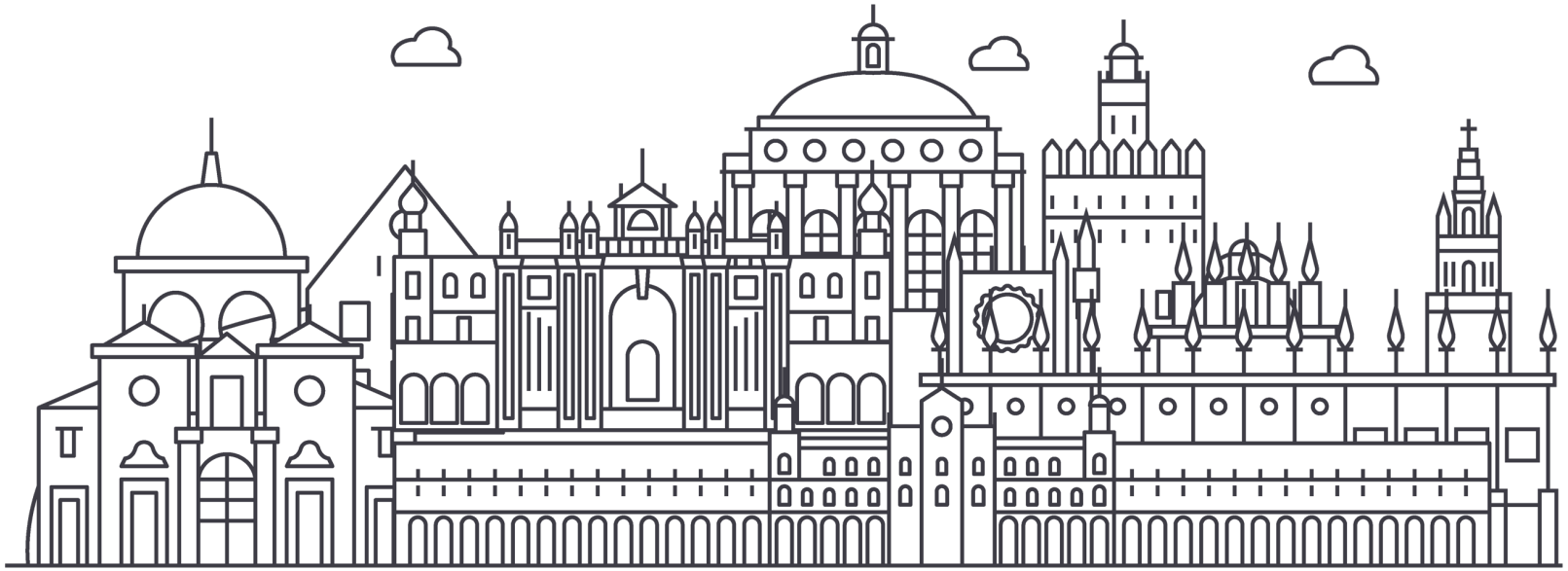
BEeS

The LifeWatch ERIC Biodiversity & Ecosystem eScience Conference

Seville
22-24/05/23



Threats and challenges to biodiversity and ecosystem conservation from an eScience perspective

LifeWatch ERIC

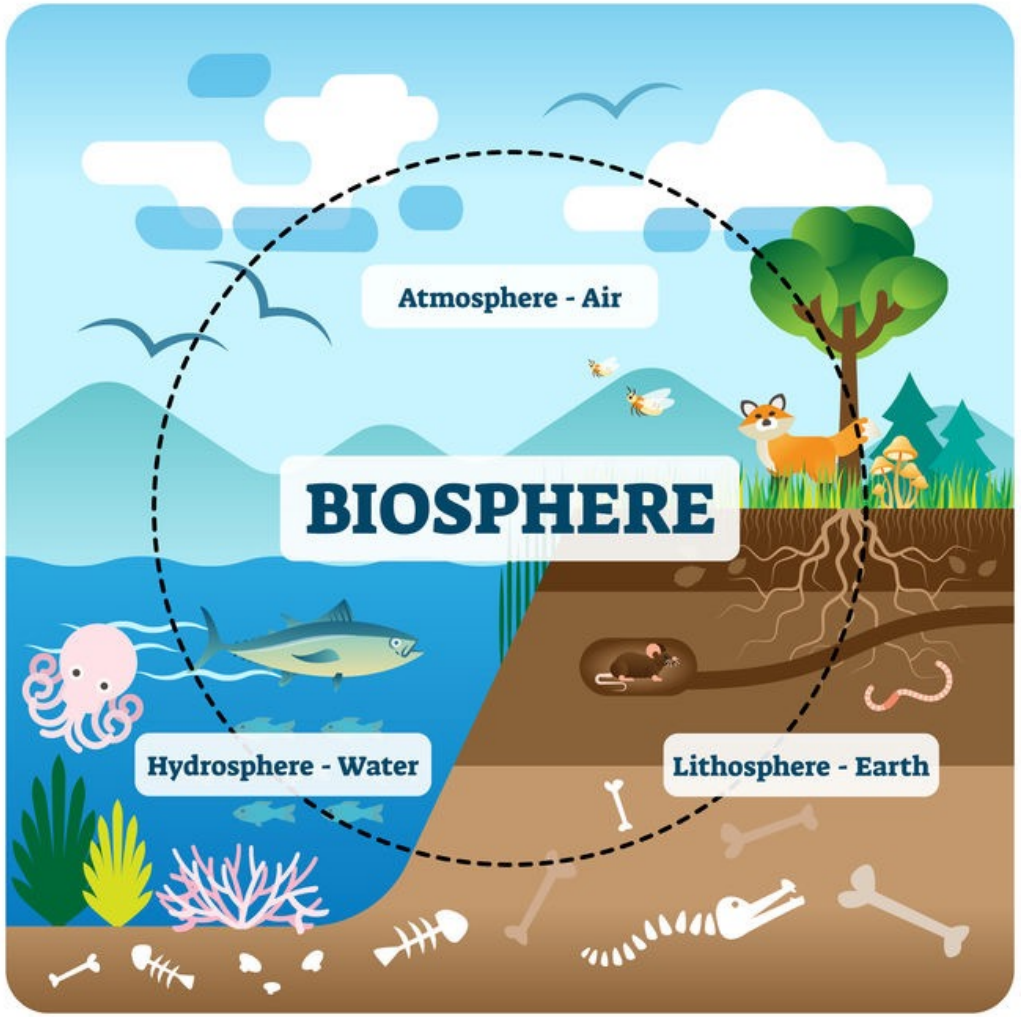
GOBIERNO DE ESPAÑA · MINISTERIO DE CIENCIA E INNOVACIÓN

UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa

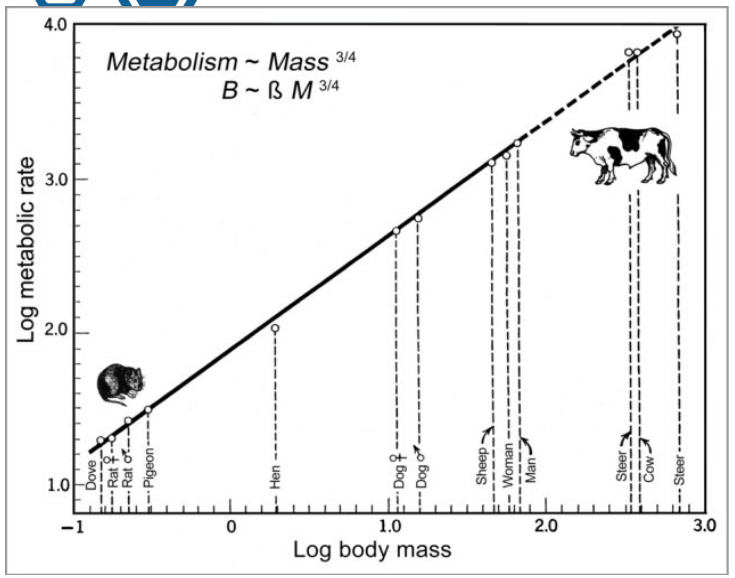
Fine scale positioning and space use behaviour of the invasive species *Callinectes sapidus* in the Aquatina lagoon (SE Italy)

Vanessa Marrocco; Milad Shokri; Jan Reubens; Fabio Vignes; Alberto Basset

Life in the biosphere is regulated by ecological interactions. By definition, interactions occur where the home ranges of two individuals of the same or different species overlap in space. It follows that quantitative spatial extent estimates are required to develop affordable future ecosystem scenarios of biodiversity conservation and ecosystem service provision in the face of global changes.



”*Home range is the area traversed by an individual in its norma activities of food gathering, mating, and caring for young. Occasional sallies outside the area, perhaps exploratory in nature, should not be considered part of the home range*” (Burt, 1943).

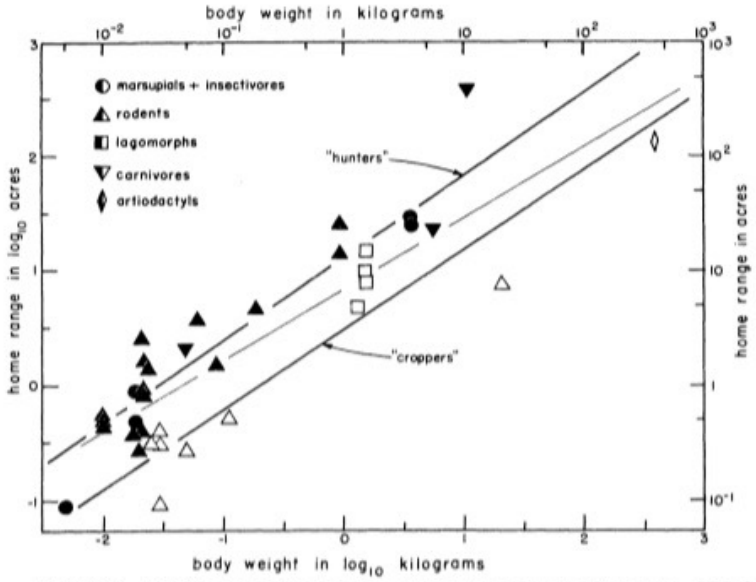


Larger animals have larger home ranges, which in turn must be large enough to meet metabolic energy needs that scale positively with mass.

$$HR = a M^{b}$$

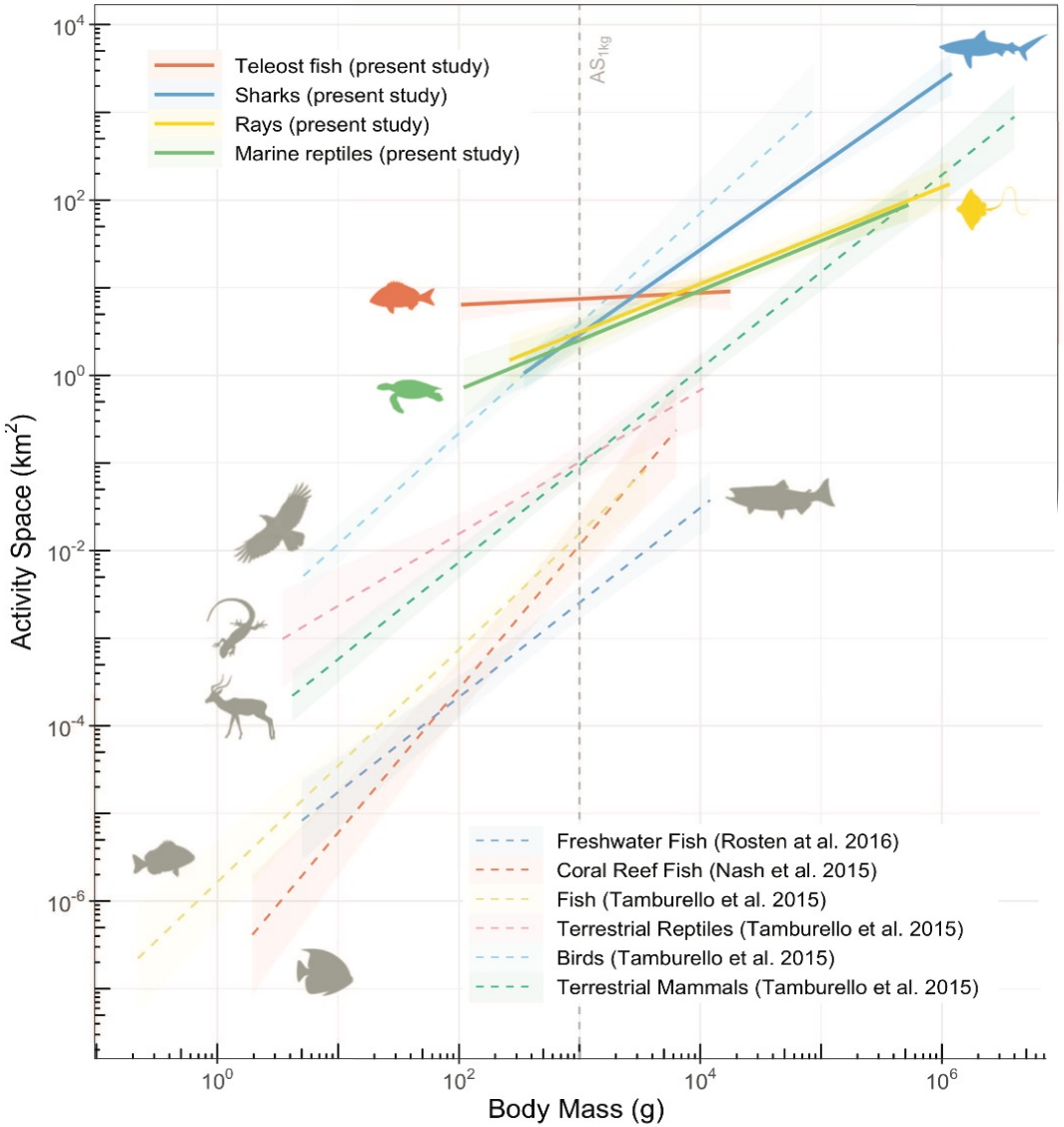
0.75= the value expected if area of home range is a function of basal metabolic rate.

HR= home range area
a= taxon-specific normalization constant
M= mass



GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN

UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa



Space use among taxa has been long debated in the scientific literature

- **thermoregulation strategy** (Hendriks 2007);
- **differences in productivity across realms** (Harestad and Bunnell 1979; Hendriks 2007);
- **giving up time and giving up densities from resource patches** (Cozzoli et al., 2018, 2019, 2020) ;
- **space use behaviour and coexistence relationships** (Basset & De Angelis, 2007)

GOBIERNO DE ESPAÑA MINISTERIO DE CIENCIA E INNOVACIÓN

UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa

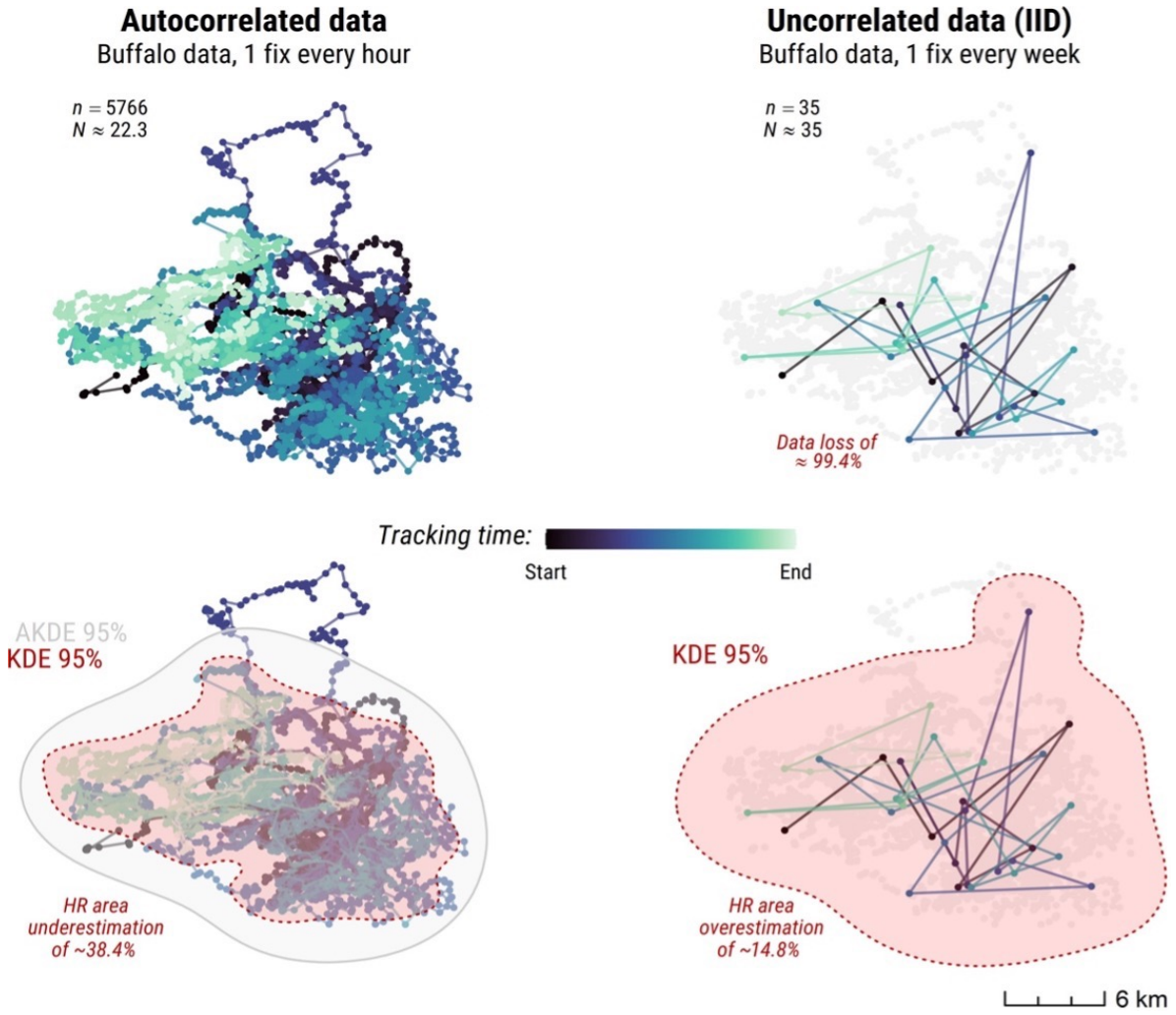
Bias in the estimation due to the:

- RANGE OF TECHNIQUES
  - visual tracking
  - mark-recapture
  - biotelemetry
- DENSITY ESTIMATOR USED
  - Conventional home range estimators

    Minimum Convex Polygon (MCP)

    Kernel Density Estimators (KDE)
  - Recent new approach

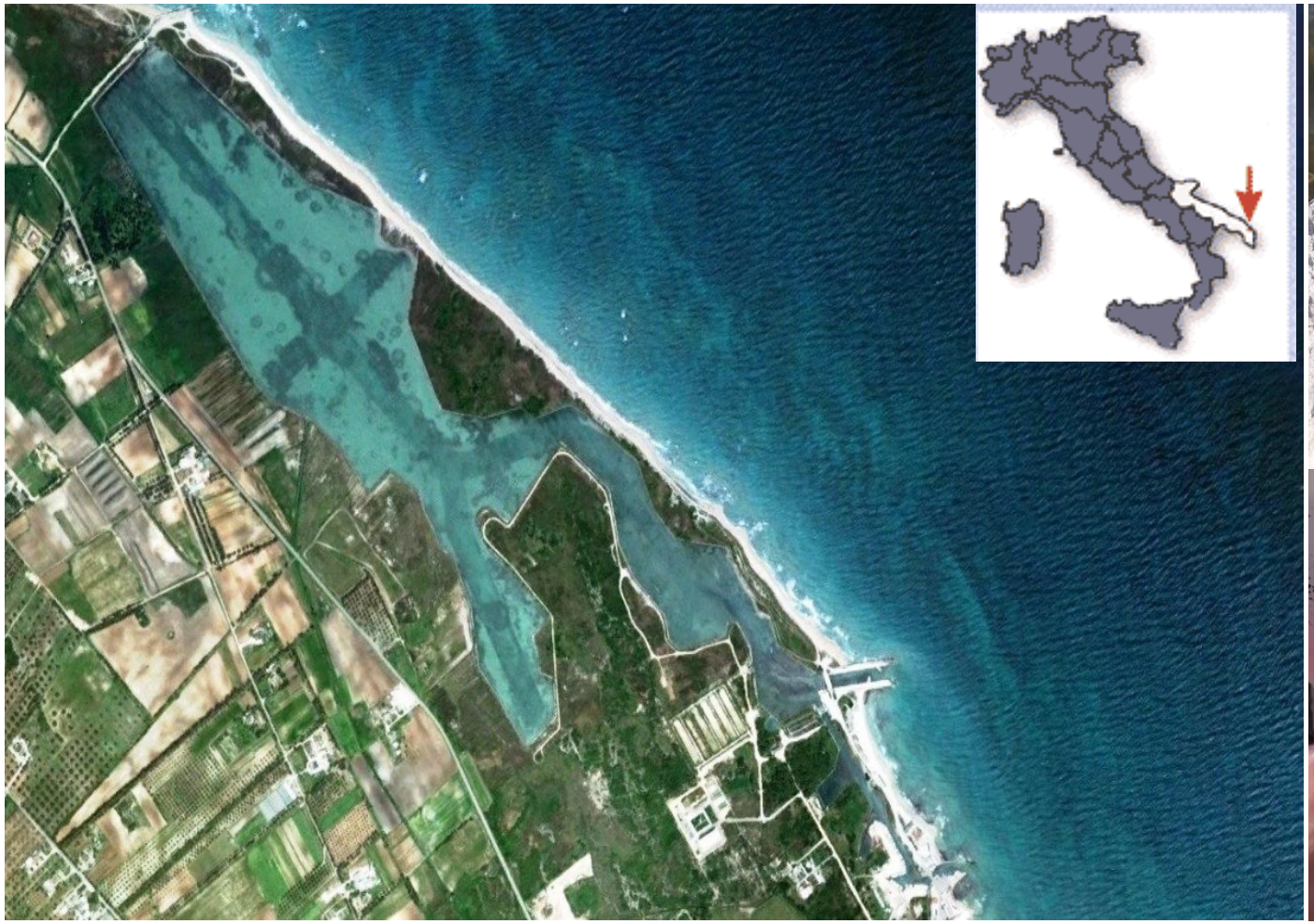
    Autocorrelated-KDE (AKDE)



BEeS Seville, 22-24 May 2023

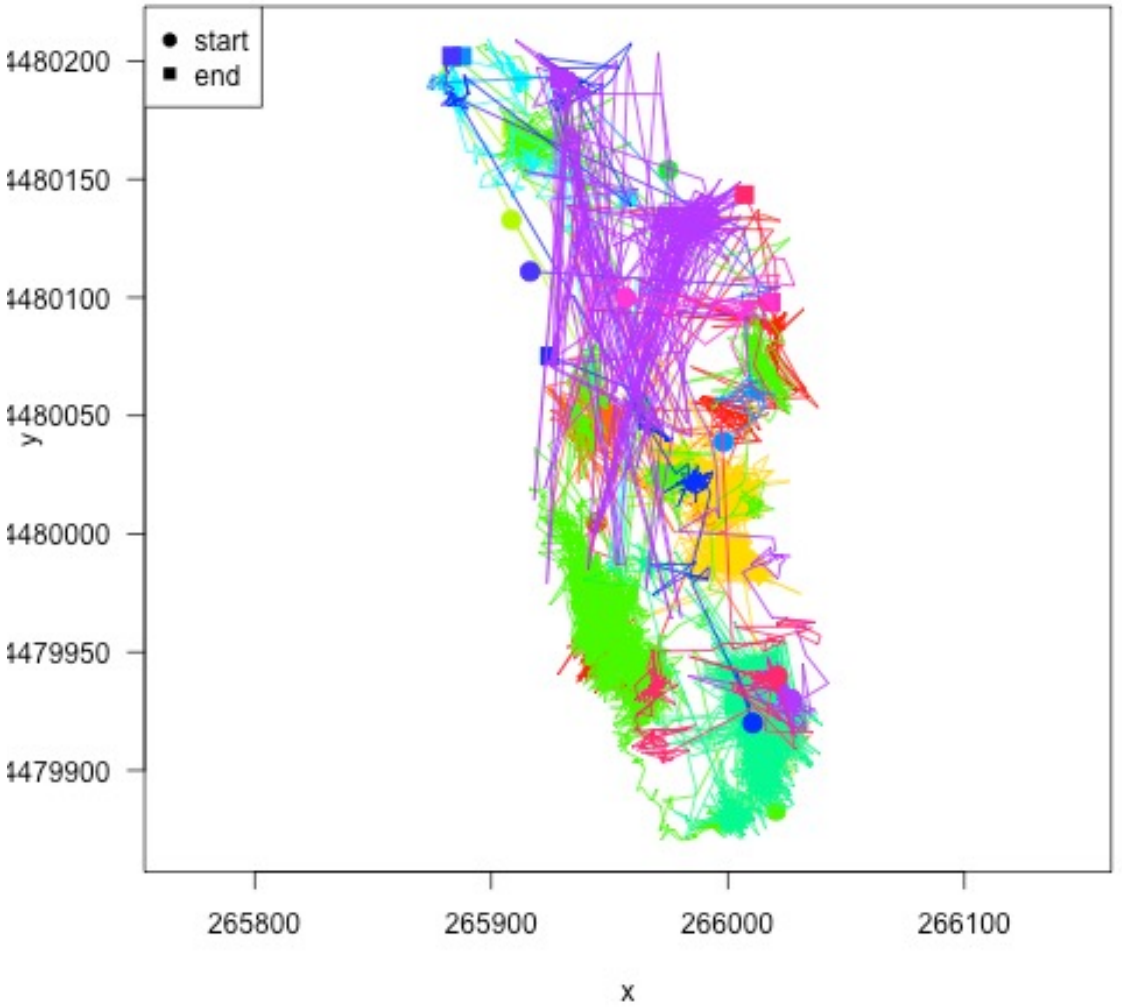
Threats and challenges to biodiversity and ecosystem conservation from an eScience perspective

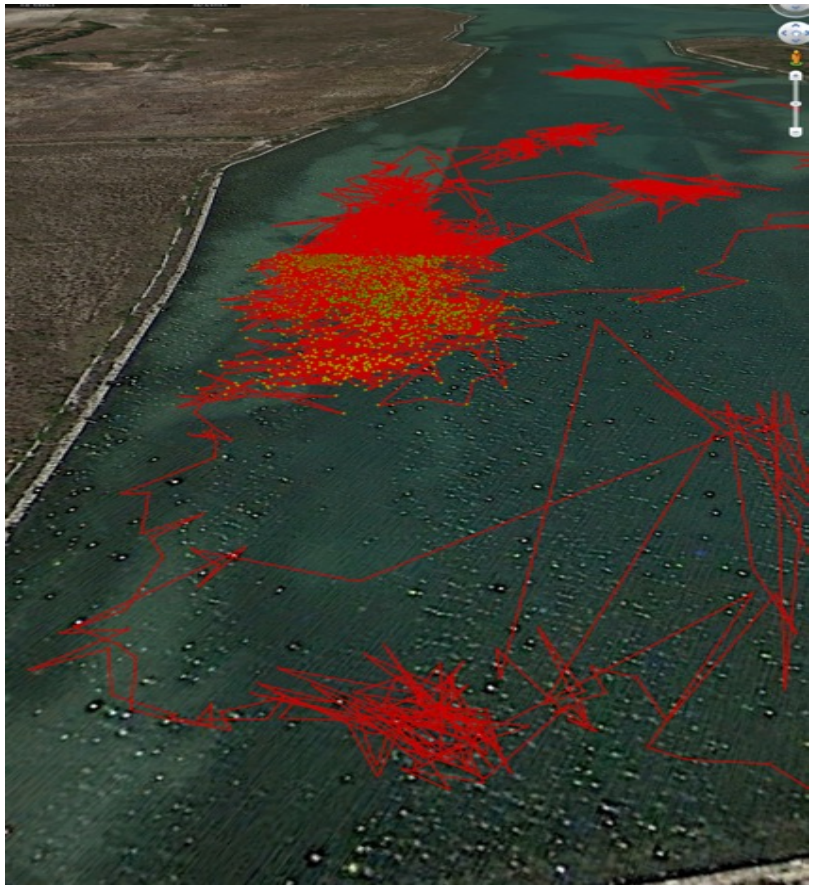
LifeWatch ERIC



GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN

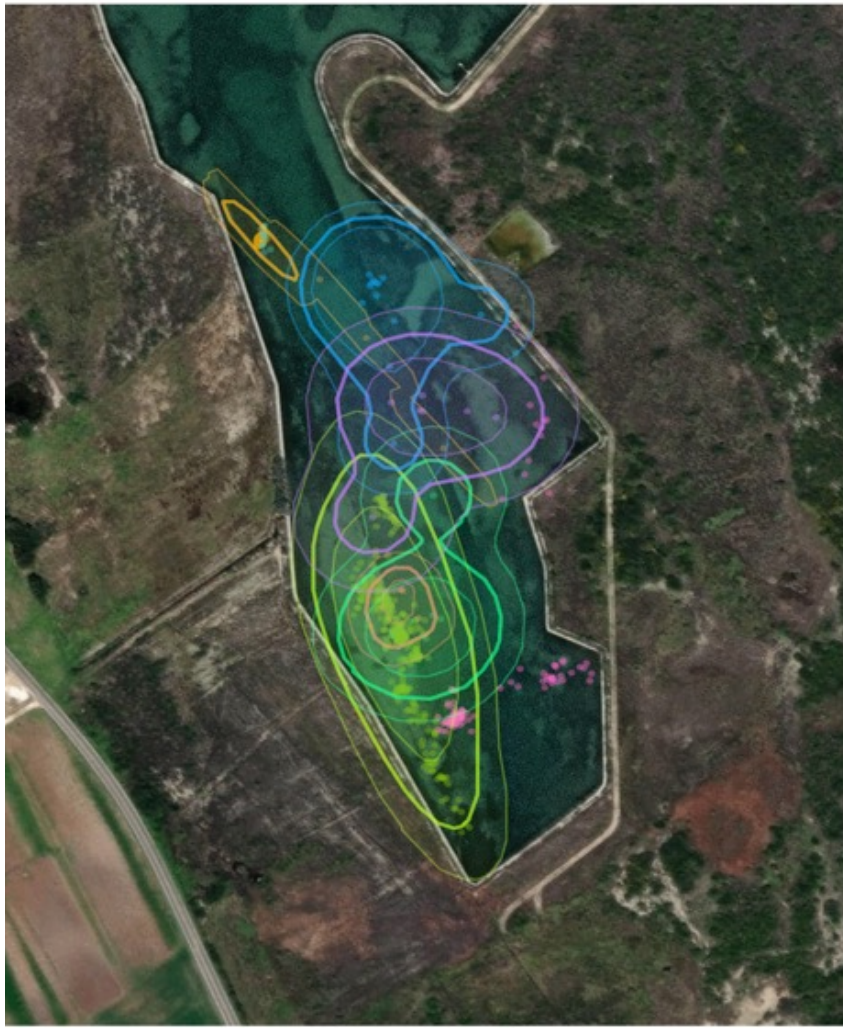
UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa

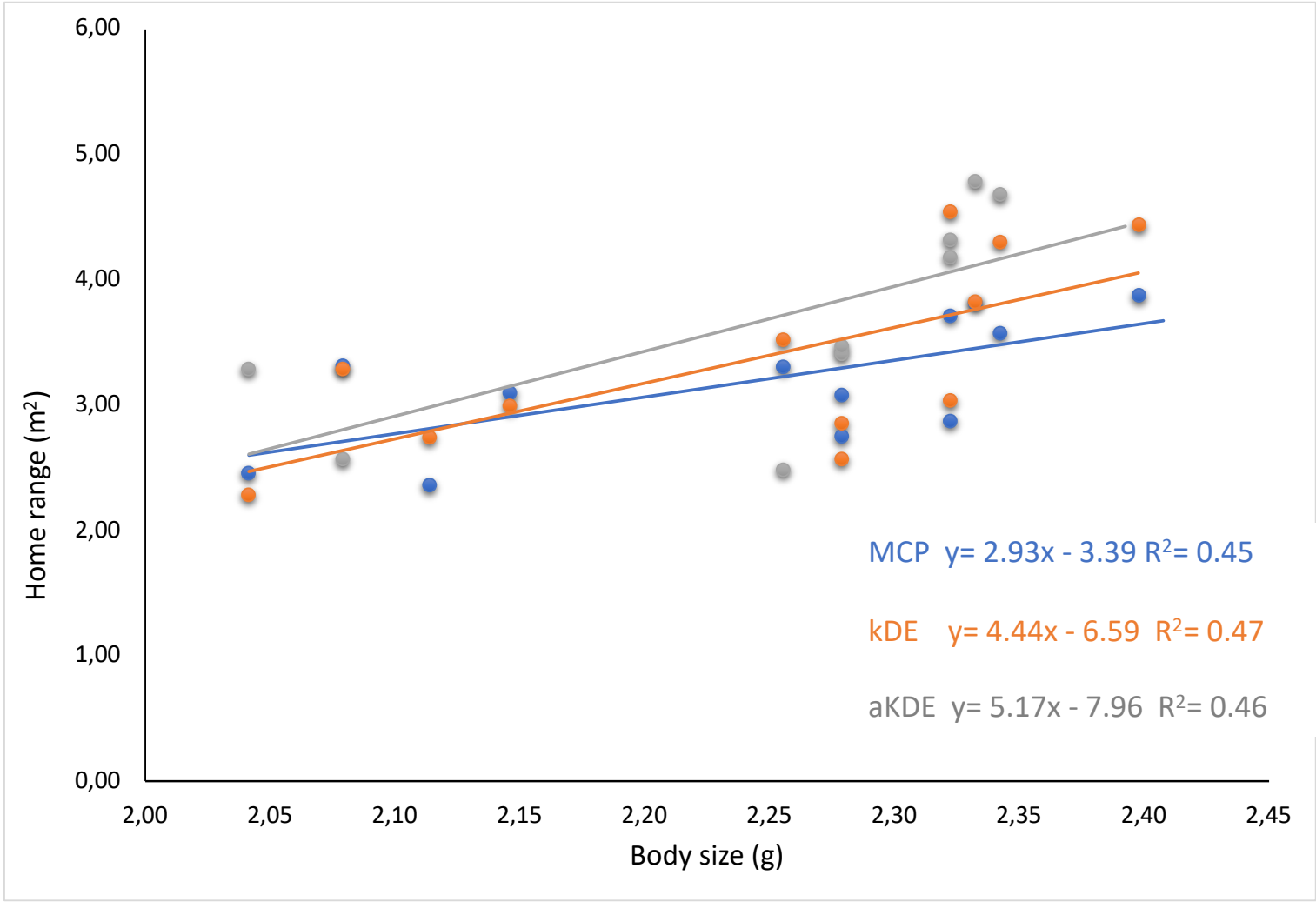




GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN

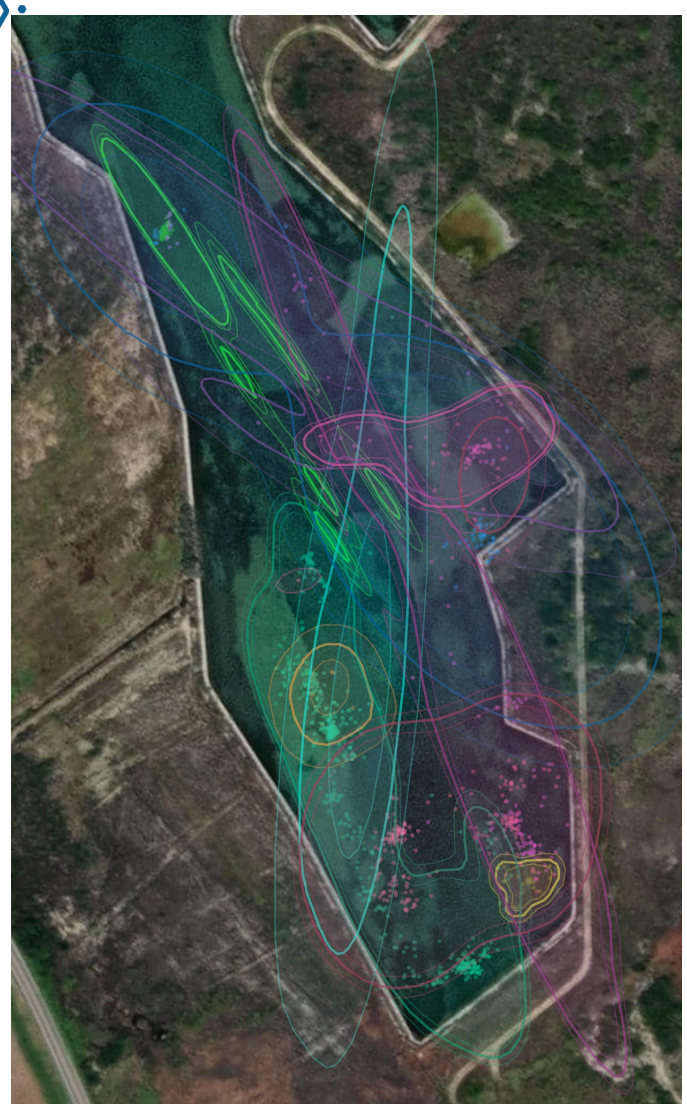
UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa

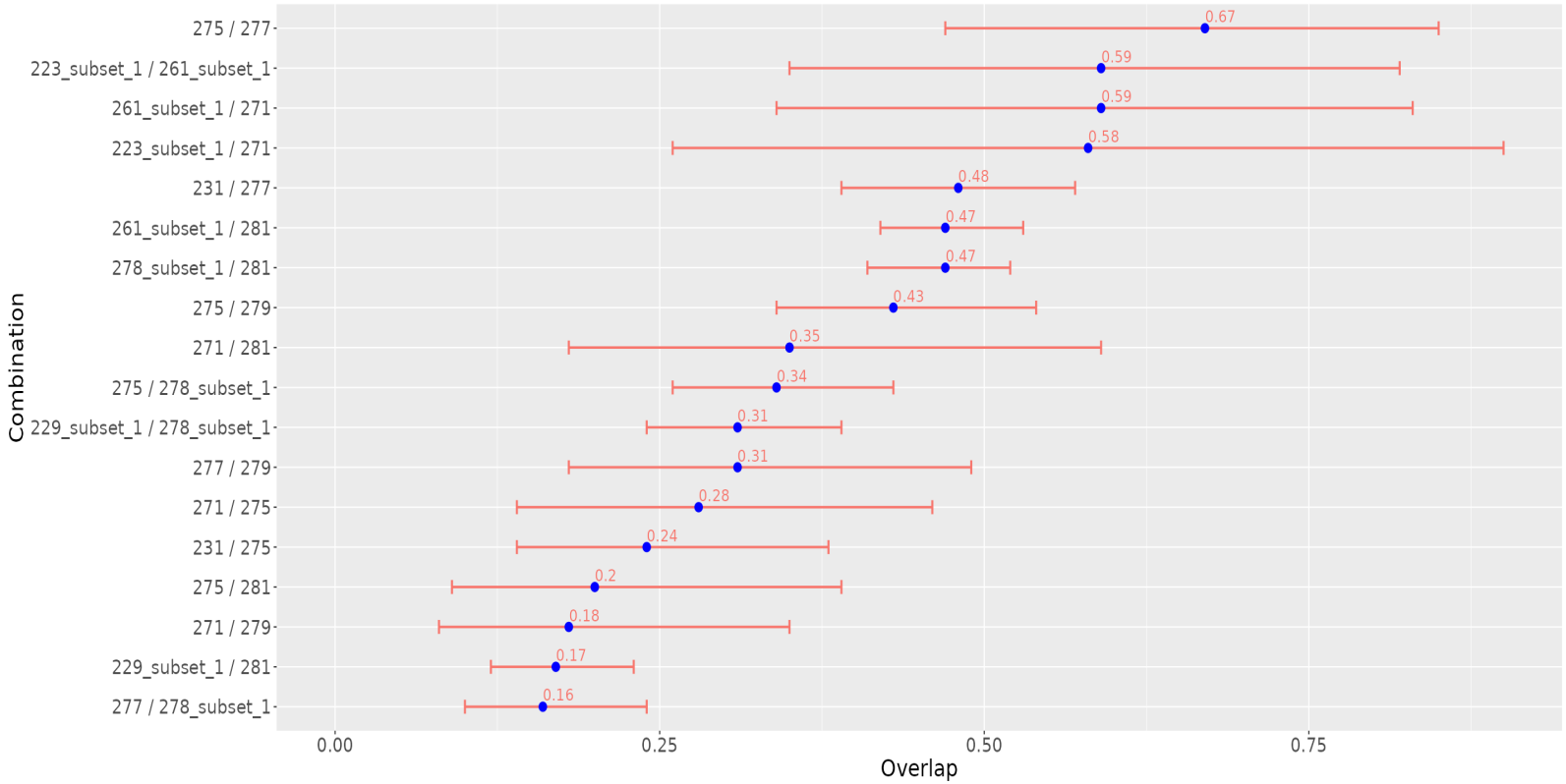




GOBIERNO DE ESPAÑA MINISTERIO DE CIENCIA E INNOVACIÓN

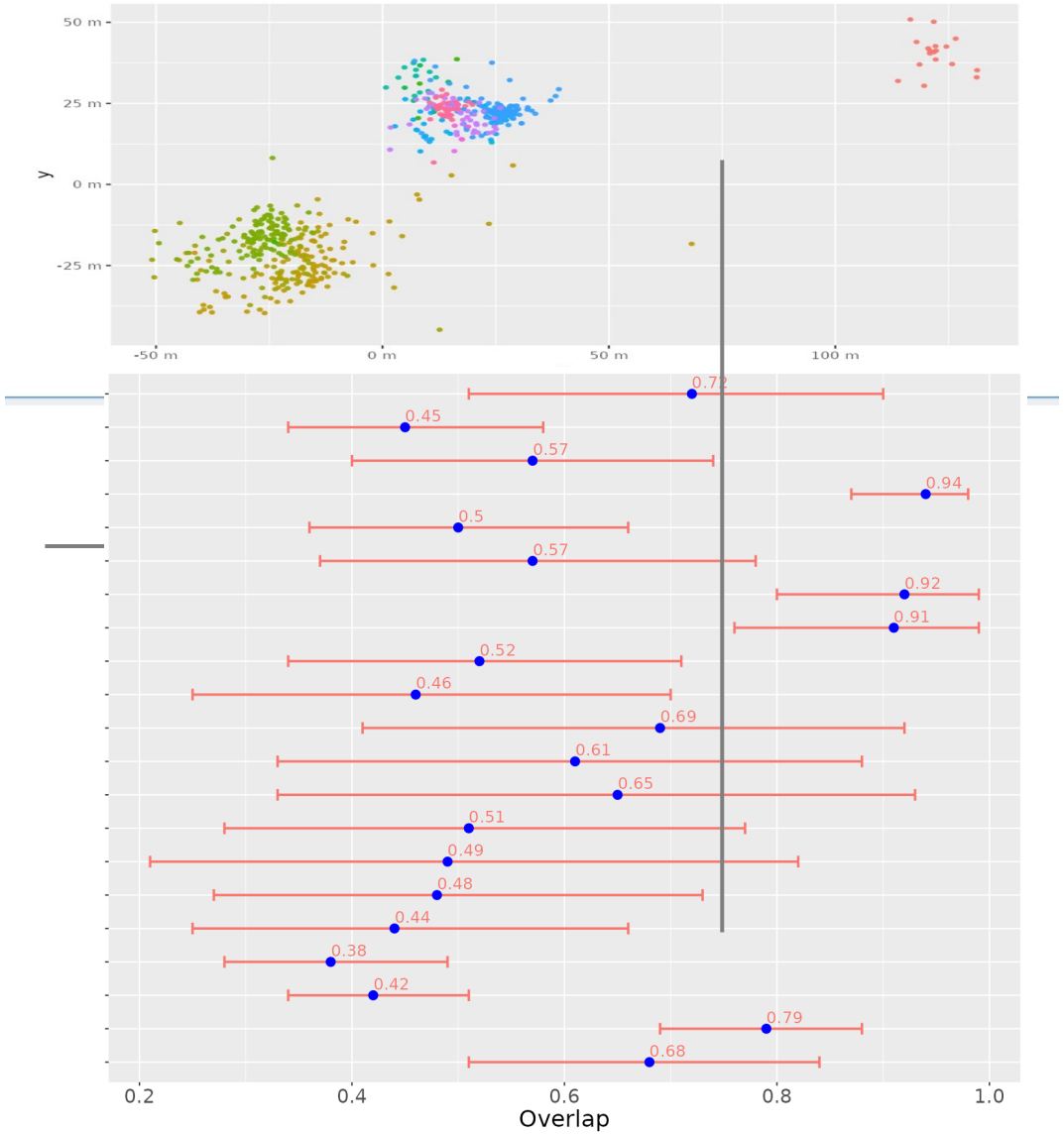
UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa





GOBIERNO DE ESPAÑA MINISTERIO DE CIENCIA E INNOVACIÓN

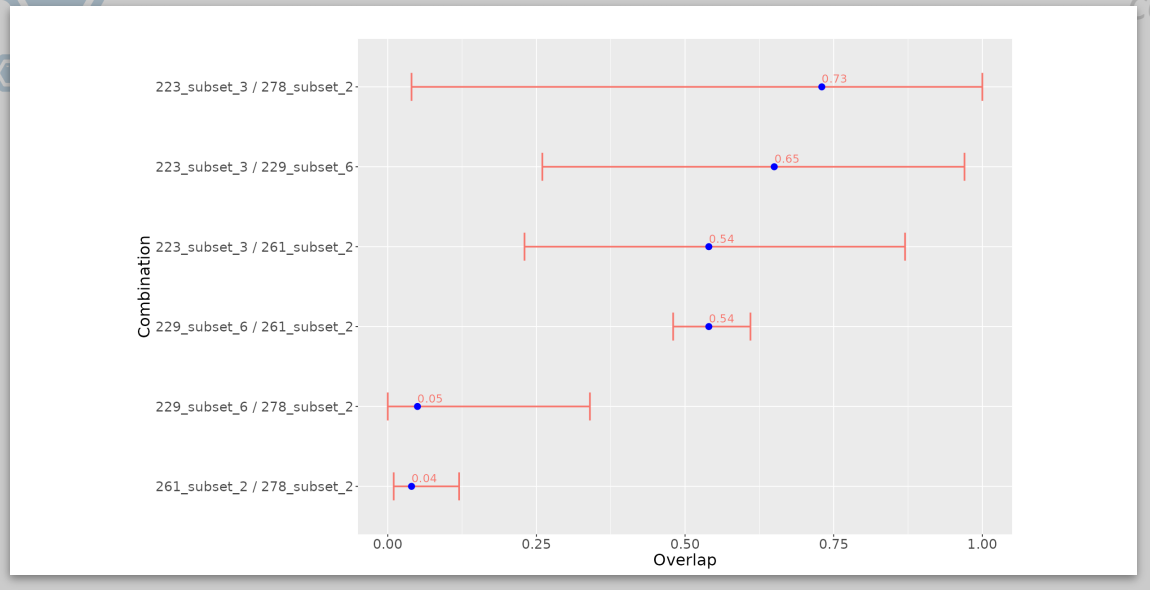
UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa

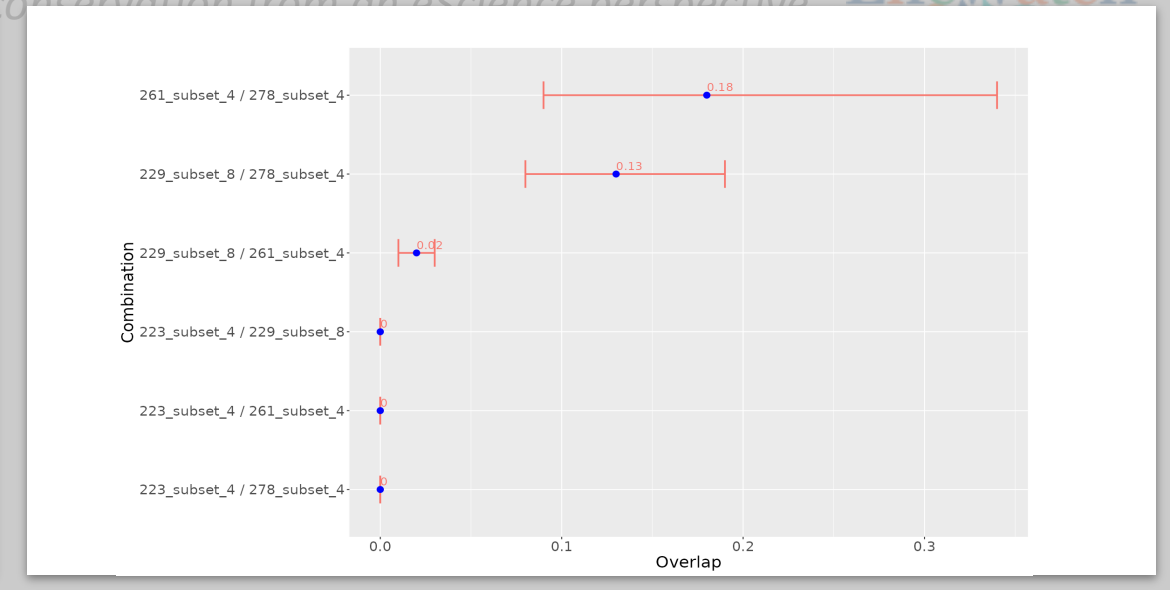


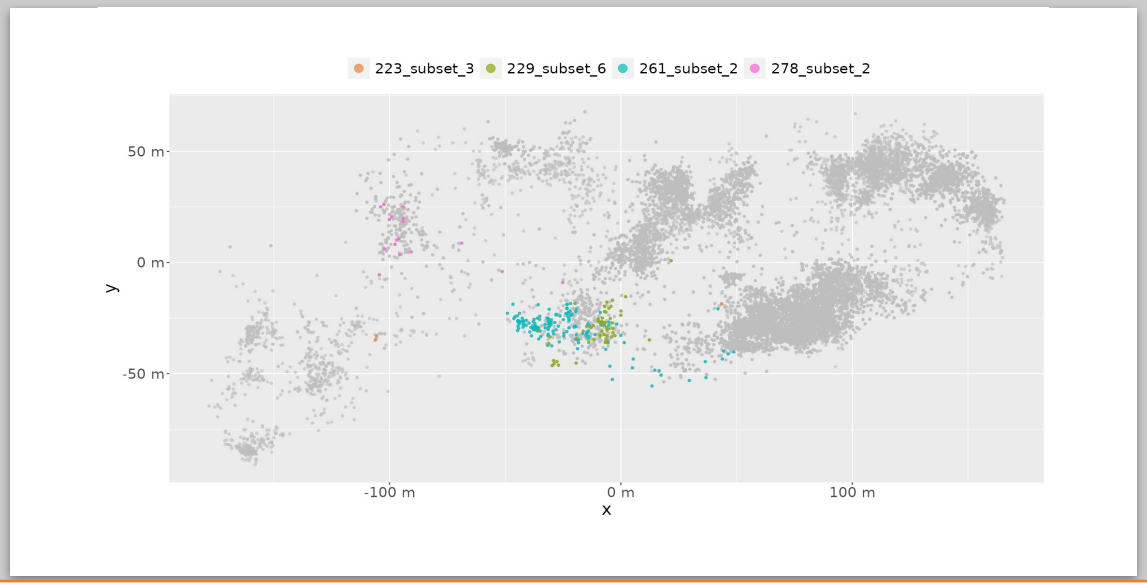
GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN

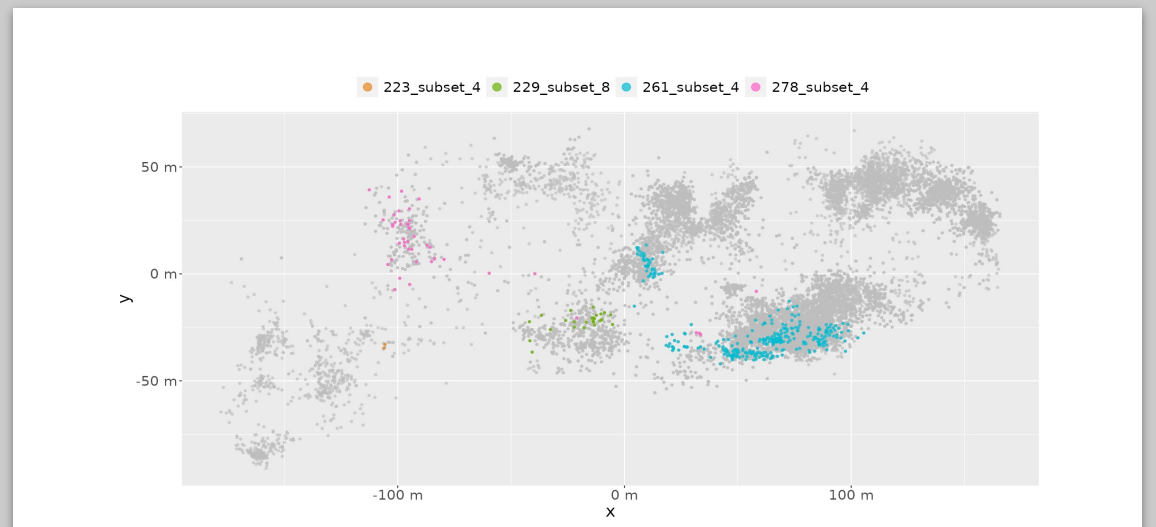
UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa

First day vs One week later









First day vs One week later

Since metabolism is influenced by temperature, in view of the recent scenarios related to climatic change, spatially explicit vision of individual space use behavior can be used as a good indicator for estimating inter-intraspecific variations.

With the news tracking technologies, ecologists can address overlap-related questions for a larger number of species and individuals, in more ecosystems, and with more accurate data than ever before.

AKDE Home Range estimates can validly be compared across studies, sites, species, and times, even when sampling strategies and underlying movement parameters differ.

Whether and how ecological consequences of inter-individual behavioural variation ultimately affect species coexistence and maintain variation in behavioural and ecological traits and their potential covariation in natural populations will be fascinating areas of future research.

GOBIERNO DE ESPAÑA MINISTERIO DE CIENCIA E INNOVACIÓN

UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa

Thanks for your attention!

LifeWatch ITALIA

UNIVERSITÀ DEL SALENTO
L'Ateneo tra i due mari

EUROPEAN TRACKING NETWORK ETN

LifeWatch BELGIUM

GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN

UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa