REINTRODUCTIONS AS A TOOL FOR CONSERVATION OF MIGRATORY RAPTORS

How a reintroduction program must be done?

Viability Criteria

1. **Historical record of the species in the area**
2. Causes of previous extinction had disappeared
3. Availability of good quality habitat
4. Carrying capacity and future population viability
5. Possible actual problems in the reintroduction area
6. Sustainable source of young
7. Genetic considerations about donor populations
8. Selection of the release area
9. Release method
10. Duration of the program
11. Evaluation and monitoring

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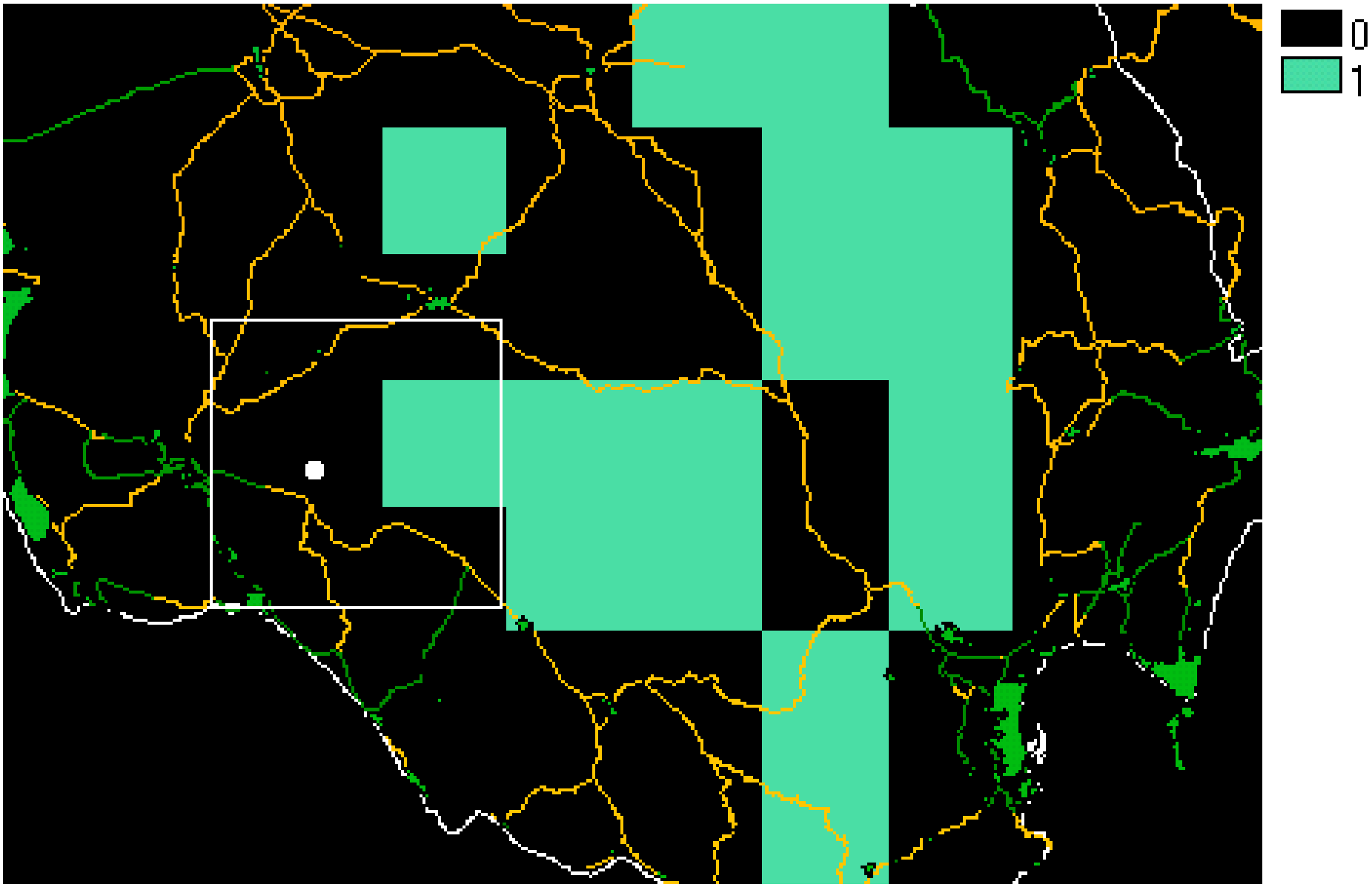
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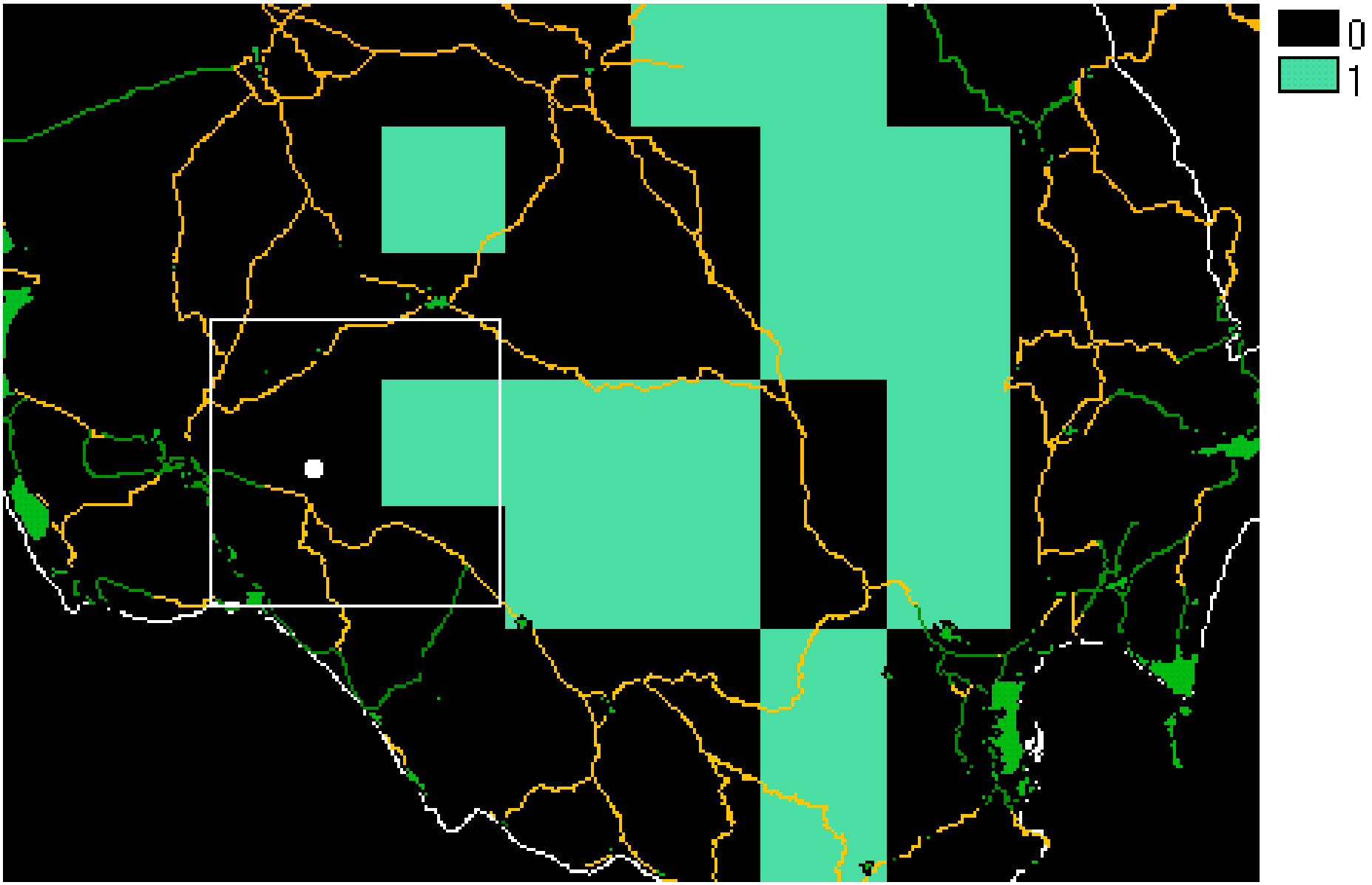

Estimated K: 32-47 pairs

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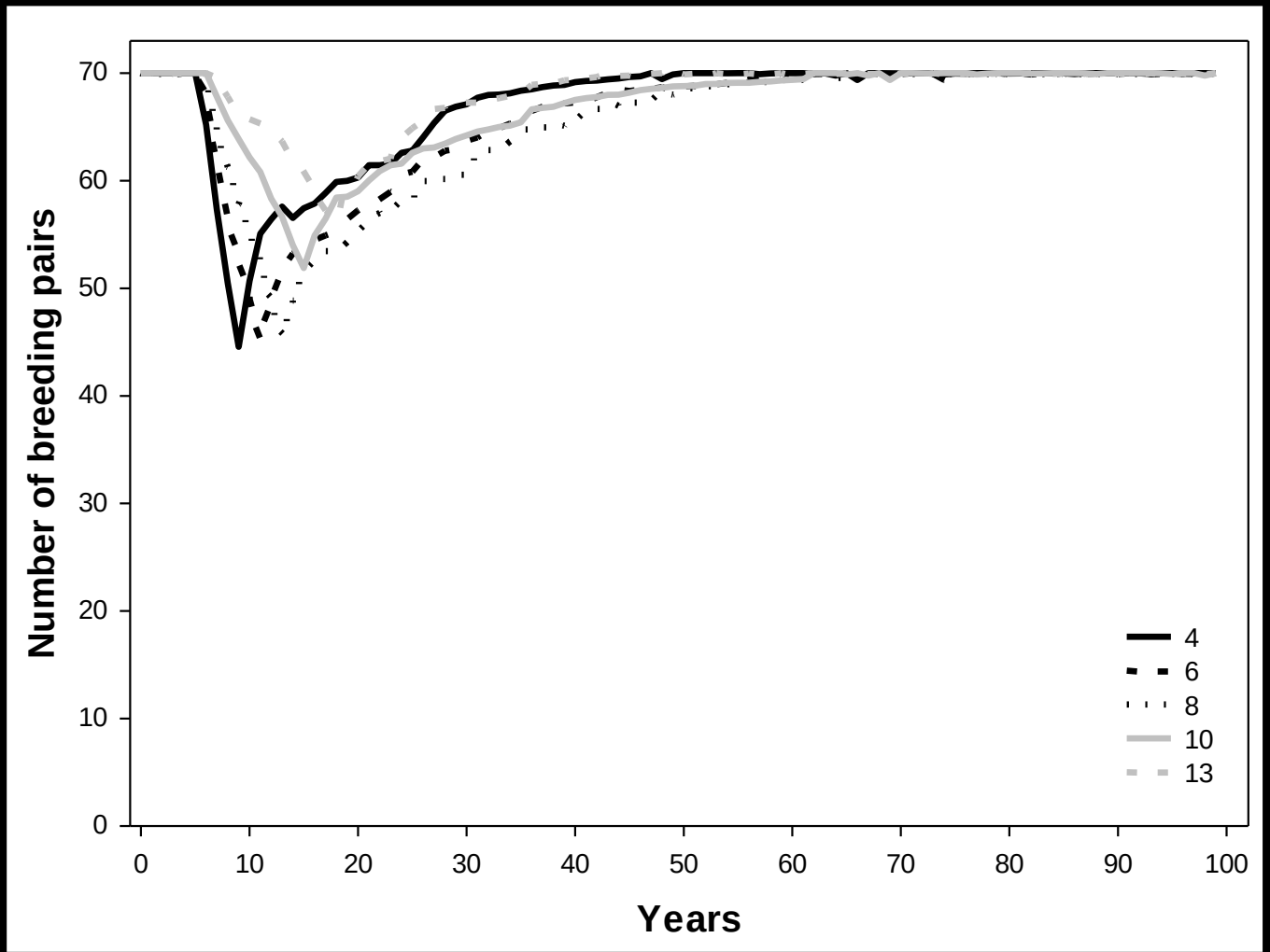
Wild versus captive populations


It is necessary to make a study of the effect of a repeat extractions of birds from the wild donor population

Effect of different combinations of young removed per year and number of years of extraction on the number of breeding pairs in the donor population without a supplementary feeding program (4 years-26 young, 6 years-18 young, 8 years-14 young, 10 years-10 young and 13 years-7 young).



Brood reduction is an opportunity for several species

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DOI: 10.1111/1365-2664.13014

RESEARCH ARTICLE

Journal of Applied Ecology | BRITISH ECOLOGICAL SOCIETY

Reintroducing endangered raptors: A case study of supplementary feeding and removal of nestlings from wild populations

Miguel Ferrer[1] | Virginia Morandini[1] | Gerardo Baguena[2] | Ian Newton[3]

TABLE 2 Paired comparisons of productivity in the same territories with and without supplementary feeding. In both species, significantly higher relative productivity was found when supplementary food was provided (Wilcoxon matched pairs test; $Z = 2.906$, $n = 45$, $p = .003$)

Species	Mean productivity without supplementary feeding	Mean productivity with supplementary feeding	Increment
Aquila adalberti	0.8373	1.3430	60.40%
Gypaetus barbatus	0.1436	0.4135	187.95%

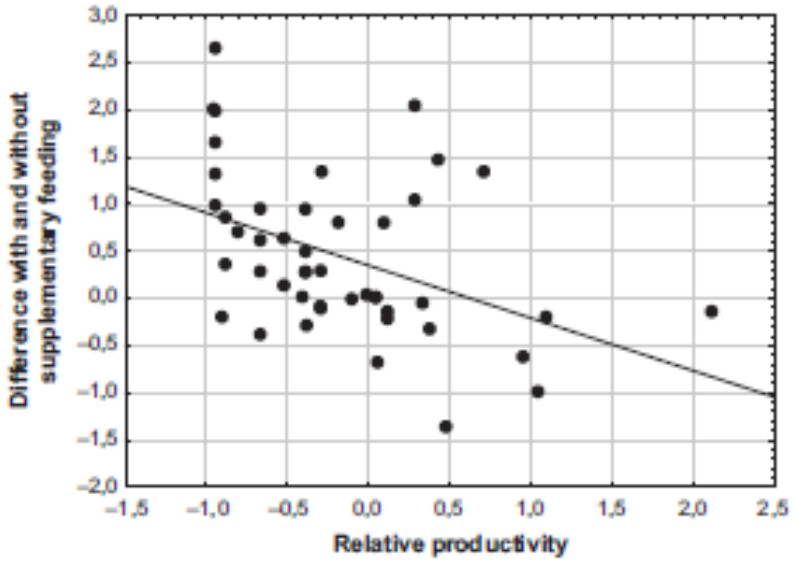

FIGURE 1 Linear regression between relative productivity of territories and response of these same territories when supplementary feeding is conducted. Poor-quality territories with low productivity levels respond more strongly to supplementary feeding than those with higher levels of natural productivity ($r = -.435$, $n = 45$, $p = .002$)

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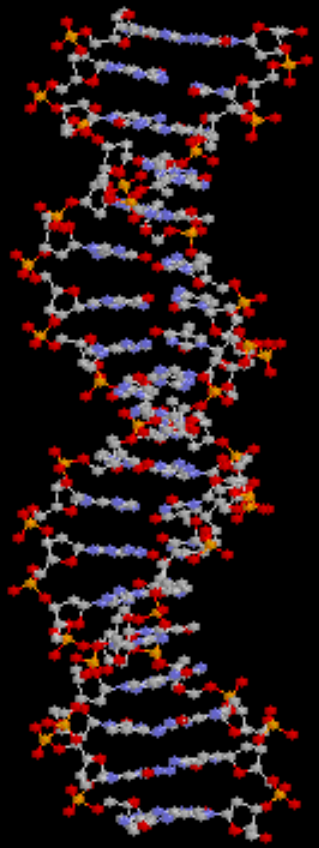

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Private or public land?

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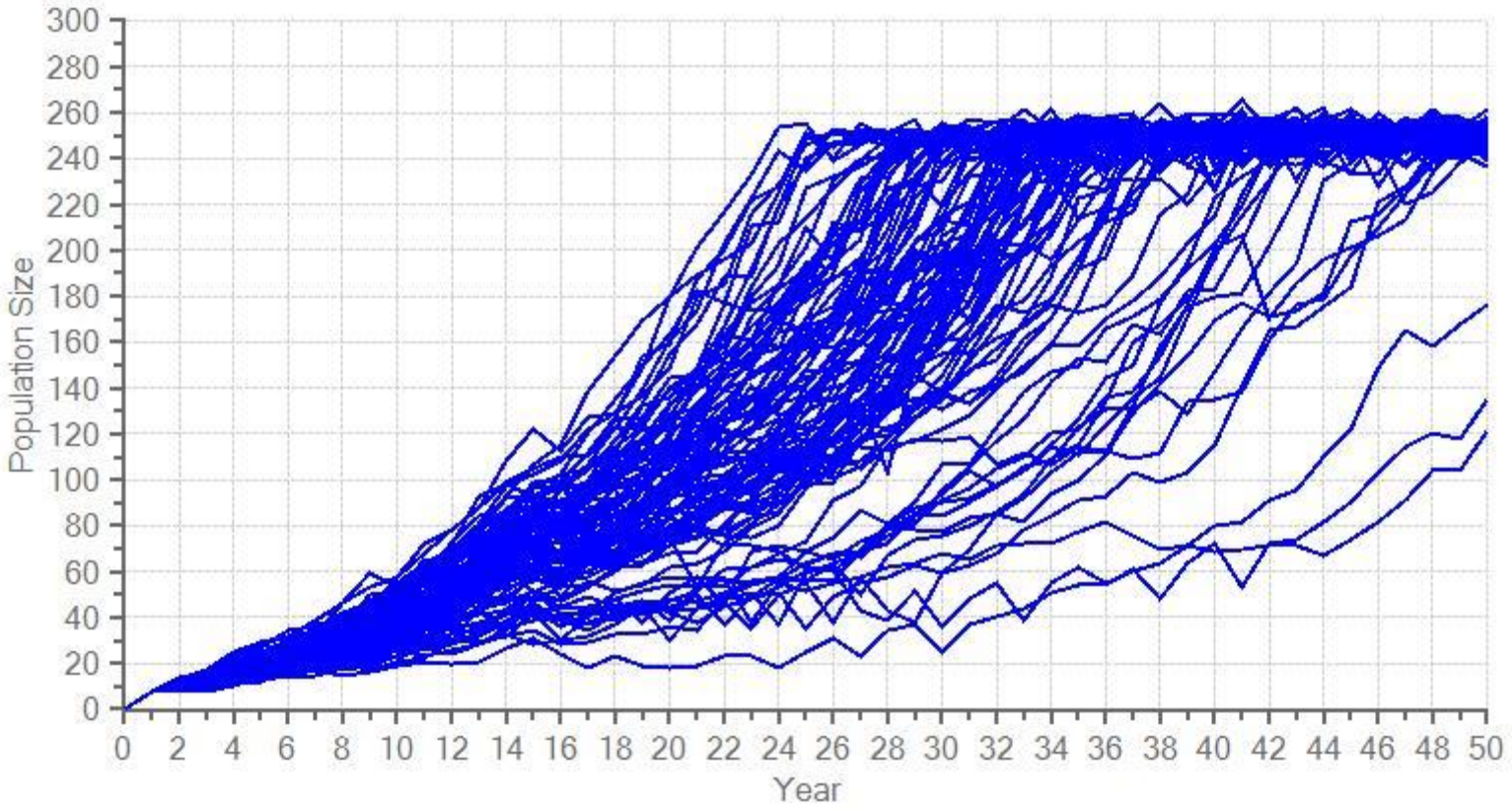
- How many birds we need to released per year ?
- How many of each sex ?
- For how long ?
- When we expected to obtain the first breeding pairs?

Population modeling: Vortex, Object Oriented Simulations, any other consistent approach including environmental, demographic and sexual stochasticity

reintroduction



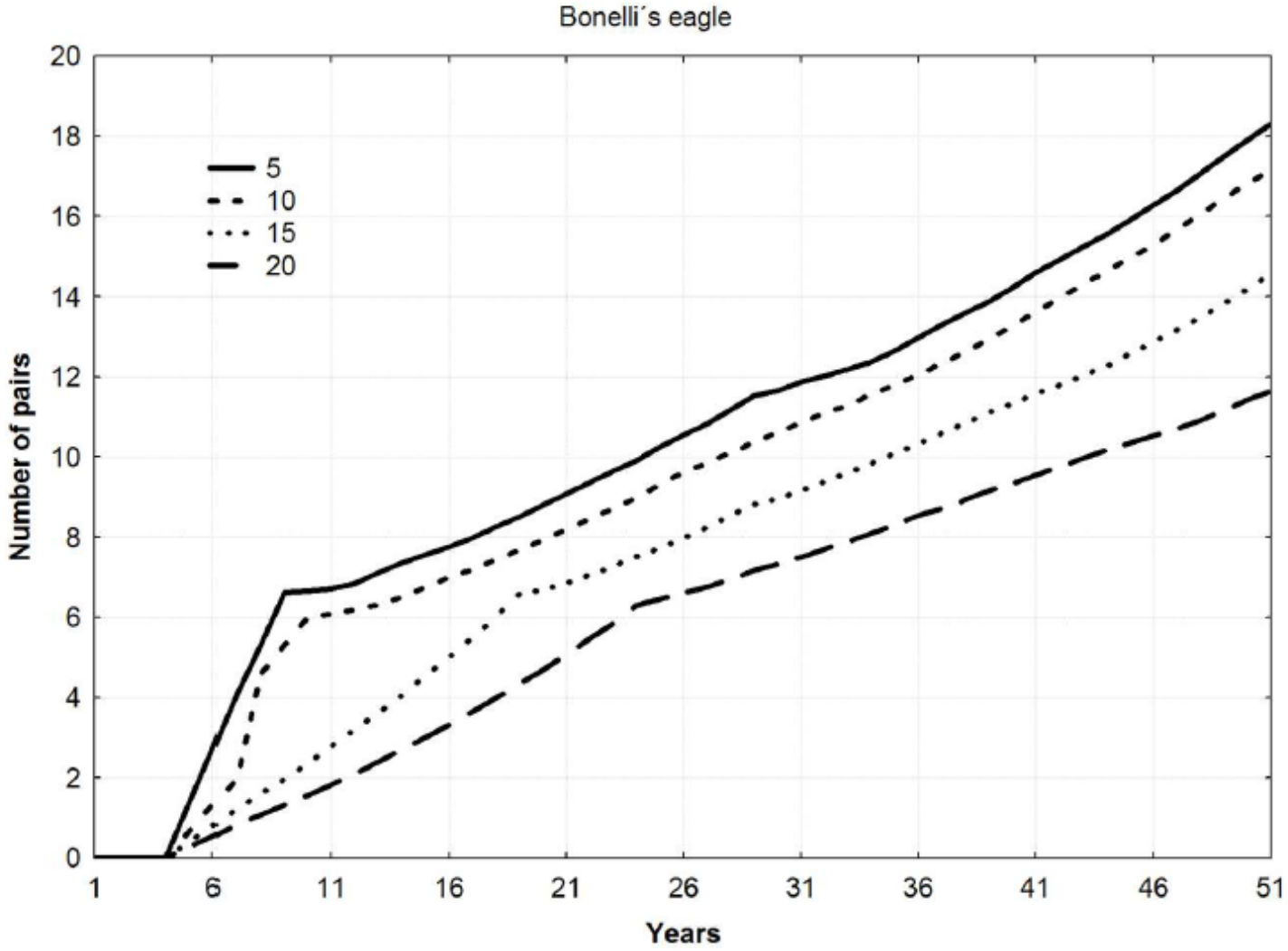


Fig 3. Trajectories of new populations according to different combinations of young released per year and duration of the releases for the specie *Aquila fasciata* (5 years–20 young, 10 years–10 young, 15 years–6 young, and 20 years–5 young).

PLOS ONE

RESEARCH ARTICLE

How to plan reintroductions of long-lived birds

Virginia Morandini*, Miguel Ferrer

Applied Ecology Group, Estación Biológica de Doñana, CSIC, Seville, Spain

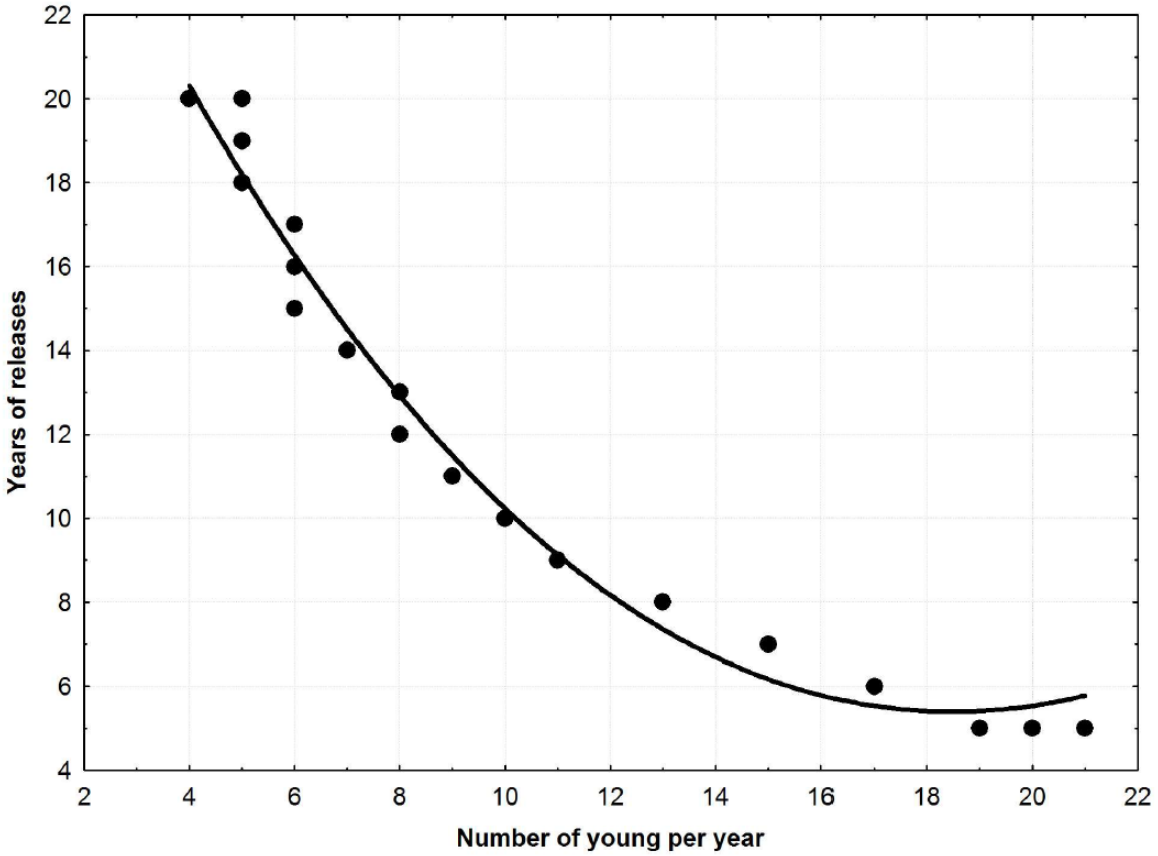
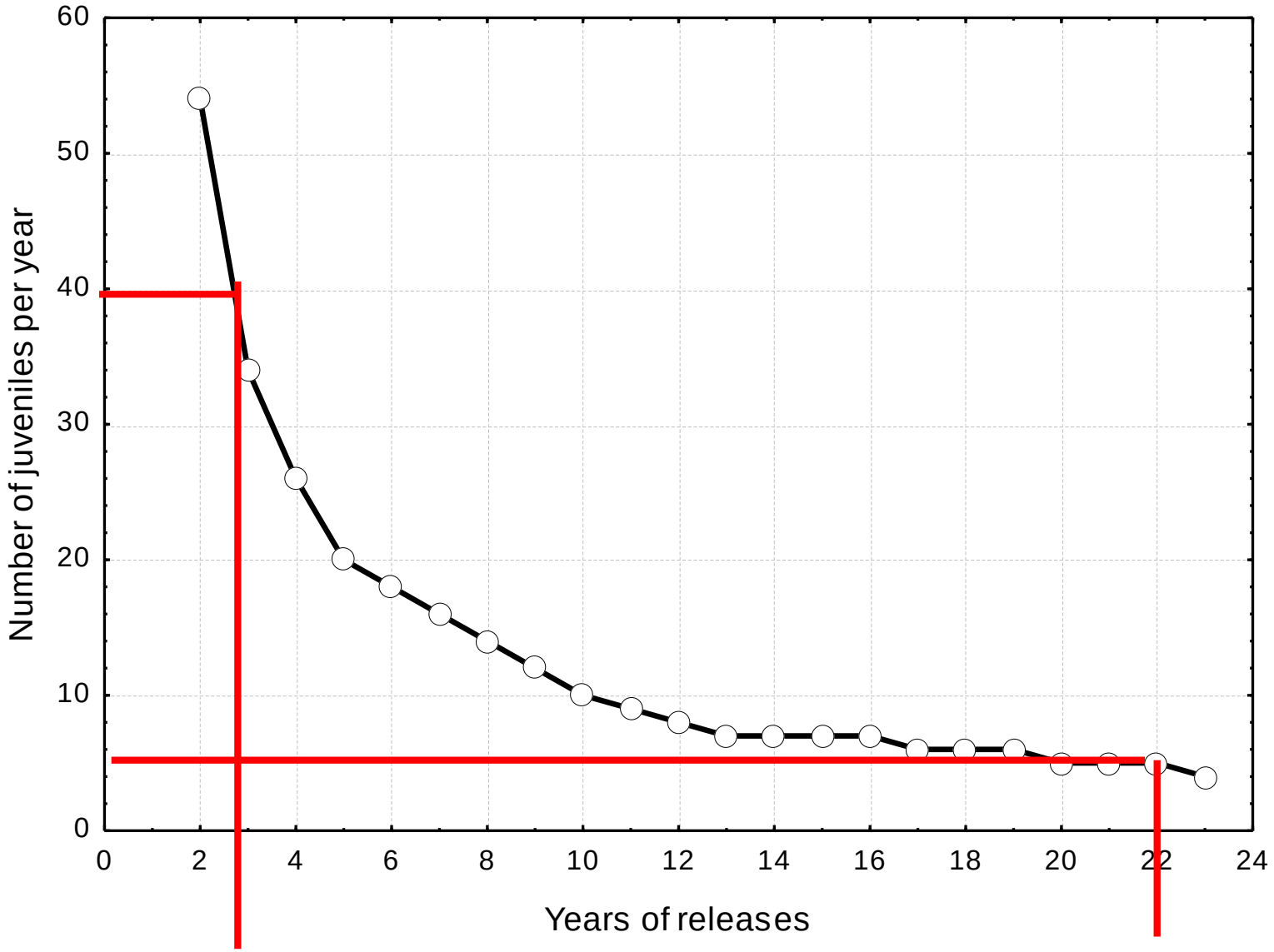


Fig 1. Negative exponential relationship ($r = -0.934$, n = 48, $p<0.001$) between the number of young released per year and number of years necessary to obtain a probability of extinction below 0.001 for all the species.



80,000 € X 3 years 240,000 €

80,000 € X 22 years 1,760,000 €

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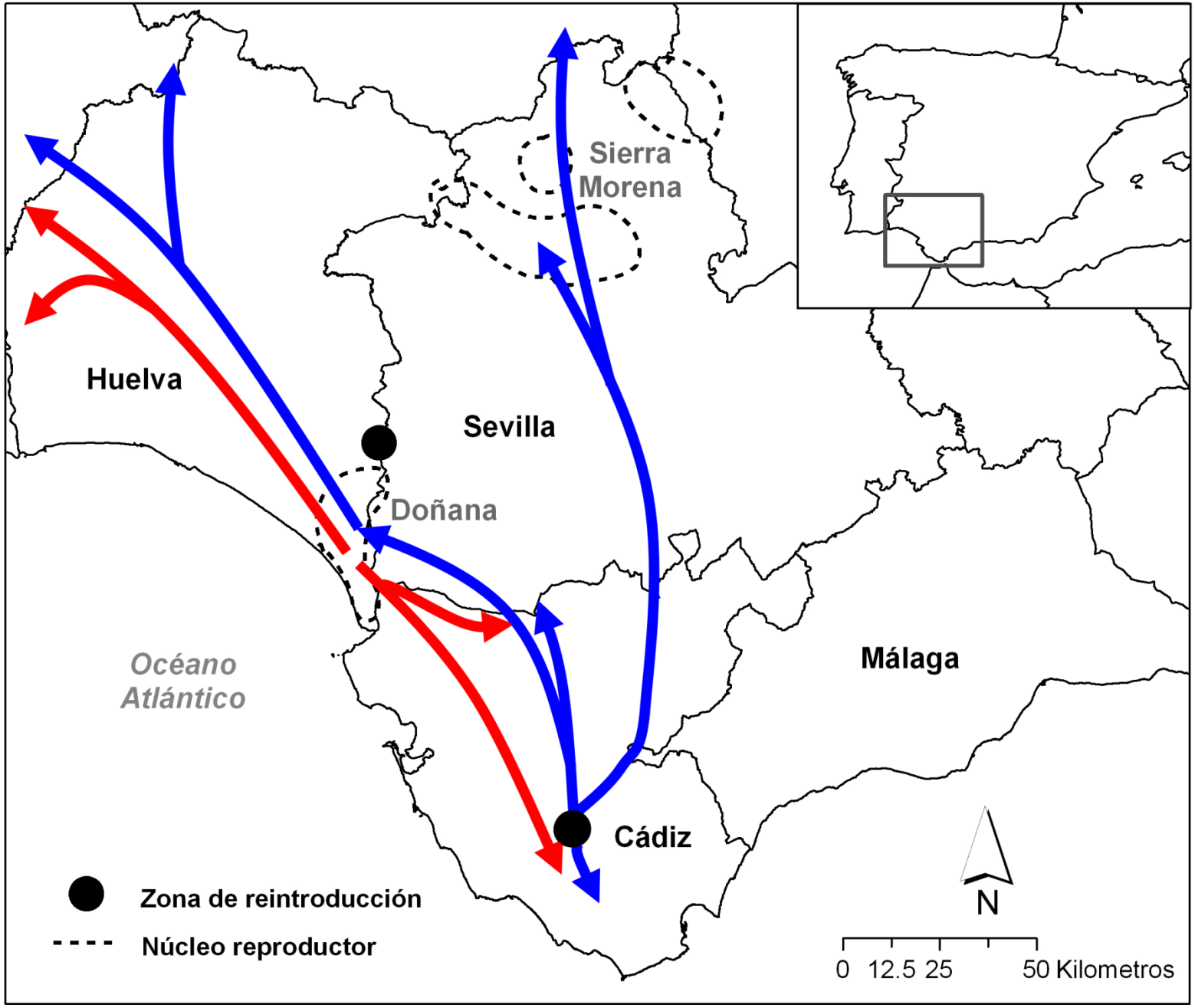
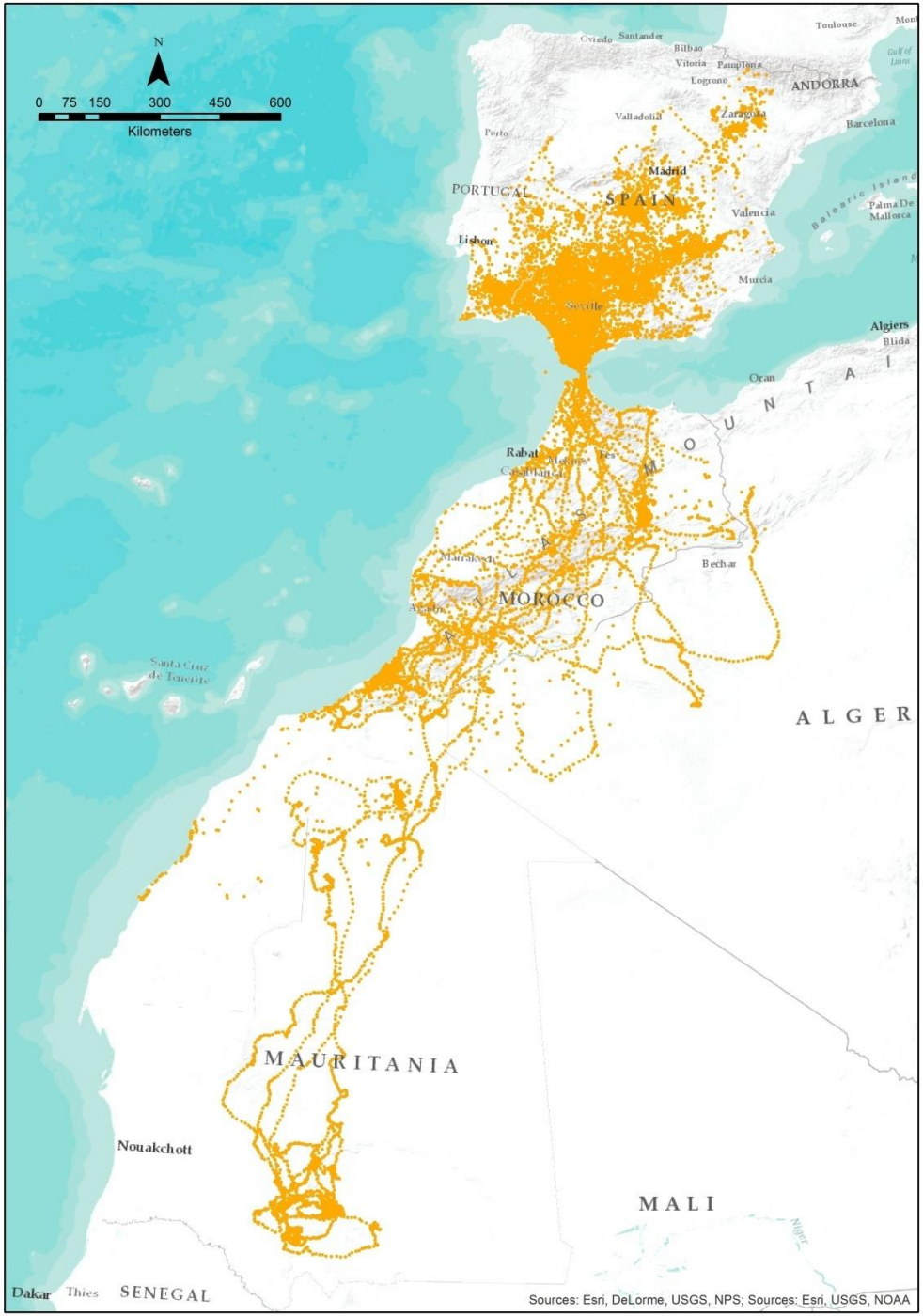
Consejería de Medio Ambiente

Águila Imperial, ¡Vuelve!

JUNTA DE ANDALUCIA


Sierra
Morena
Huelva
Sevilla
Doñana
Océano
Atlántico
Málaga
Cádiz
Zona de reintroducción
Núcleo reproductor
N
0 12.5 25 50 Kilometros

1990 DISTRIBUTION

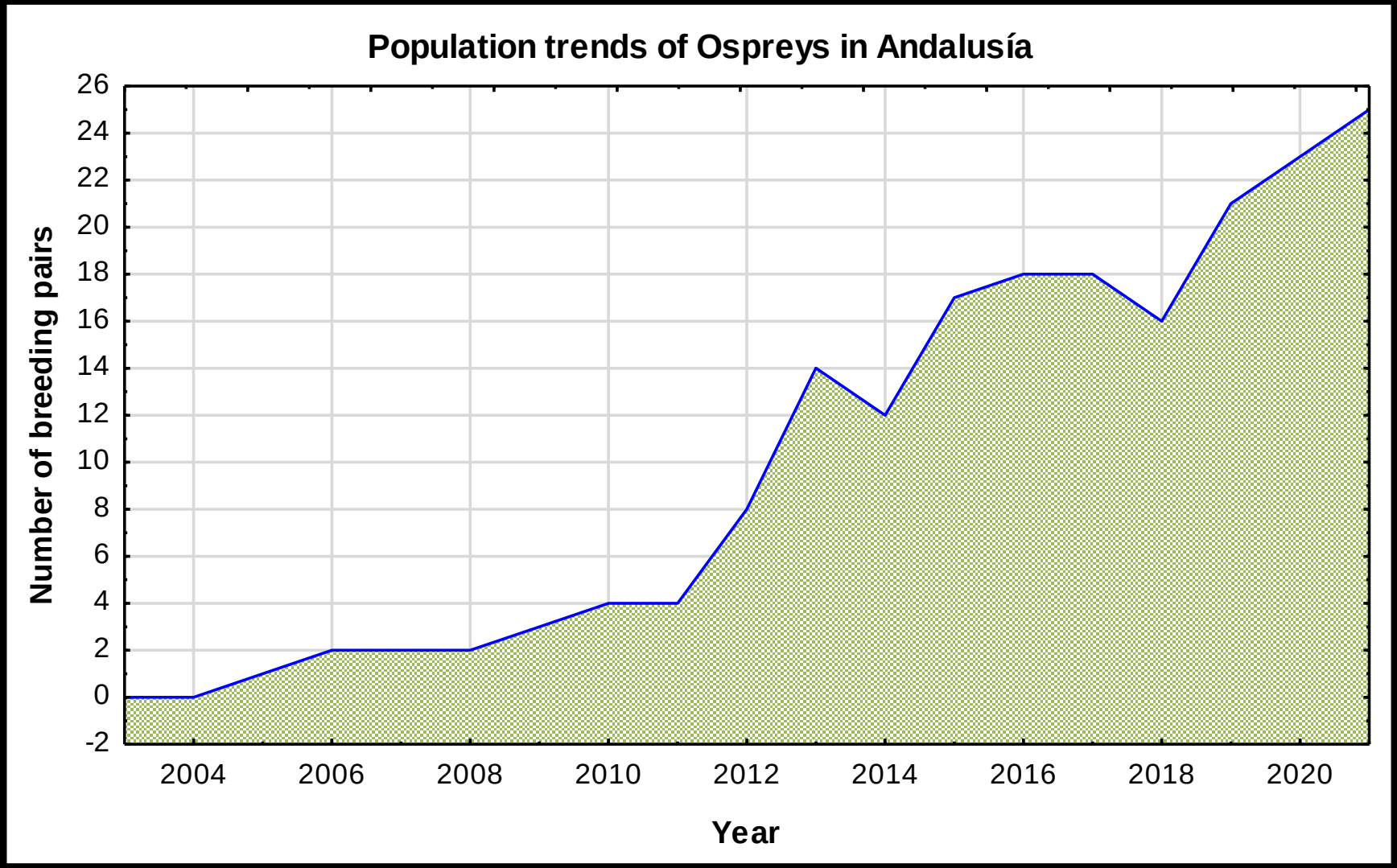

N
0 75 150 300 450 600
Kilometers
Oviedo
Santander
Bilbao
Vitoria
Pamplona
Logrono
Toulouse
Gulf of Lions
ANDORRA
Barcelona
Valladolid
Zaragoza
Porto
Madrid
PORTUGAL
SPAIN
Valencia
Balearic Islands
Palma De Mallorca
Lisbon
Murcia
Seville
Algiers
Blida
Oran
Rabat
Casablanca
Fes
Marrakech
Agadir
MOROCCO
Bechar
Santa Cruz de Tenerife
ALGER
MAURITANIA
Nouakchott
MALI
Dakar
Thies
SENEGAL
Sources: Esri, DeLorme, USGS, NPS; Sources: Esri, USGS, NOAA

1982: 21 pairs in Andalucía
2021: 140 pairs in Andalucía

Annual growth ~ 5%
The highest ever recorded


¡el águila pescadora vuelve!
JUNTA DE ANDALUCIA
CONSEJERÍA DE MEDIO AMBIENTE
CONSEJERÍA DE OBRAS PÚBLICAS Y TRANSPORTES
Medidas Compensatorias
Jerez -Los Barrios
PARQUE NATURAL
Los Alcornocales


Extinct in 1982
Reintroduction: 2003
2017: 32 occupied territories


Population trends of Ospreys in Andalusía
Number of breeding pairs
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
2004
2006
2008
2010
2012
2014
2016
2018
2020
Year

- Hacking techniques do not affect the subsequent dispersal behavior of released young (Morandini and Ferrer, 2017a; Ferrer and Morandini, 2017).

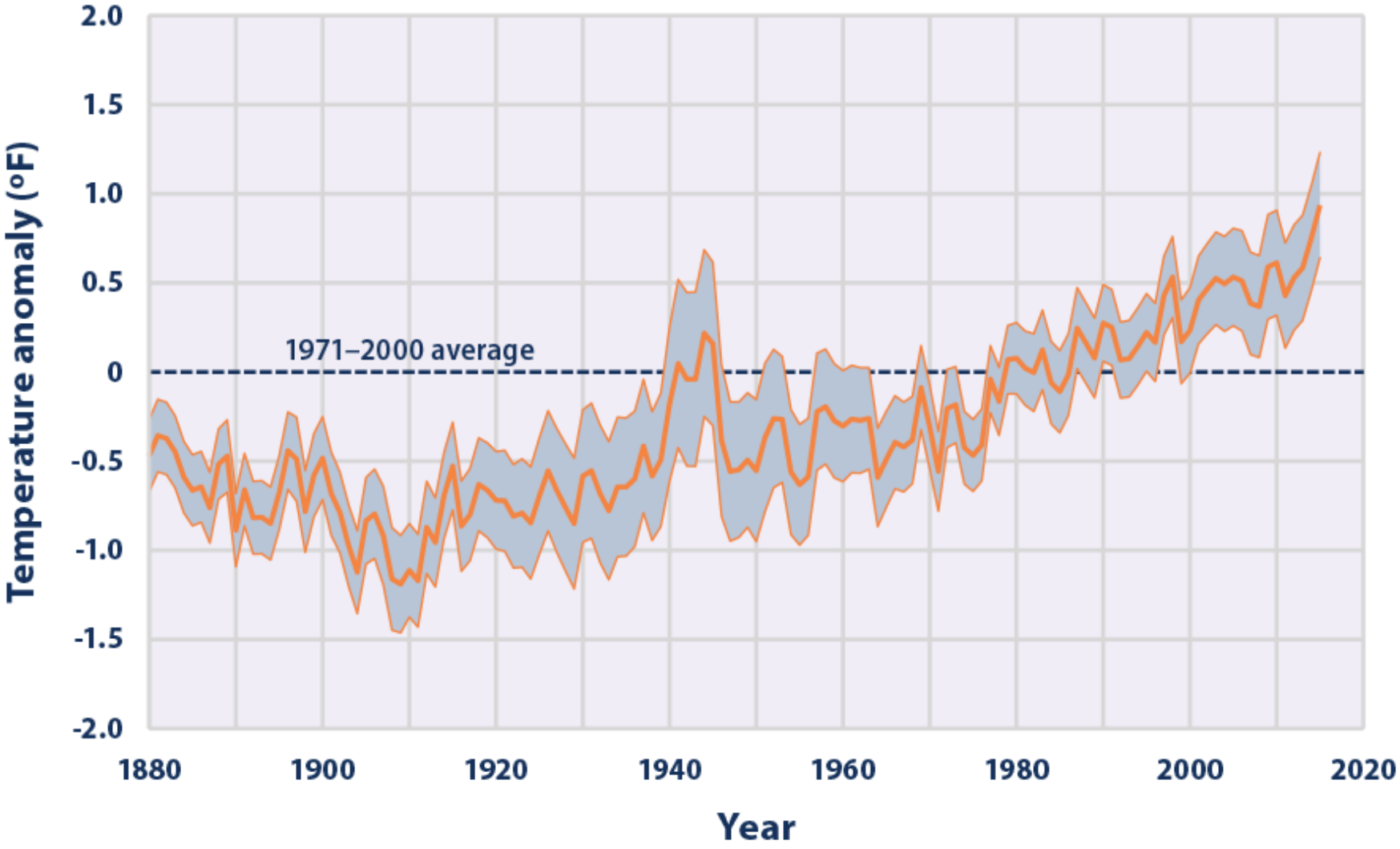
- Survival probabilities are equal or slightly higher than wild birds (Evans et al., 2009; Muriel et al., 2020).

- Productivity in their later breeding life is equal or higher than wild birds (Morandini et al., 2017, 2019; Murgatroyd et al., 2018).

- The immune system and nutritional parameters showed a significant improvement during the hacking period.

- **There are not any harmful effects in hacking techniques that should prevent their use.**

Average Global Sea Surface Temperature, 1880–2015



Data source: NOAA (National Oceanic and Atmospheric Administration). 2016. Extended reconstructed sea surface temperature (ERSST.v4). National Centers for Environmental Information. Accessed March 2016. www.ncdc.noaa.gov/data-access/marineocean-data/extended-reconstructed-sea-surface-temperature-ersst.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

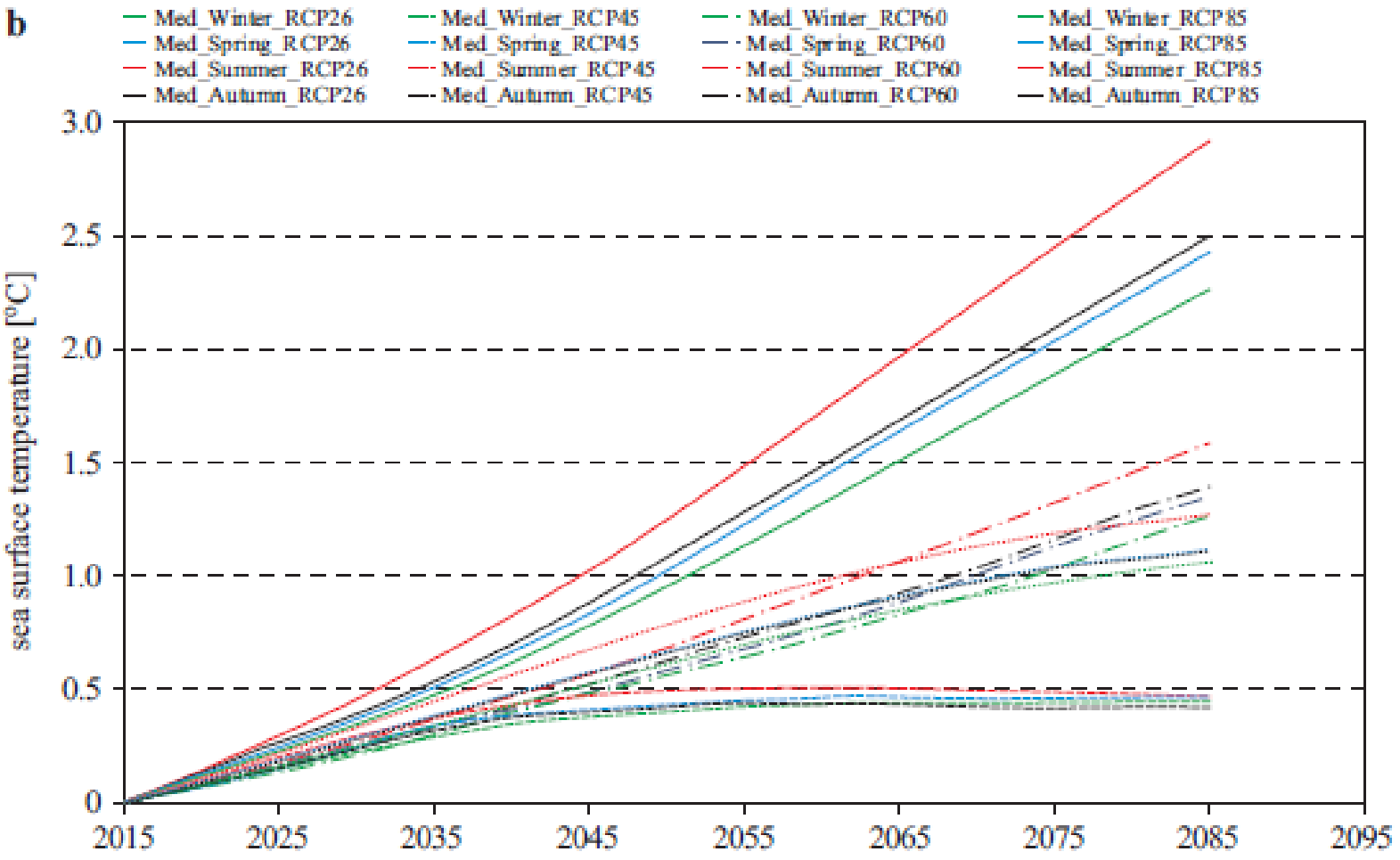
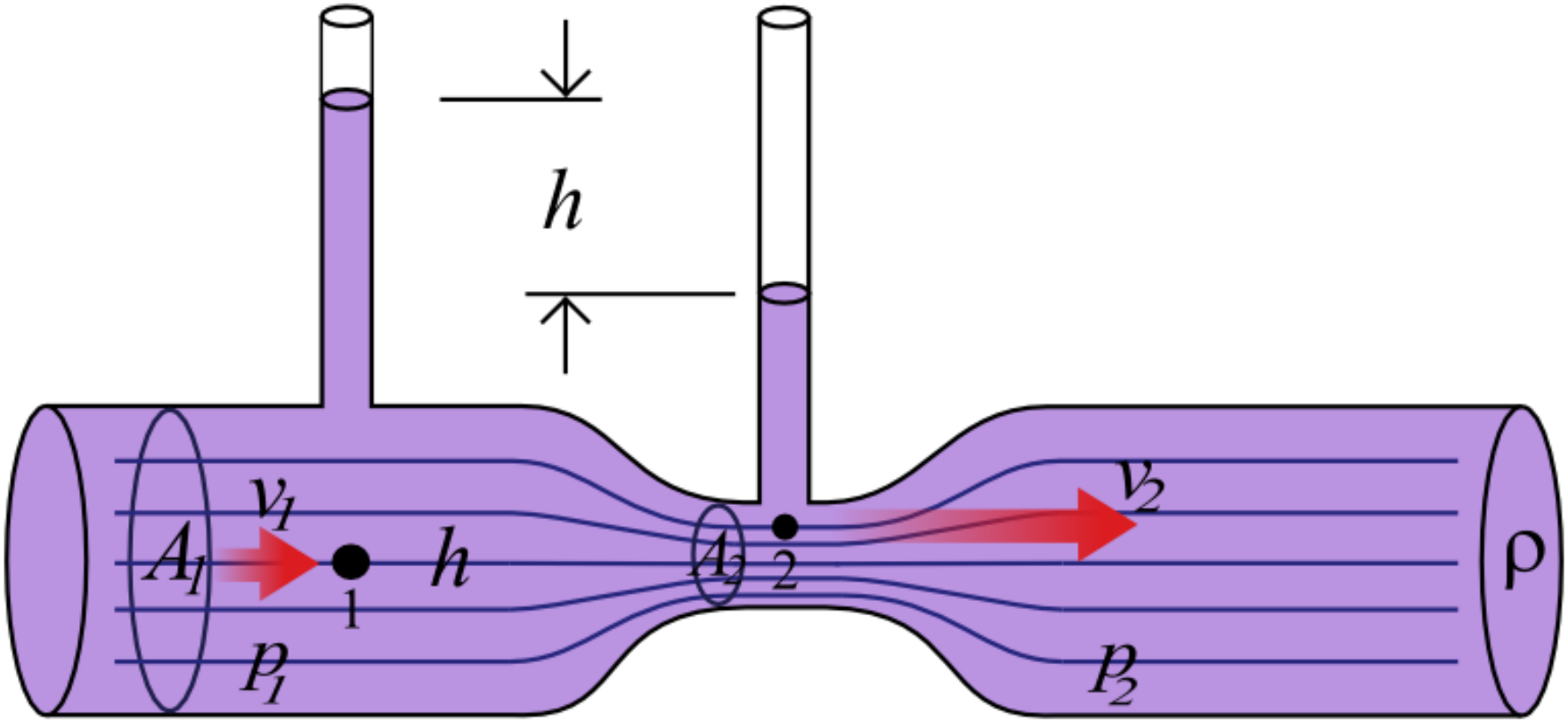
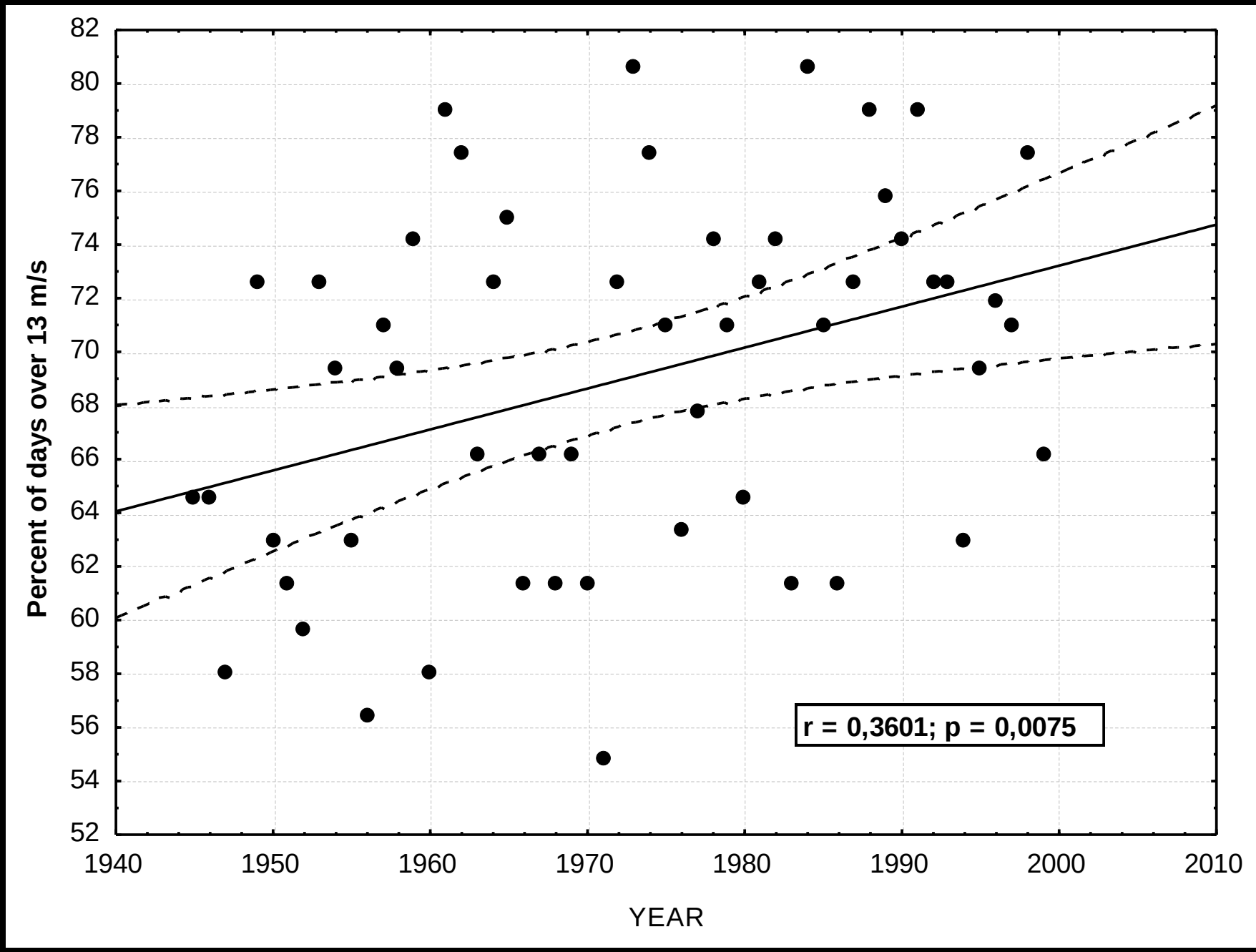


Figure 7. Thirty-year running (a) annual and (b) seasonal SST means with reference to the 2000–2029 period for the various RCP scenarios


h
v1
A1
1
h
A2
2
v2
ρ
p1
p2


Percent of days over 13 m/s
82
80
78
76
74
72
70
68
66
64
62
60
58
56
54
52
1940
1950
1960
1970
1980
1990
2000
2010
YEAR
r = 0,3601; p = 0,0075

Breeding ranges of some species in Europe are already shifting to the north, as birds are withdrawing from the southern parts of their range, and spreading at the northern edge. In the other hand, typical African species in the past are now breeding in Europe.

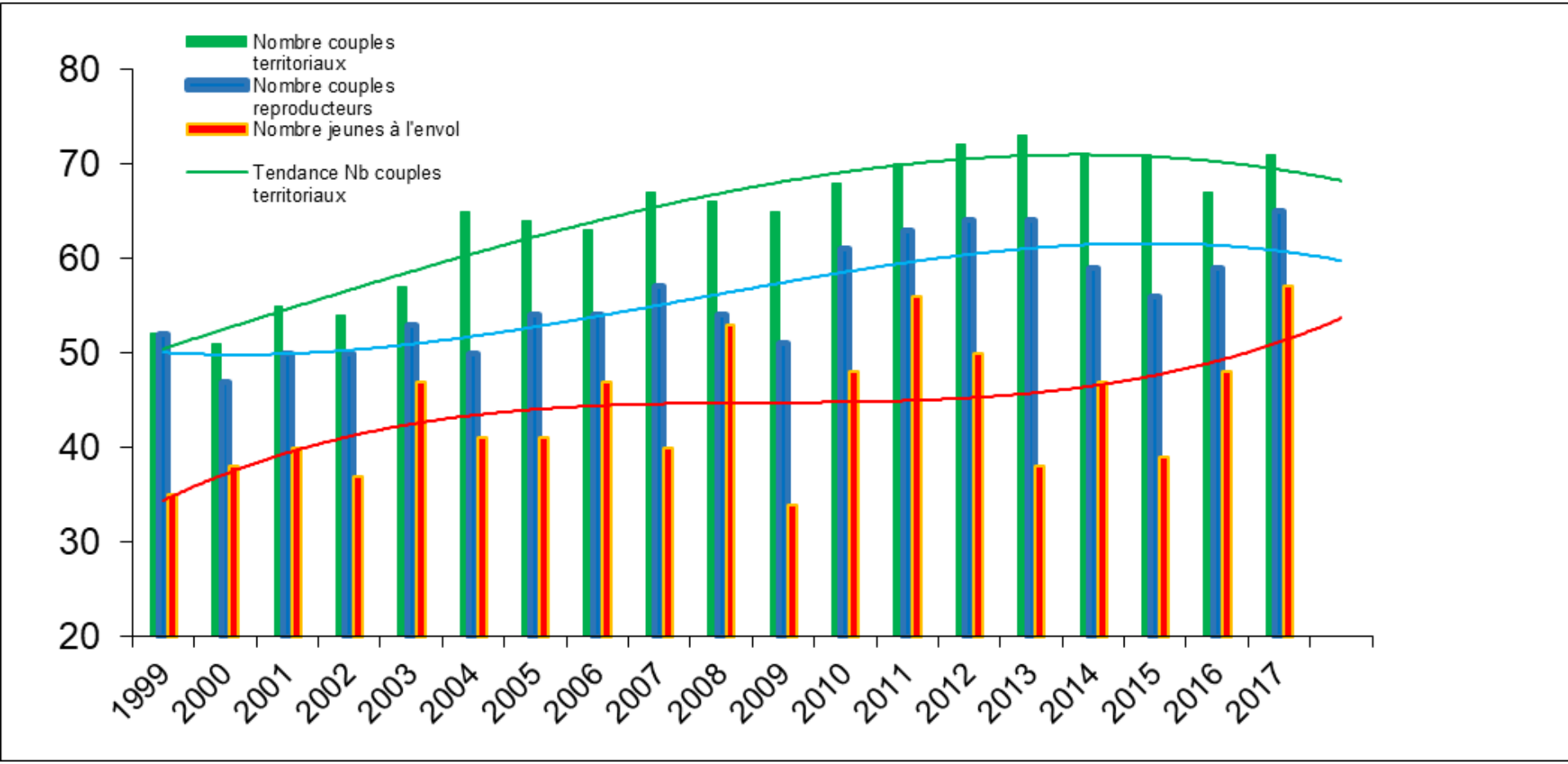
These shifts appears to be occurring in **Red Kites** in Western Europe.

....and Booted Eagles

and Common Buzzards

and Short-toed Eagles
.... among others

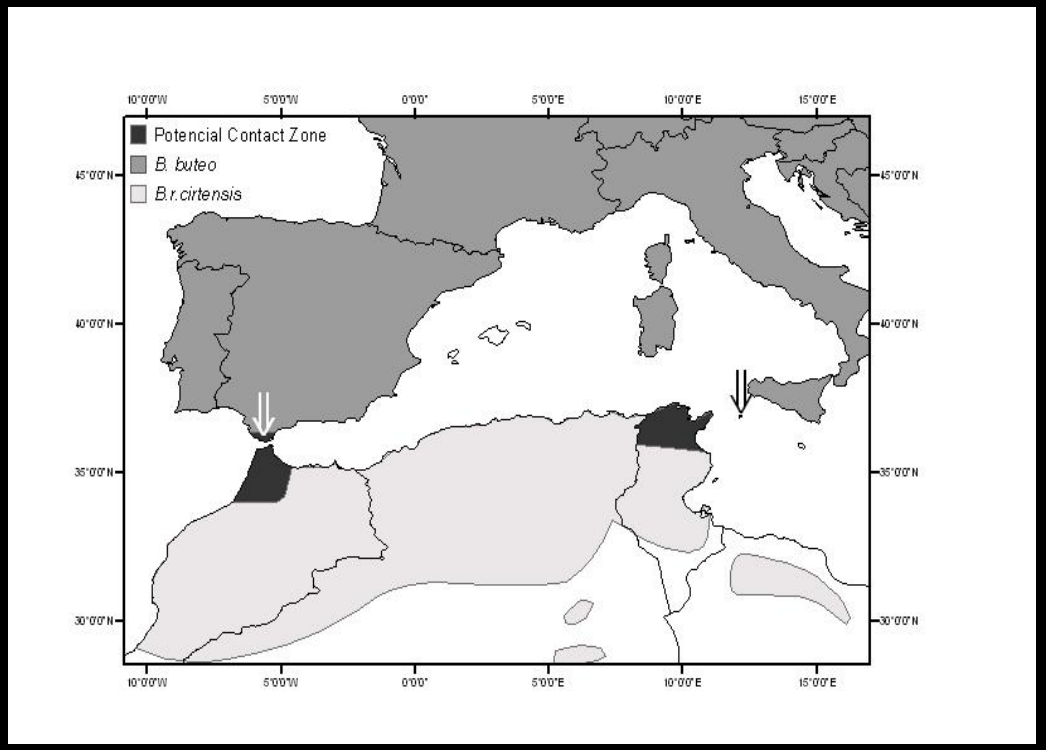
Apparent declines when we consider the problem locally


Nombre couples territoriaux
Nombre couples reproducteurs
Nombre jeunes à l'envol
Tendance Nb couples territoriaux
80
70
60
50
40
30
20
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017

Exotic (invasive ?) species when we consider the problem locally

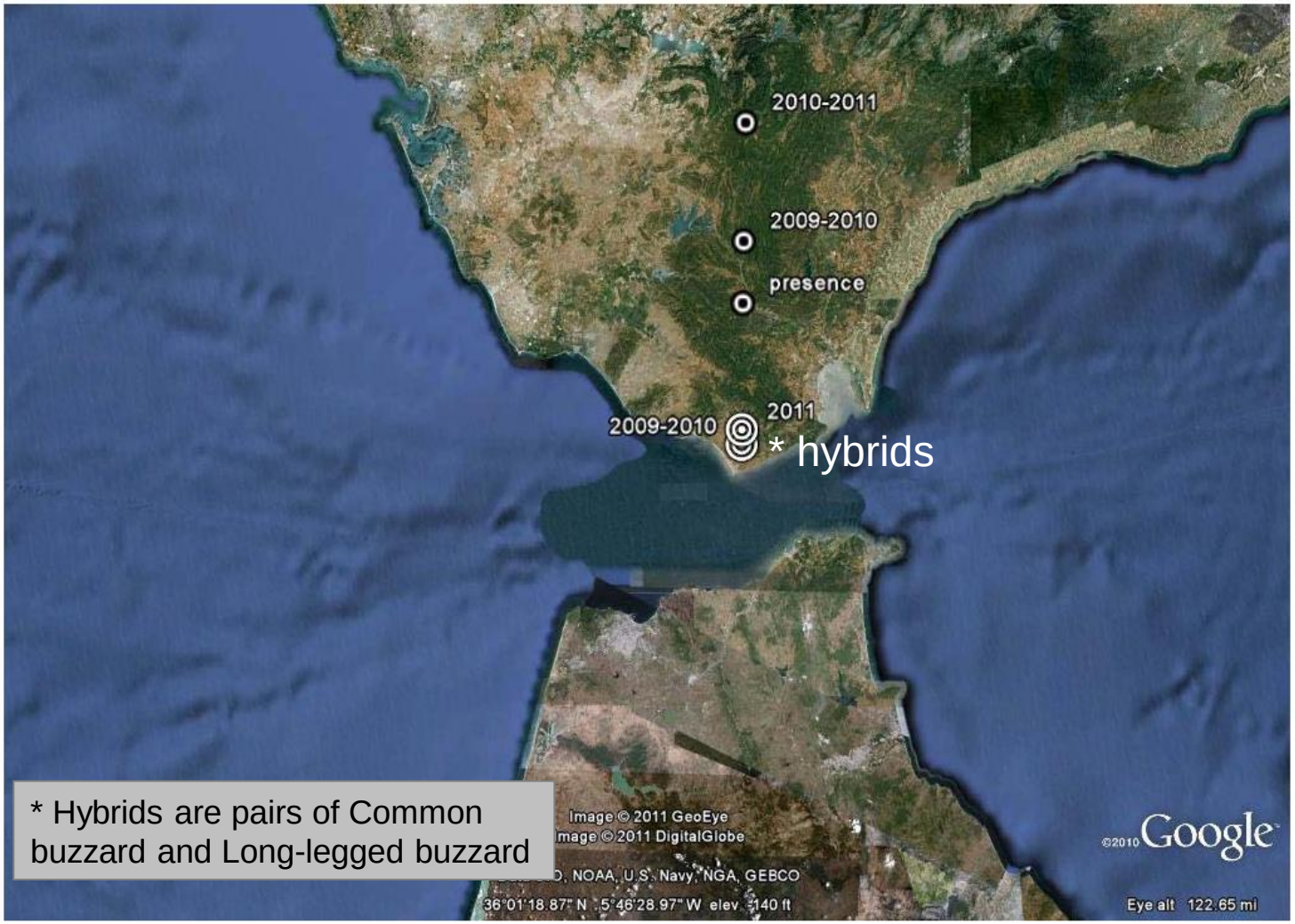
Changes in the distribution range of the Long-legged Buzzard (*Buteo rufinus cirtensis*)


Javier Elorriga



FUNDACIÓN MIGRES

-Nests and breeding pairs locations-








25 YEARS

Convention on Biological Diversity

SAFEGUARDING LIFE ON EARTH






Must be considered as an Alien Invasive Species?

Alien species: a species introduced outside its natural past or present distribution area

Invasive alien species: an alien species Whose introduction threaten biological diversity

By hybridization, long legged buzzard is eroding genetic integrity of the common Buzzard.

Rüppell's vulture

White-backed vulture

Hooded vulture

Are we trying to avoid any change in Present or past distribution areas?

That is, are we trying to avoid the natural respond of living beings to climate change?

Don't judge species on their origins
Adopt a evolutionary point of view