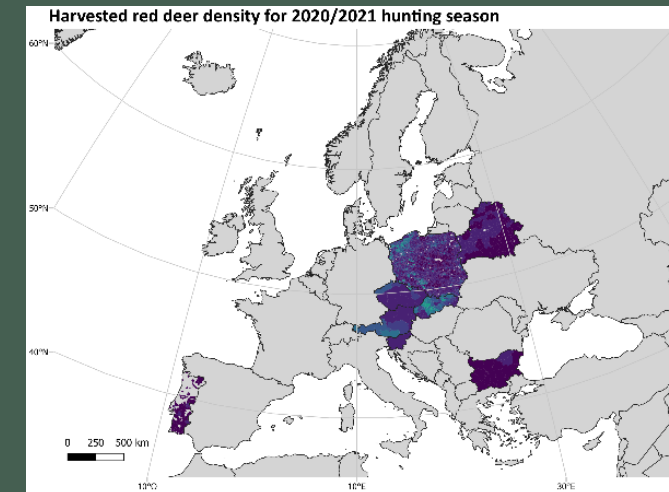
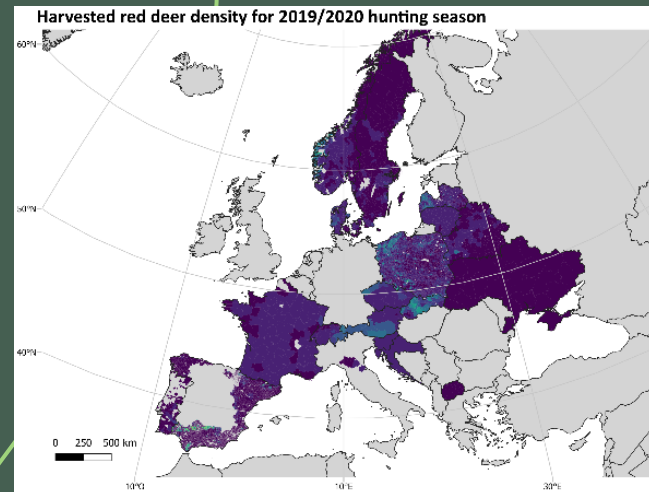
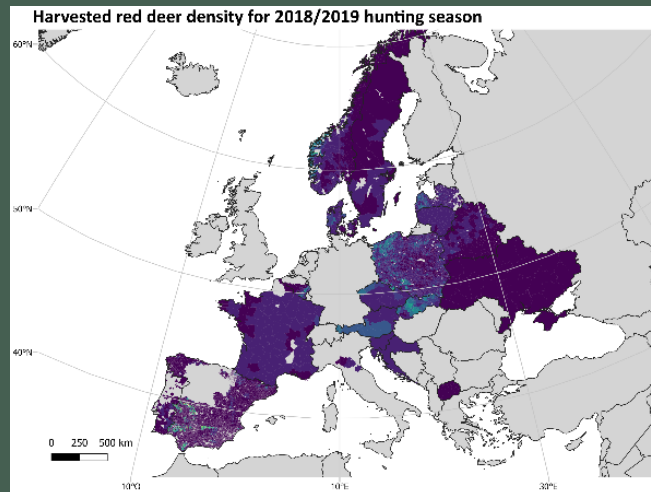
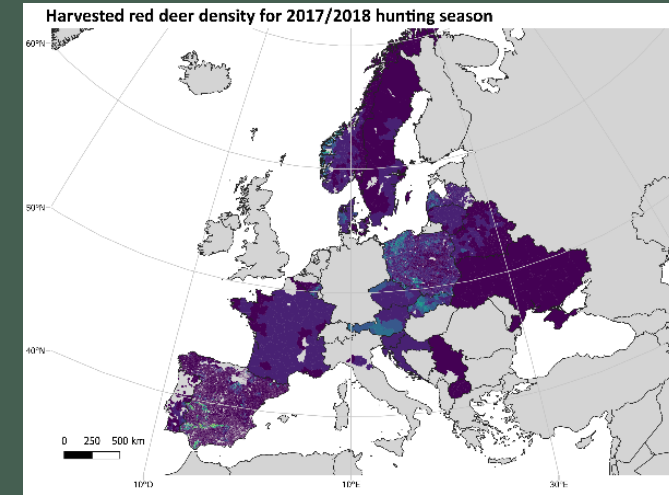
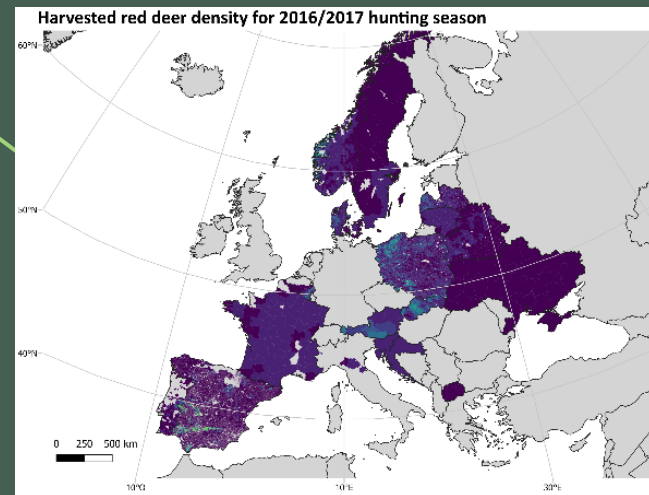
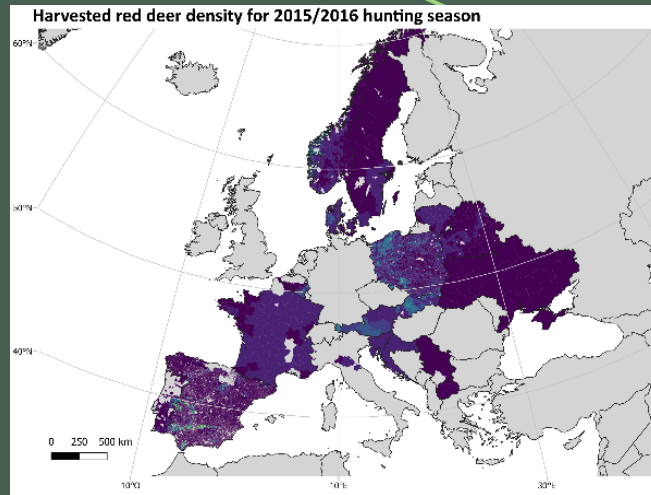
Presencia

occurrenceStatus	occurrenceType	recordingMethod	valMethod	sex	lifeStage
A statement about the presence or absence of the species at a given Location See Data catalogue	Type of sightings recorded in the database See Data catalogue	Name or description of the method used to record an event See Data catalogue	Method used to validate data records See Data catalogue.	The sex of the individual(s) represented in the Occurrence.	The age class of the individual(s) at the time the Occurrence was recorded
present	indirect sign	direct observation	no validation	female	adult

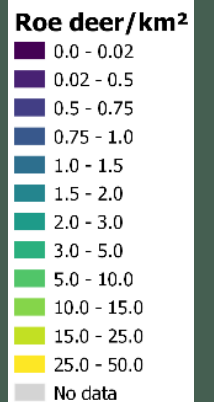
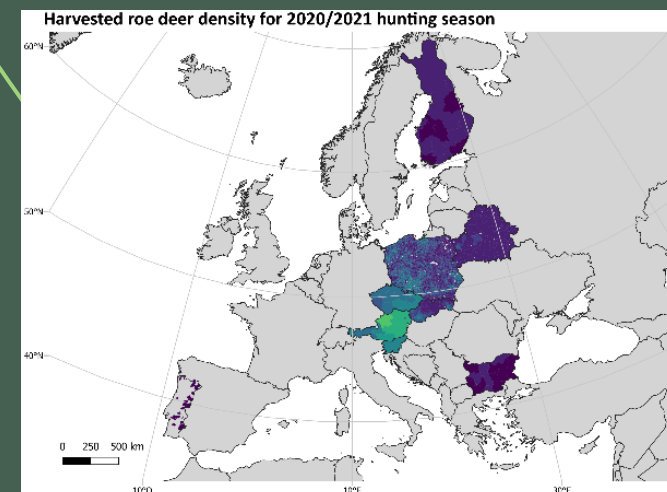
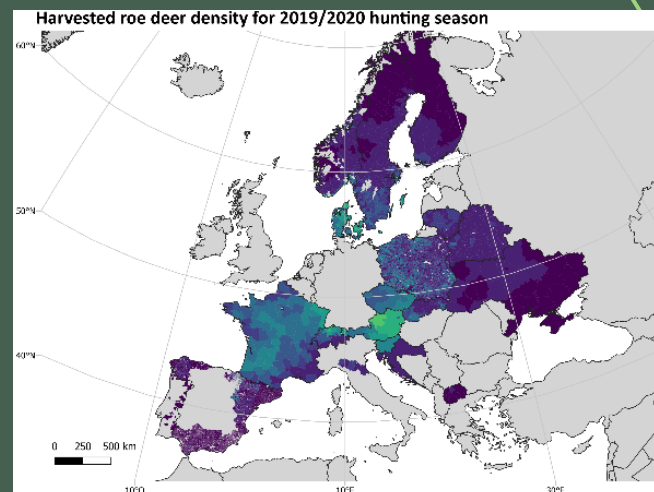
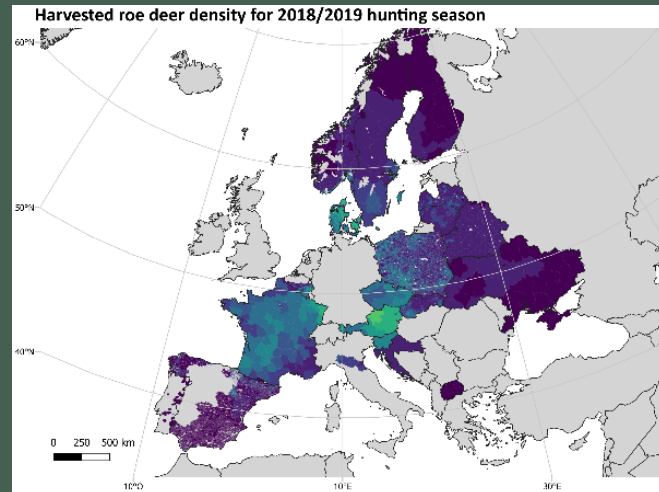
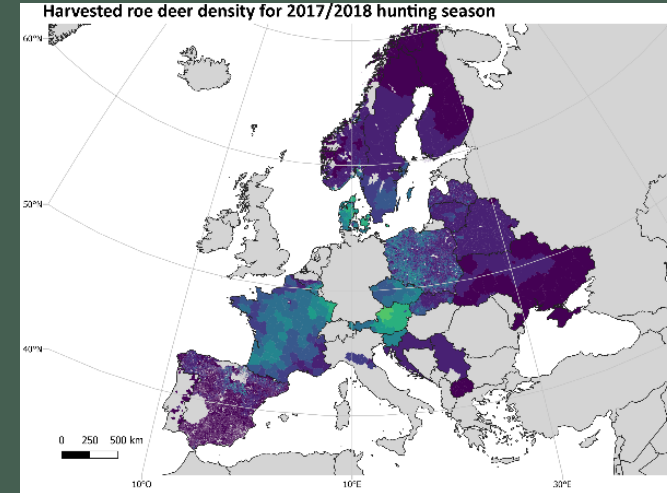
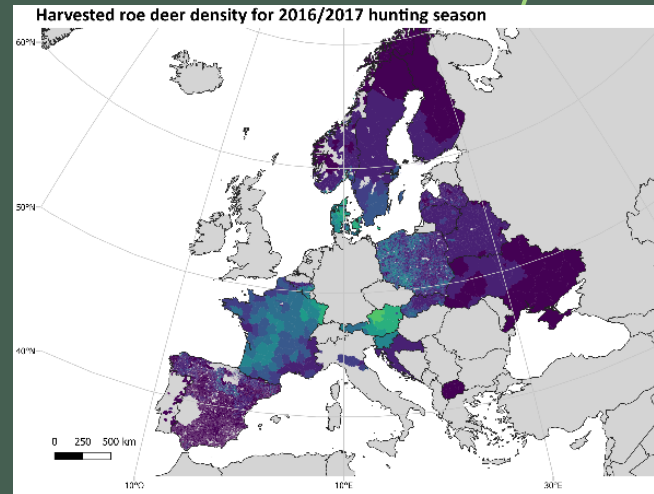
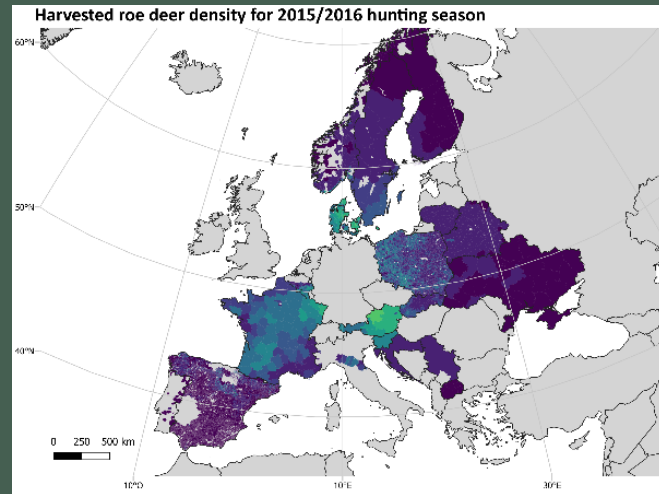
1) Armonización de datos: bolsas de caza



1) Armonización de datos: bolsas de caza



1) Armonización de datos: bolsas de caza



1) Armonización de datos: bolsas de caza

1. Jabalí (*Sus scrofa*): 9HS
2. Ciervo (*Cervus elaphus*): 217705 datos; 49HS
3. Corzo (*Capreolus capreolus*): 201235; 49HS
4. Arruí (*Ammotragus lervia*): 44057 datos, 8HS
5. Alce (*Alces alces*): 35985 datos; 9HS
6. Gamo (*Dama dama*): 203037 datos, 49HS
7. Muflón (*Ovis aries*): 195347 datos; 49HS
8. Cabra (*Capra hispanica* y *Capra pyrenaica*): 138839 datos; 8HS
9. Íbice alpino (*Capra ibex*): 133 datos; 12 HS
10. Rebeco (*Rupicapra rupicapra*): 970 datos; 47HS
11. Sarrio (*Rupicapra pyrenaica*): 48103 datos; 47HS
12. Ciervo sika (*Cervus nippon*): 30628 datos; 34HS
13. Reno (*Rangifer tarandus*): 315 datos; 21HS
14. Muntiac de Reeves (*Muntiacus reevesi*): 196 datos; 2HS

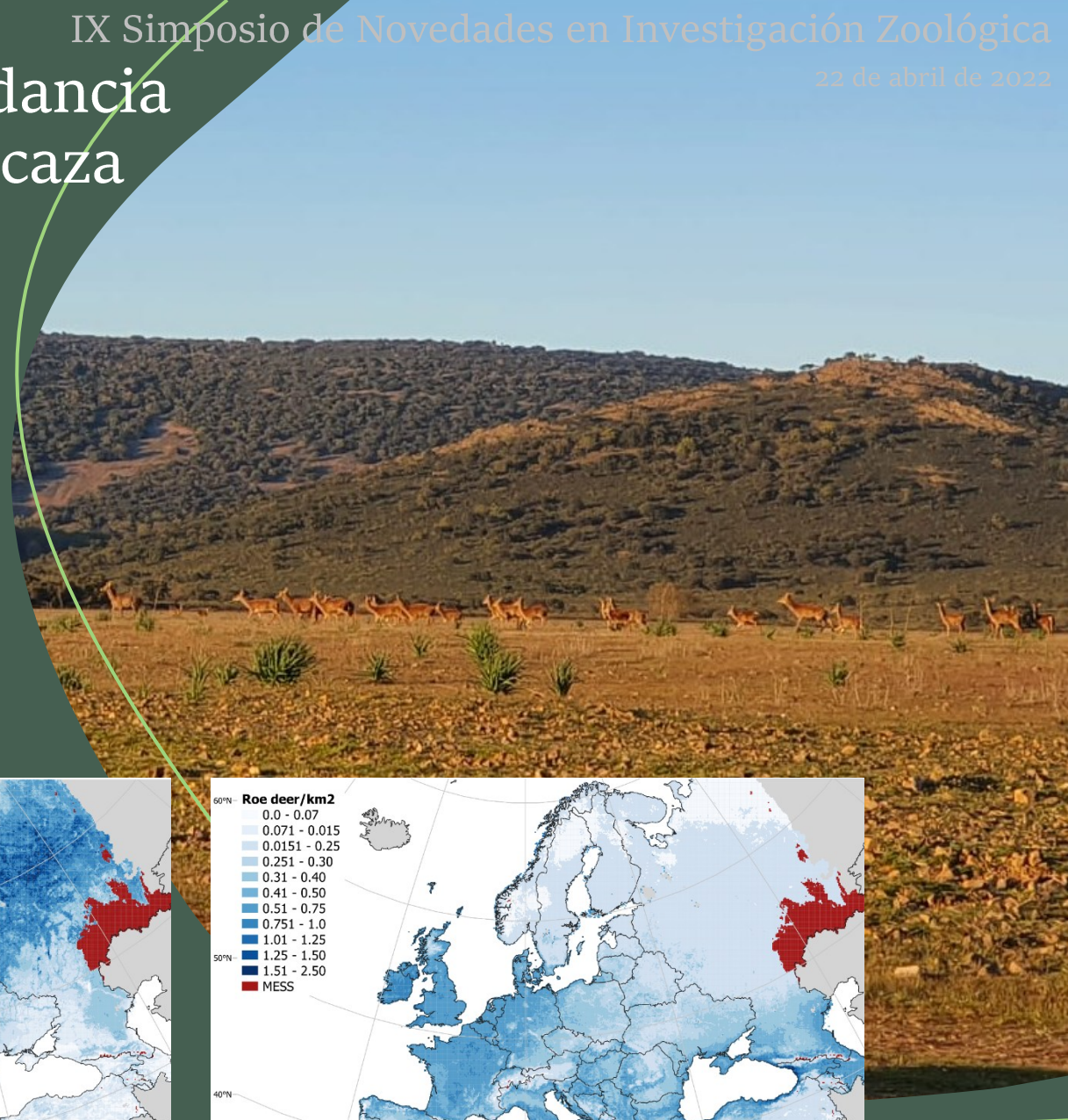
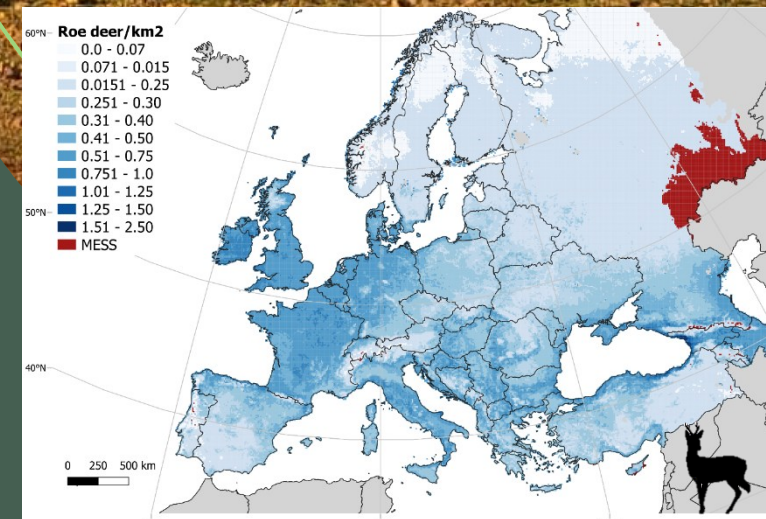
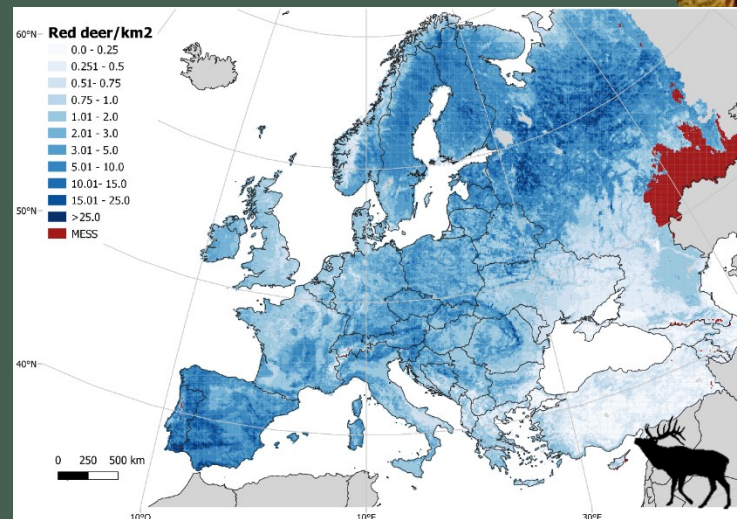
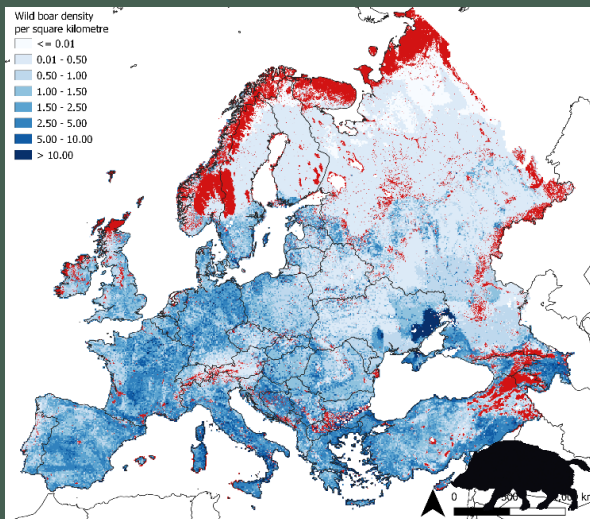
- Diferente resolución espacial.
- Diferente resolución temporal.
- Huecos.



Modelización espacial de las bolsas de caza para la estimación de la abundancia y densidad de especies silvestres en Europa.

2) Estimación de la distribución, abundancia y densidad: modelización de bolsas de caza

- Diferentes aproximaciones de modelización:
1 modelo por bioregion geográfica
glm.nb ($D_{HG} \sim$ variables climáticas y de land cover)
- Predicción de la densidad de especies a alta resolución espacial: 2x2 km grid & 10x10k grid.
 - Buen patrón espacial de la densidad de especies.

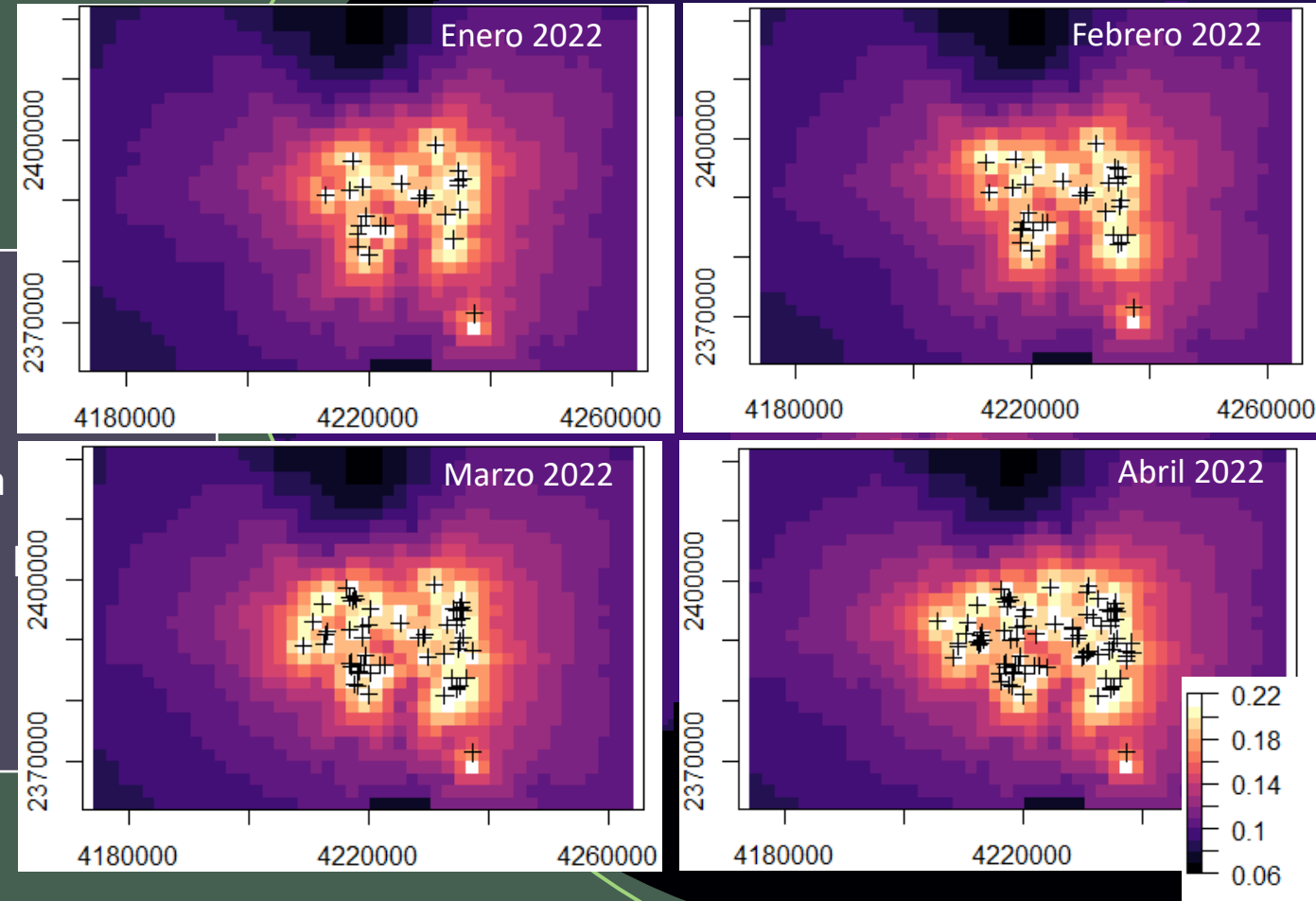


3) Aplicaciones: Dispersión de enfermedades

- Peste Porcina Africana (PPA) en Italia. Enero 2022.
- Conectividad ecológica (teoría de grafos).

1. Creación matriz de coste acumulado
 1. Modelo de abundancia de jabalí +
 2. localizaciones detectadas con PPA positiva
2. Transformación del coste acumulado mediante transformación exponencial negativa
($\text{Conductancia} = \text{CosteAcumulado}^{-1}$).

Se asume movimiento de la enfermedad más fácil donde hay más abundancia de jabalí



Conclusión

Las **bolsas de caza** son una **herramienta útil** para la gestión de especies silvestres ya que los modelos resultantes aportan **buenos patrones** de su distribución y abundancia, pero tienen ciertas limitaciones:

1. Aproximación metodológica sólo aplicable a especies cinegéticas;
2. Son índices de abundancia $\neq$ abundancia real.

Es necesario el **trabajo de campo** para la obtención de **abundancias reales** que puedan utilizarse para **calibrar los modelos** obtenidos a partir de bolsas de caza.



Puesta en marcha en octubre de 2021 del
European Observatory of Wildlife (EOW)

Este estudio ha sido posible gracias a:

- ENETWILD consortium, proyecto financiado por EFSA.



- La ayuda para contratos predoctorales para la formación de doctores 2020 (PRE2020-095091) asociada al Proyecto de I+D+i HAWIPO (PID2019-111699RB-I00).



¡Muchas gracias por vuestra atención!

IX Simposio de Novedades en Investigación Zoológica

22 de abril de 2022

