

# Migration and wintering behaviour of UK Ospreys



Dr Tim Mackrill

**Osprey** | Leadership Foundation

Tomorrow's conservation leaders





- Ospreys flew further per day in autumn compared to spring, and in Africa compared to Europe
- No seasonal difference in stop-overs
- Wind conditions more favourable in autumn - key driver in shaping migration speed
- Departure date also had an impact. Later departing birds fly further per day, including nocturnal flight...

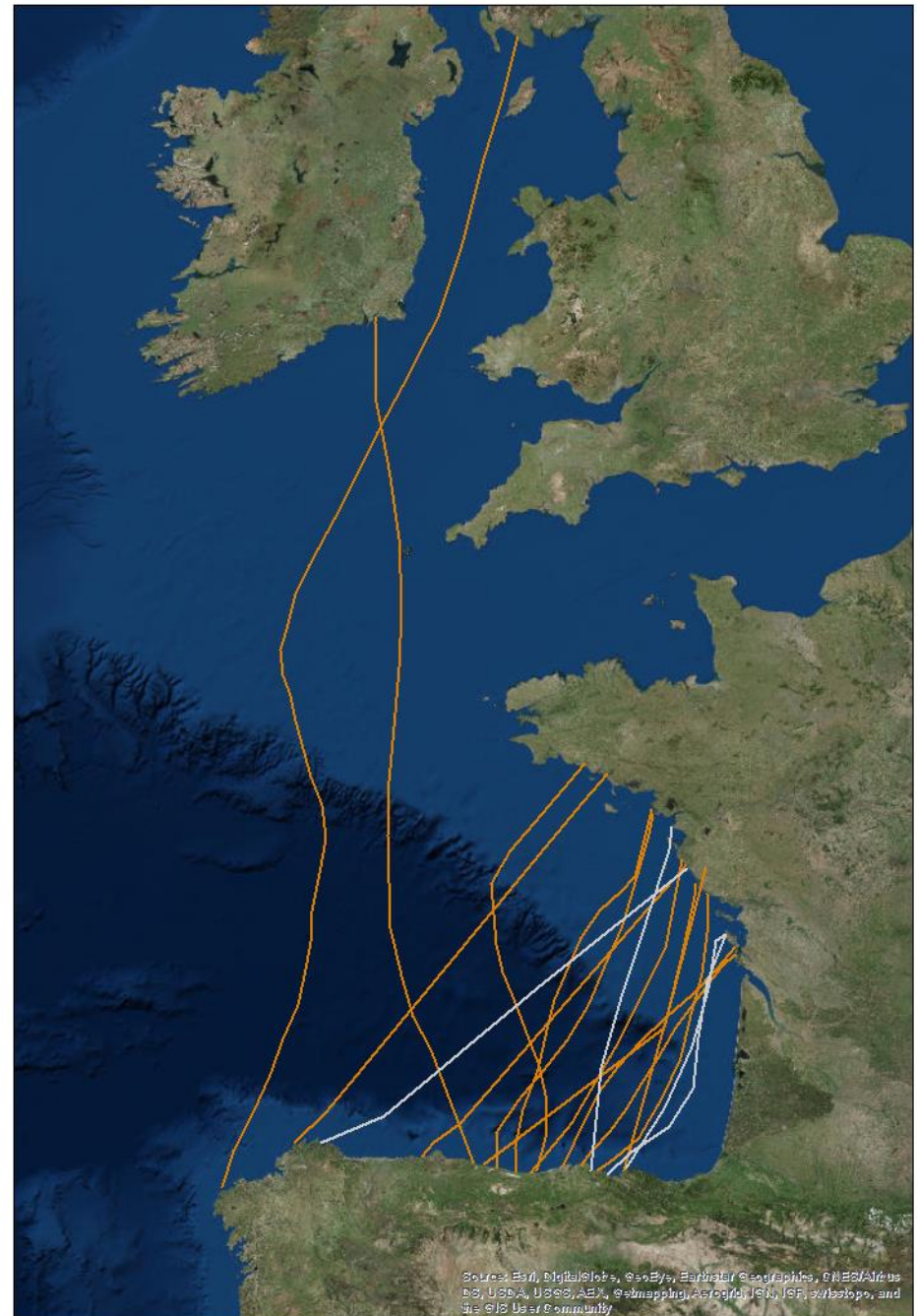
		Flying time (mins)		Daily distance (km)	
Season/Region	N	Mean	SD	Mean	SD
Autumn Europe	269	515	275	263.5	210.9
Autumn Africa	171	577	119	307.0	123.1
Spring Europe	251	454	173	220.7	172.9
Spring Africa	191	525	109	268.1	108.8



- Longest flight at start of migration by Blue XD – breeding male from Strathspey
- Flew 2001 km to central Spain from nest site in just under 36 hours

## Bay of Biscay

- Most instances of nocturnal flight in Europe associated with Bay of Biscay crossings
- Clear seasonal difference: ospreys appear to readily cross Biscay in autumn, but avoid it in spring
- Longest flight 1365 km
- All autumn crossings undertaken with NE tailwinds
- Predominance of NW winds in spring prohibit crossings





- Analysis indicates meteorological conditions shape osprey migration speed, but...behavioural triggers also important, even in autumn
- Later departing ospreys migrate with increased urgency in autumn and incorporate time minimisation techniques – such as nocturnal flight
- **So, what's the rush?**

- Reclamation of winter territories – satellite tracking has shown that adult ospreys return to the same site every winter



- Adults defend these territories against newly-arrived juveniles



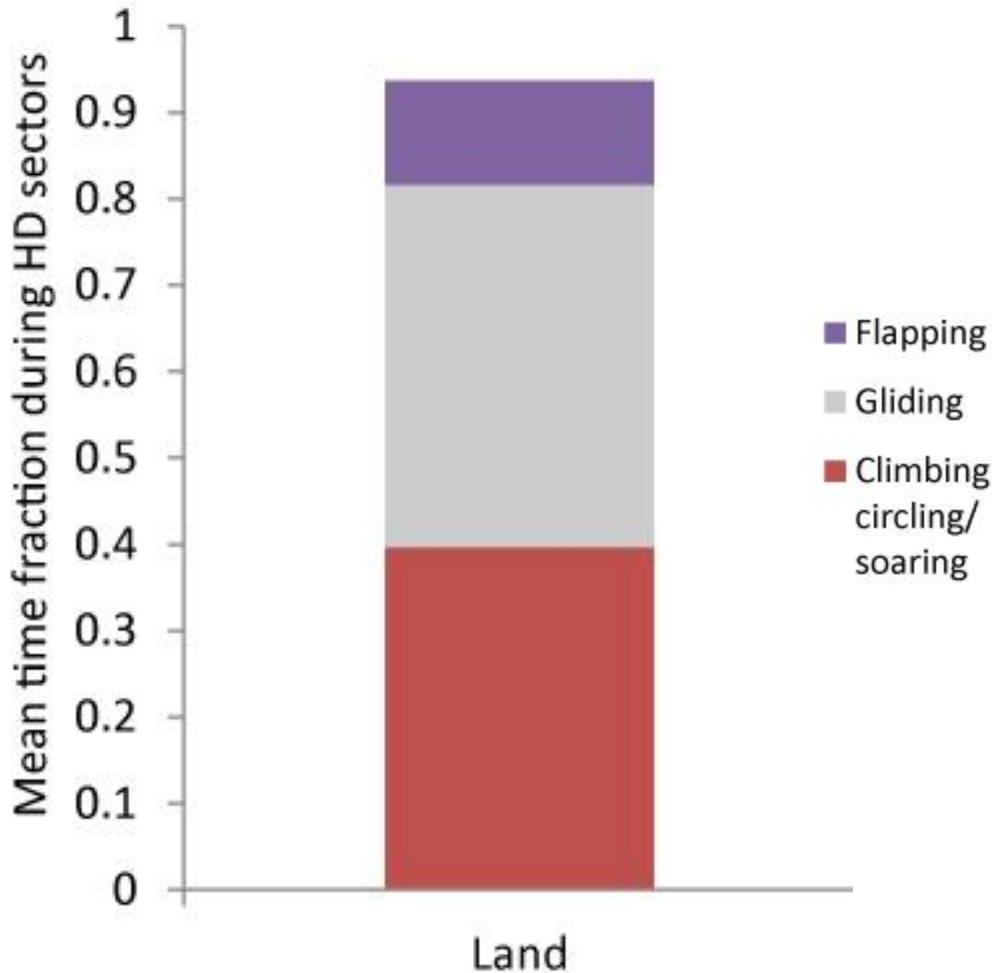


## *How do Ospreys migrate?*

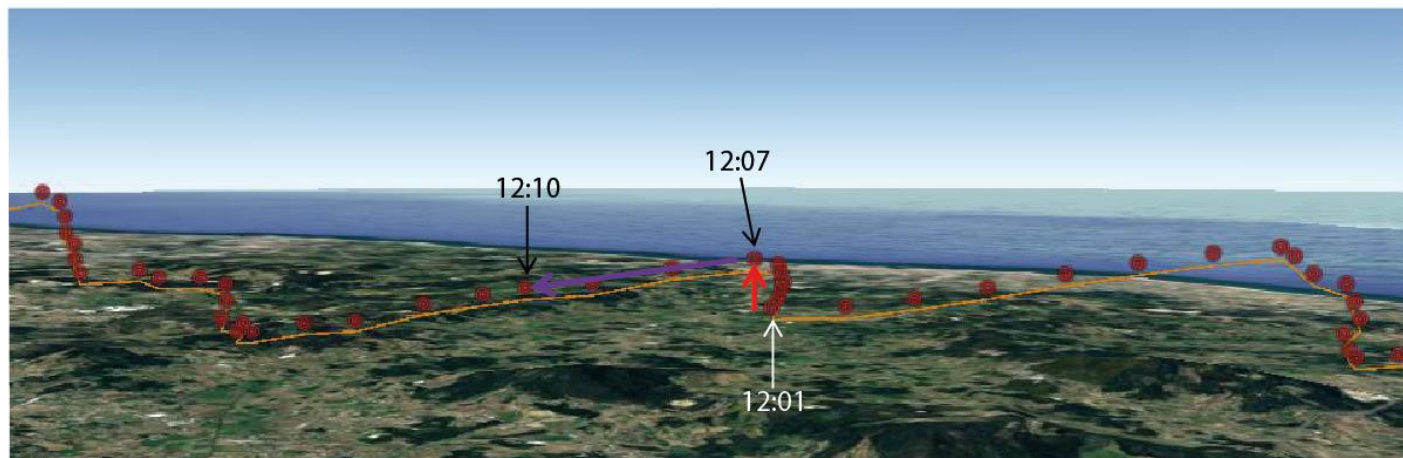
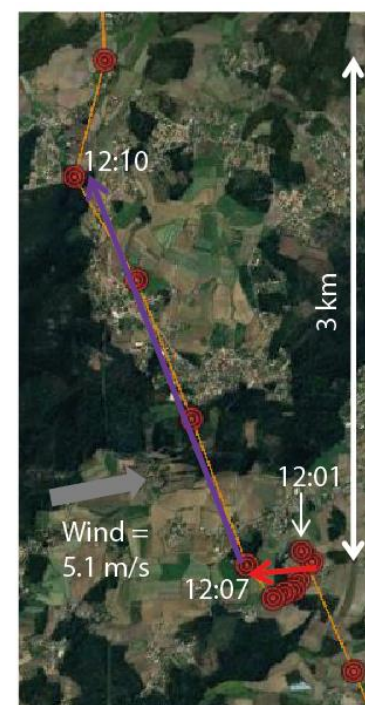
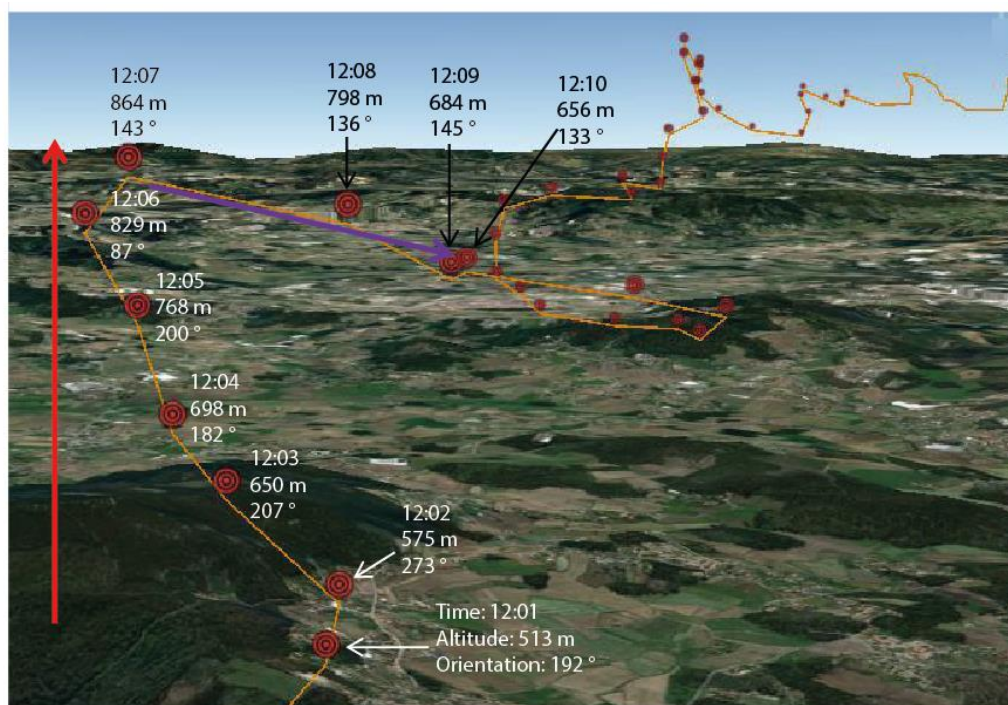
- GSM transmitters log the location, altitude, speed and orientation of migrating ospreys as regularly as once per minute when battery voltage is highest
- High resolution data enables us to understand *how* Ospreys migrate, not just where they go and how long it takes
- GSM transmitters used to track three adult ospreys during eight migratory flights (five autumn, three spring)



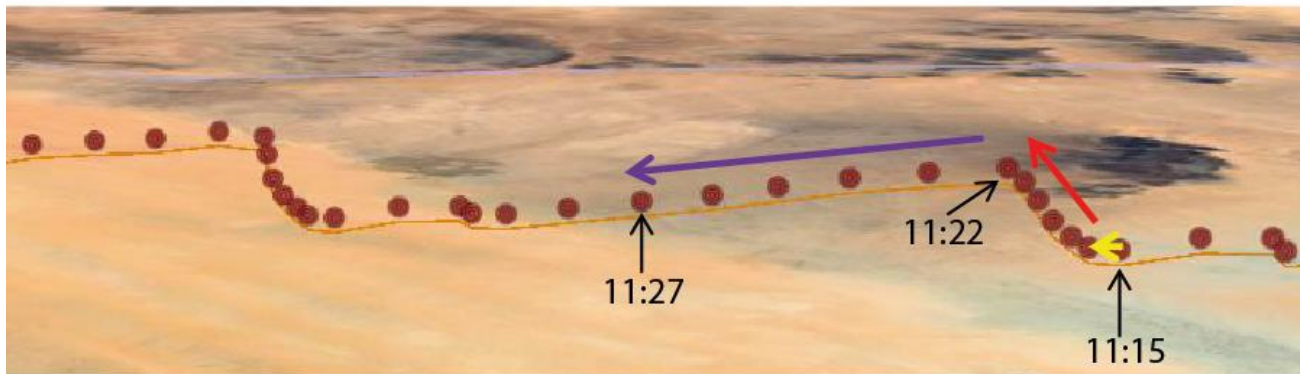
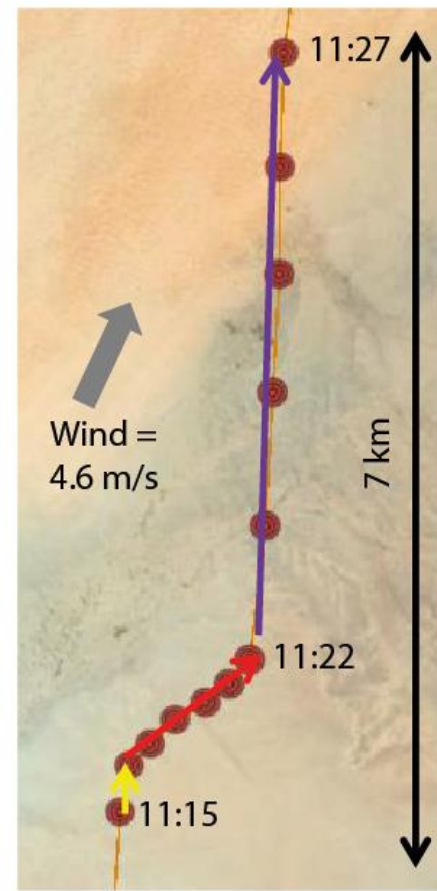
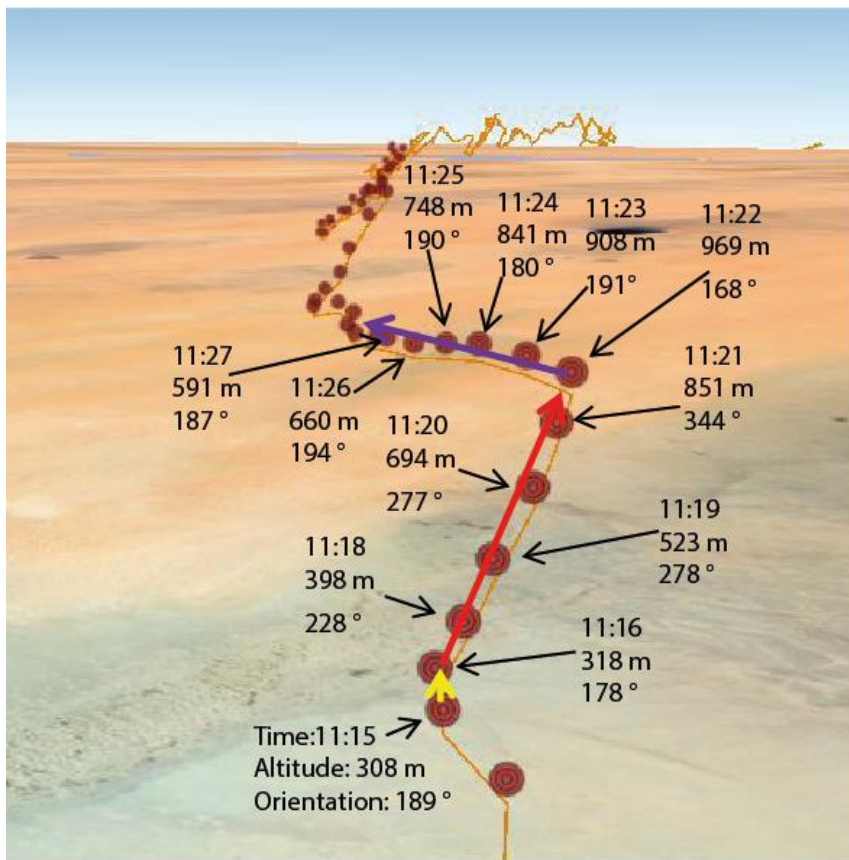
# Flight method over land



- Simple method devised to classify flight mode during sectors of high definition data, using distance and altitude changes
- Clear preference for soaring-gliding flight over land, with birds exploiting thermal updrafts and orographic lift when possible
- Birds resort to flapping flight when thermals weak or absent

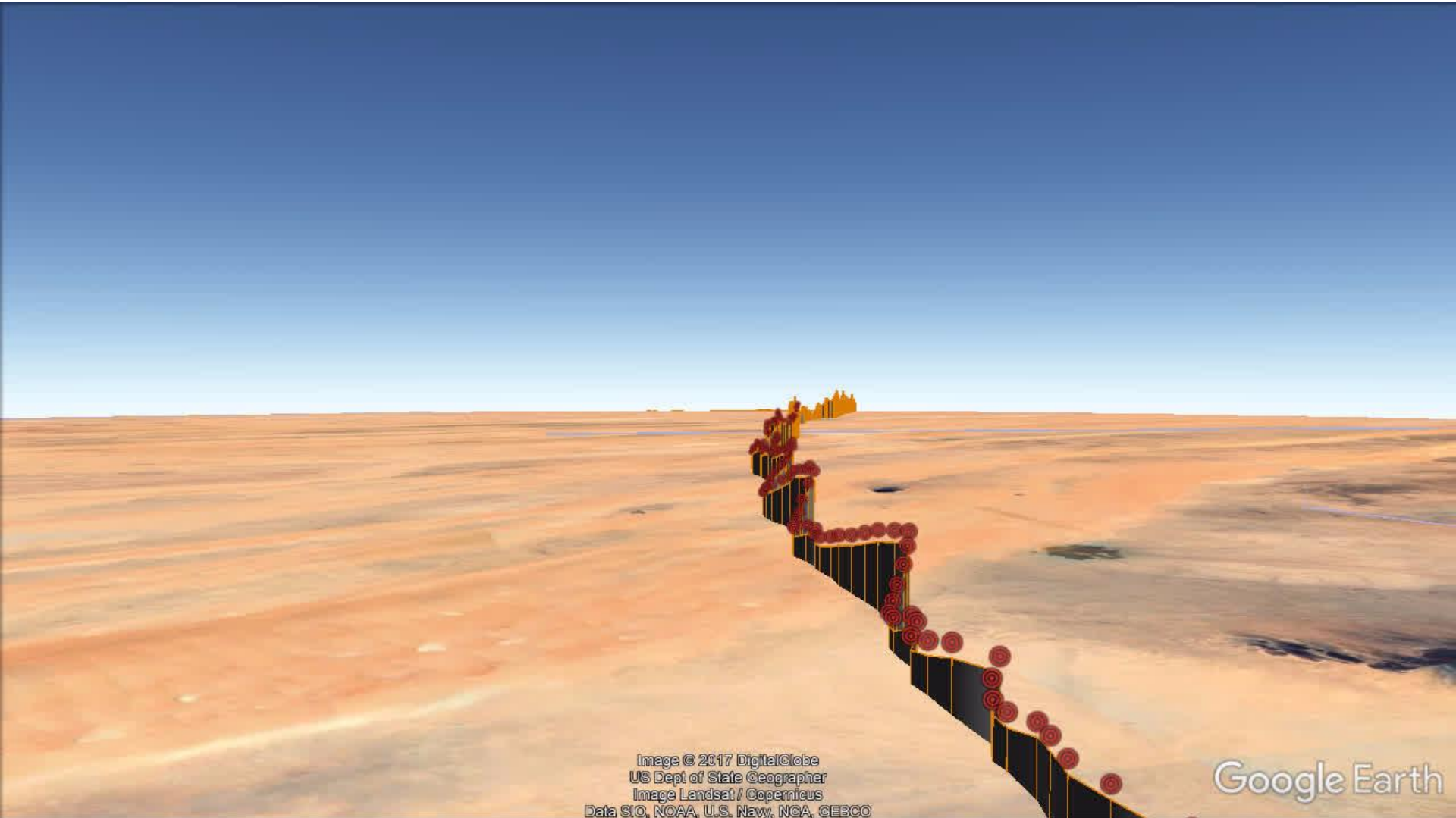


- Typical climbing and gliding flight over Portugal. Red circles show the location of GPS observations, with accompanying time and altitude and orientation data. Circling segments indicated by red arrows and gliding segments by purple arrows.

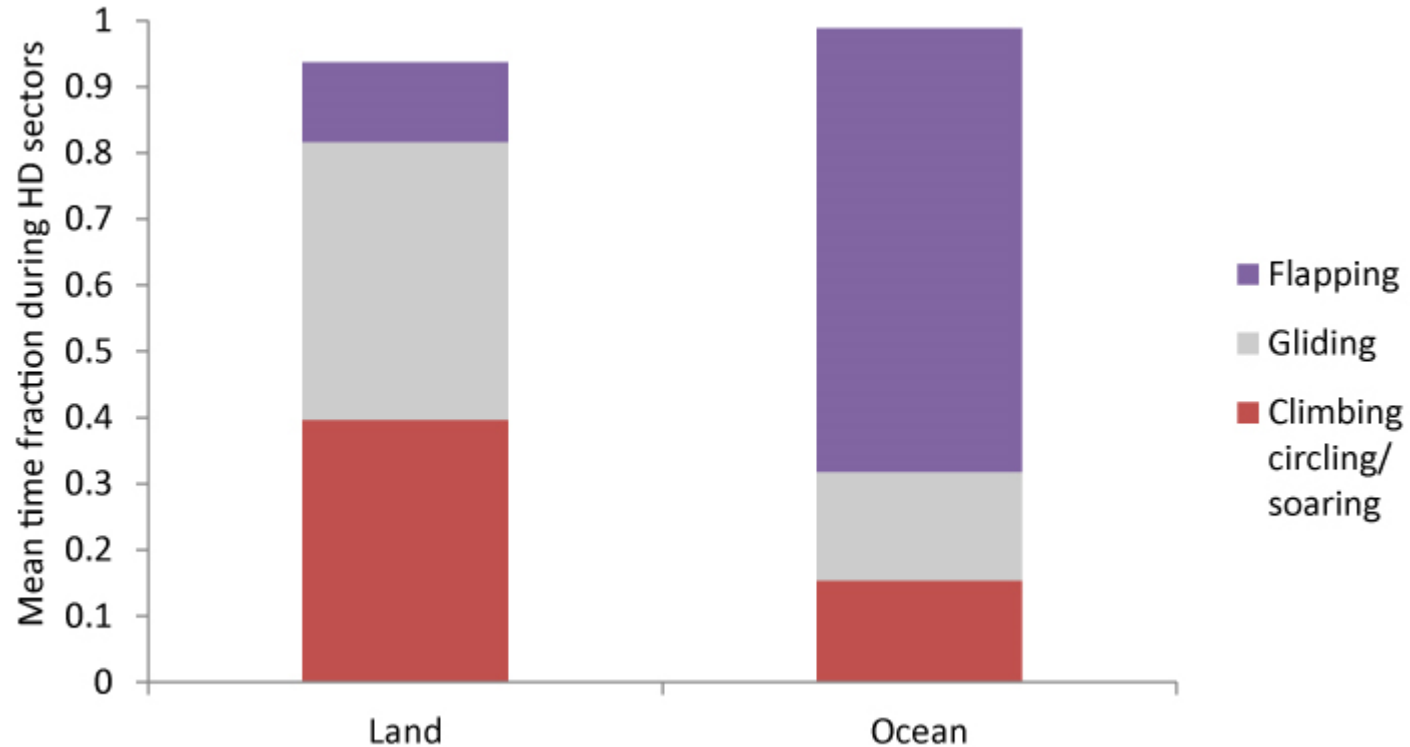


- Typical climbing and gliding flight over Sahara

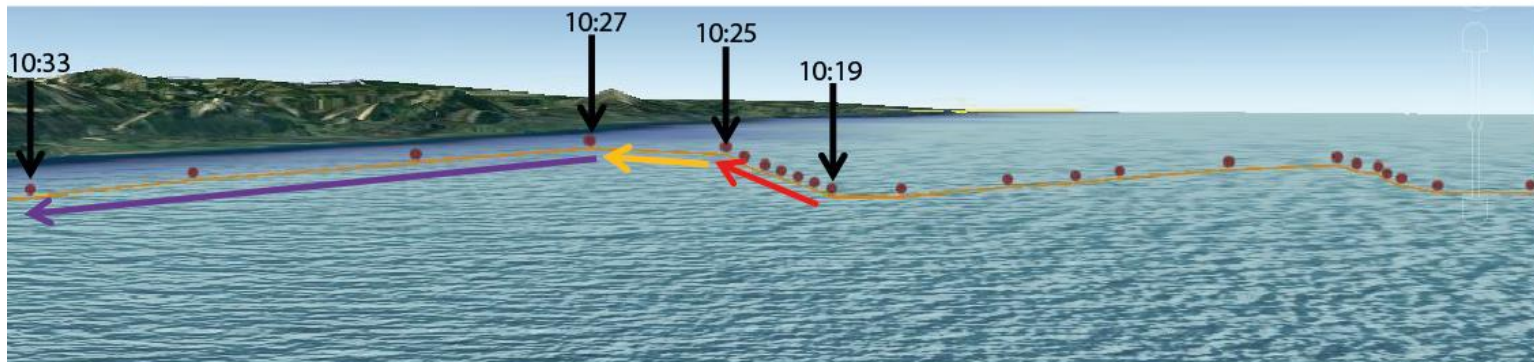
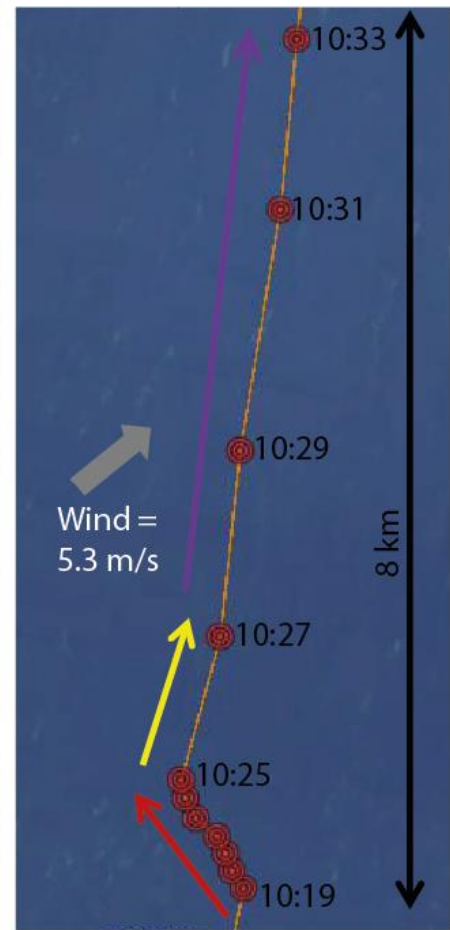
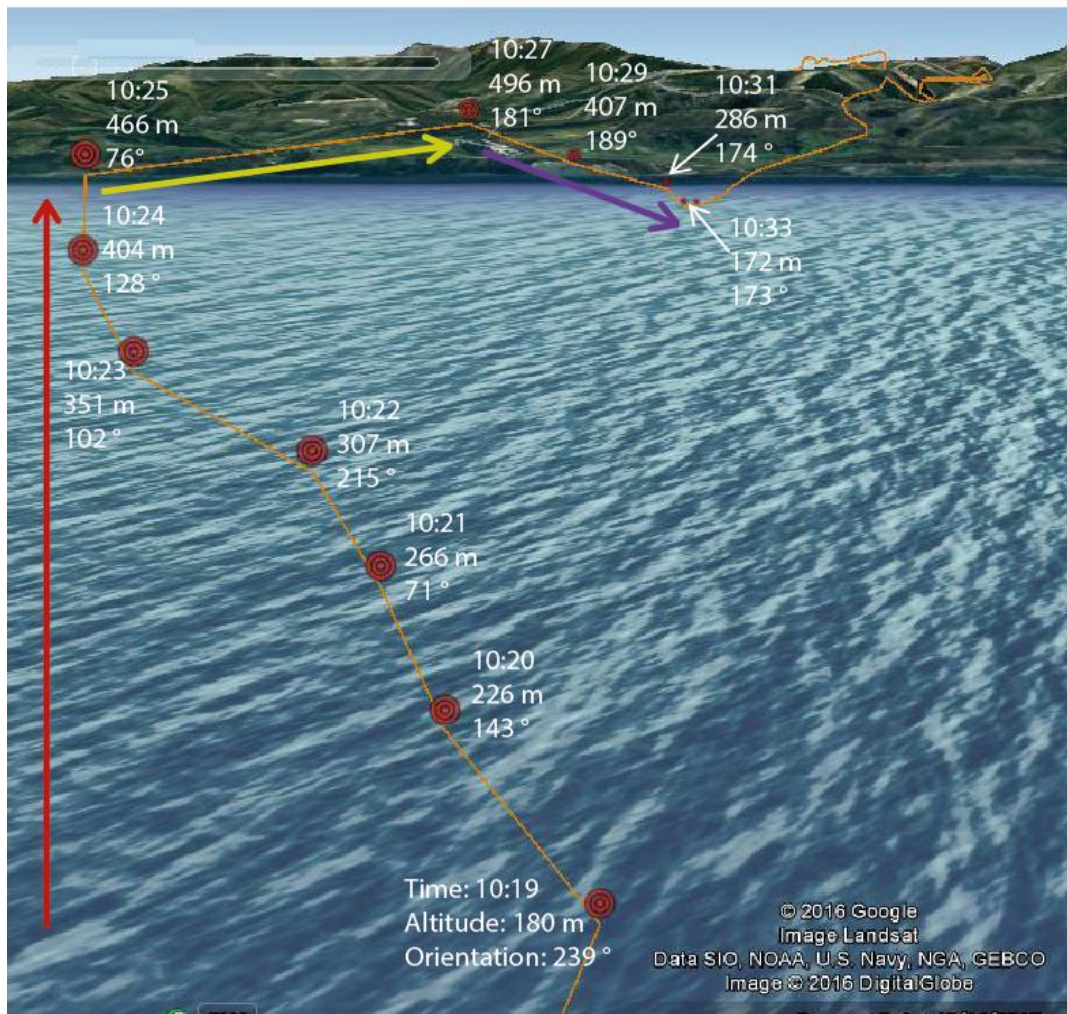
- Ospreys tend to limit flight across Sahara to periods when thermals are available



## Flight method land v sea



- Most ocean crossings undertaken by flapping flight
- But some evidence of soaring-gliding flight during autumn crossings of Atlantic – birds may exploit weak sea thermals than can develop in late summer/autumn



# Survival during migration

- 90% of adult ospreys return each spring, but mortality does occur during migration – satellite tracking provides an insight into where and when





## 09 (98)

- Breeding male from Rutland Water
- Left Rutland on 5<sup>th</sup> September
- Signals on 12<sup>th</sup> September from ridge on northern edge of Sahara
- Signal from same location for five days





09's location





- Farid Lacroix from Agadir offered to go and find out what had happened







- Farid found the remains of 09 and the transmitter
- Appeared to have been predated by an eagle owl while roosting – a danger of desert crossings

# Migration of juvenile Ospreys



- Juvenile ospreys migrate alone
- More prone to the effects of crosswinds than adults

# Stan



- Eight day migration to Cape Verde, via Canaries, strongly influenced by easterly winds

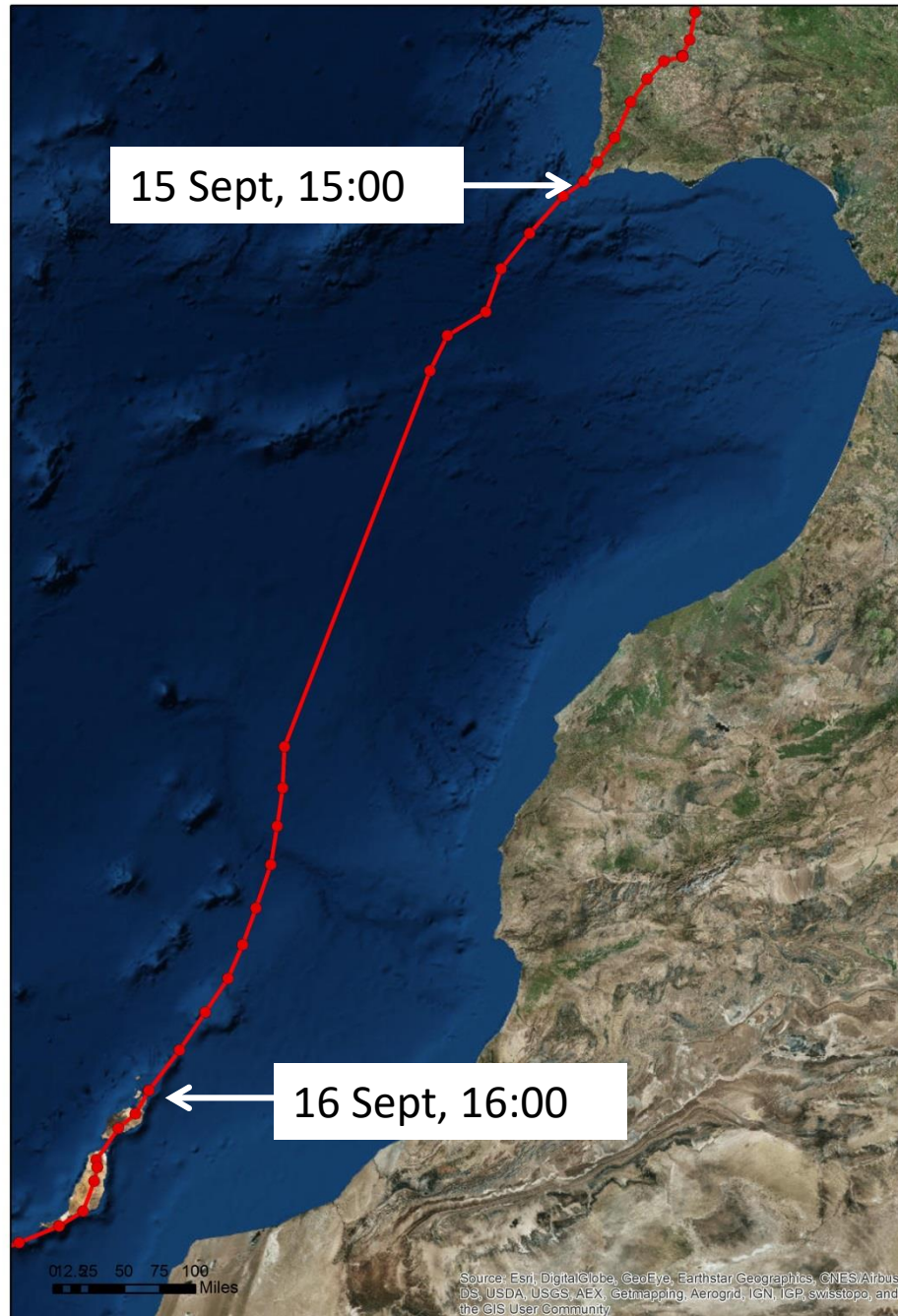


0 65 130 260 390 520 Miles

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroX, Getmapping, Aergrid, IGN, IGP, swisstopo, and the GIS User Community



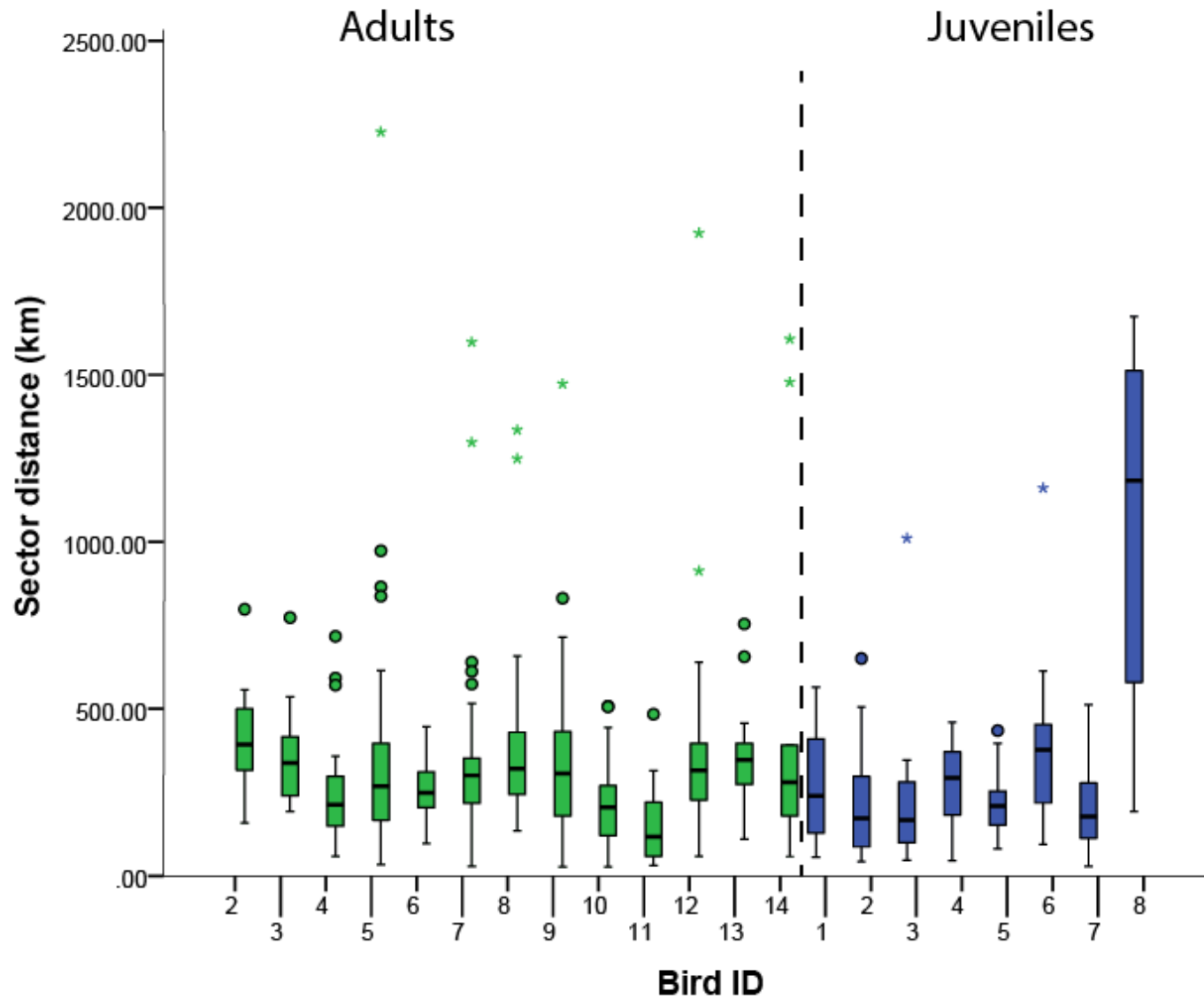
Portugal to  
Lanzarote  
980 km, 25 hours



Gran Canaria to  
Cape Verde  
1542km, 33 hours



# Mean daily distance of adult and juvenile ospreys



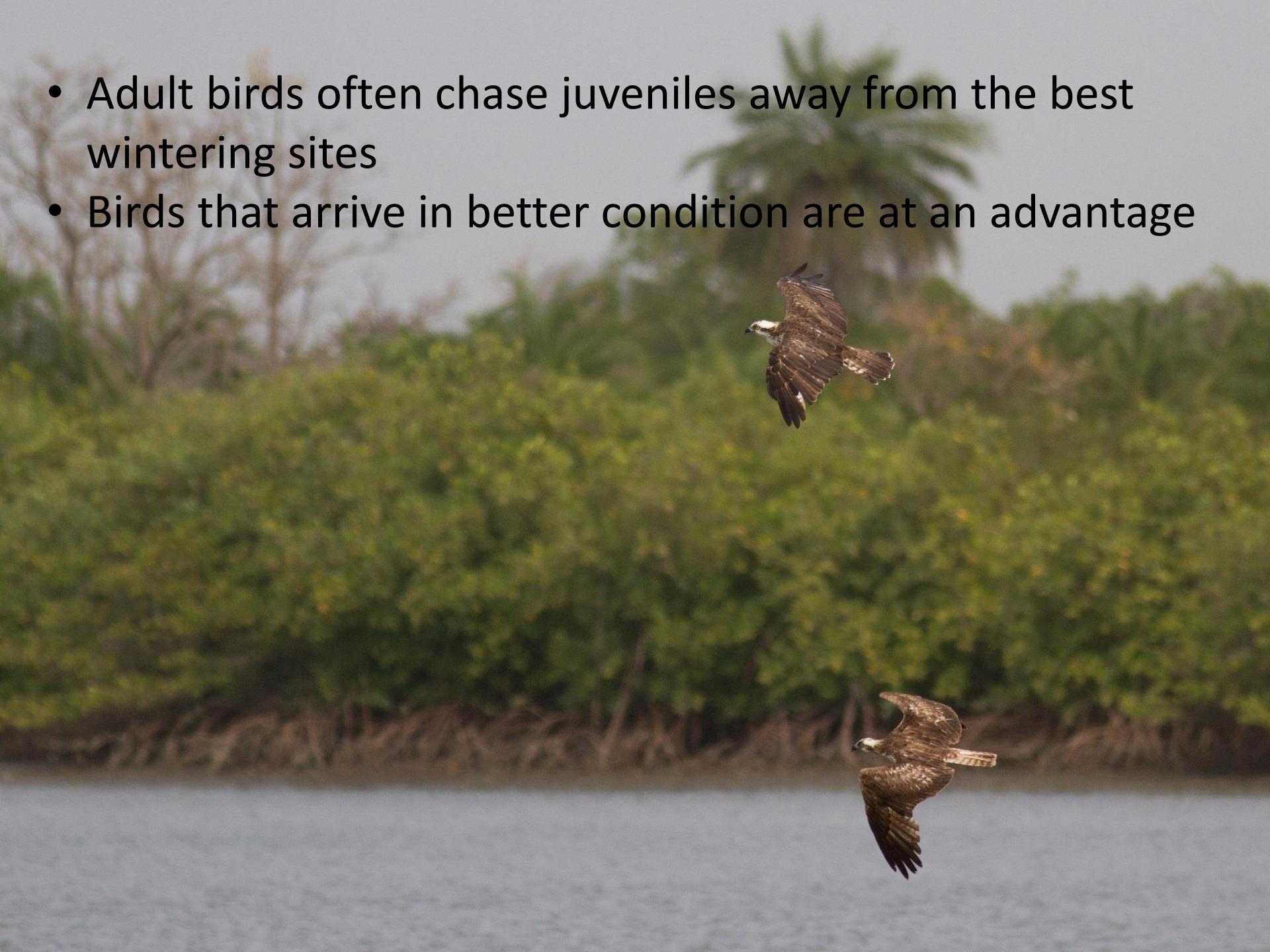
# Overall duration of migration of adult and juvenile ospreys

Age	N	Total days		Travelling fraction		Straightness	
		Mean	SD	Mean	SD	Mean	SD
Adult	34	22	10	0.76	0.20	0.90	0.64
Juvenile	8	45	29	0.59	0.35	0.94	0.26

*\*travelling fraction = total duration of migration divided by number of travelling (as opposed to stop-over days), i.e. travel fraction of 1 = no stop-overs*

- Juveniles tend to incorporate more stop-over days
- Less incentive for juveniles to migrate faster, compared to adults who are eager to reclaim winter territories
- Stop-overs often a good opportunity to improve fishing skills
- Juveniles with a longer post-fledging period incorporated few stop-over days
- It may be more important for juveniles to reach the wintering grounds in good condition...

- Adult birds often chase juveniles away from the best wintering sites
- Birds that arrive in better condition are at an advantage



# Long-term tracking of individual ospreys - the story of Rothiemurchus

- Satellite tagged as chick on 10<sup>th</sup> August 2009 on Rothiemurchus Estate near Aviemore
- Transmitter continued to provide data until winter 2014/15



## Autumn 2009

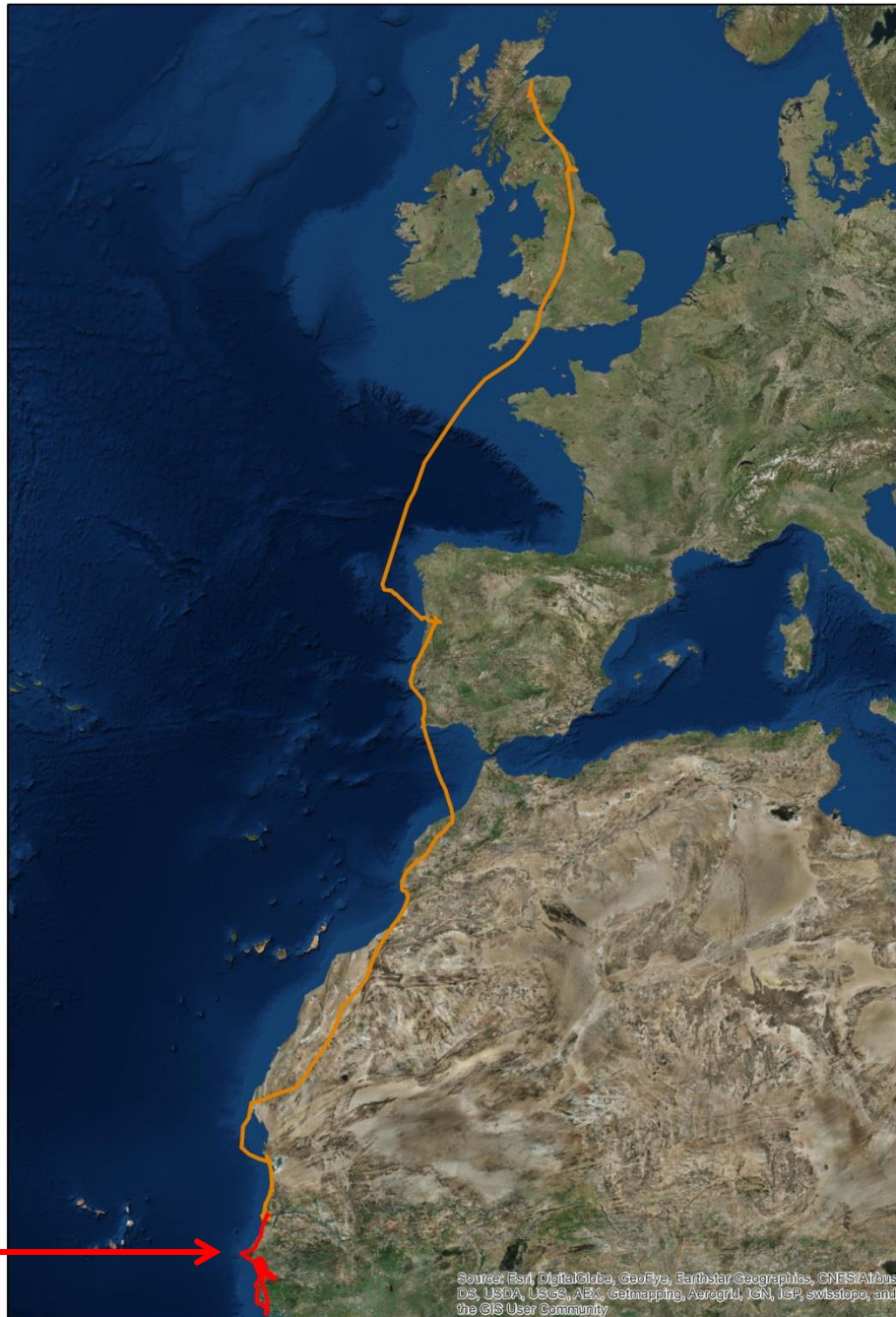
Strong easterly winds resulted in *Rothiemurchus* missing north coast of Spain – 1302 km in 33 hours before making landfall in Portugal

Initial migration to Djoudj National Park in northern Senegal (total 47 days, 13 travelling and 34 on stop-over)



Stopped over for one month beside Rio Paiva in Portugal

January-June 2010

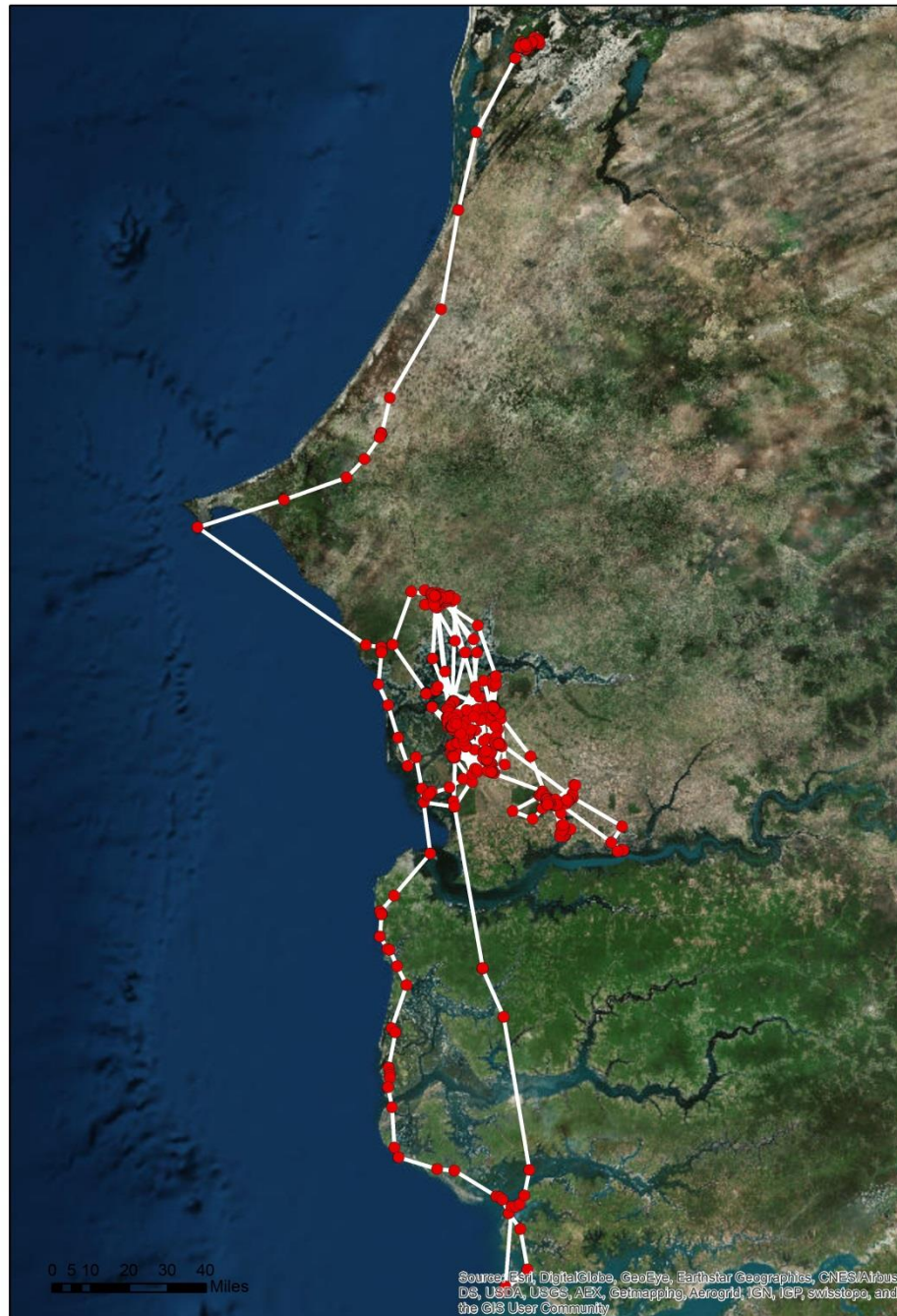


Local movements in West Africa – as expected

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, Aero, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



# January-June 2010



# Osprey fieldwork in West Africa

- Annual trips since 2011 to look for colour-ringed ospreys and to build important links



# Djoudj National Bird Sanctuary, Senegal



- 16,000 ha
- Up to 1.5 million birds recorded here annually, including many Palearctic migrants - from Aquatic Warbler to Garganey



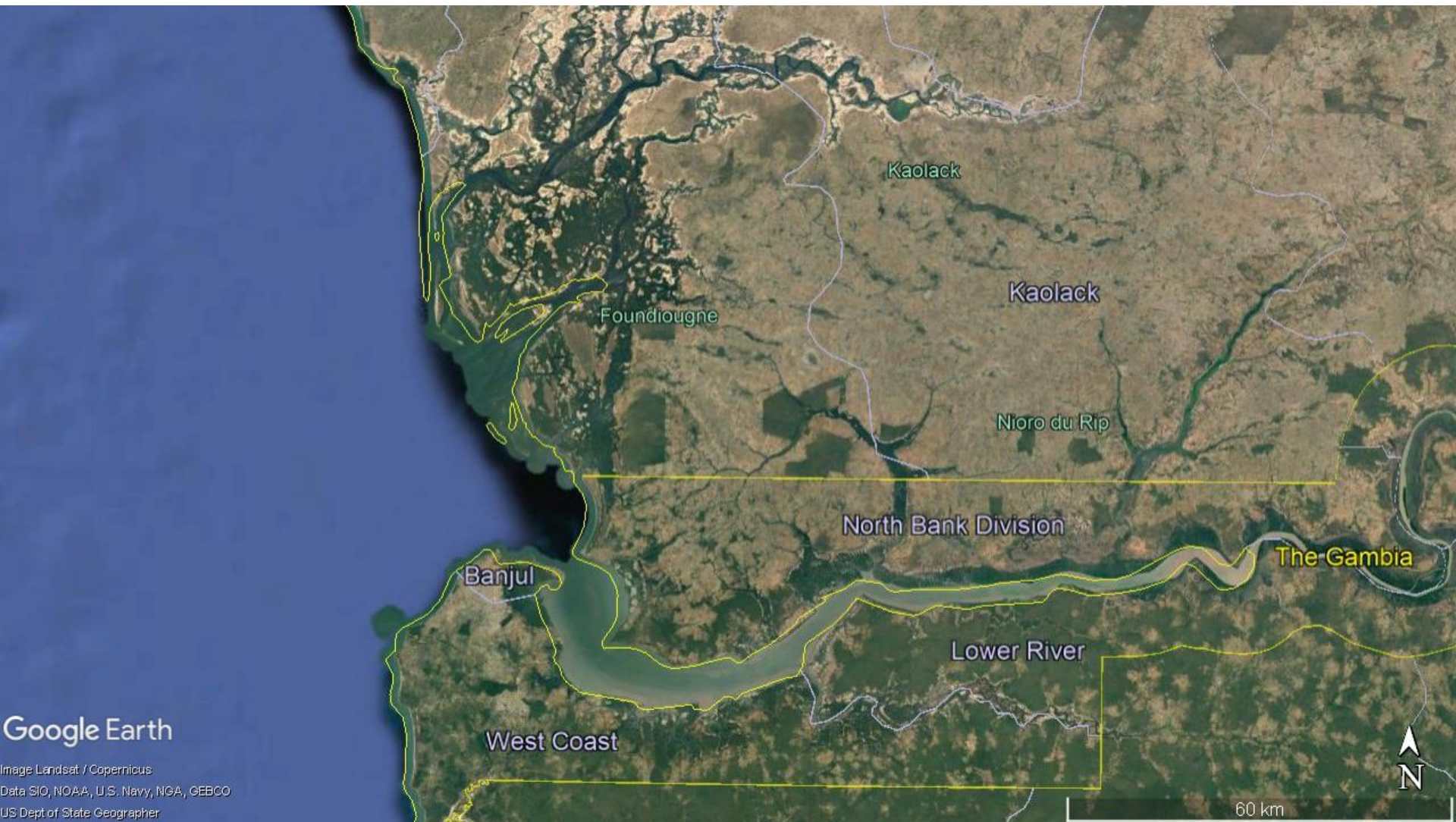
- Rothiemurchus seen here during first winter in Africa





19  
18  
17  
16  
15  
14  
13

# Sine-Saloum Delta, Senegal



- 180,000 hectares of mangrove and shallow intertidal water























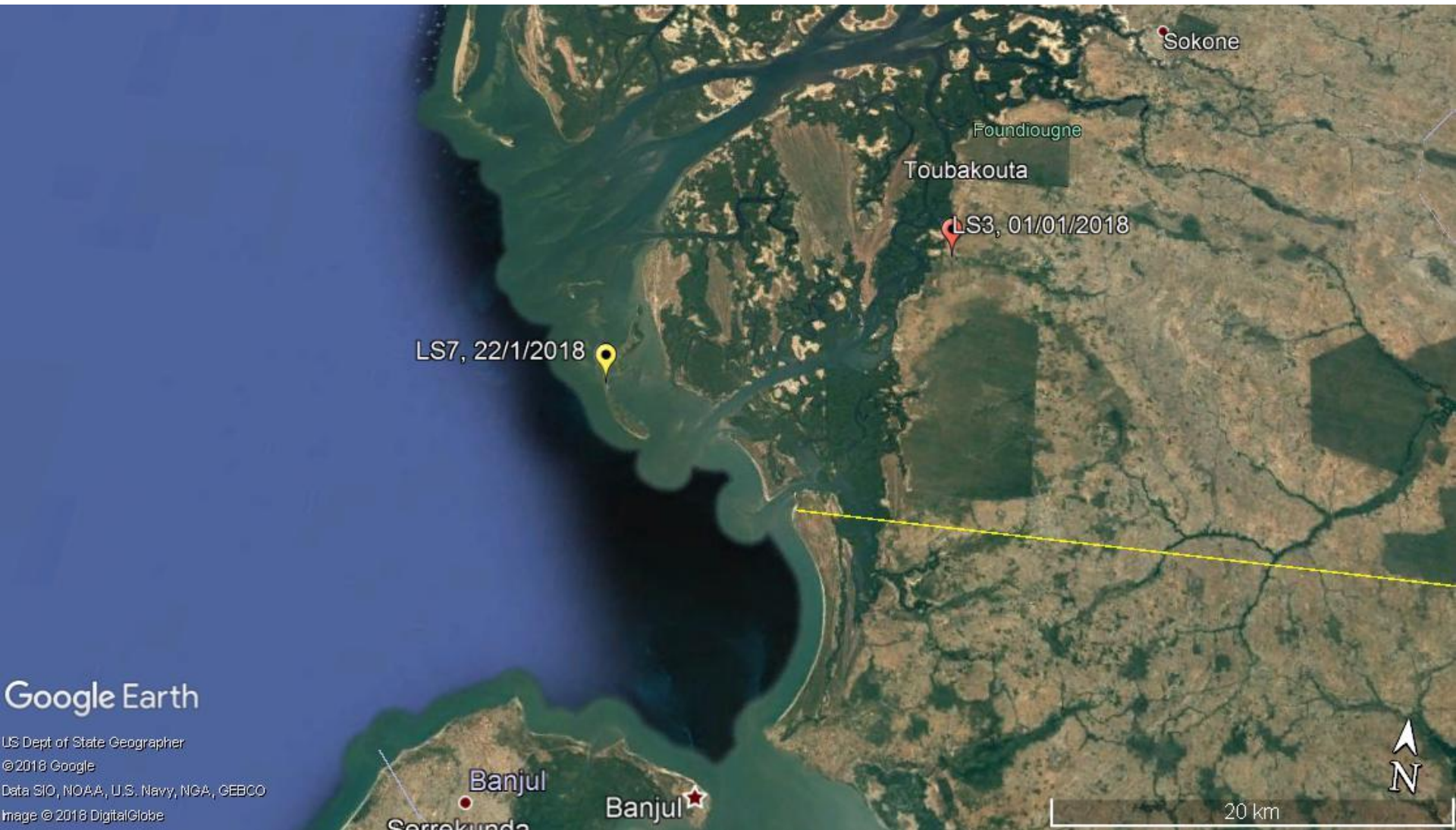








- LS3 photographed at Sine-Saloum Delta on 1/1/18



Sokone

Foundiougne

Toubakouta

LS3, 01/01/2018

LS7, 22/1/2018

Banjul

Banjul

Serrekunda

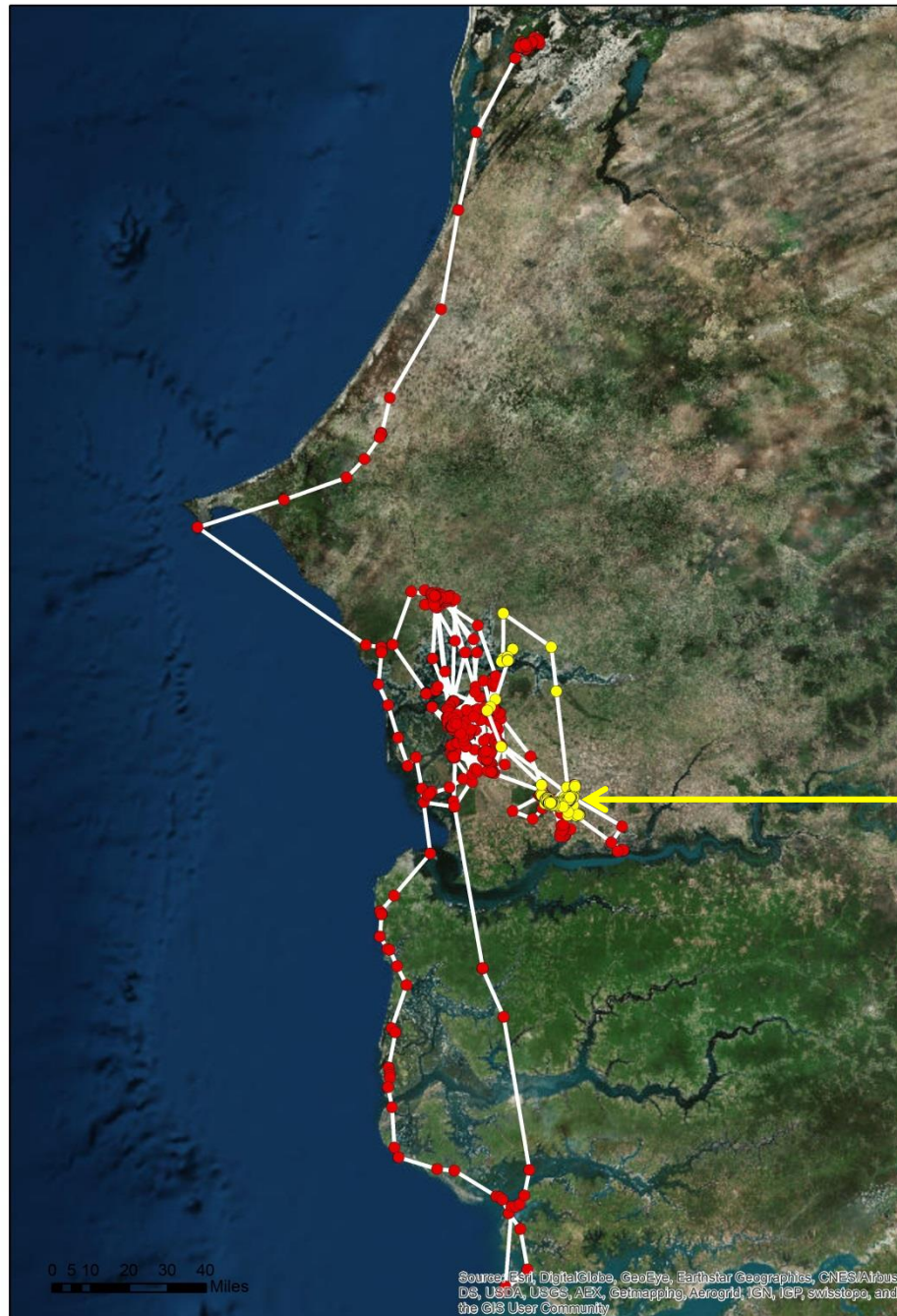
20 km



Google Earth

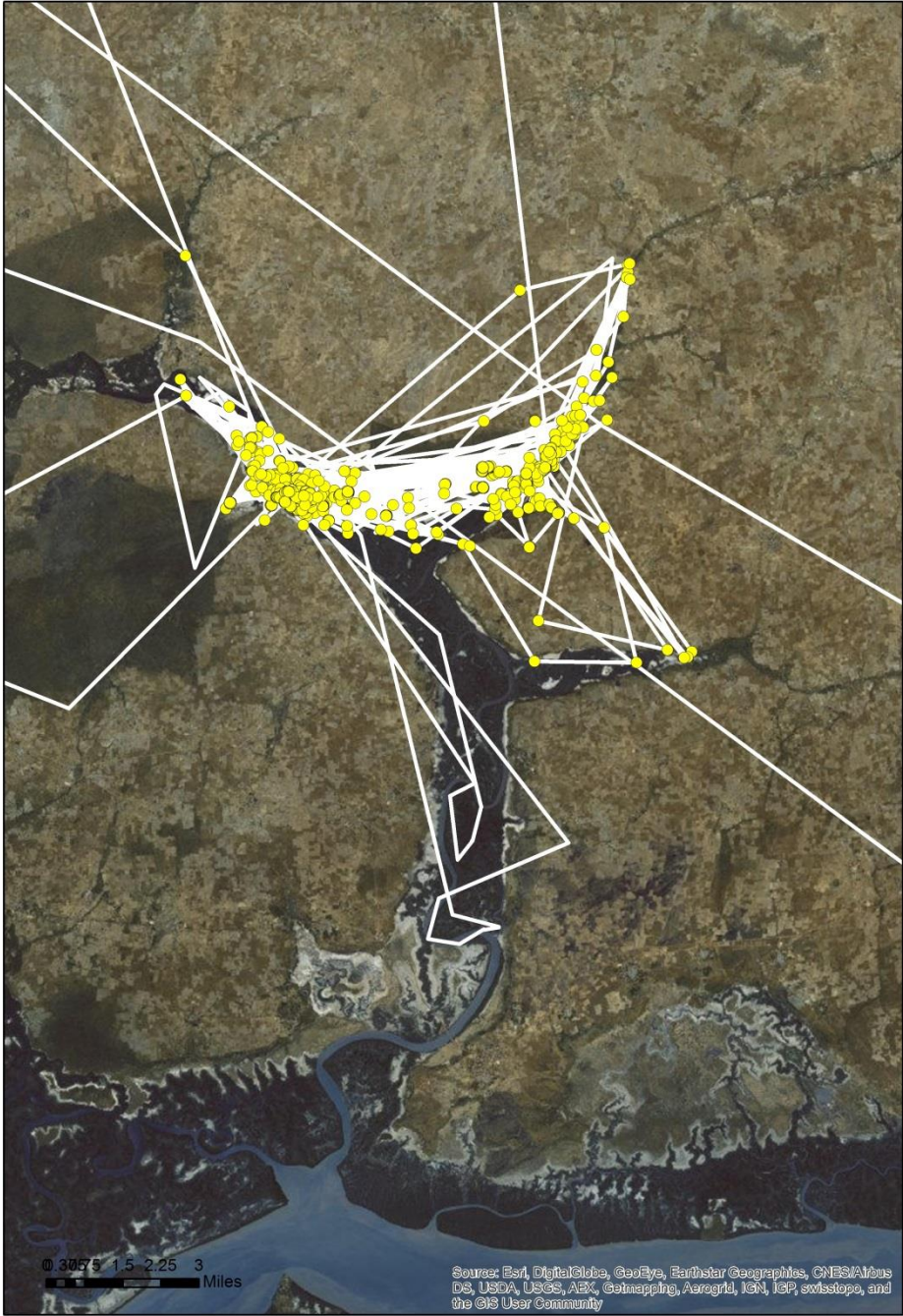
US Dept of State Geographer  
©2018 Google  
Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image © 2018 DigitalGlobe

# Rothiemurchus July-Dec 2010



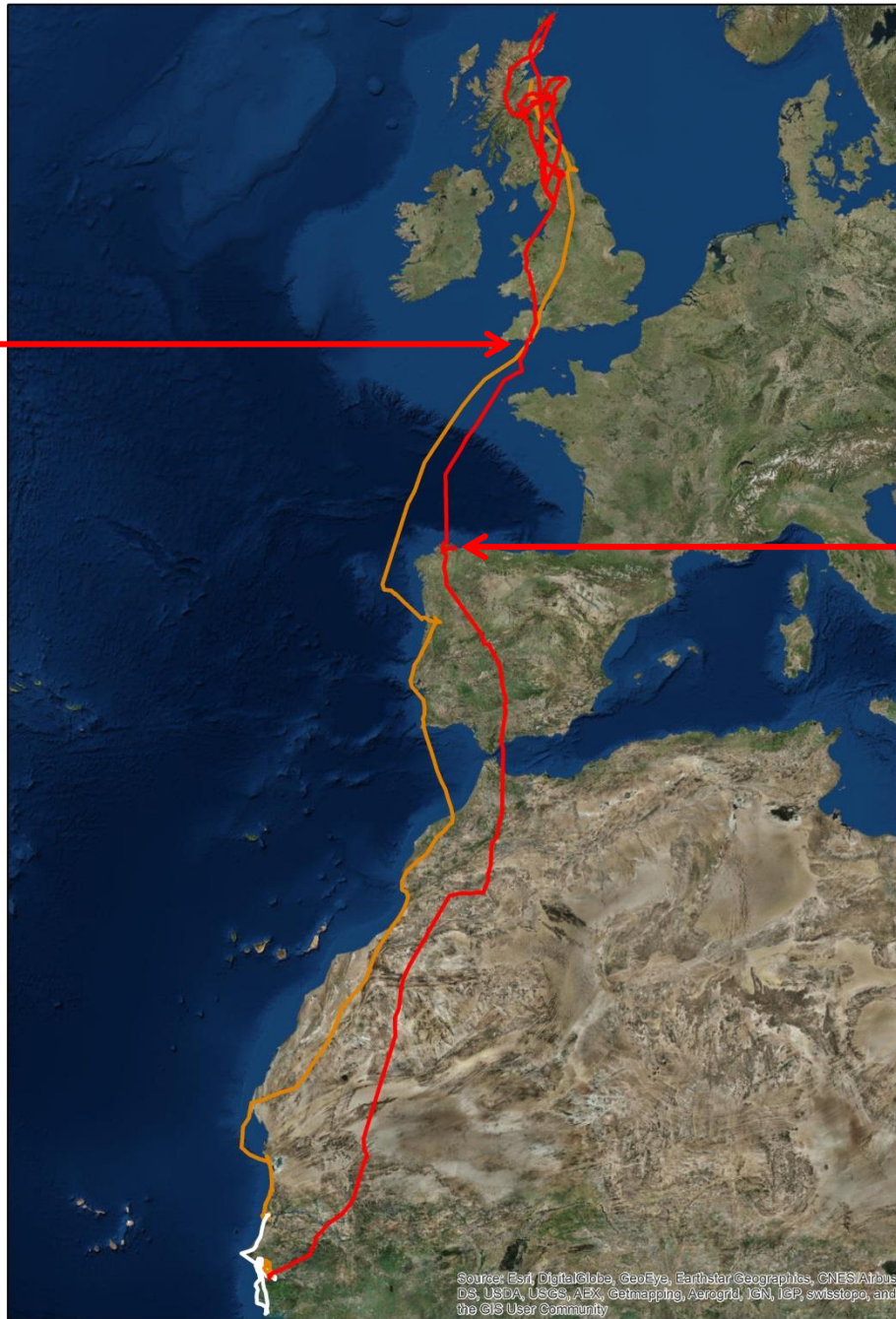
Eventually settled to north of River Gambia

July-Dec 2010



## Spring 2011

Flew 830 kms in 28 hours over Bay of Biscay. Came ashore at almost exactly the same location that he had departed from in September 2009

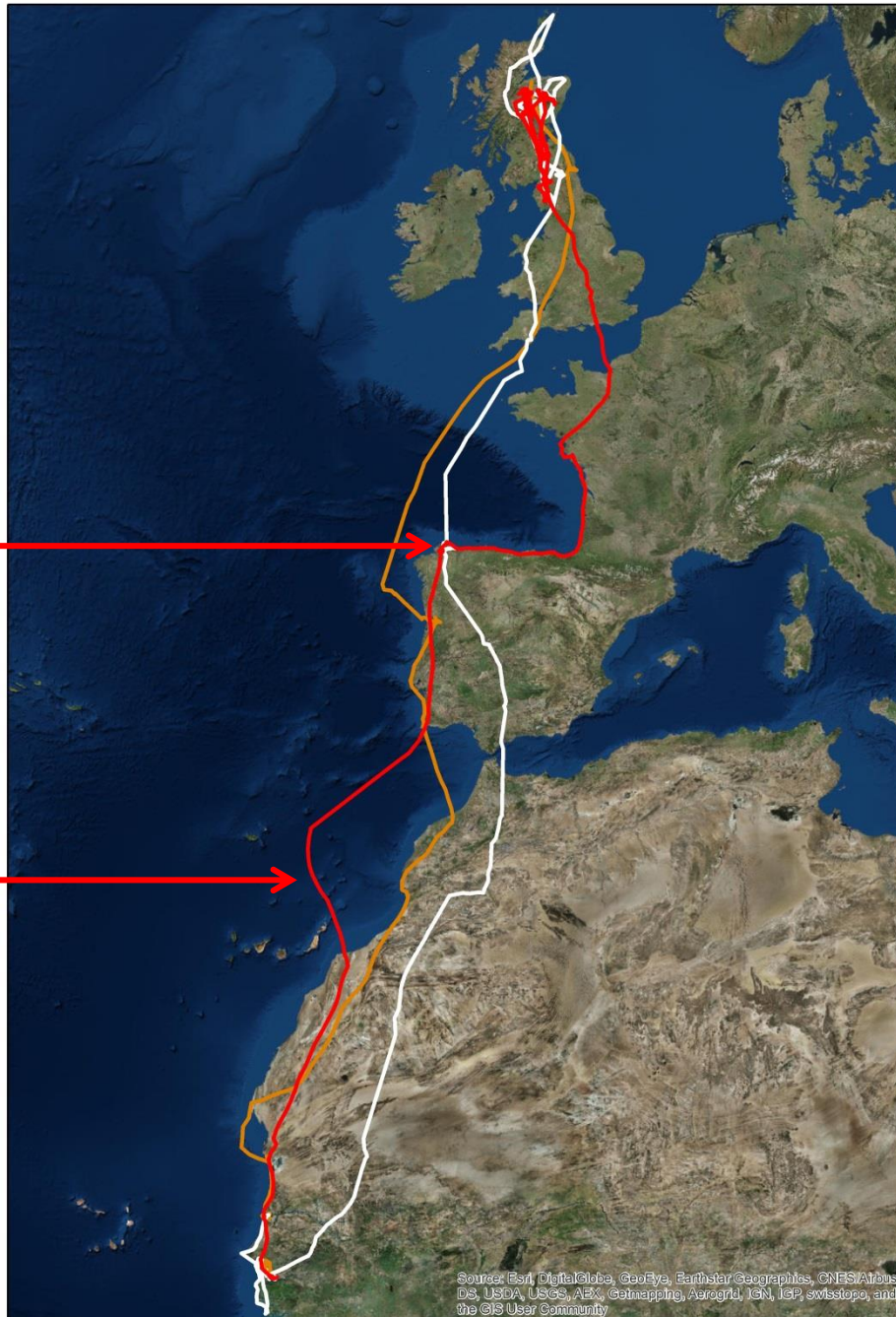


9 day stop-over in Galicia on return migration in 2011



Returned for a week long stop-over in Galicia, but via dog-leg route around Bay of Biscay - 450 km further than a direct flight from Brittany to Galicia direct across the sea.

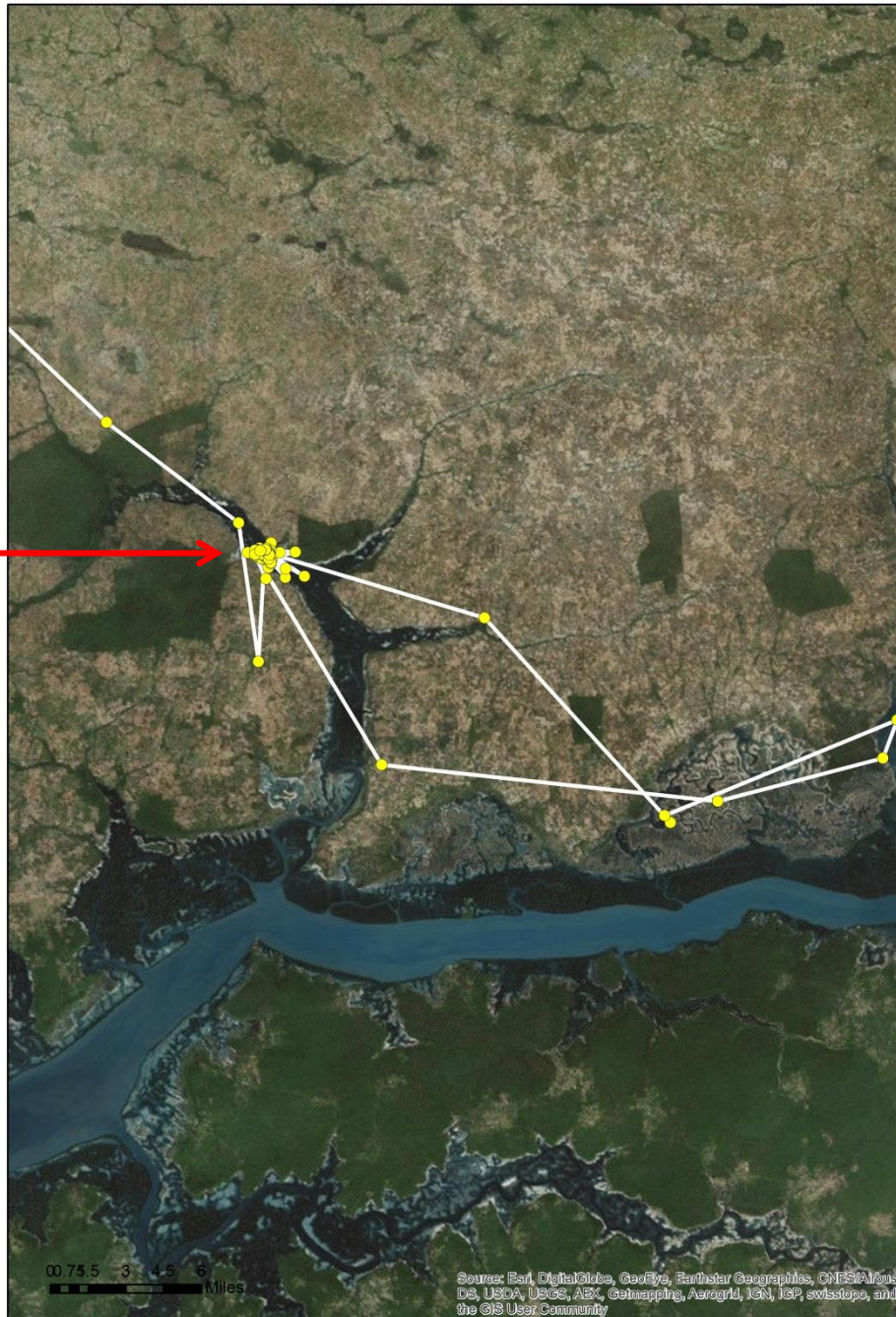
24 hour flight of 1278 km from Portugal to Morocco. Left Portuguese coast from same location as first autumn migration



**Autumn 2011  
(red)**

# Winter 2011

Winter range of  
0.5 km<sup>2</sup>





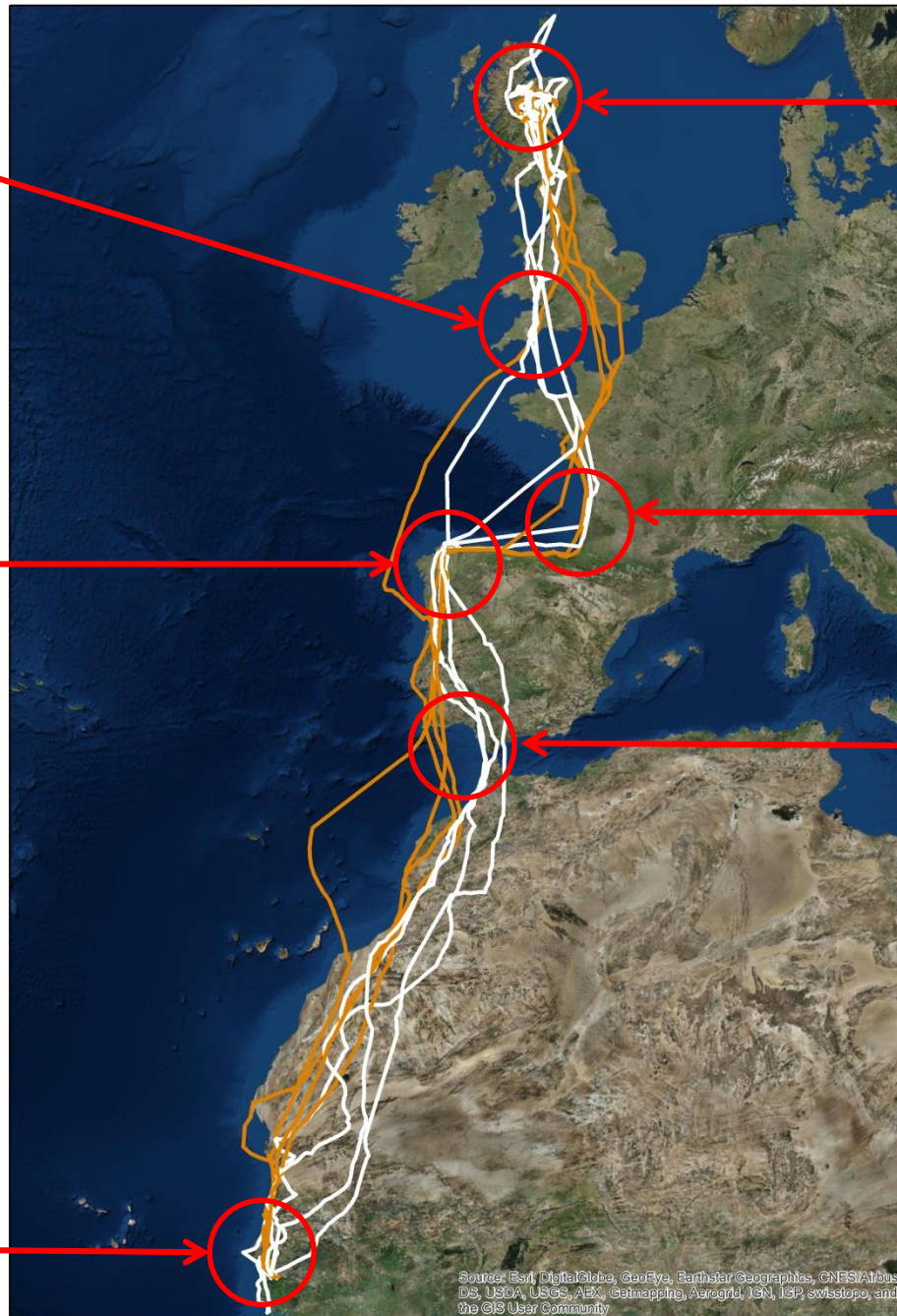




Three spring crossings through Prawle Point in Devon, autumn fights further east apart from first year

Goal area in northern Spain, influenced by first migration. Stop-overs in Galicia every spring and autumn

Regular wintering site established after initial 6 months of exploration



Wandered very widely after first returning

Unusual dog-leg caused by difficult Biscay crossing in first autumn

Spring crossings across Strait of Gibraltar, autumn from SW Portugal

**What did we learn?**









Adult Ospreys generally an easy life in winter



- F93 – 19 year old German female
- Winters at Tanji Marsh in The Gambia











**DIA**

الله فو كولو

# Wildlife education in West Africa

- Pilot education project in Gambian schools
- Provision of educational resources, including computers
- Field trip opportunities – e.g. hiring of minibuses to visit osprey/wildlife sites
- Optics used by groups on fieldtrips





# Ozzie's Migration



By Ken Davies

Illustrated by John Wright

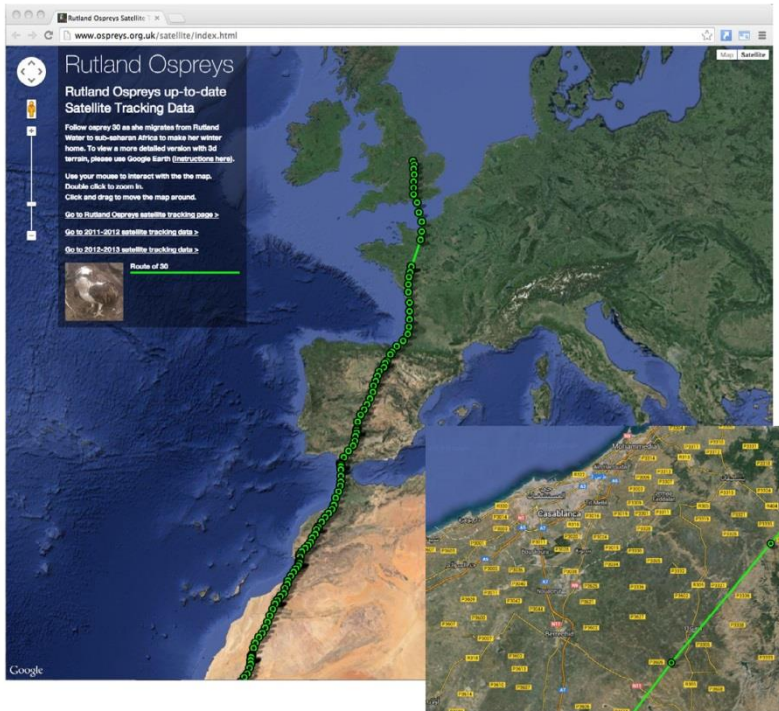






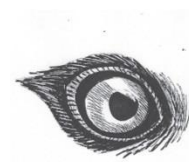
## Materials

1. Proforma **Osprey Migration log** sheet to complete each day.
2. Daily information will be available on the Rutland Ospreys website, using the information received from the satellite tags on the different birds.



## Designed to be an Osprey - cont

**ACTIVITY** Label the drawing of an osprey's eye to explain how it is adapted to catch fish.



**EXTRA** Ospreys have forward facing eyes like most predators. This gives "stereoscopic" vision. Find out how two forward facing eyes helps them to catch their prey.

## Feet & Legs

Their legs are very long and have few feathers so they do not get wet when plunging feet first into water.

The bottoms of their feet are covered in short spines, which helps them to grip slippery fish and they can snap their razor sharp talons together around a fish in 0.2 of a second. On each foot the outer front toe can be reversed so that they can grip with two toes forward and two back. This adaptation gives the osprey a very good grip on the fish it catches. This particular adaptation is very unusual, and is known as zygodactyly. A long difficult word which is great for those who play scrabble or if you want to impress someone! Each toe also has a long sharp curved "claw" called a talon.

**ACTIVITY** Label the drawing of an osprey's foot to explain how it is adapted to catch fish.

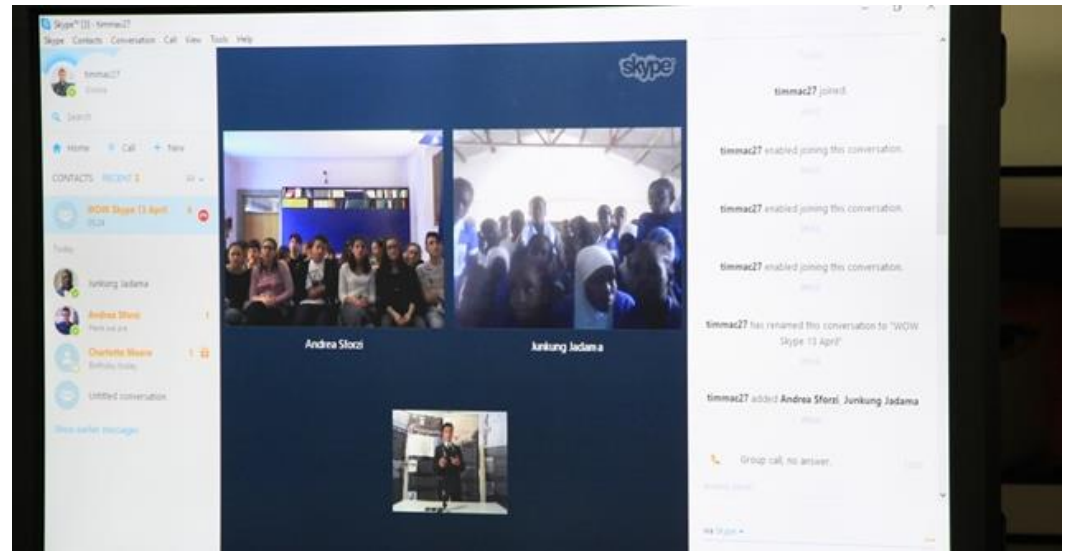
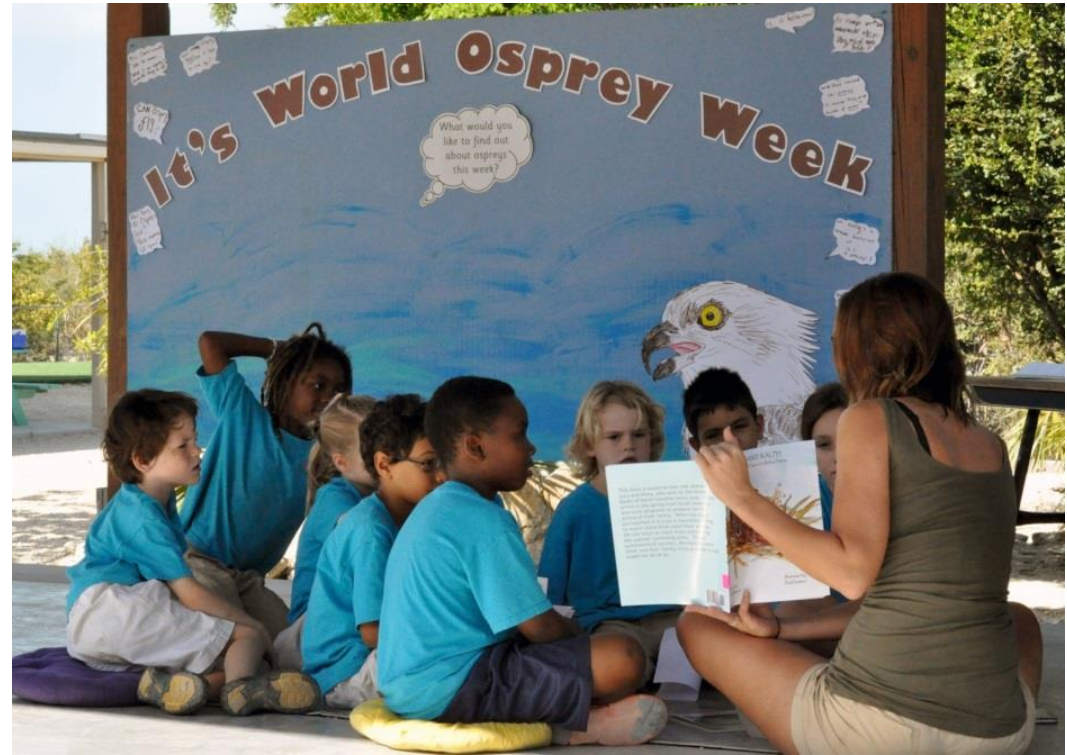


# Links with schools elsewhere on the migration flyway



# World Osprey Week

- Over 300 schools from 12 countries
- Interactive map showing migration routes of satellite-tagged Ospreys
- Over 50 online lessons plans
- International Skype video calls – including one linking UK, Italy, Spain, The Gambia and USA





OSPREY  
F. C

DONOT SHOOT THE OSPREY







- Several students have a genuine interest in nature and conservation
- Can we help them make it into a career?

# Osprey

Leadership  
Foundation

Tomorrow's conservation leaders



Registered Charity No. 1176199

# We aim to inspire, enable and support the conservation leaders of the future

## Level 1

### Osprey Club Scheme

To inspire young people about the natural world.



[Find out more](#)

## Level 2

### Future Conservation Leaders

To enable young people to develop their interest in nature and conservation through a programme of innovative and exciting opportunities that help them gain valuable experience, and to develop leadership and other transferable skills.



[Find out more](#)

## Level 3

### Stars of the Future

To support aspiring conservationists in the early stages of their career through university bursaries, bespoke work experience opportunities, tailored leadership mentoring and coaching



[Find out more](#)



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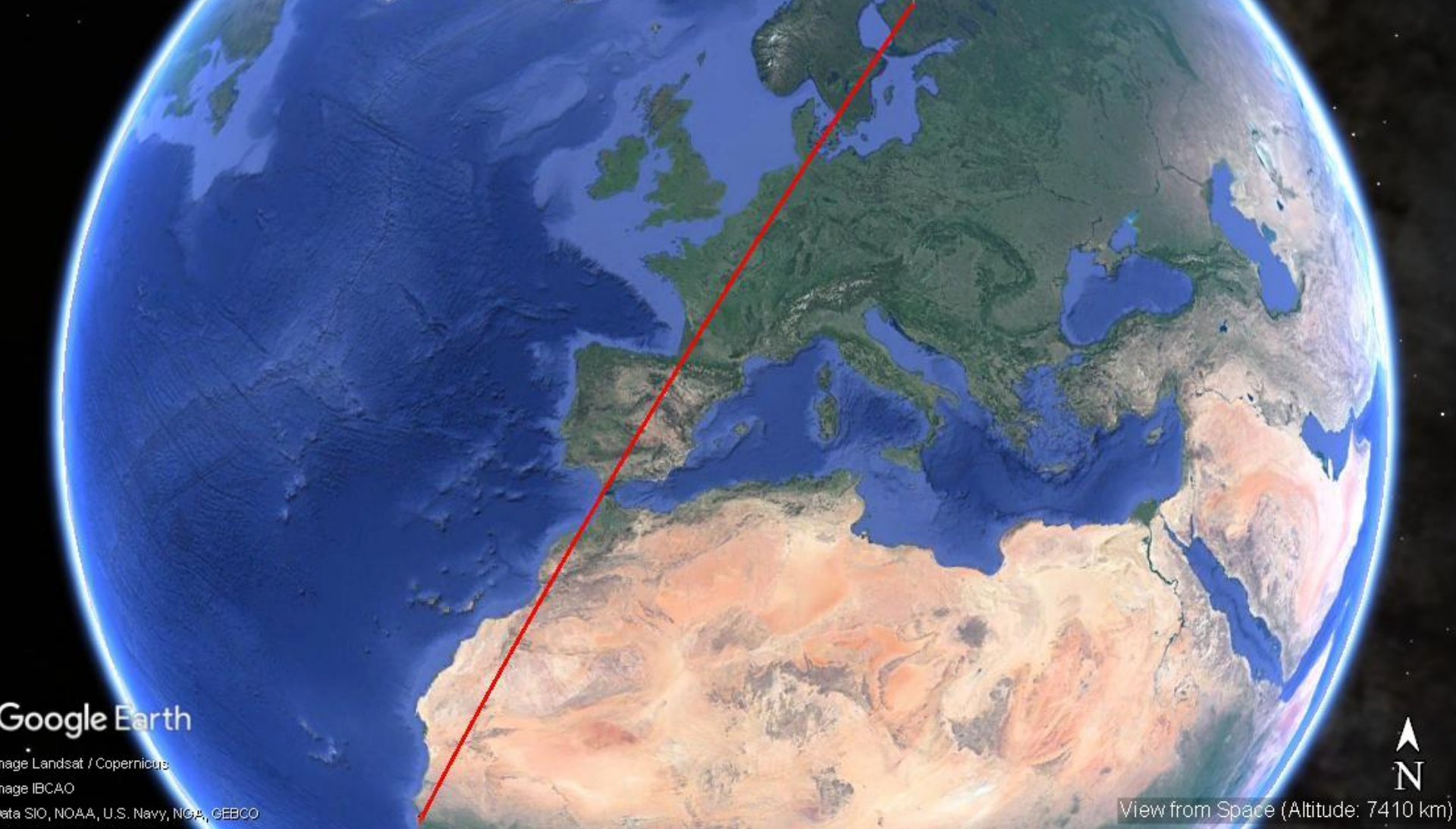
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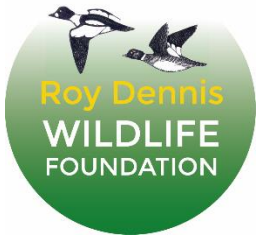




- Ringed as a nestling in a nest close to Viitasaari in Finland on 18/7/18
- 6474 km from nest site



# Thank you for listening!



[www.roydennis.org](http://www.roydennis.org)

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