SEATRACK
Seabird Tracking

# Arctic-breeding seabirds' hotspots in space and time

## a framework for year-round modelling of abundance and environmental niche using SEATRACK data

Arnaud Tarroux, Per Fauchald, & co-authors

Norwegian Institute for Nature Research (NINA)

NORSK POLARINSTITUTT · NINA Norsk institutt for naturforskning · MILJØ-DIREKTORATET · SEAPOP

ARCTIC COUNCIL

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# List of authors

Tarroux, A.[1], Fauchald, P.[1], Bråthen, V.S.[2], Descamps, S.[3], Ekker, M.[4], Helgason, H.H.[3], Merkel, B[3]., Moe, B.[2] and H. Strøm[3]

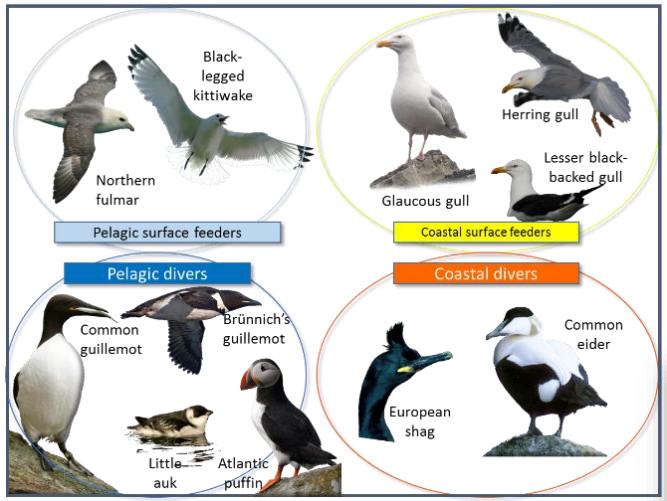
[1]Norwegian Institute for Nature Research, Tromsø, Norway
[2]Norwegian Institute for Nature Research, Trondheim, Norway
[3]Norwegian Polar Institute, Tromsø, Norway
[4]Norwegian Environment Agency, Trondheim, Norway

# SEATRACK's main objectives

1) **Year-round distribution** of seabirds breeding in the Barents, Norwegian, & North Seas

2) Effects of **changes in environmental conditions** on **demography**

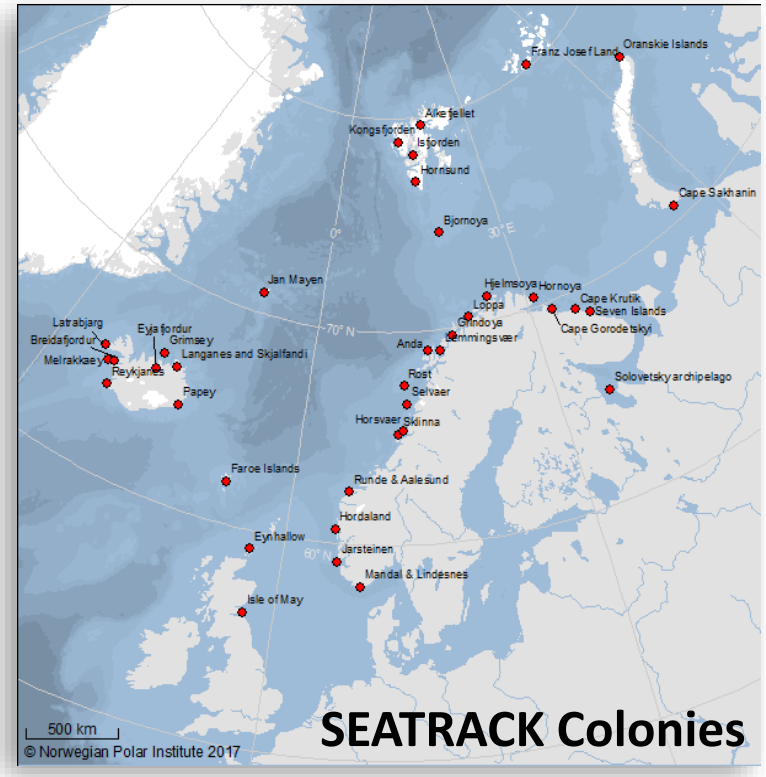
**Tracking method: light-loggers (GLS)**





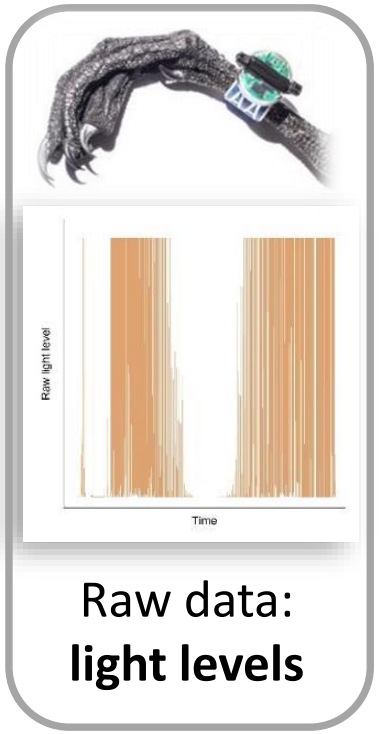
**5 countries / 11 species / 38 colonies**

Norway, Russia, Iceland, Faroe Islands, & UK

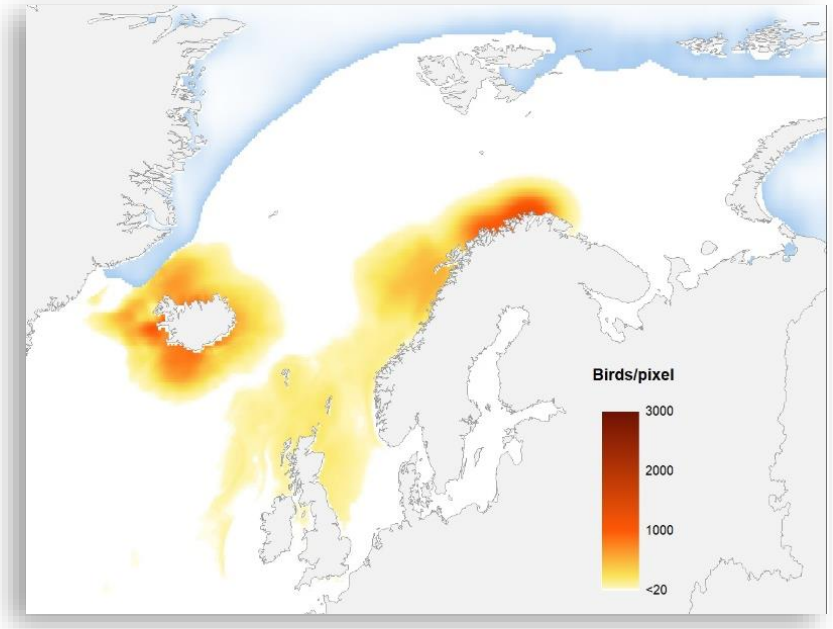


# SEATRACK's main objectives

How do we get there...?

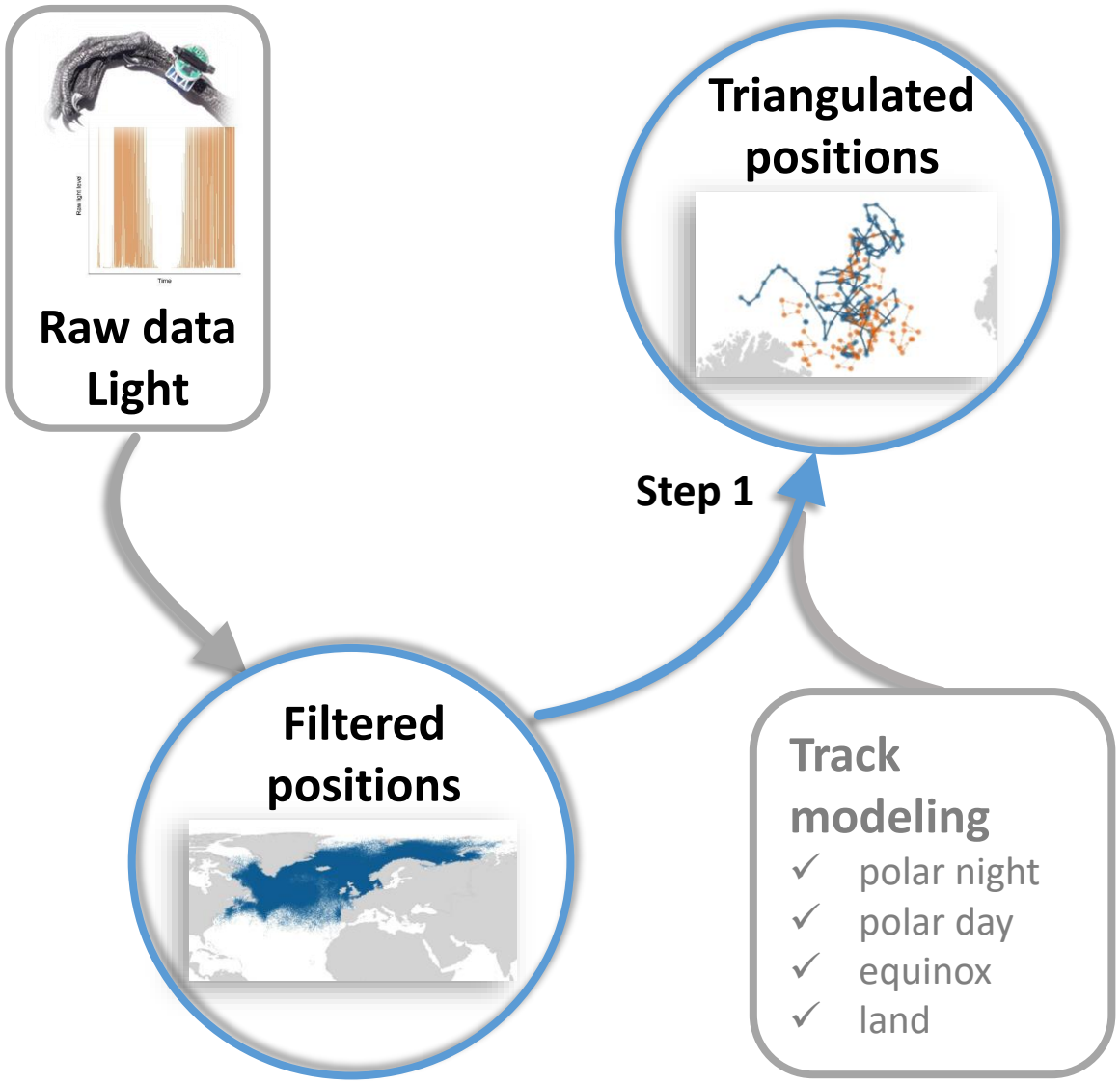


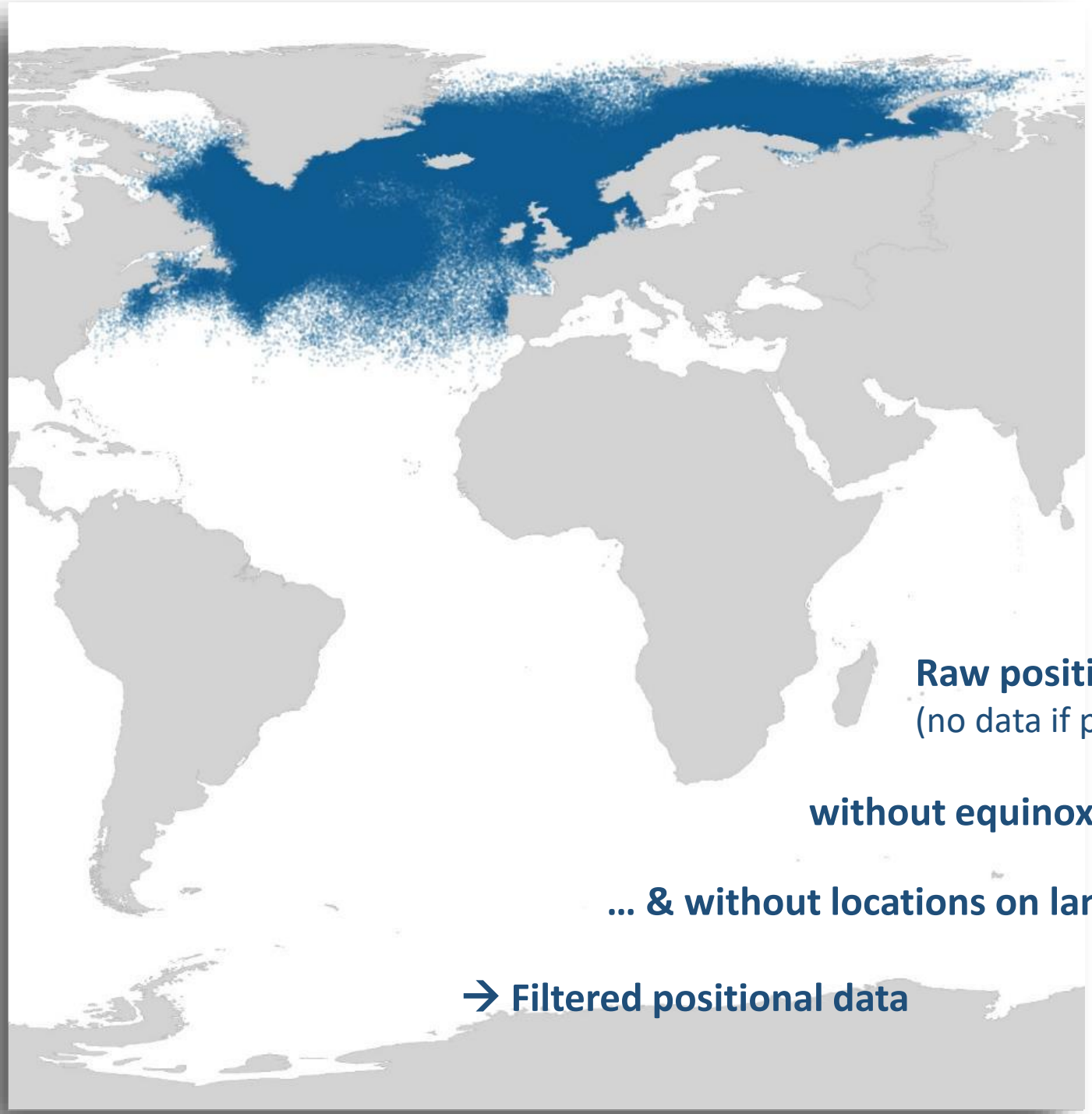

Raw data:
**light levels**




**Monthly abundance maps**
identifying hotspots during non-breeding season

# **Step 1 -** Movement model maximizing use of available information





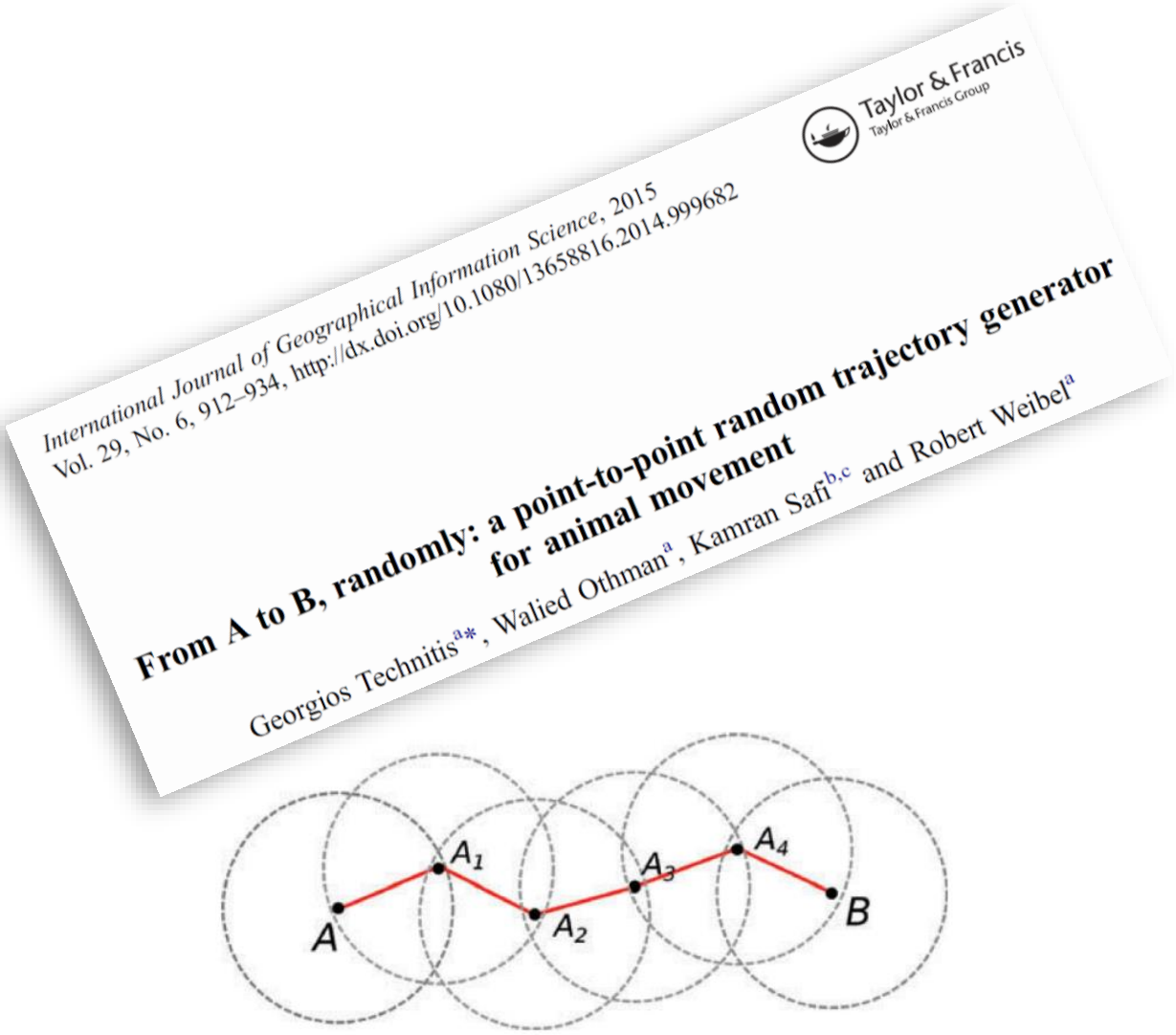
**Raw positional data (every 12h)**
(no data if polar night/day)

**without equinox periods…**

**… & without locations on land**

**→ Filtered positional data**

# **Step 1 -** Movement model maximizing use of available information



International Journal of Geographical Information Science, 2015
Vol. 29, No. 6, 912–934, http://dx.doi.org/10.1080/13658816.2014.999682

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**From A to B, randomly: a point-to-point random trajectory generator for animal movement**

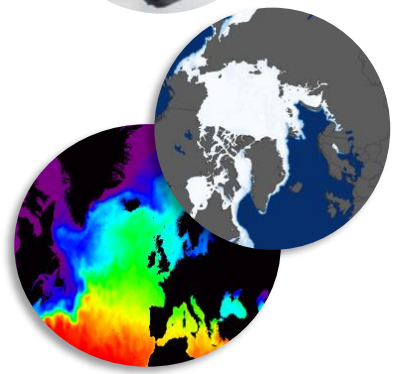
Georgios Technitis[a]*, Walied Othman[a], Kamran Safi[b,c] and Robert Weibel[a]




- **longitude** - during equinoxes
- **wet/dry data** - limit movements around colony during breeding season
- **raw light data** - limit movement within/outside of polar night areas

**Light logger data**


- **sea ice** - exclude covered areas
- **land** - exclude locations inland

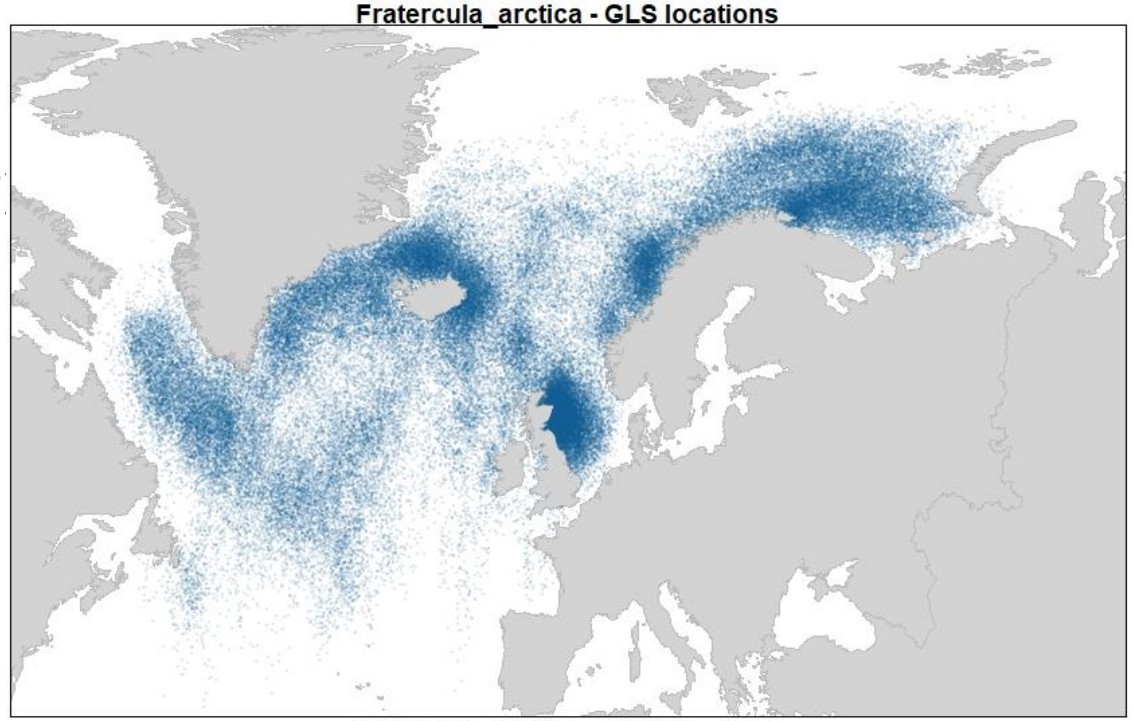


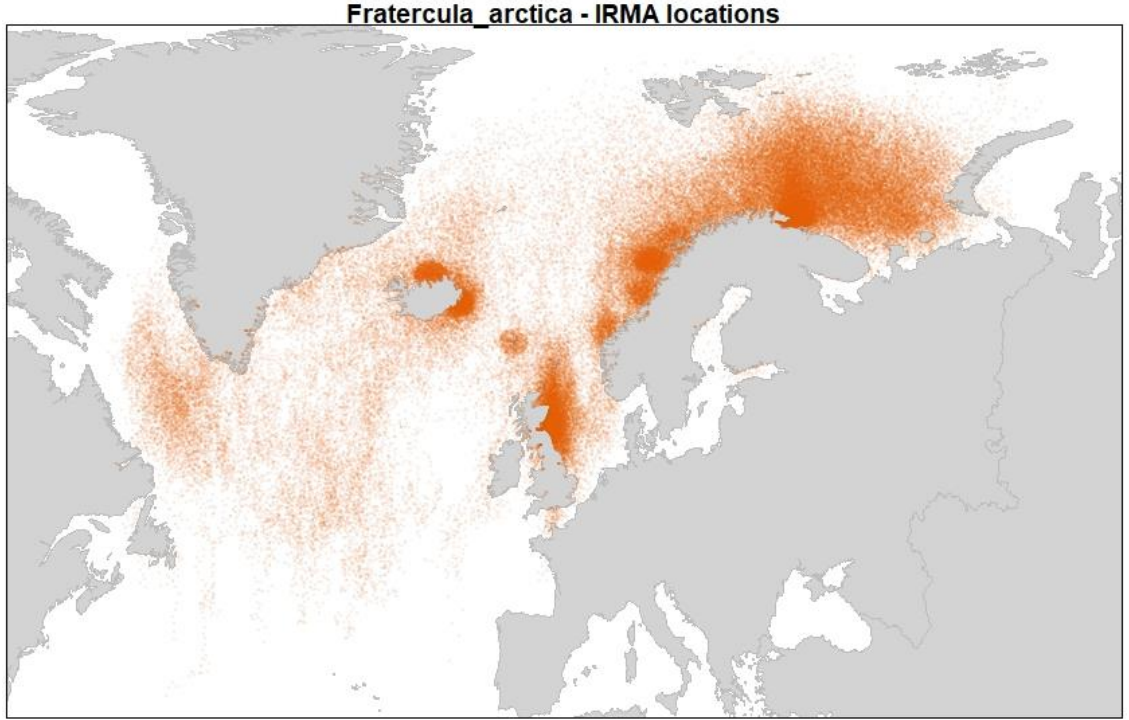
**Environmental data**

# Informed **R**andom **M**ovement **A**lgorithm (IRMA)

All available filtered locations

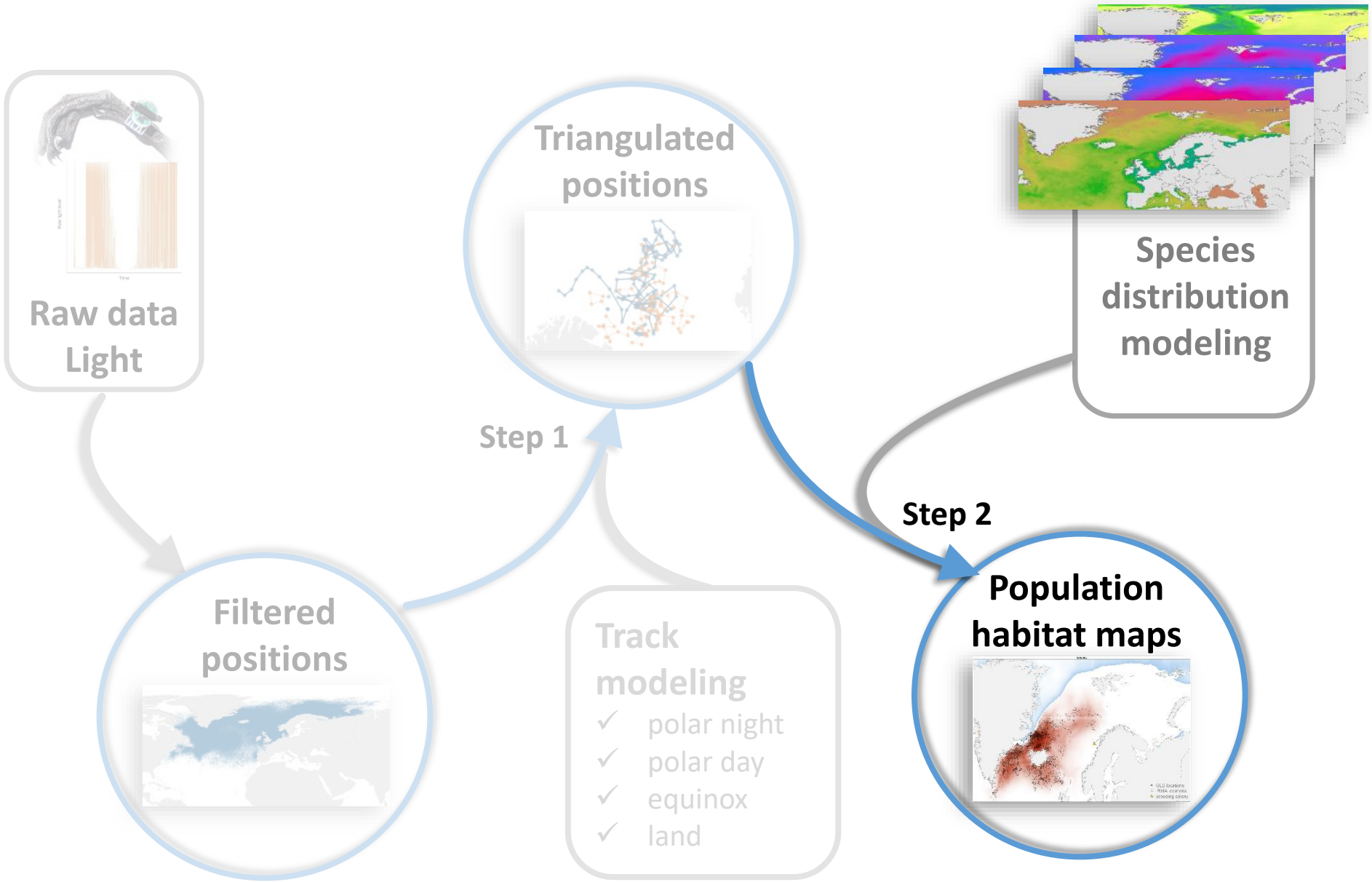
– Atlantic Puffin *Fratercula arctica* (2012-2017




- **GLS locations**
- **IRMA locations**

# **Step 2 -** Species distribution models & habitat maps



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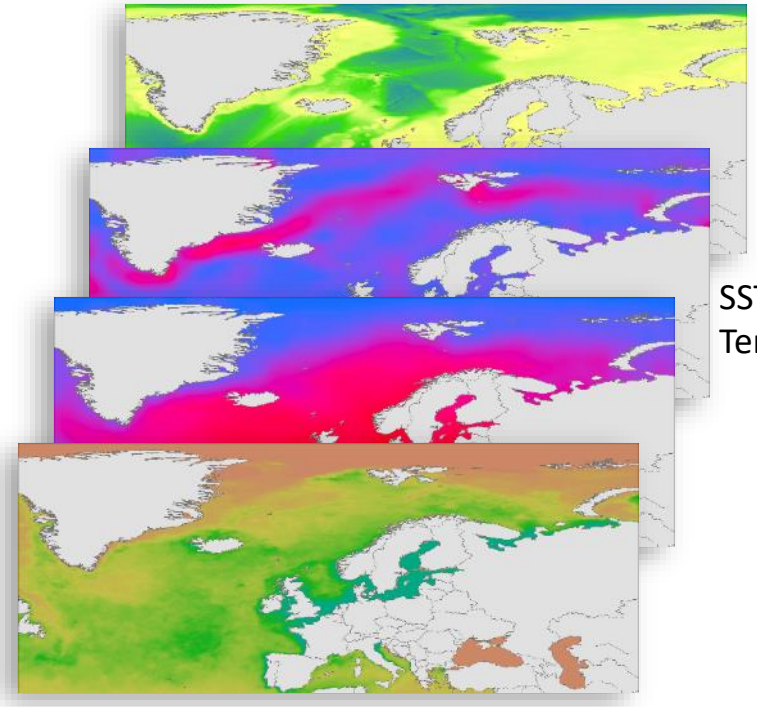


Bathymetry:
Depth and Slope

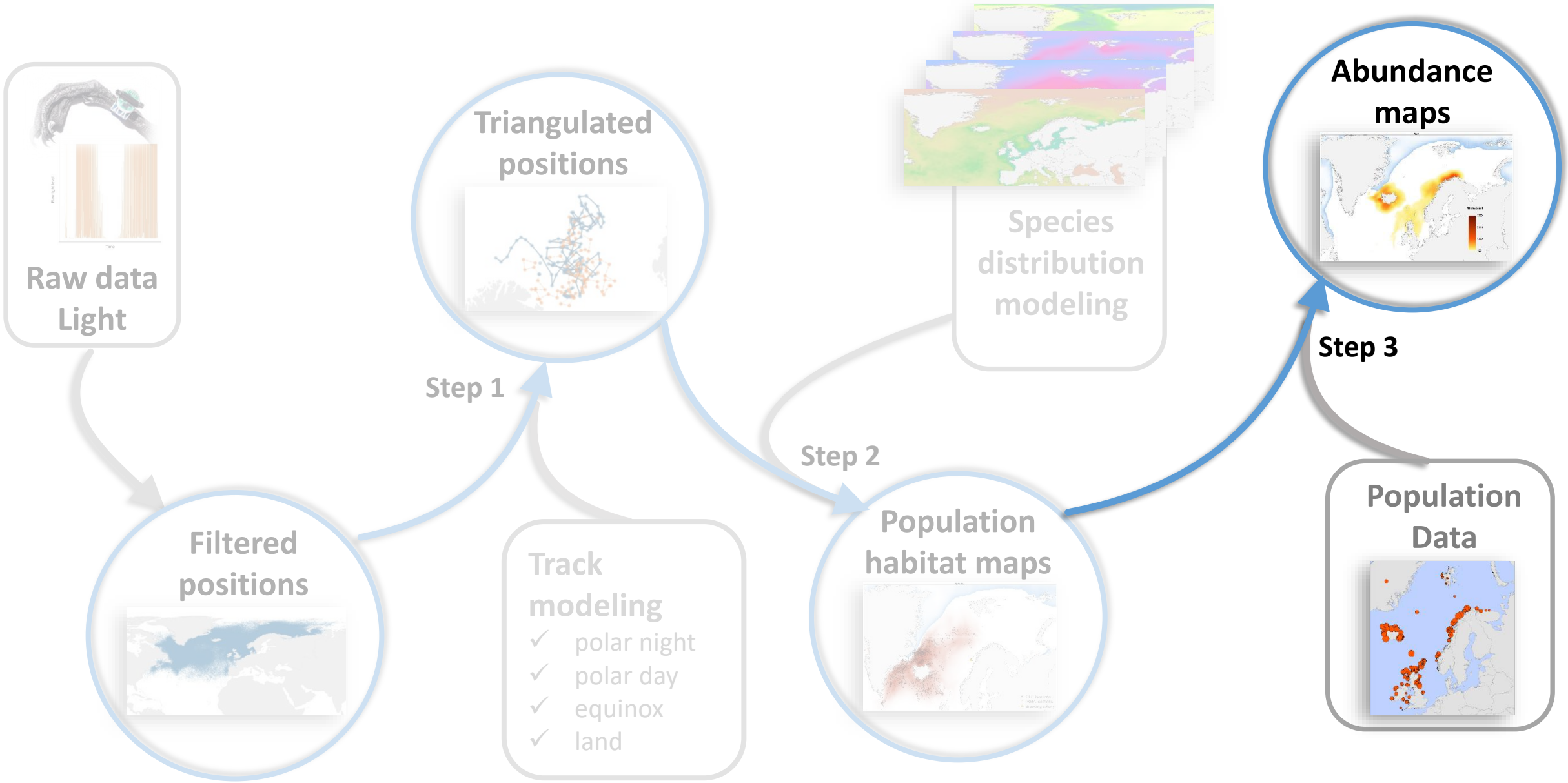
SST:
Temperature & fronts

*Chl-a*:
Primary production and bloom

+ distance to colony, distance to shore…

**Habitat modelling (Biomod/GAMs)** →

# **Step 3 -** Integrating population data to produce abundance maps



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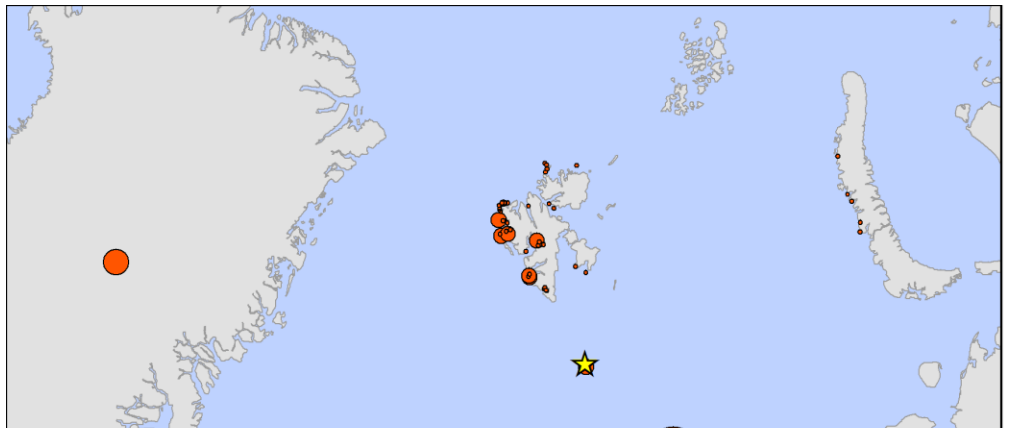
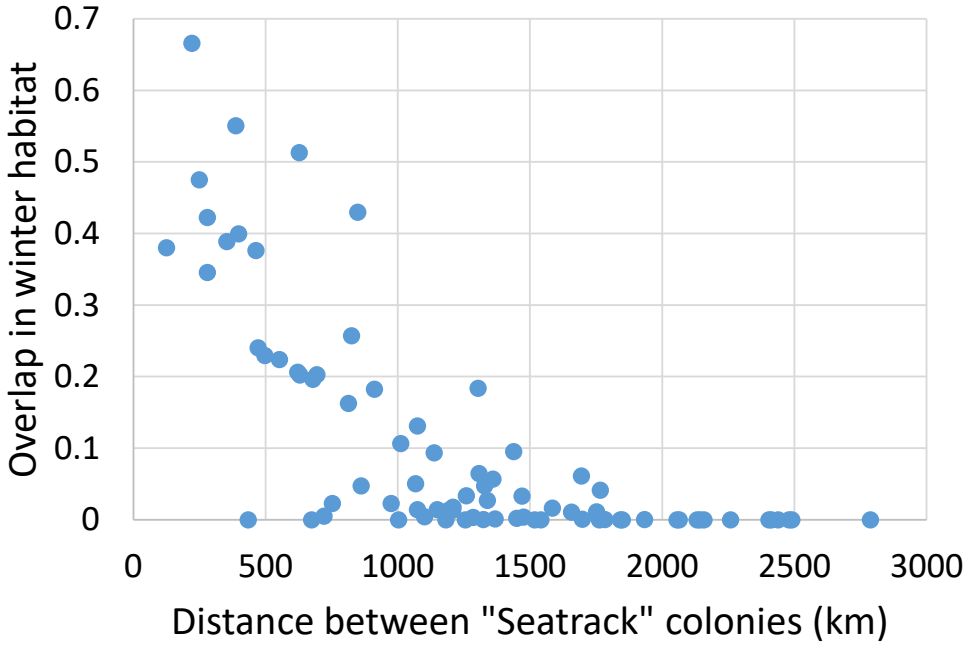
## Data on breeding populations in the North East Atlantic

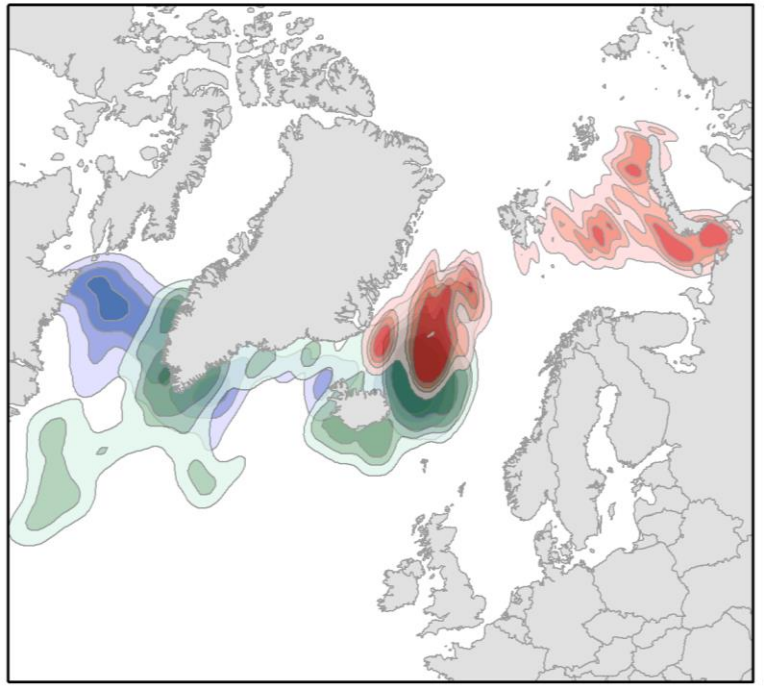


Atlantic puffin
(nr pairs)

- 1 - 100
- 101 - 1000
- 1001 - 10 000
- 10 001 - 100 000
- 100 001 - 1 000 000
- "Seatrack" colonies




Winter (Nov-Jan)



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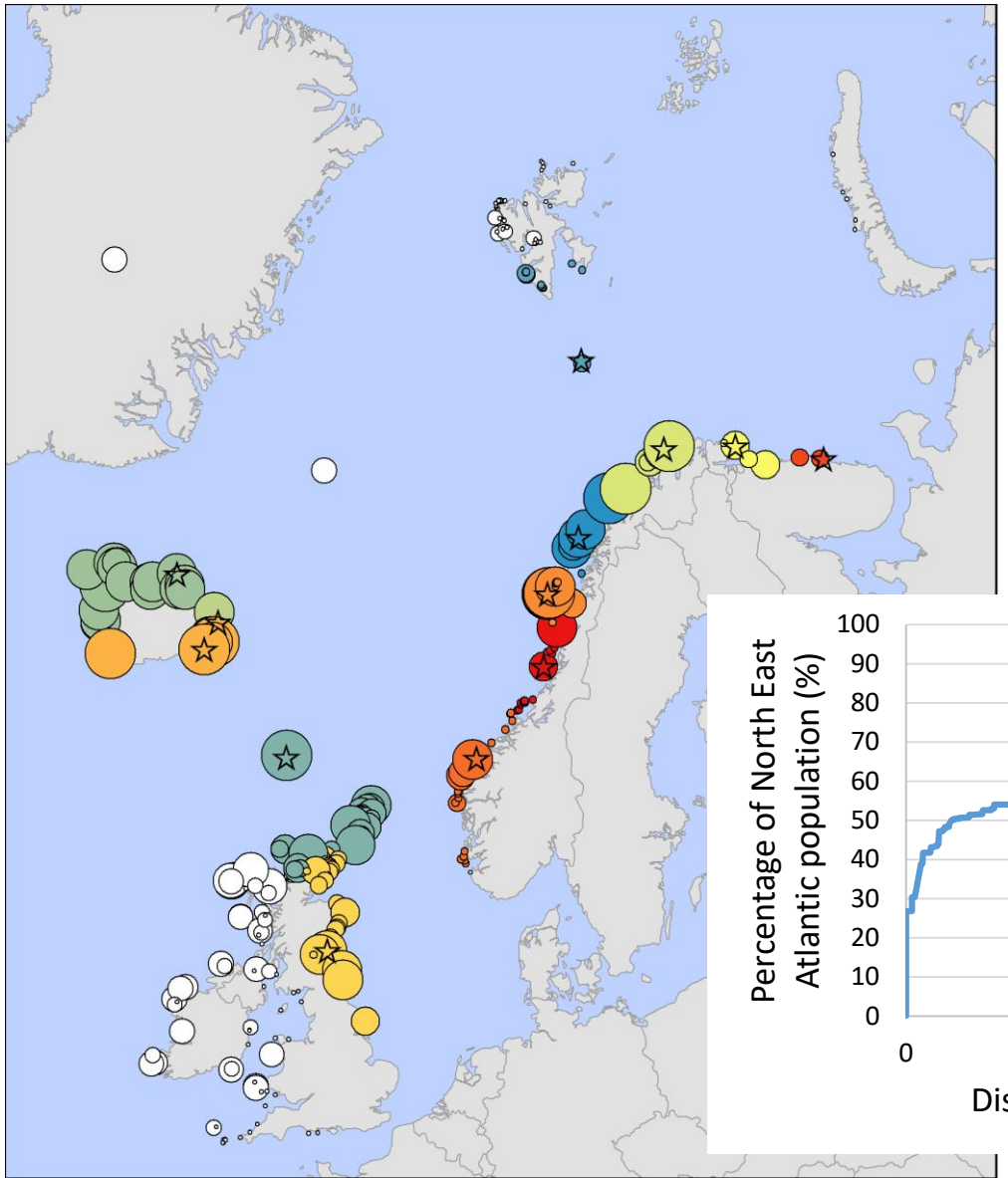
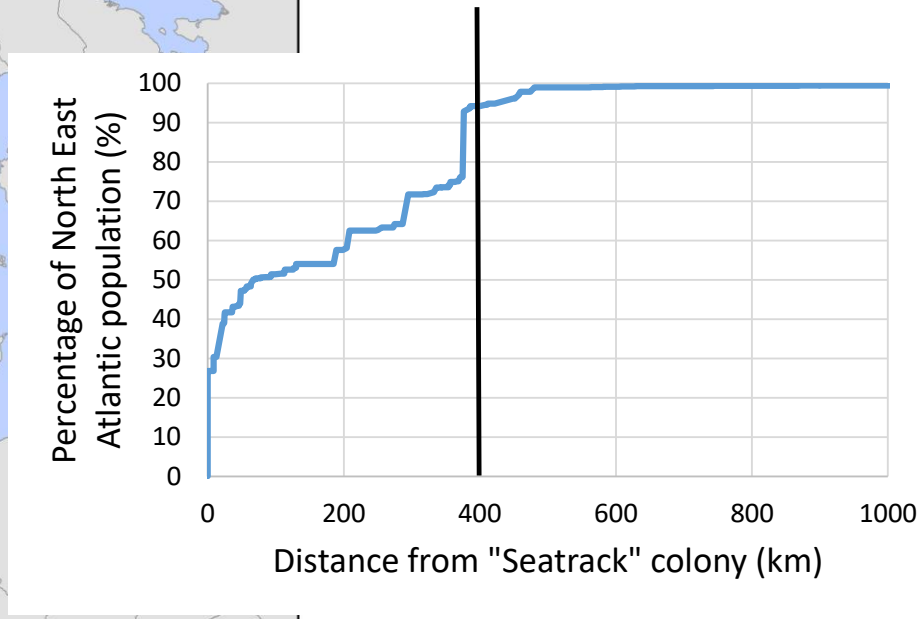
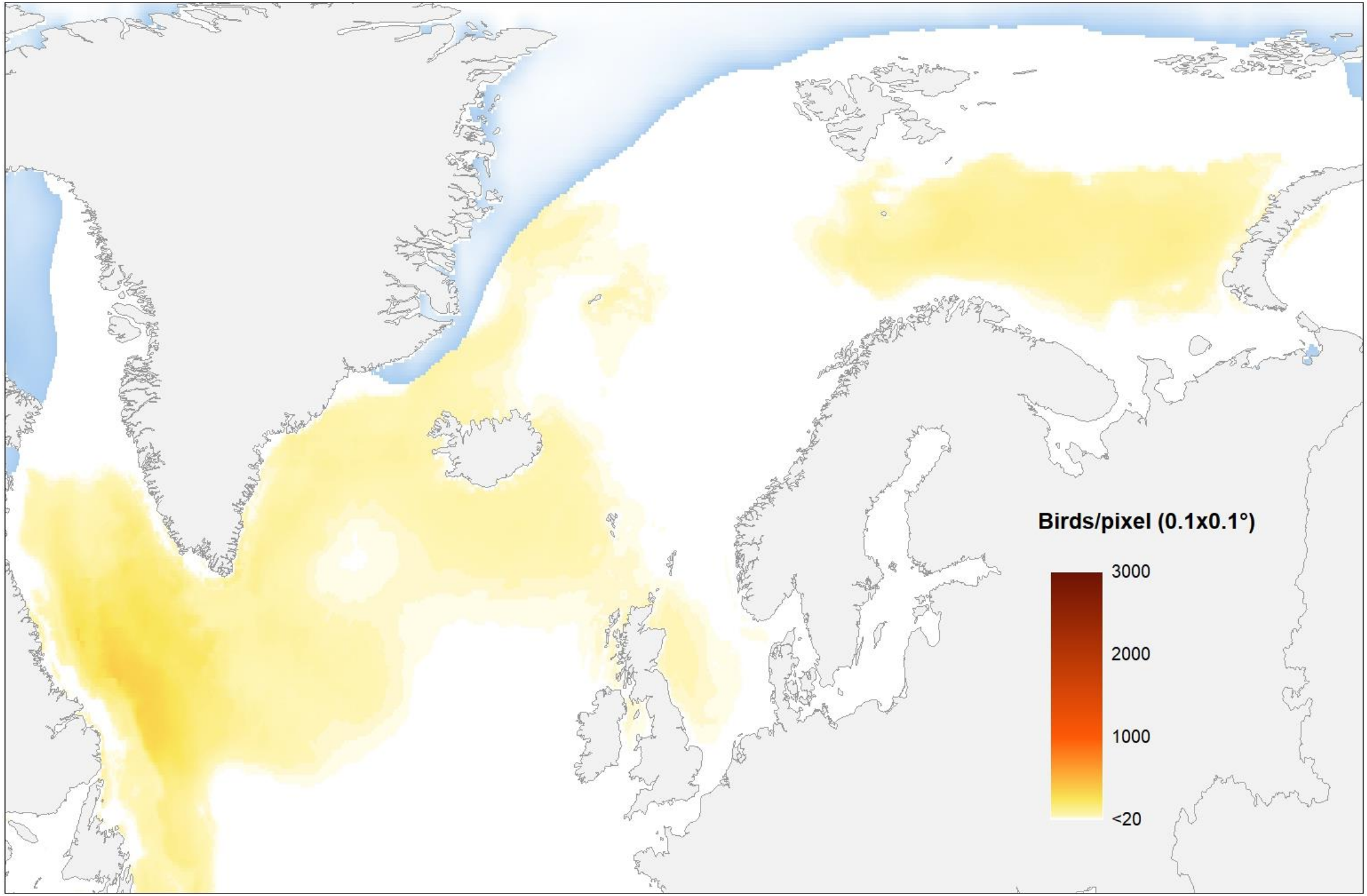


92% of the population




Birds/pixel (0.1x0.1°)
3000
2000
1000
<20

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SEATRACK Seabird Tracking

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# For more info please visit:

**SEATRACK's web-application - http://seatrack.seapop.no/map/**

**SEATRACK's webpage - http://www.seapop.no/en/seatrack**

**SEATRACK's facebook page - https://www.facebook.com/seatrack.seapop.no/**

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