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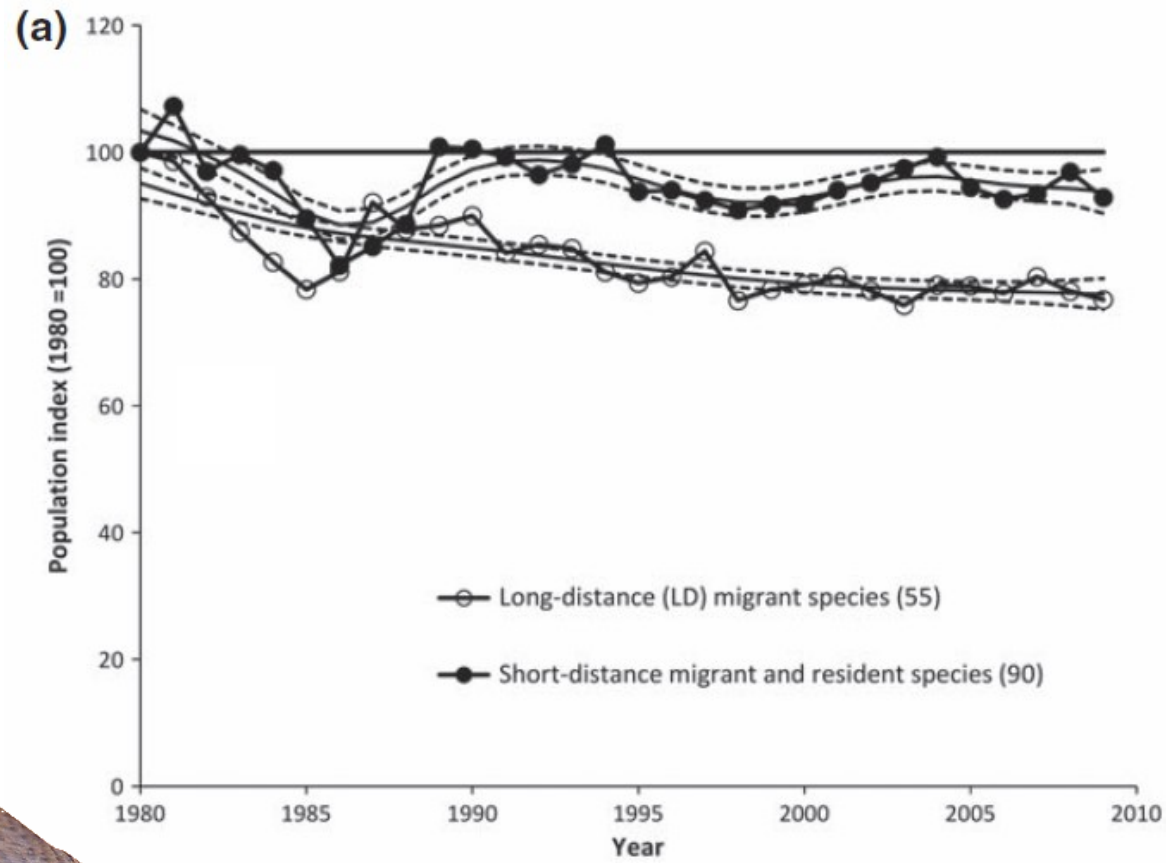
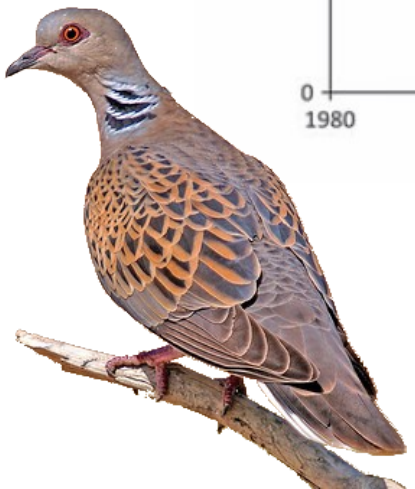
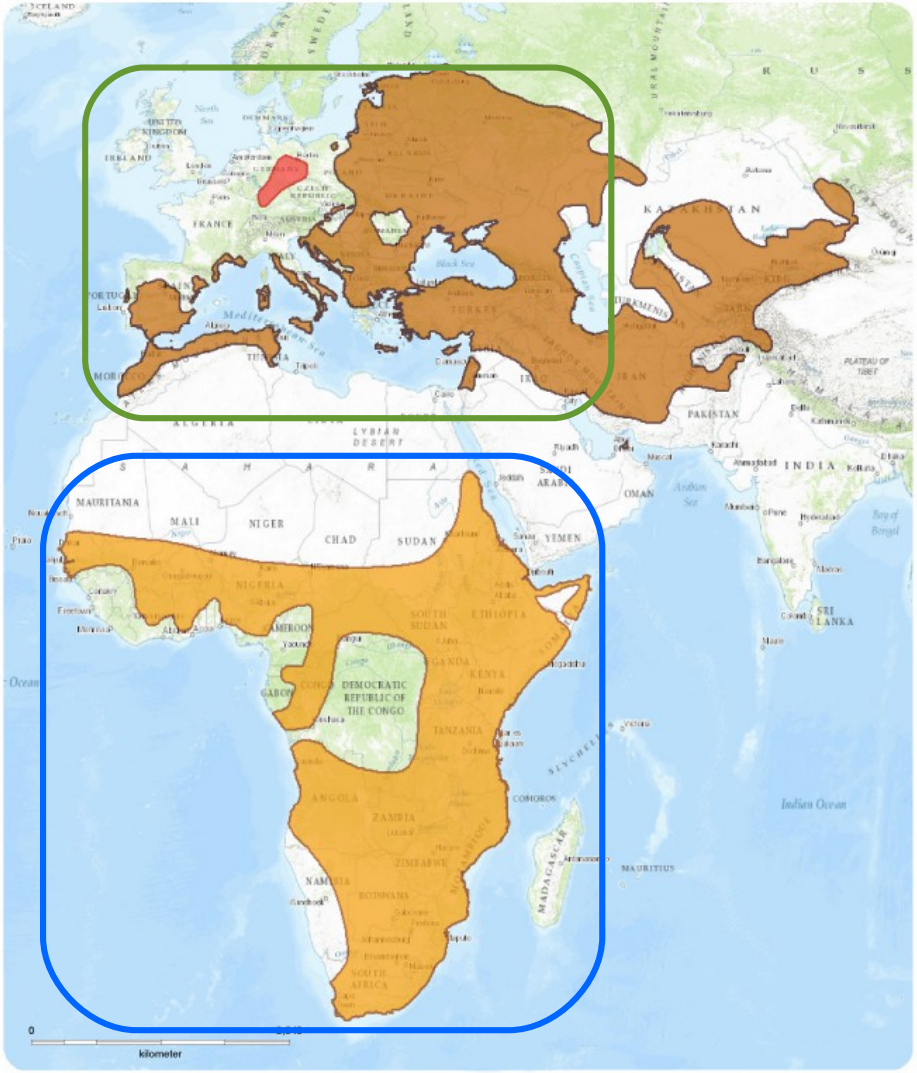
Migratory routes of south-western population of the European Roller: key areas and tracking device effects





Sanderson *et al.* 2006
Vickery *et al.* 2014



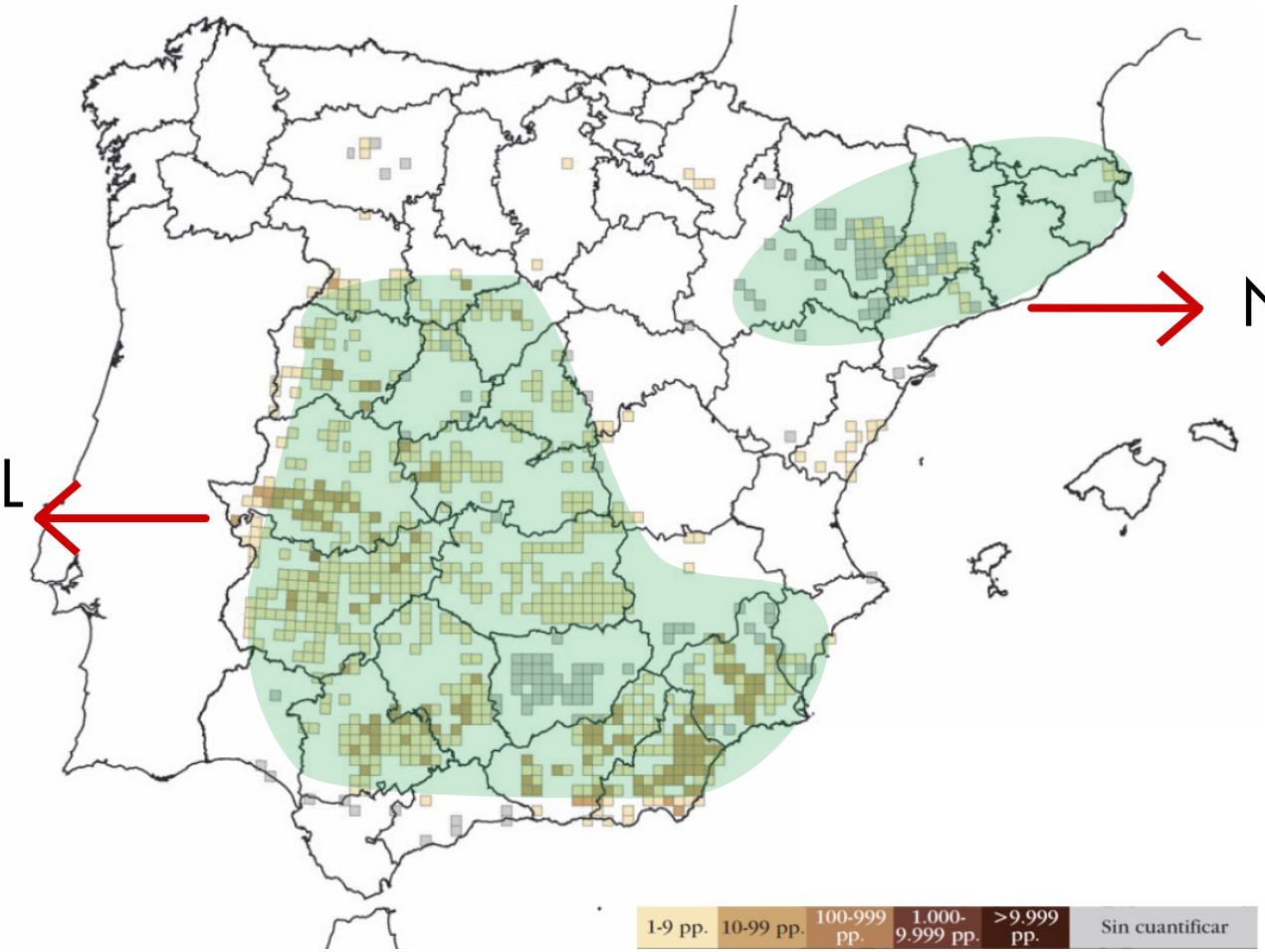
Scarce Information

Observations, Corpse recoveries, Ringing recoveries

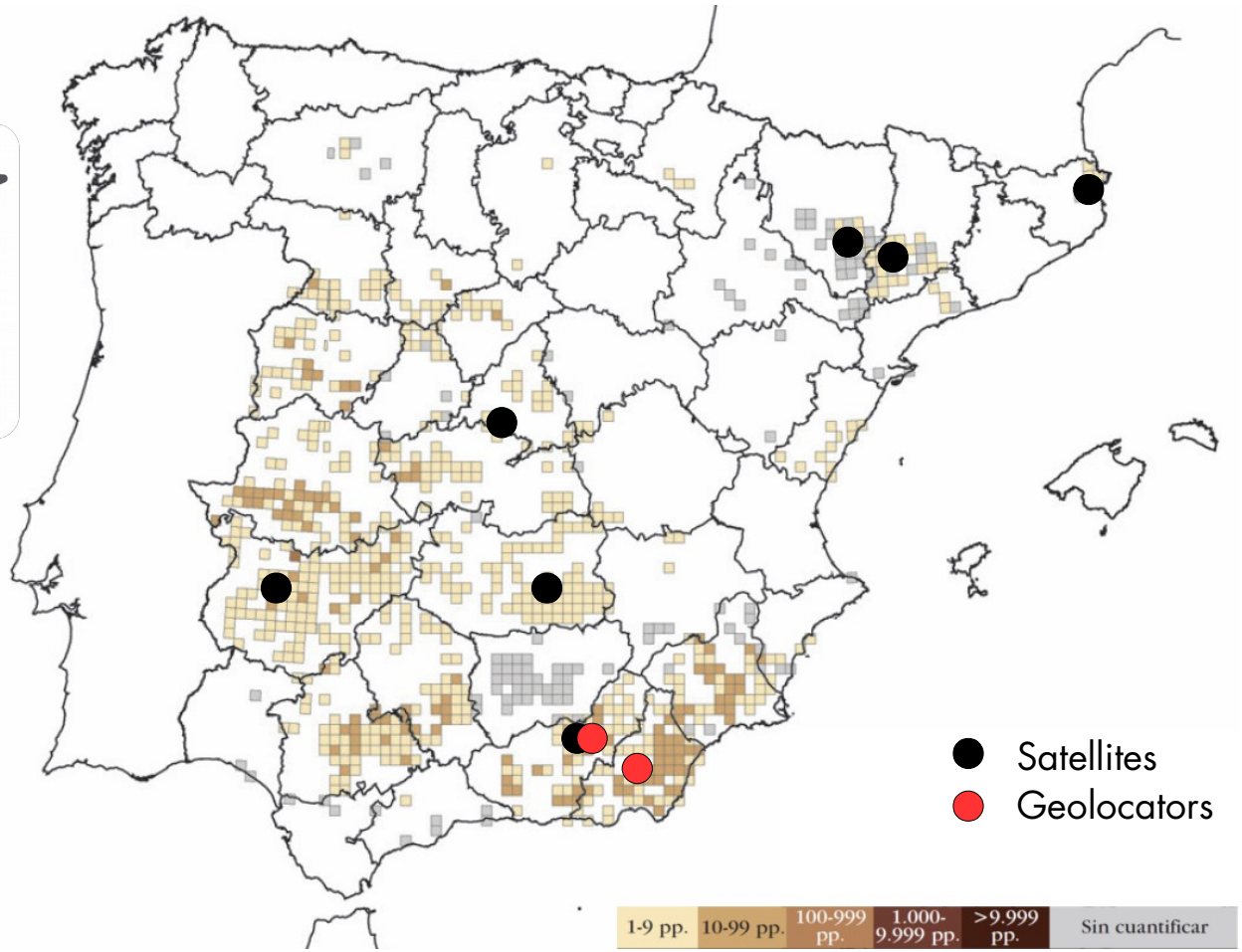
Geolocators

Small sample

PTT-Transmitters	Geolocators
Expensive	Cheap
Heavy	Light
High Accuracy	Low Accuracy



Folch and Avilés 2003
Carrascal *et al.* 2006



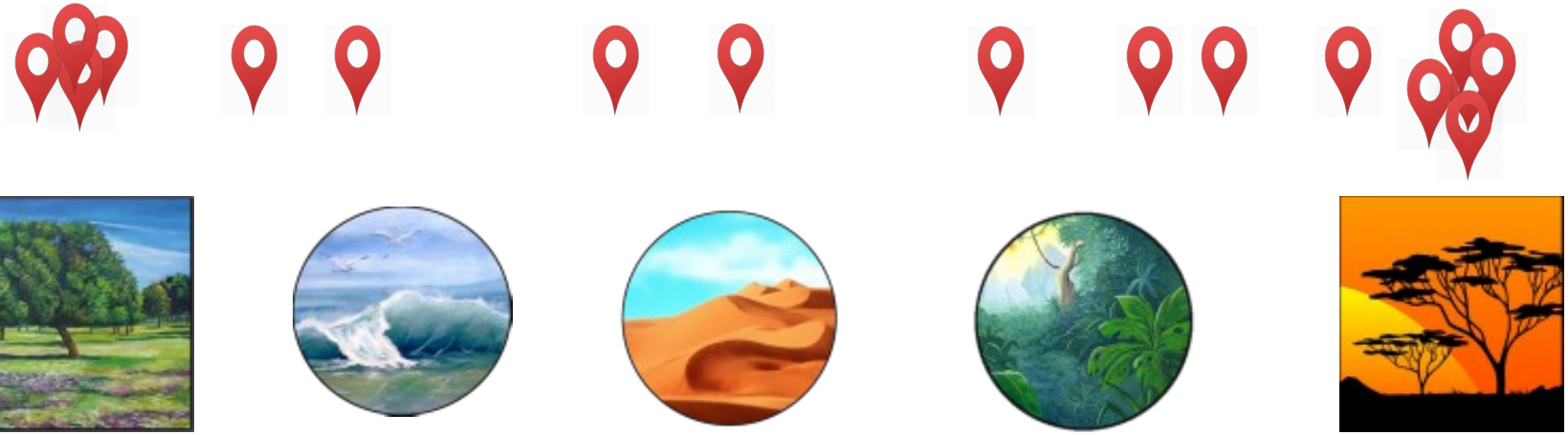
Folch and Avilés 2003
Carrascal *et al.* 2006

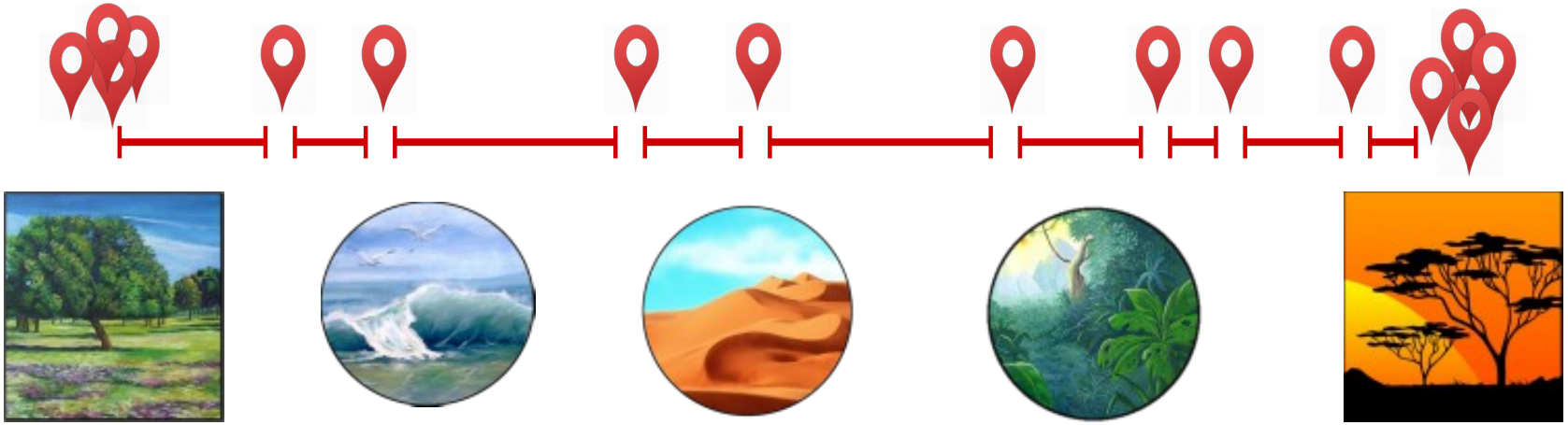
Inter-population variation
PTT-Transmitters

6.5 autumn migration events
Expensive
Heavy
High Accuracy

Intra-population variation
Geolocators

12 (4 recovered) in Almería
Cheap
Light
Low Accuracy





Steps

Distance Time Date Habitat	Speed Departure Arrival

Steps

Strandberg et al. 2009

Distance Time Date Habitat	Speed Departure Arrival

5km/h

Flying
Stationary

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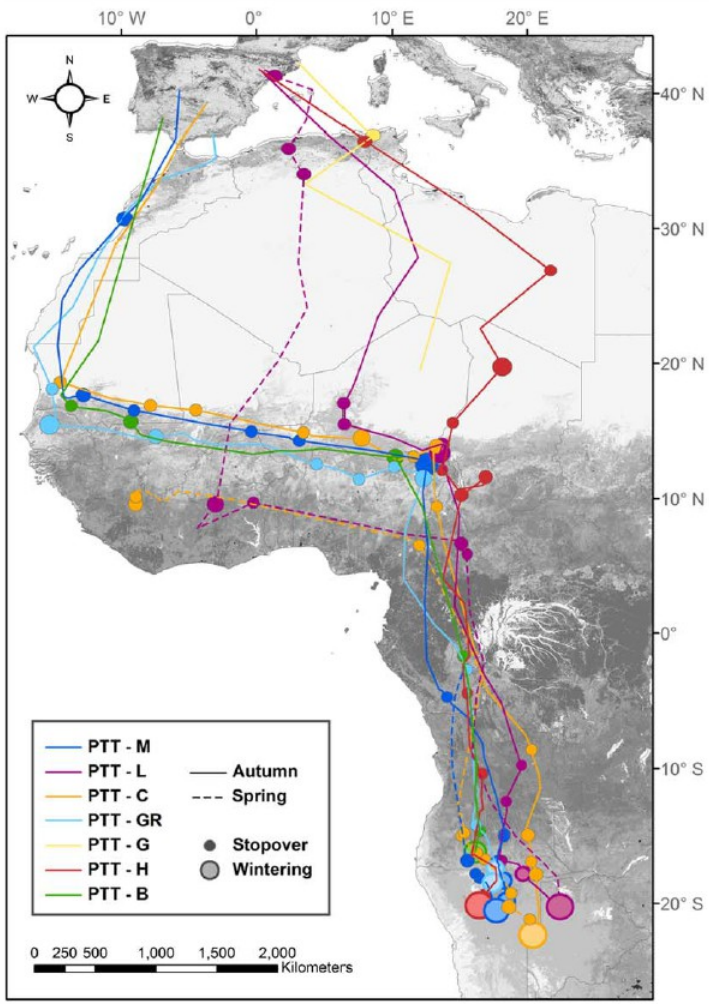
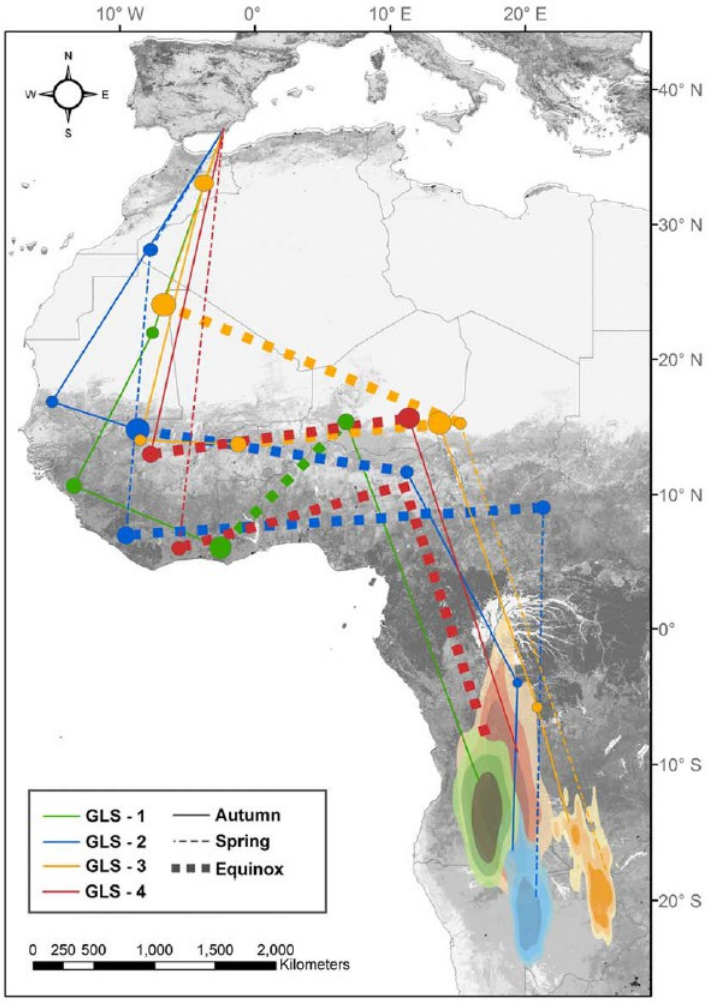
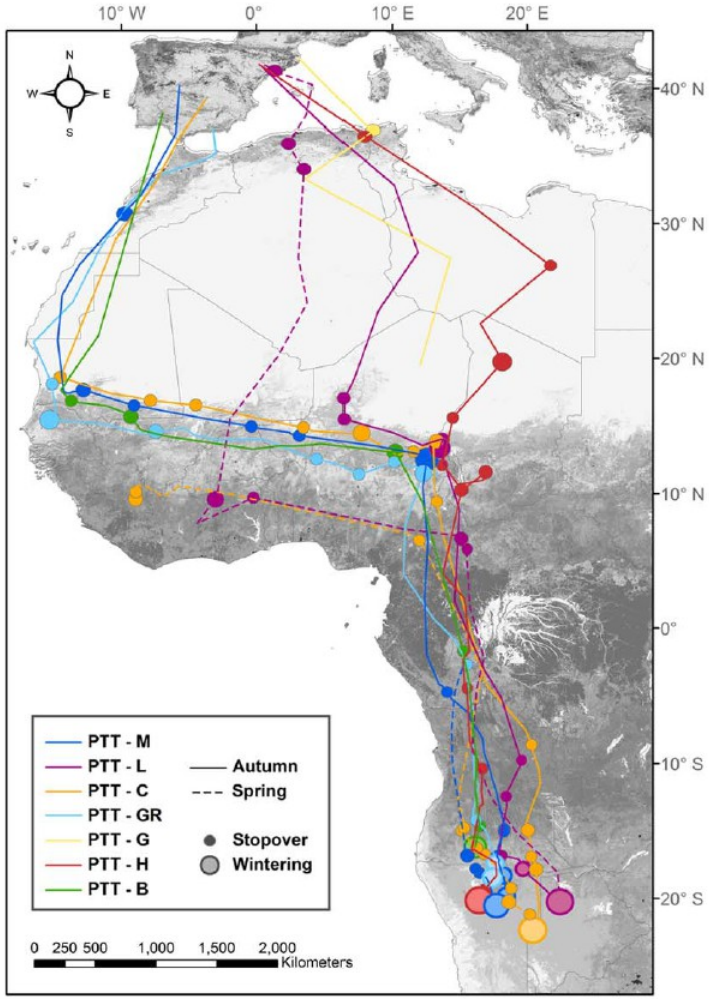
SATELLITES



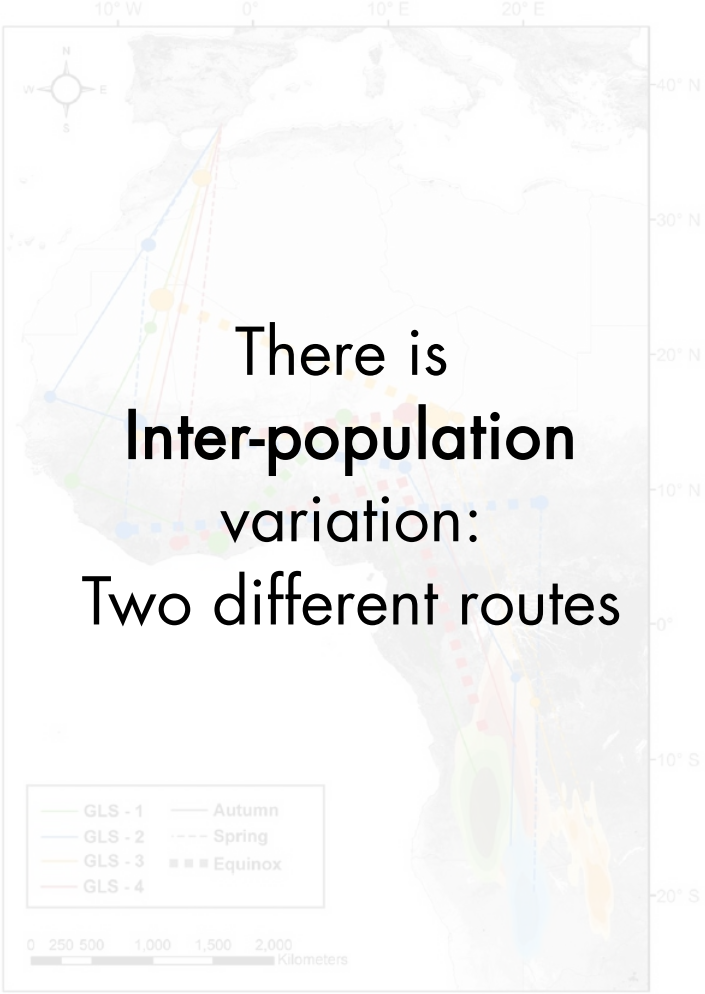
GEOLOCATORS



SATELLITES



GEOLOCATORS



There is
Inter-population
variation:
Two different routes

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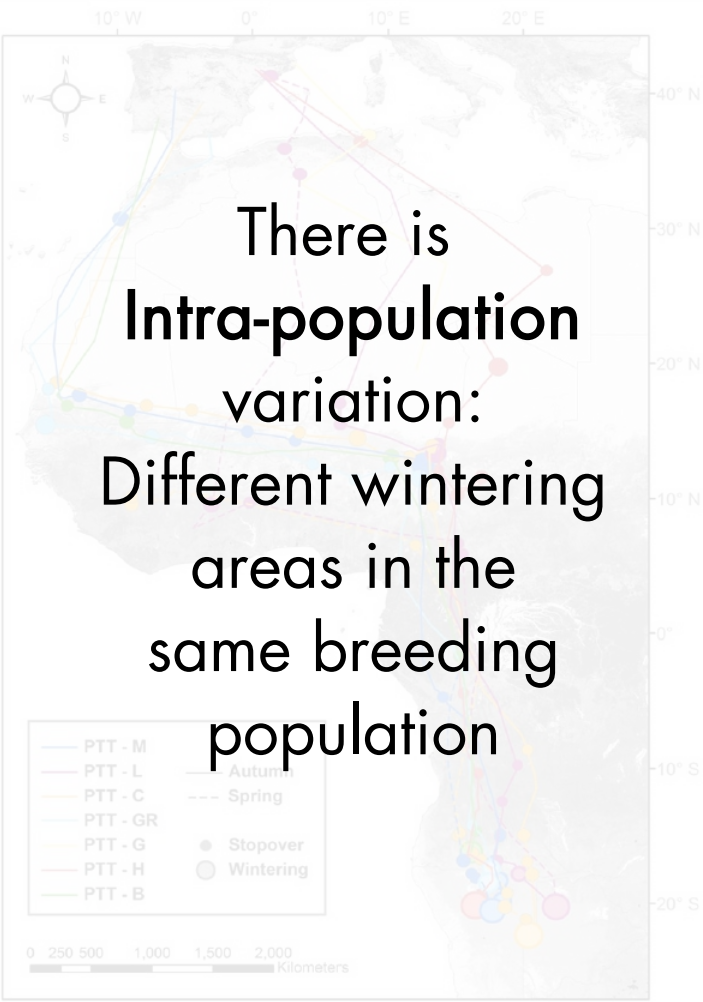
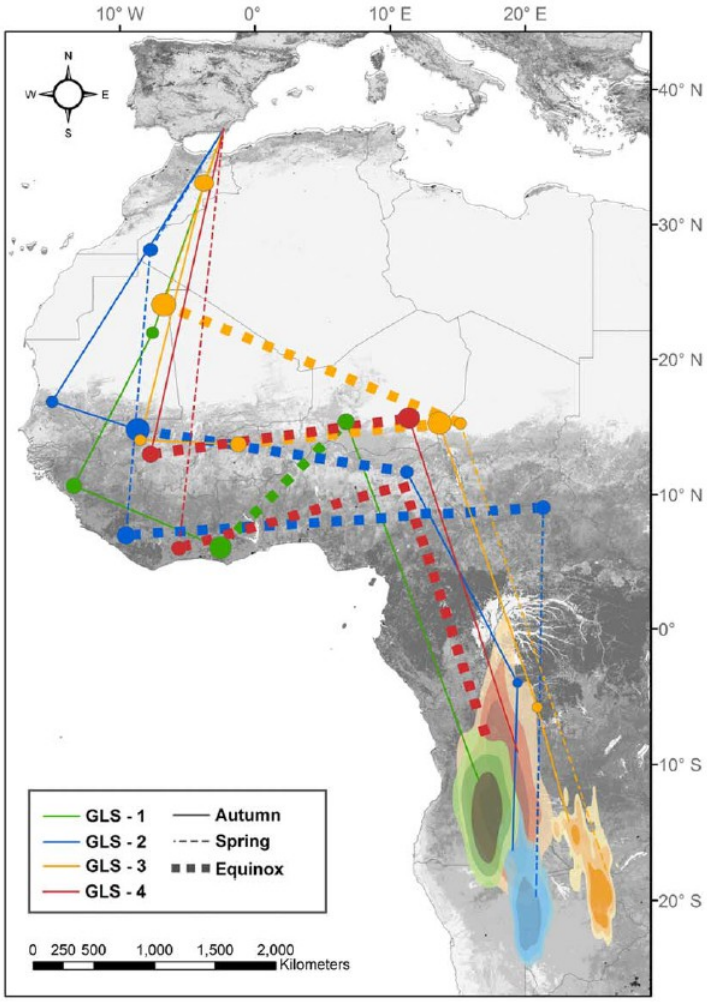
SATELLITES

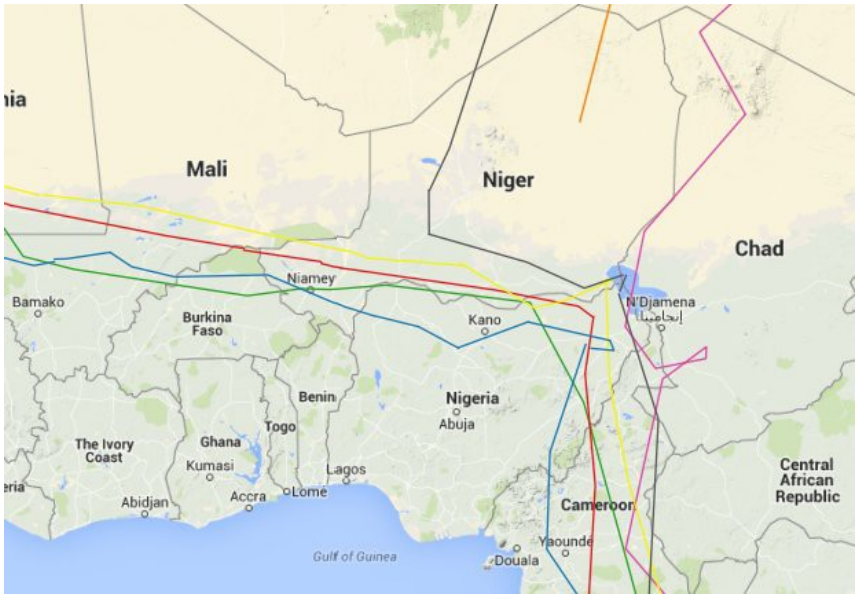


There is **Intra-population** variation: Different wintering areas in the same breeding population

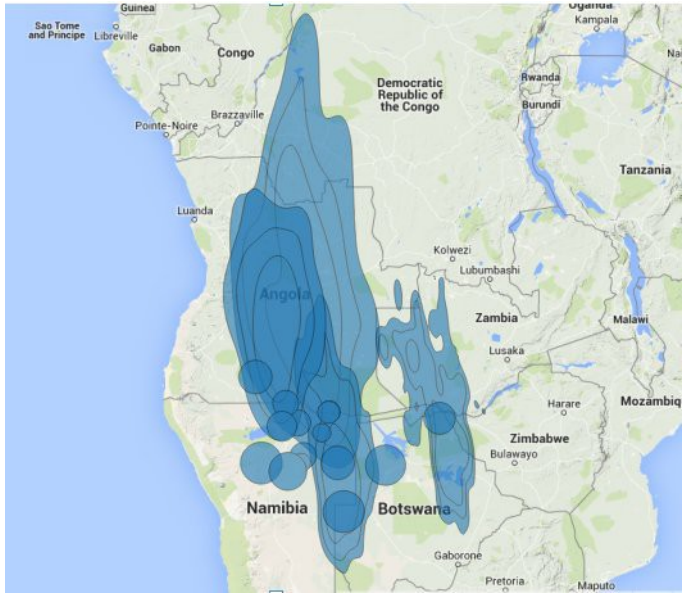
GEOLOCATORS



Key Areas



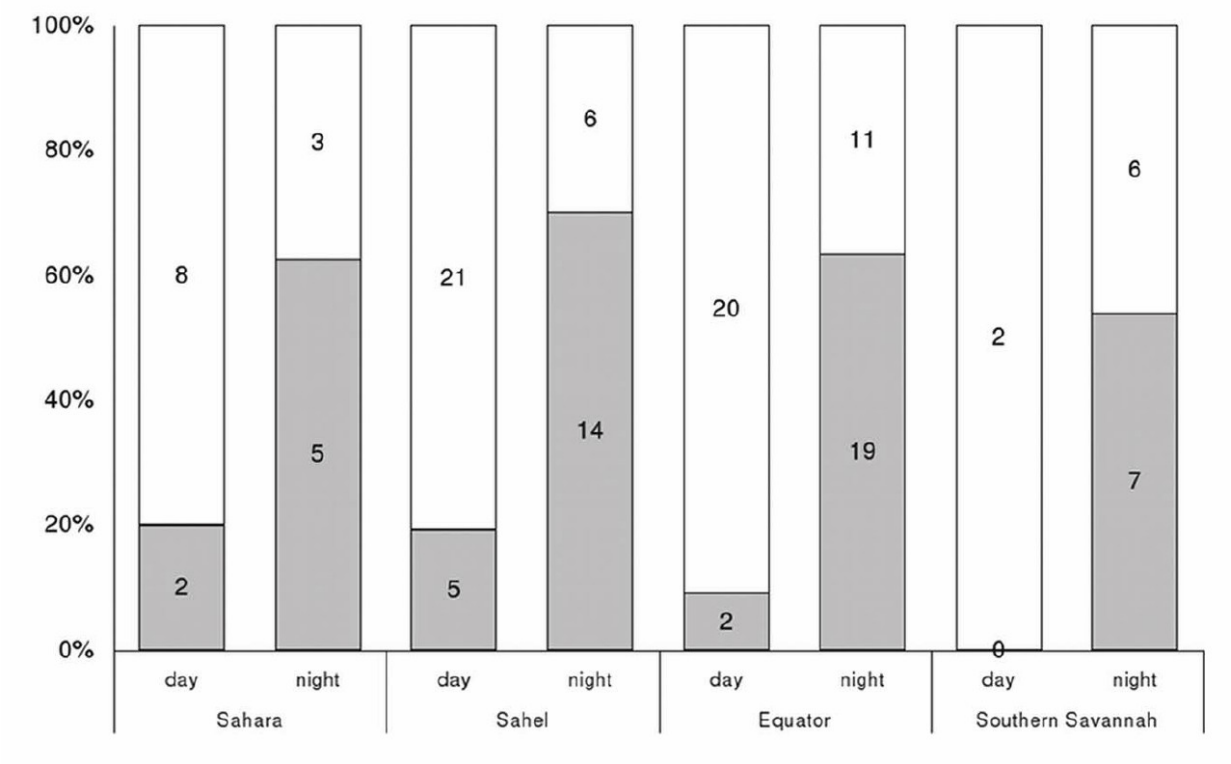
Lake Chad
Important stopover
and confluence area
of both routes
(average duration 27.8d)



Wintering quarters in
southwestern Africa:
Angola, Botswana y
Namibia

Migratory Behaviour

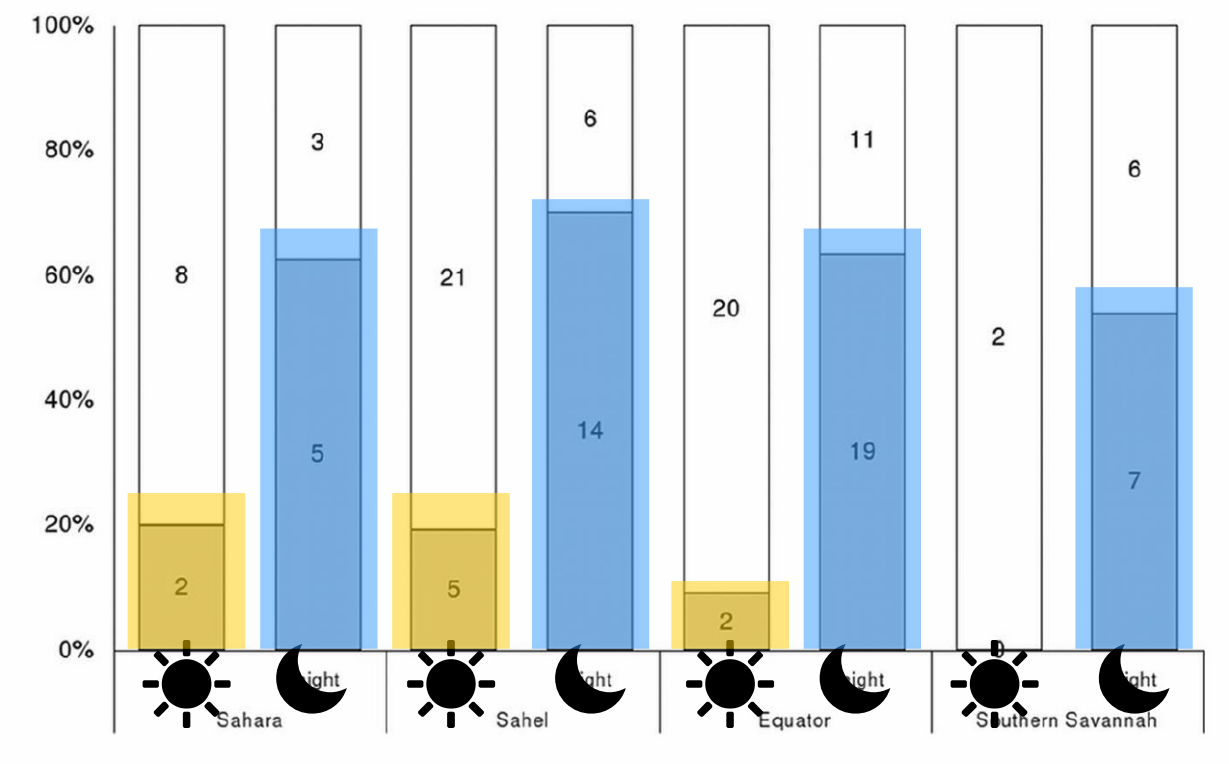
Daily Activity



- Stationary steps
- Flying steps

Migratory Behaviour

Daily Activity

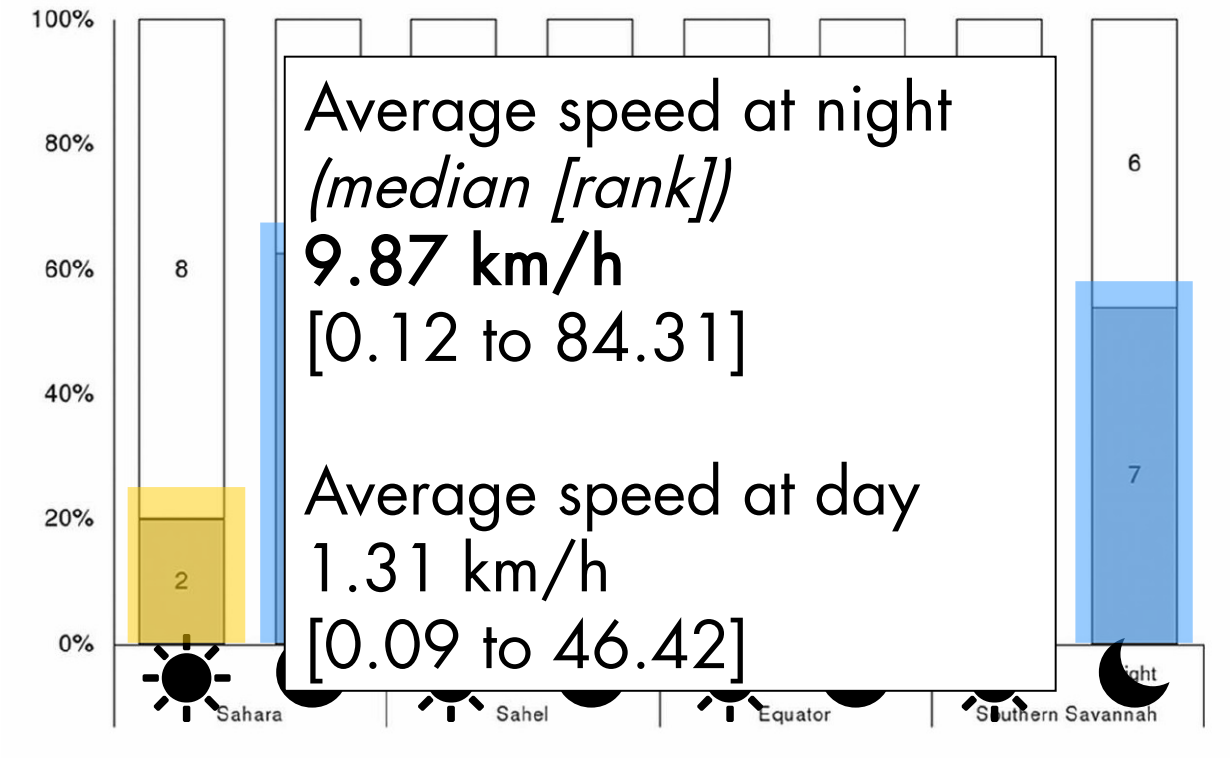


Flying steps more frequent during the night

- Stationary steps
- Flying steps

Migratory Behaviour

Daily Activity



Average speed at night
(median [rank])
9.87 km/h
[0.12 to 84.31]

Average speed at day
1.31 km/h
[0.09 to 46.42]

Flying steps more frequent during the night

Higher speed during night

Nocturnal Migrant

- Stationary steps
- Flying steps

Effects of Tracking Devices

3 ANALYSES

Short-term: Weight of fledglings raised by pairs with 1, 2 or none adults with geolocators

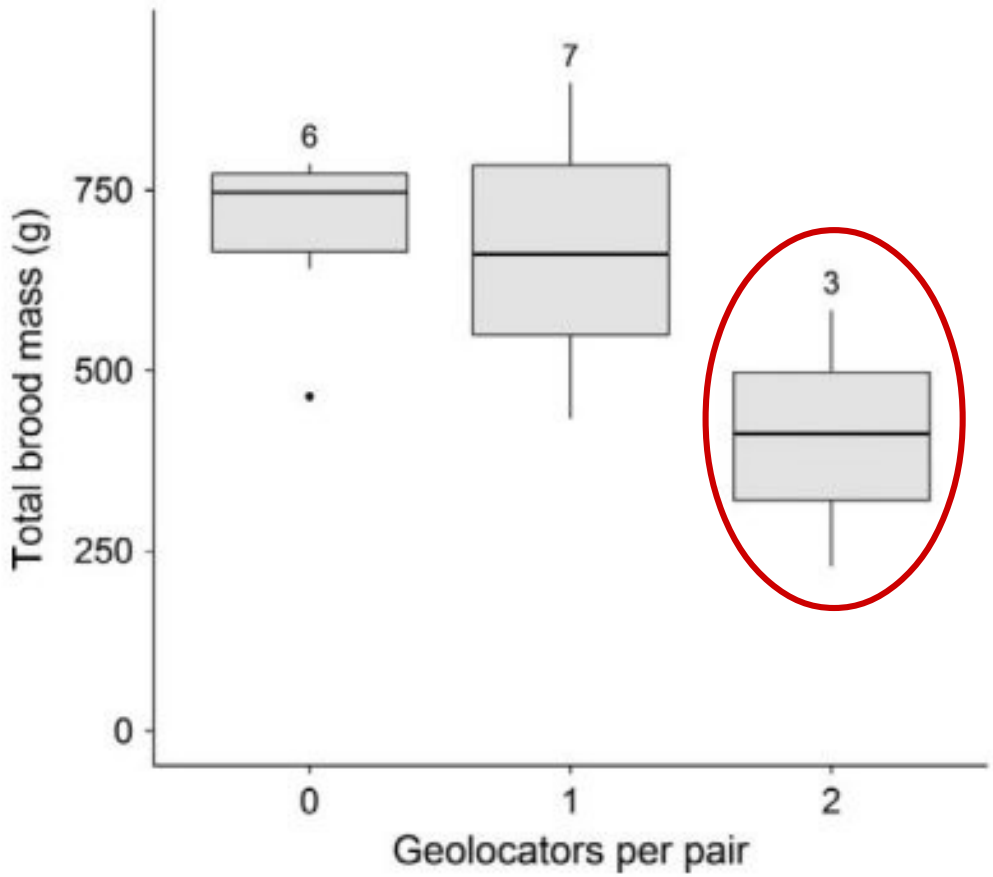
Long-term: Recapture rate of geolocator-equipped birds *vs.* ringed control birds in two populations (Guadix - Castro Verde)

Long-term: Recapture rate in relation to device-bird weight ratio

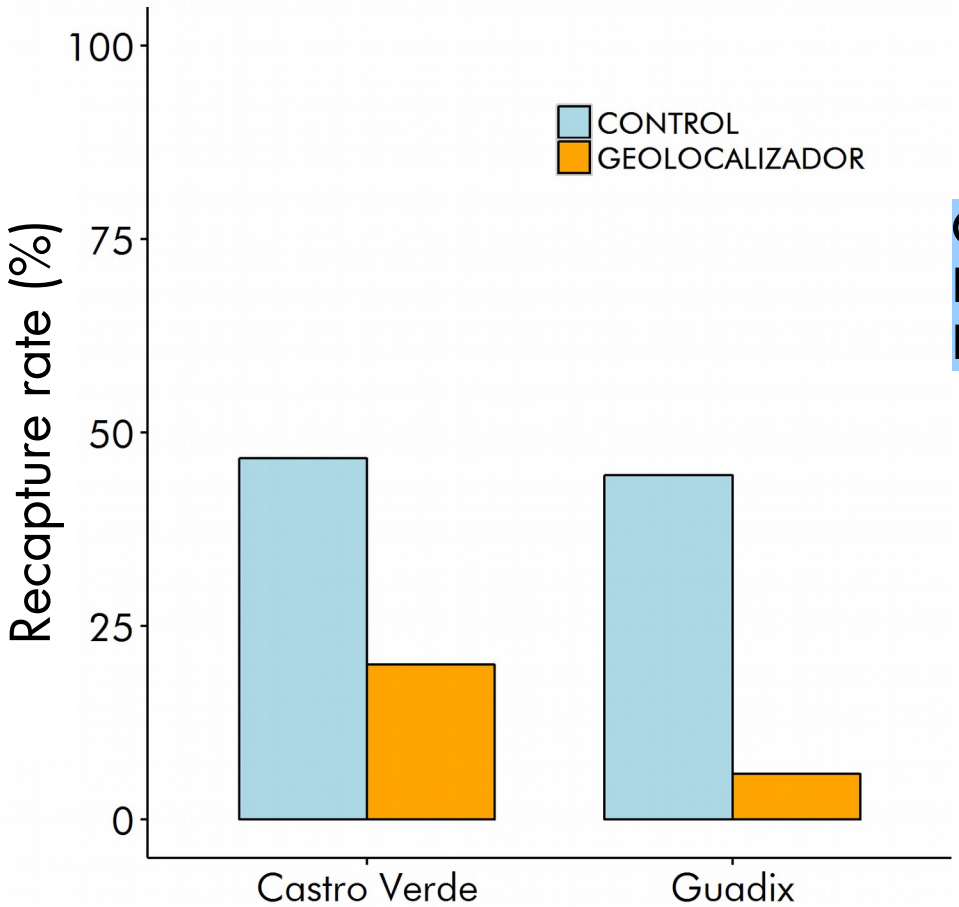
Short-term Effect

In Guadix, broods raised by pairs of two adults wearing geolocators weighted significantly less than others

These offsprings may be fledging in worse condition and, thus, have less chances of survival



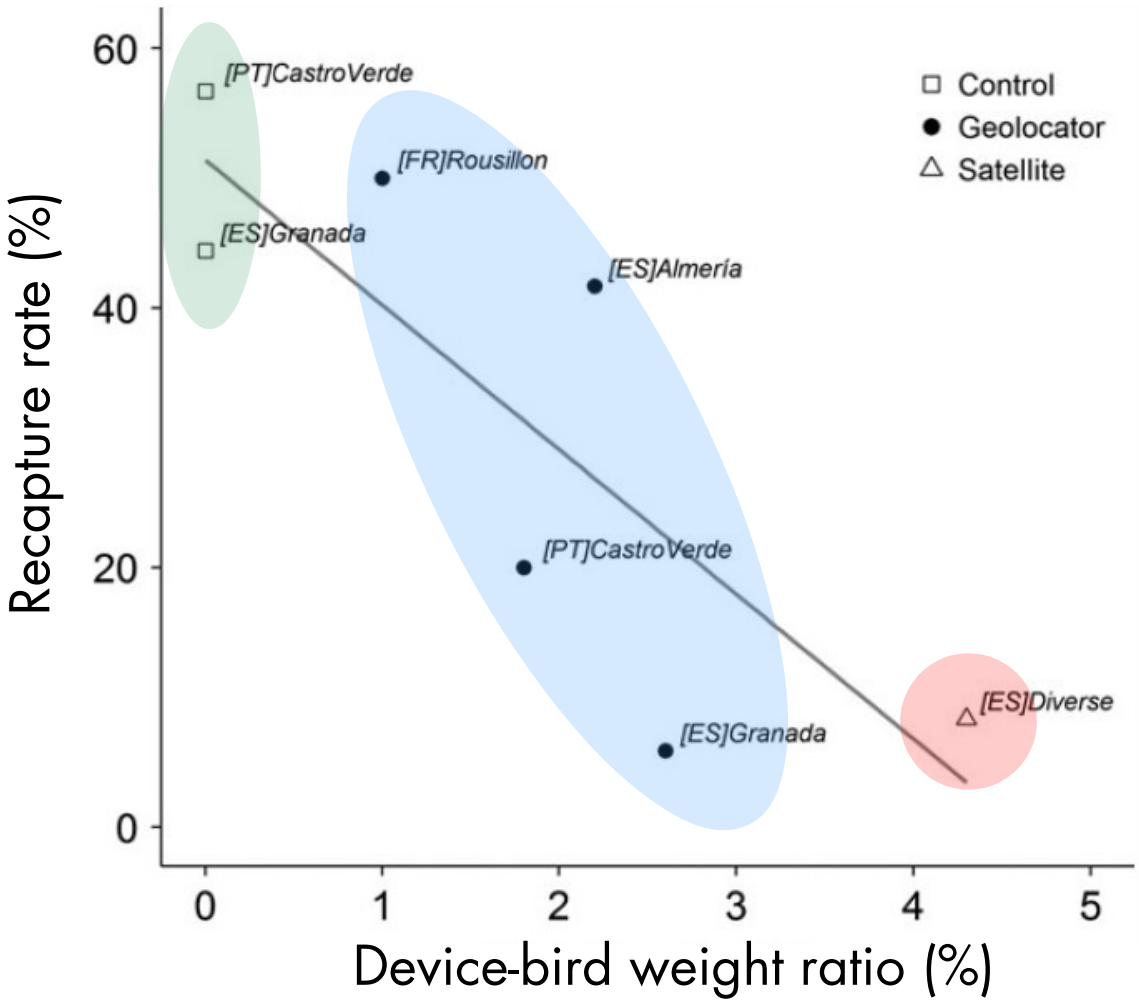
Long-term Effect



	χ^2_1	P
Geolocator	**10.43**	**0.001**
Population	0.38	0.54
Population * Geolocator	0.87	0.35

The attachment of geolocator reduces the probability of being recaptured the next year

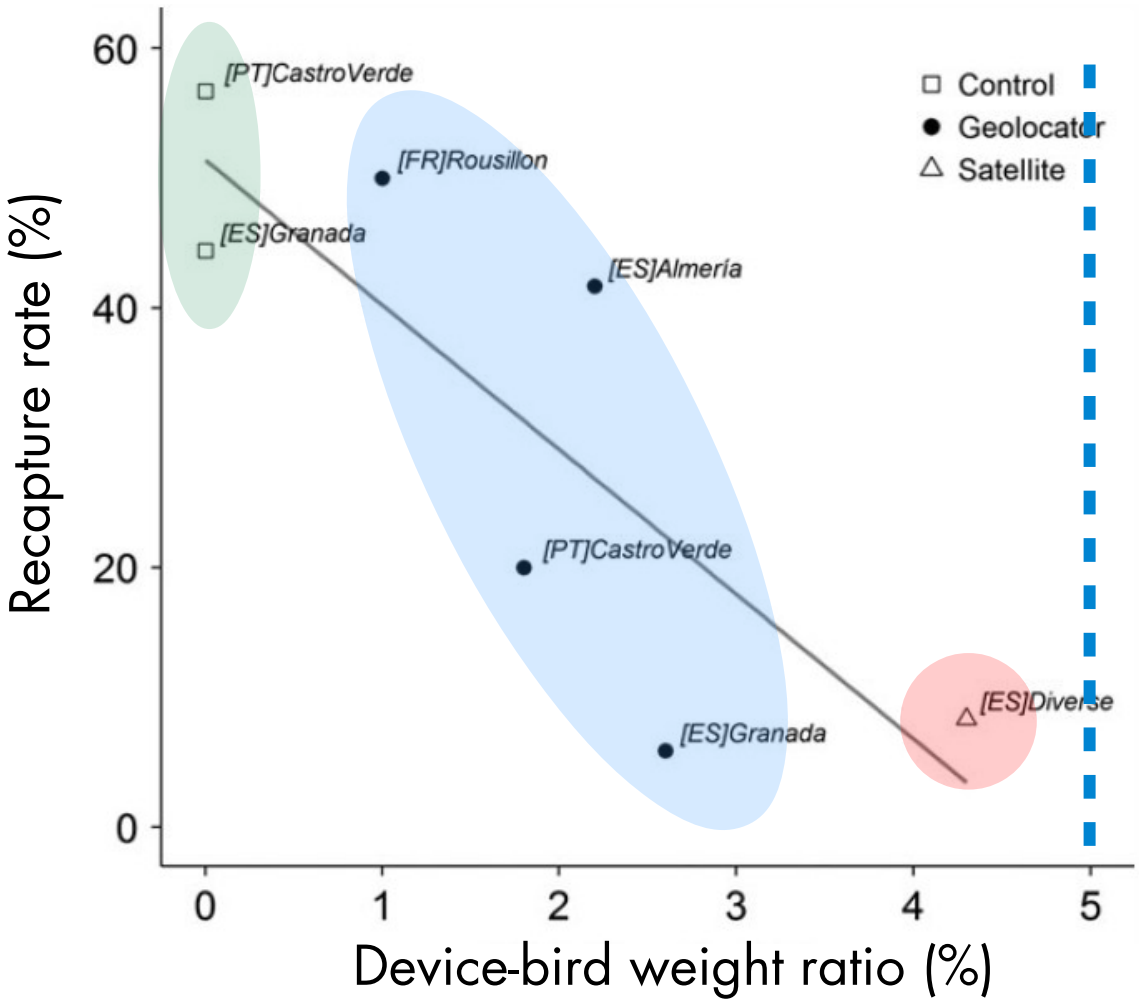
Long-term Effect



Long-term Effect

The more device weight, the less probability of recapturing equipped birds

Usual rule of thumb:
5 % (Kenward 2001)

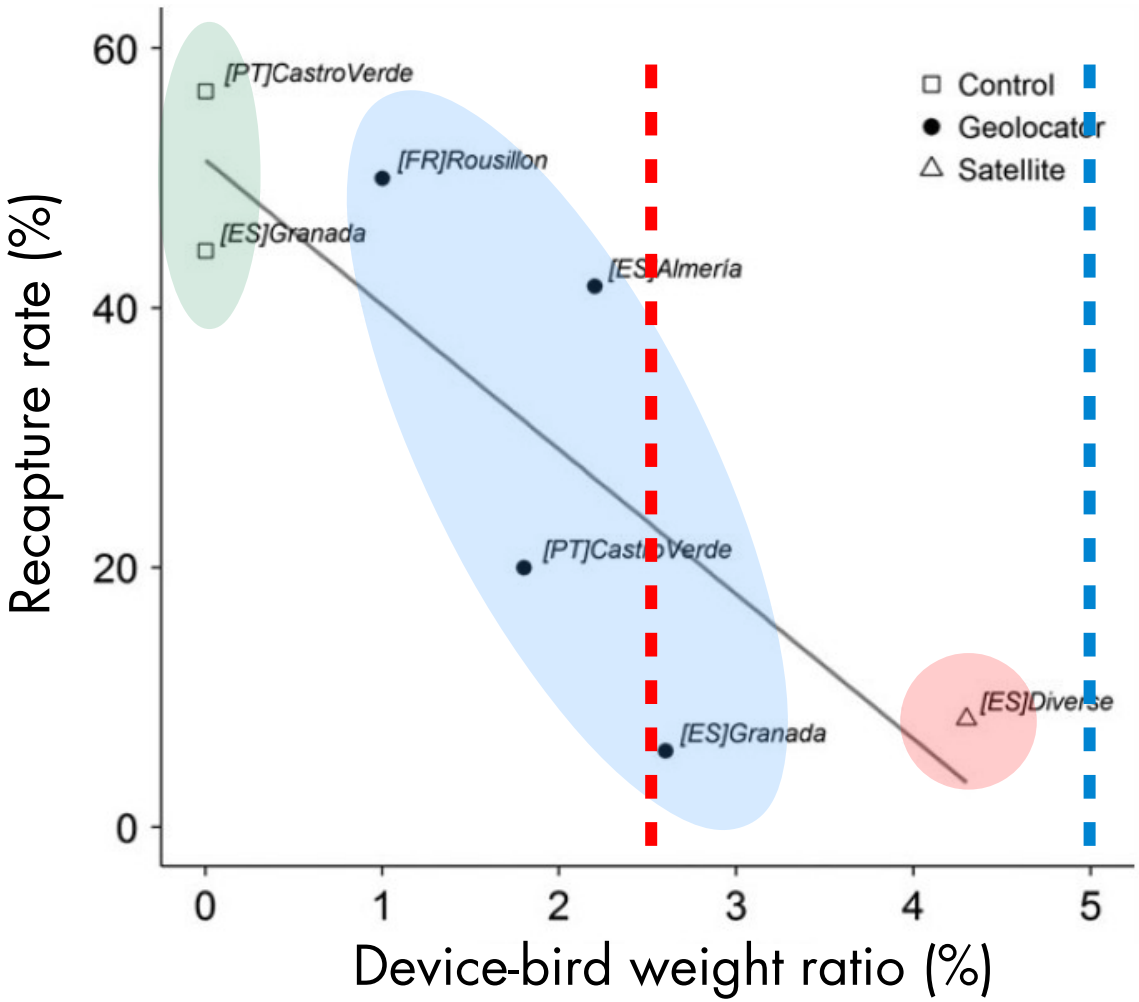


Long-term Effect

The more device weight, the less probability of recapturing equipped birds

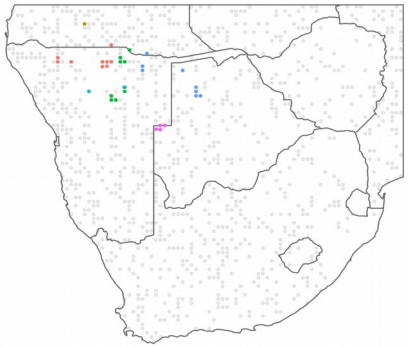
Usual rule of thumb:
5 % (Kenward 2001)

Our recommendation
2.5 %

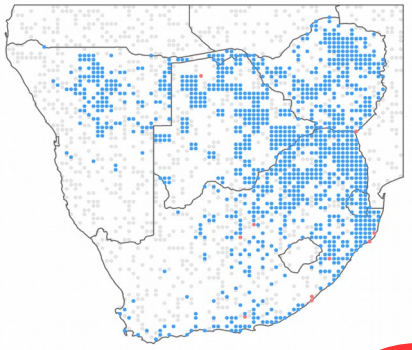


Wintering areas of Spanish Rollers and the overall wintering distribution of the species

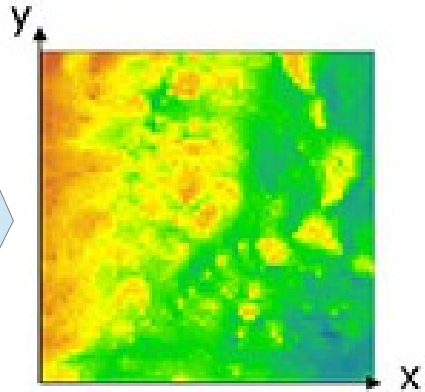
Satellite Locations



SABAP+GBIF Records



MAXENT



Probability of Ocurrence

Habitat characterization

Models Comparison

Protected Areas Coverage

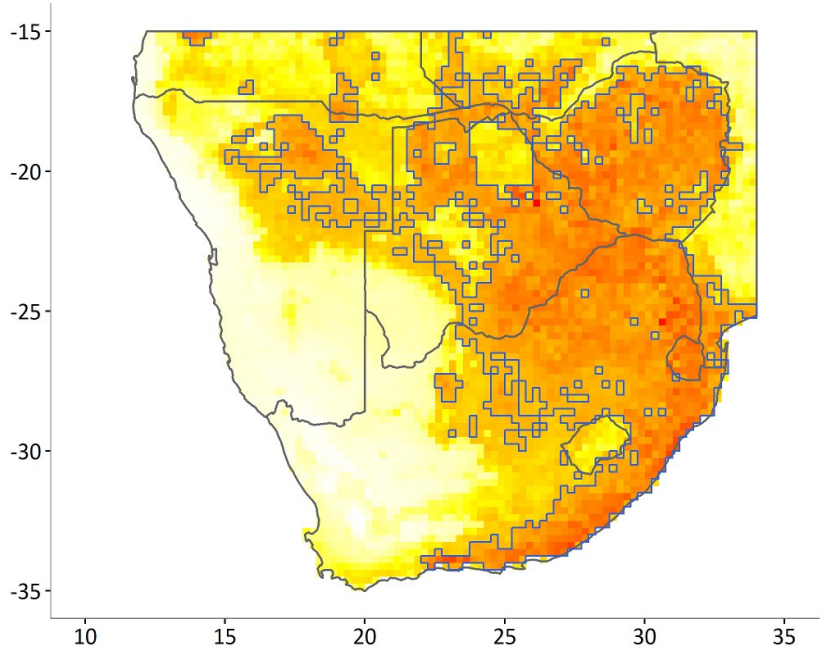
Climatic Variables

Topographic Variables

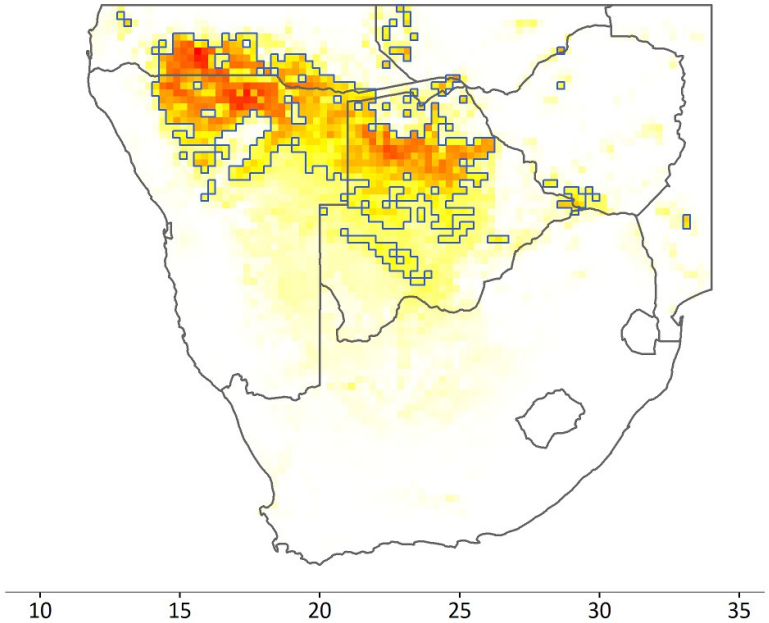
Habitat Variables

Maxent Results

General Species



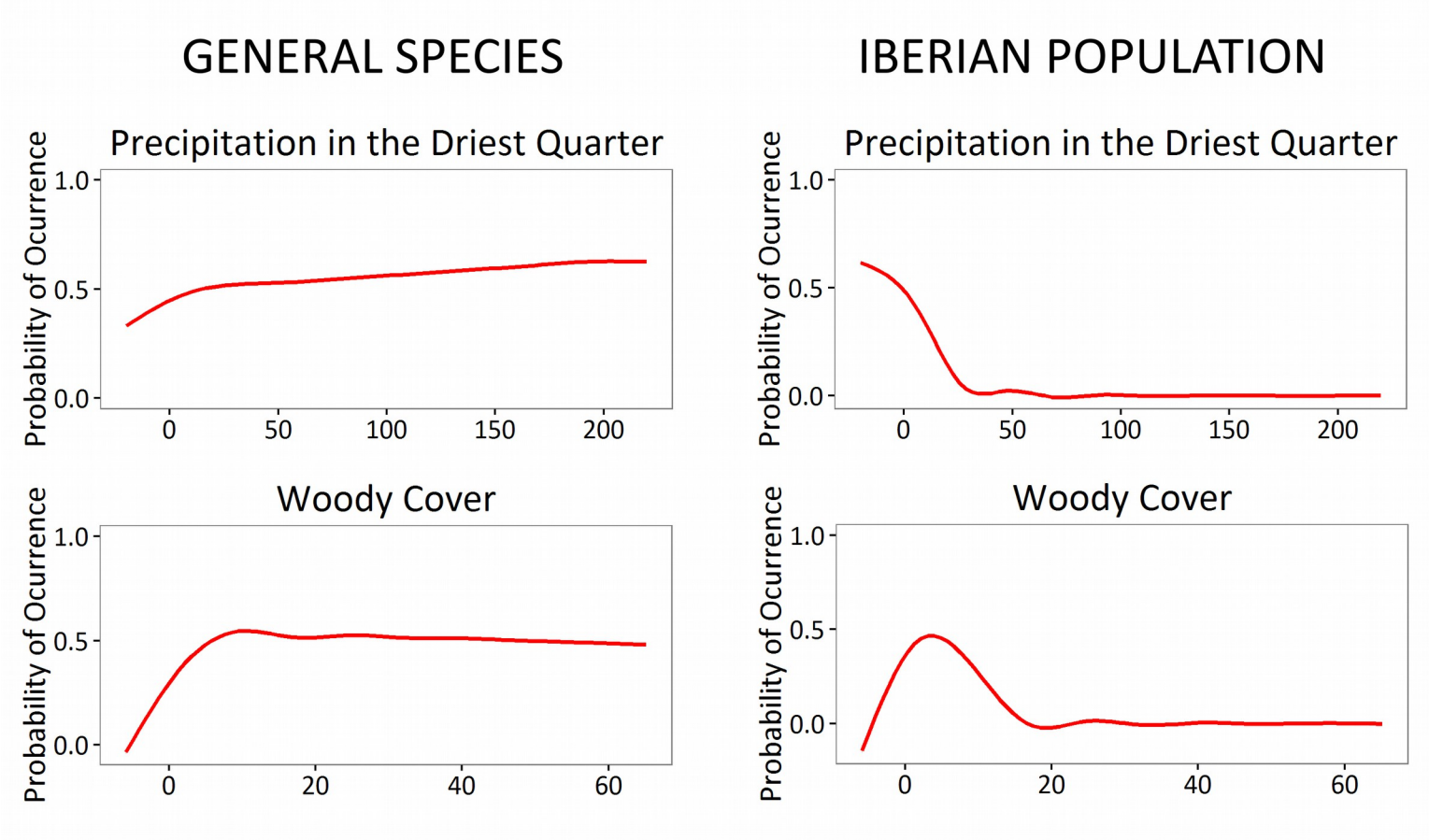
Iberian Populations



Equal Sensitivity-Specificity Threshold

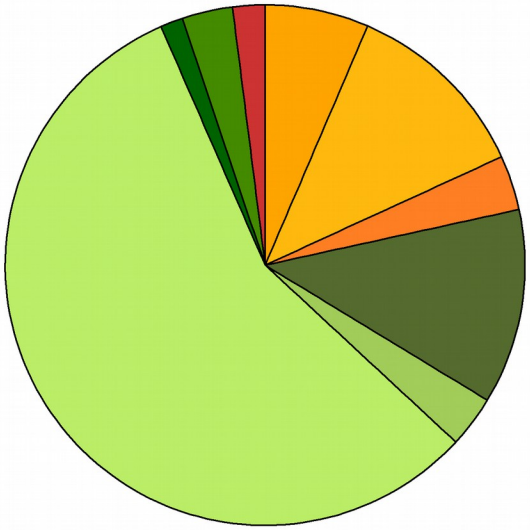
Suitable  Unsuitable

Most Important Variables

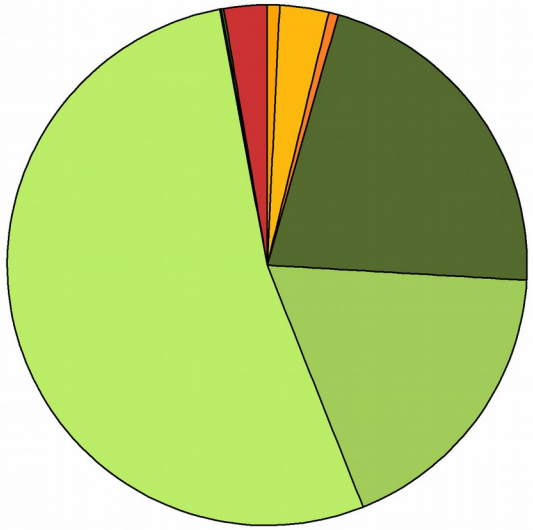


Habitat Use

General Species



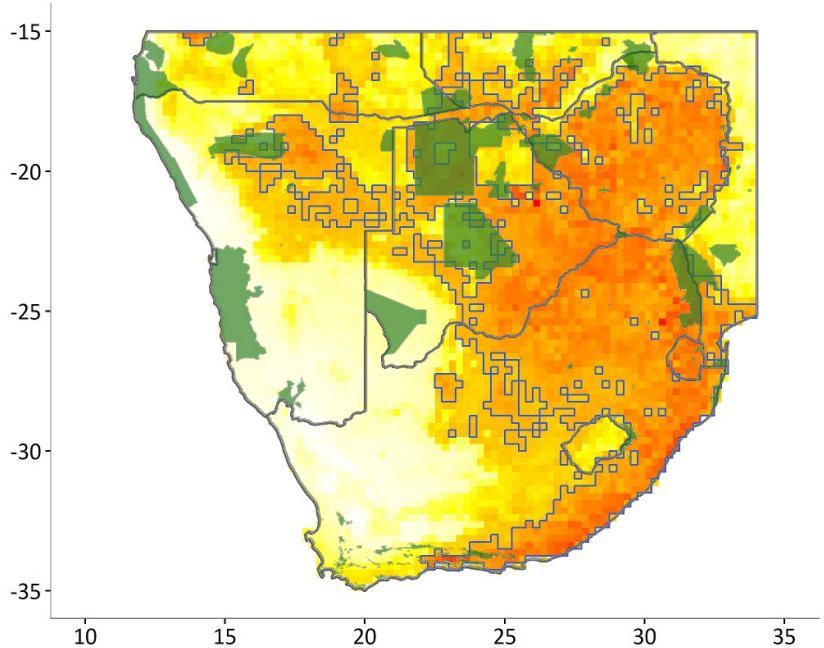
Iberian Populations



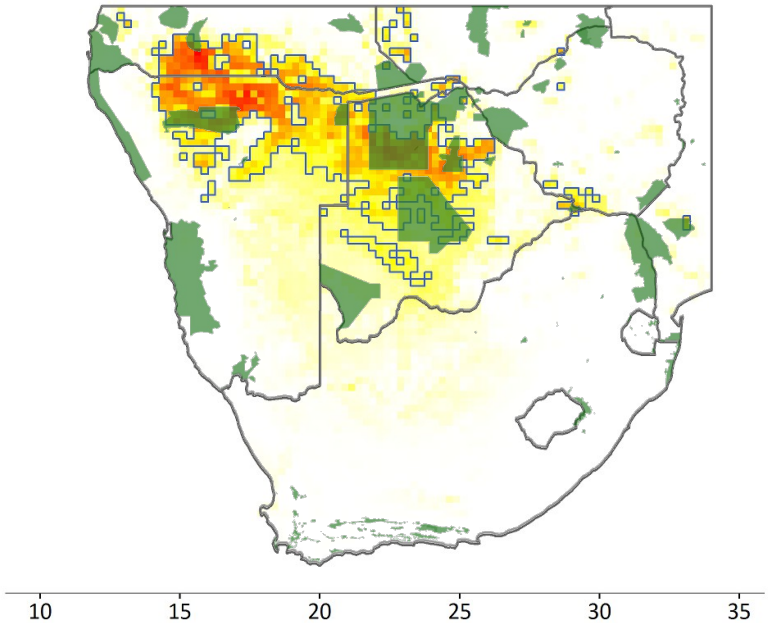
- Cropland/Grassland Mosaic
- Cropland/Woodland Mosaic
- Deciduous broadleaf Forest
- Dryland Cropland and Pastures
- Evergreen broadleaf Forest
- Grassland
- Savanna
- Shrubland
- Other

Protected Areas

General Species



Iberian Populations



Equal Sensitivity-Specificity Threshold

Suitable

Unsuitable

9.58 %

18.37 %

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Thank you

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