

# Trophic niche overlap between sympatric harbour seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) at the southern limit of their European range (Eastern English Channel)

Yann Planque<sup>1\*</sup>, Jérôme Spitz<sup>1,2</sup>, Matthieu Authier<sup>2</sup>,  
Gaël Guillou<sup>3</sup>, Cécile Vincent<sup>1</sup>, Florence Caurant<sup>1,2</sup>



Centre d'Études Biologique de Chizé <sup>1</sup>, Observatoire Pelagis <sup>2</sup>, LIENSs<sup>3</sup>

CNRS / La Rochelle Université



Contact\*: [yann.planque@univ-lr.fr](mailto:yann.planque@univ-lr.fr)

SMM 2022 – 24th Biennial Conference on the Biology of Marine Mammals  
Palm Beach, Florida, USA & virtual – August 1-5, 2022



# Trophic niche overlap between sympatric harbour seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) at the southern limit of their European range (Eastern English Channel)

Yann Planque<sup>1\*</sup>, Jérôme Spitz<sup>1,2</sup>, Matthieu Authier<sup>2</sup>,  
Gaël Guillou<sup>3</sup>, Cécile Vincent<sup>1</sup>, Florence Caurant<sup>1,2</sup>



**Video of the presentation at the SMM conference:**

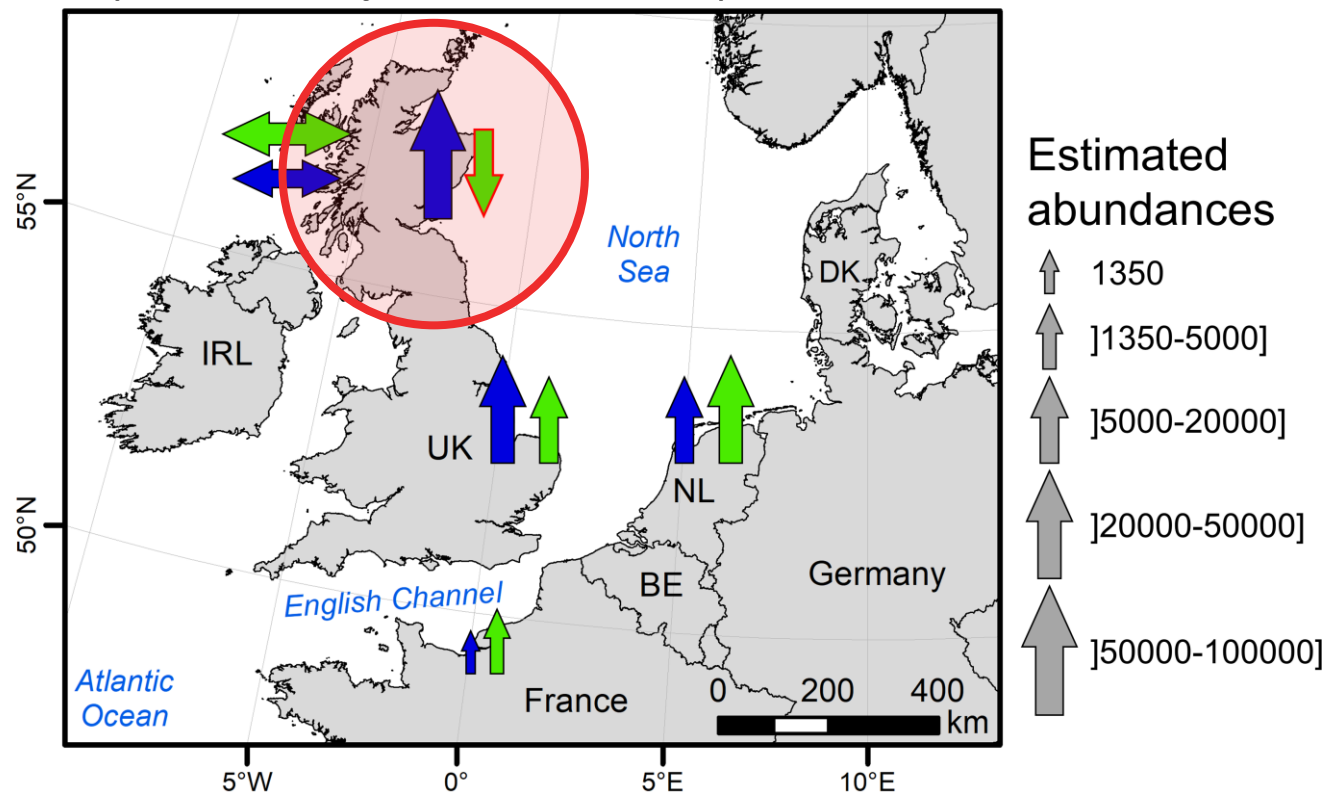
<https://pod.univ-lr.fr/video/3308-smm2022-conference-video-trophic-niche-overlap-between-sympatric-harbour-seals-phoca-vitulina-and-grey-seals-halichoerus-grypus-at-the-southern-limit-of-their-european-range-eastern-english-channel/> (4 minutes)

# Context : a potential trophic competition

## → Two sympatric seal species

Can have similar functional traits, diets, foraging strategies, feeding areas

Population trajectories in Europe... (~ last 20 years)



**Harbour seals**  
*Phoca vitulina*



**Grey seals**  
*Halichoerus grypus*

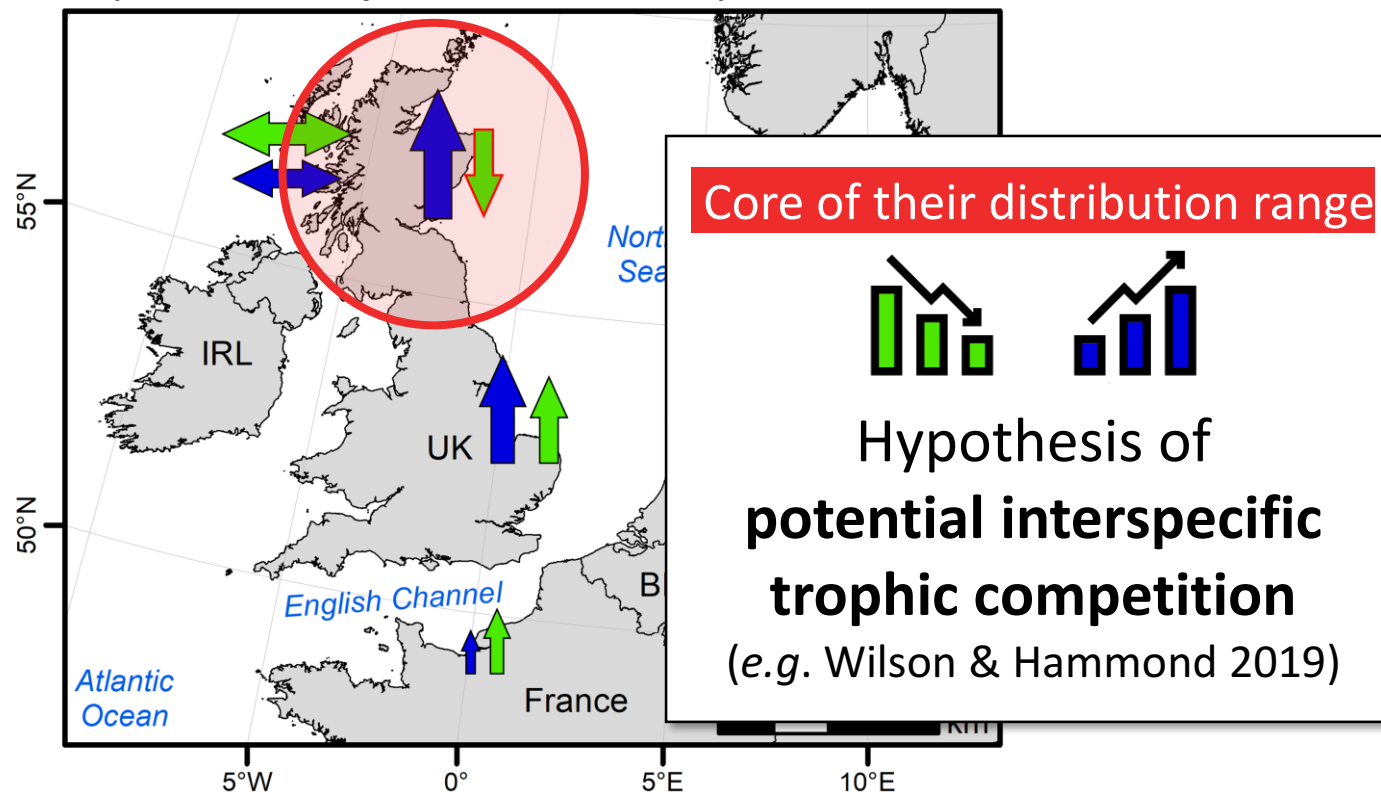


# Context : a potential trophic competition

## → Two sympatric seal species

Can have similar functional traits, diets, foraging strategies, feeding areas

Population trajectories in Europe... (~ last 20 years)



**Harbour seals**  
*Phoca vitulina*



**Grey seals**  
*Halichoerus grypus*

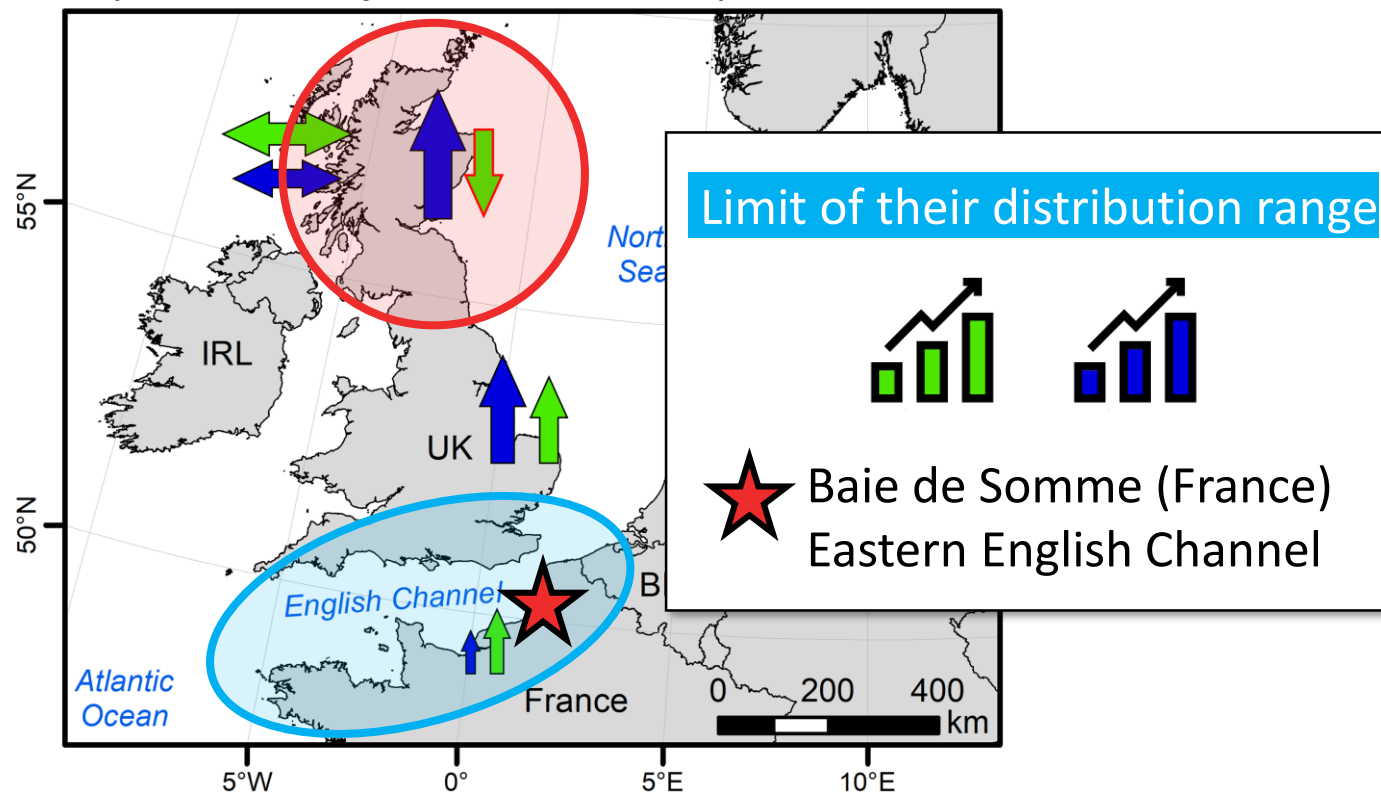


# Context : a potential trophic competition

## → Two sympatric seal species

Can have similar functional traits, diets, foraging strategies, feeding areas

Population trajectories in Europe... (~ last 20 years)



**Harbour seals**  
*Phoca vitulina*



**Grey seals**  
*Halichoerus grypus*



# Context : a potential trophic competition

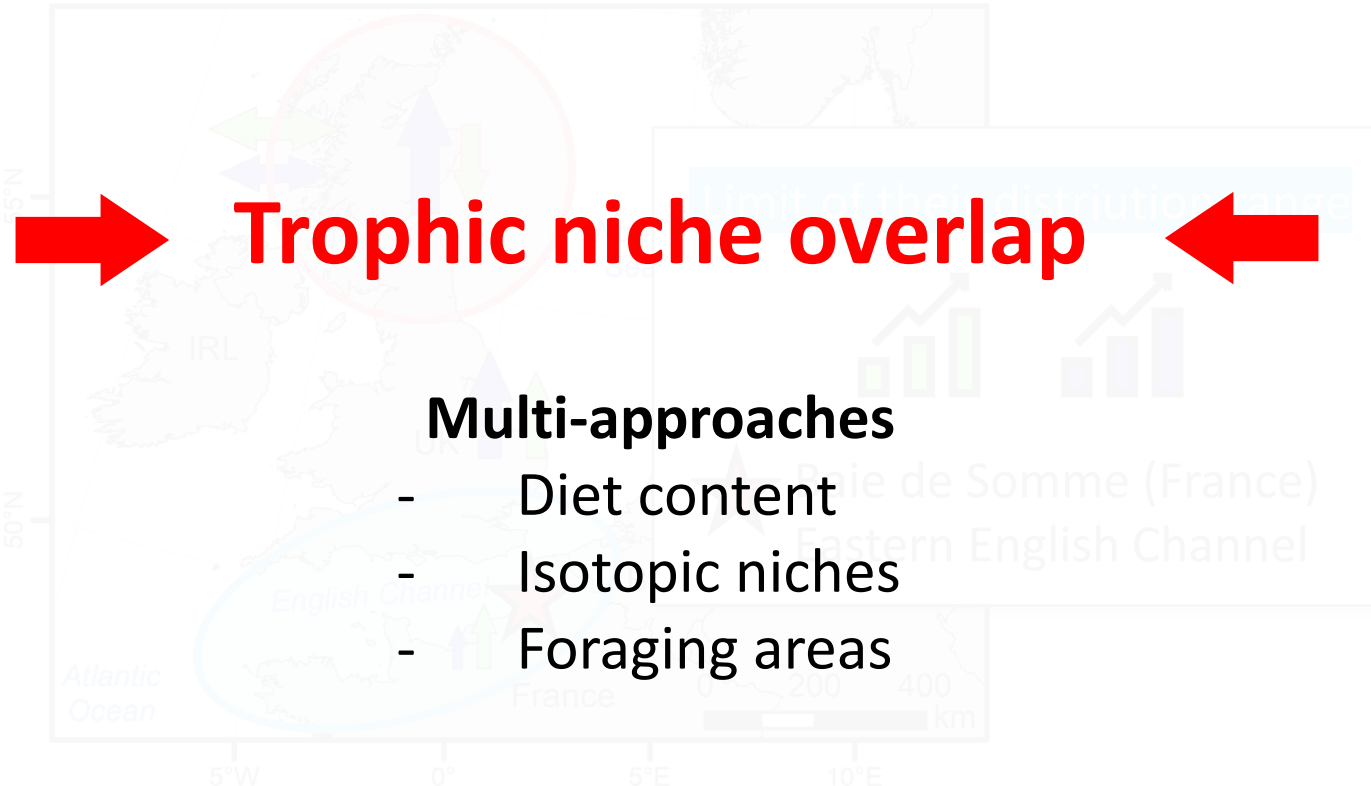
→ Two sympatric seal species

Can have similar functional traits, diets, foraging strategies, feeding areas

Southern limit of their European range:

**potential trophic competition?**

Population trajectories in Europe... (~ last 20 years)



**Harbour seals**  
*Phoca vitulina*



VS

**Grey seals**  
*Halichoerus grypus*



# Diet composition

## From scat content analysis (hard parts)



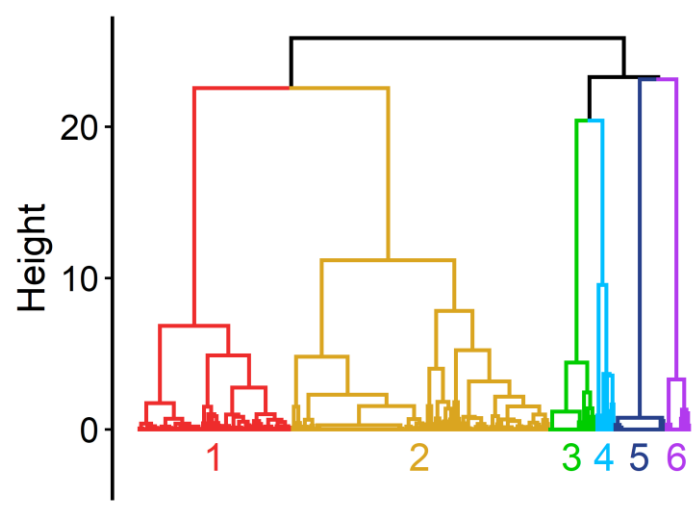
**Harbour seals**  
N = 193 (2002-2019)



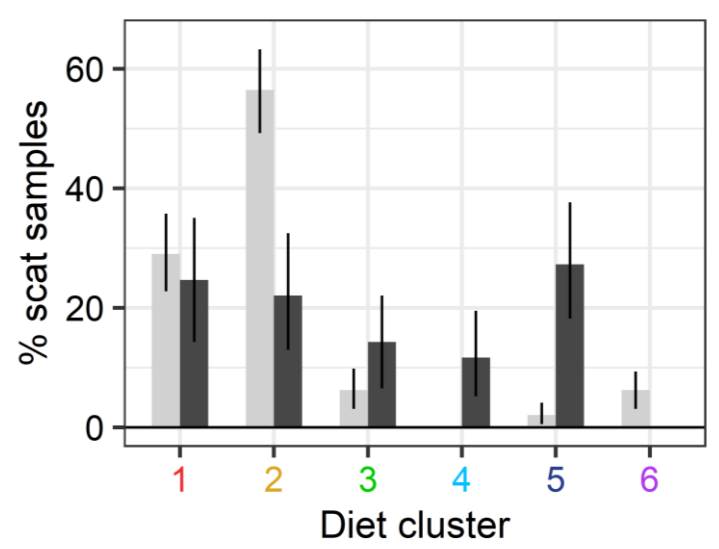
**Grey seals**  
N = 77 (2017-2019)



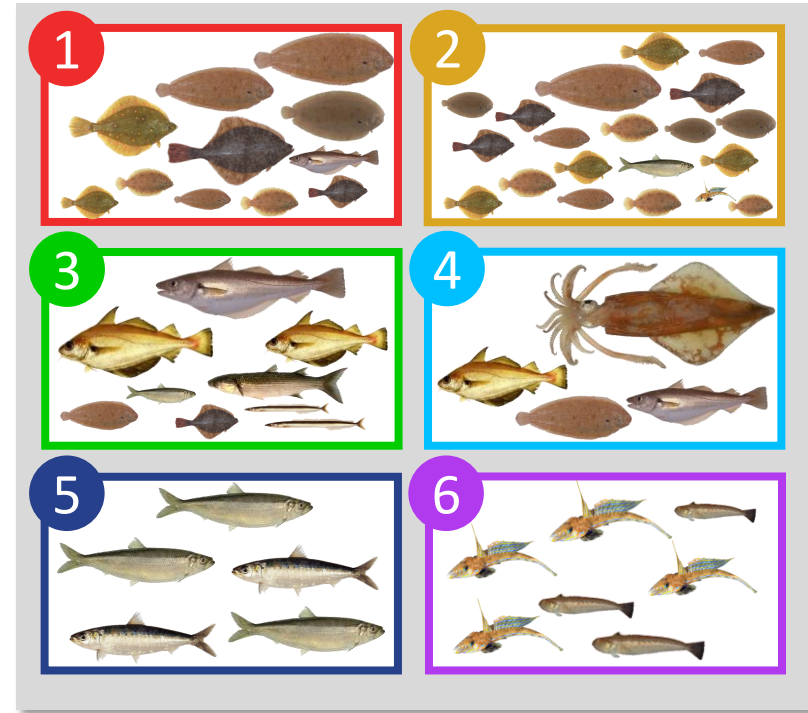
### Dietary clusters (N = 6)



### Scat distribution by cluster



### Scat content by cluster



# Diet composition

From scat content analysis (hard parts)



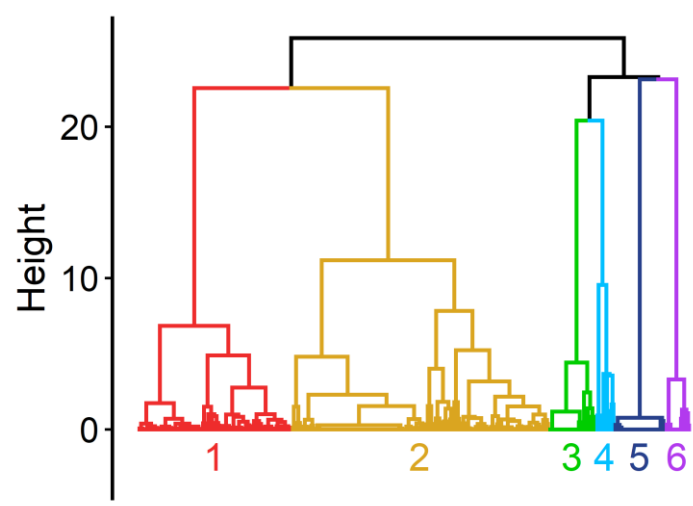
**Harbour seals**  
N = 193 (2002-2019)



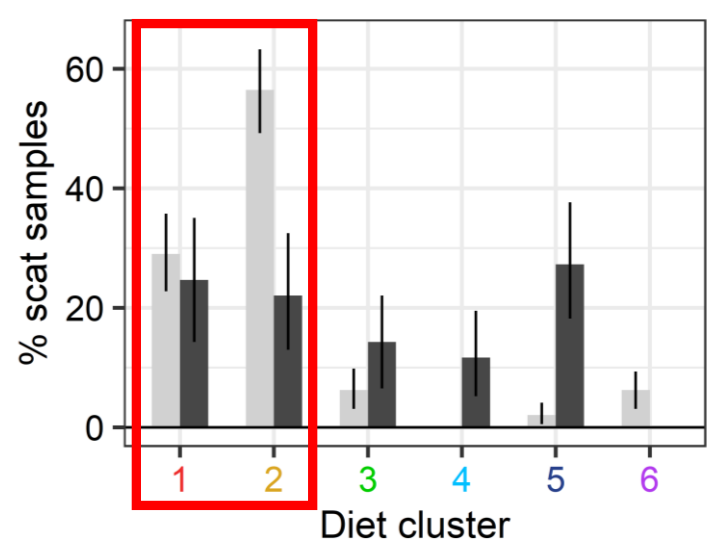
**Grey seals**  
N = 77 (2017-2019)



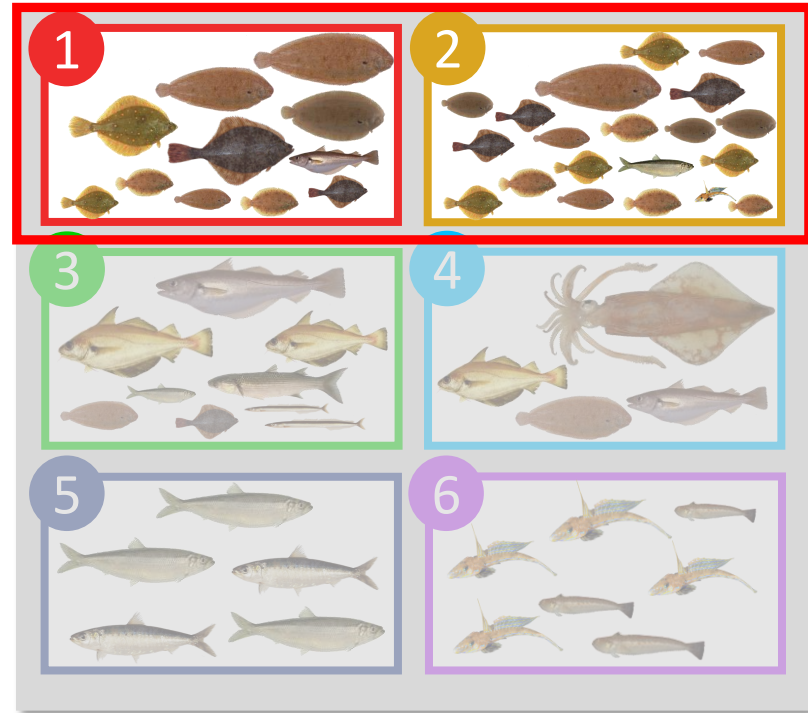
Dietary clusters (N = 6)



Scat distribution by cluster



Scat content by cluster



**High dietary overlap** = benthic flatfish



# Isotopic niches & Foraging areas

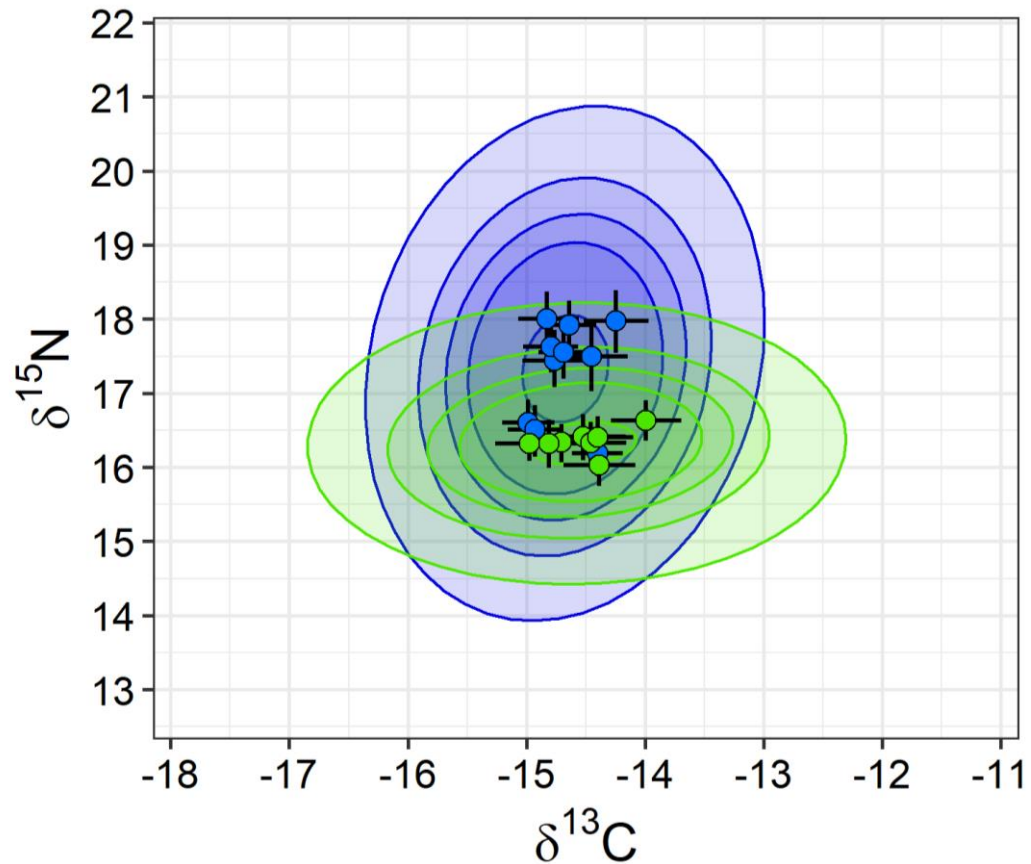
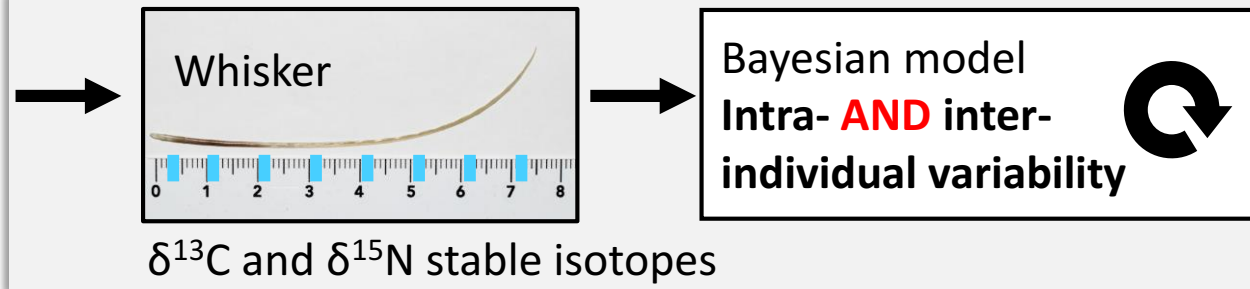
Individuals captured  
(2008 & 2012)



8 Harbour seals



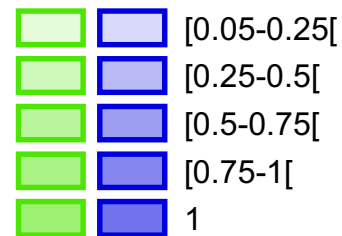
10 Grey seals



Predicted values for  
observed individuals



Probability belonging  
to the isotopic niche



**Smaller harbour seal niche**  
nested within  
**larger grey seal niche**

# Isotopic niches & Foraging areas

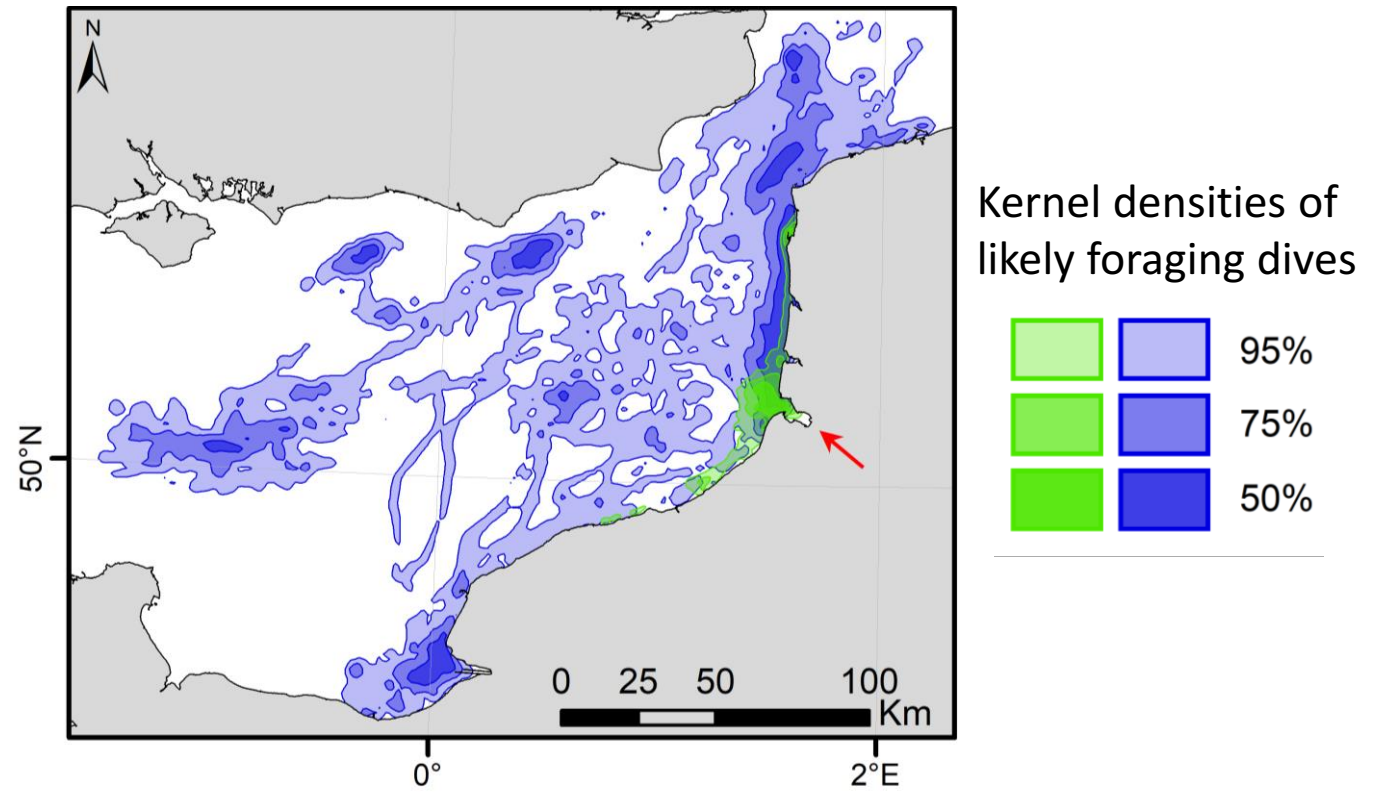
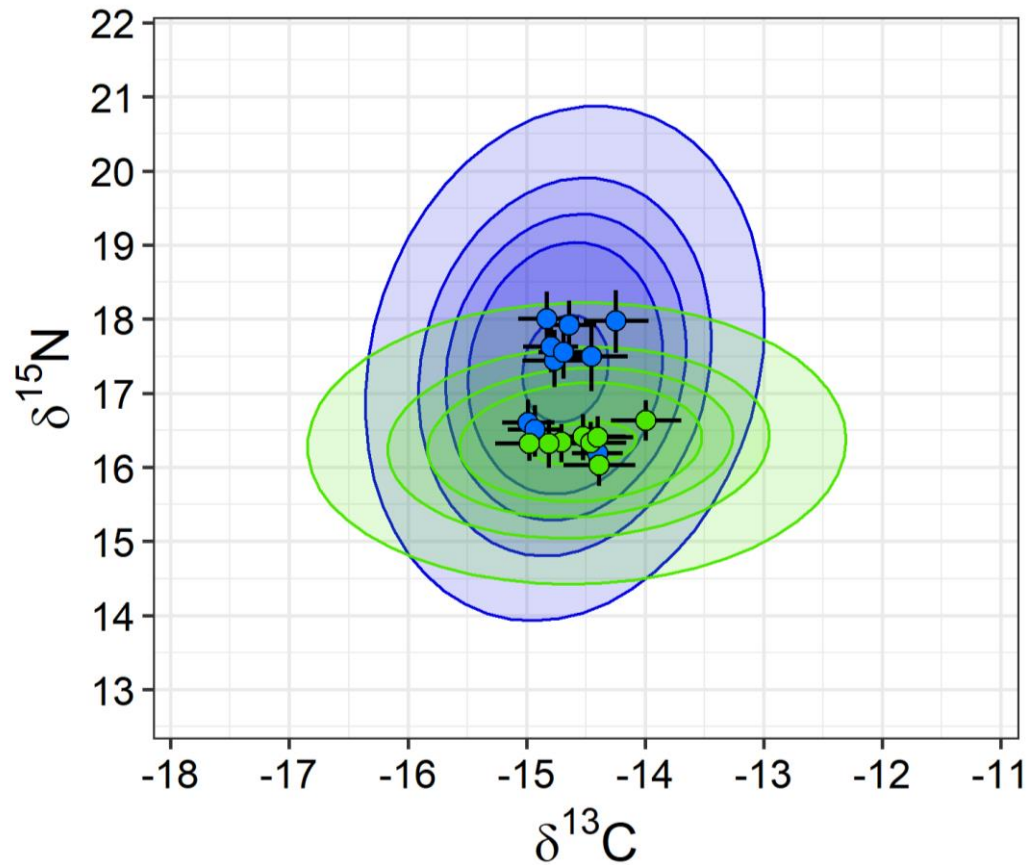
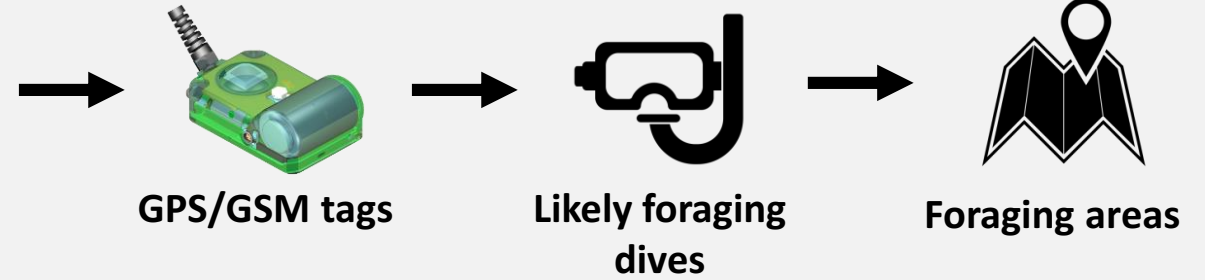
Individuals captured  
(2008 & 2012)



9 Harbour seals



11 Grey seals



# Isotopic niches & Foraging areas

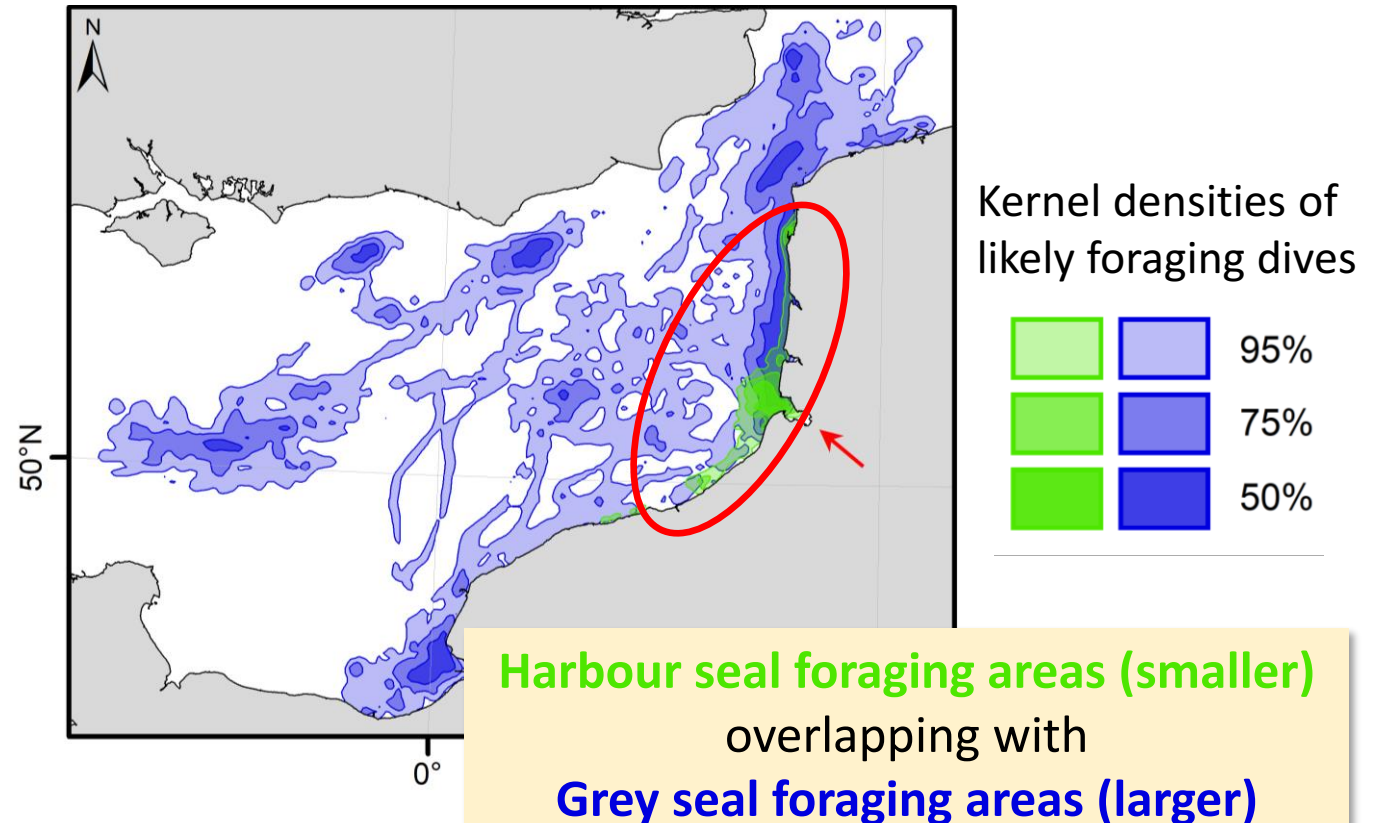
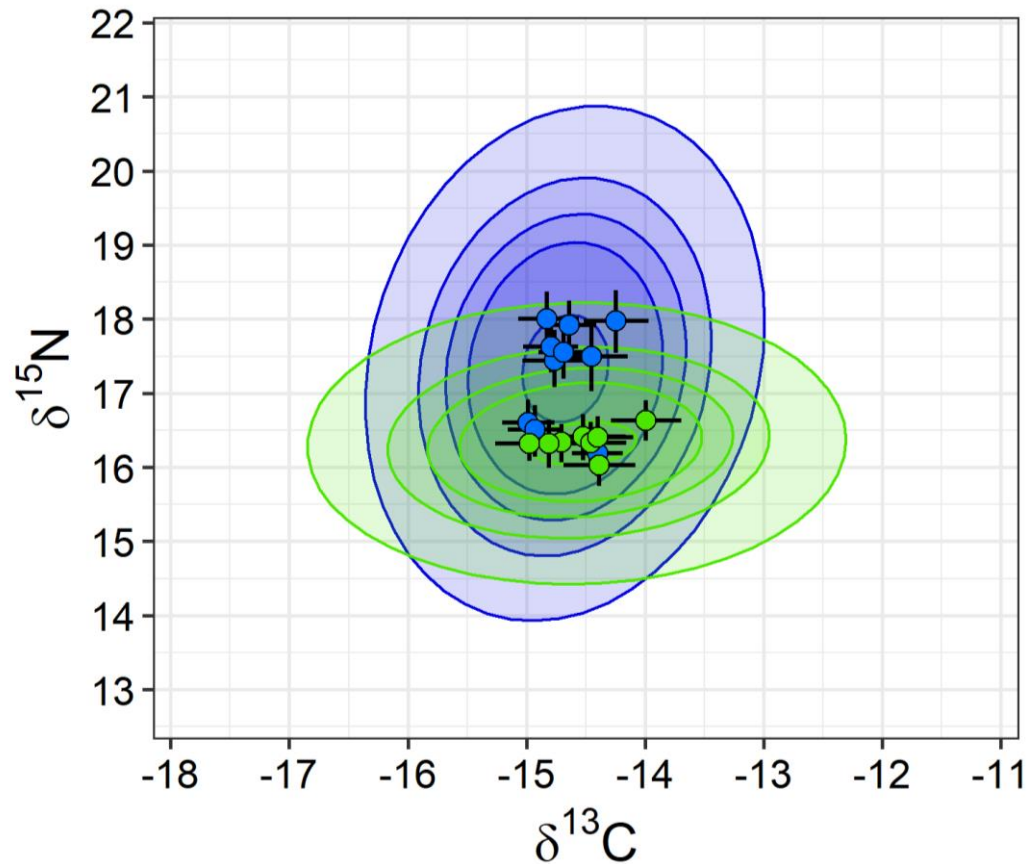
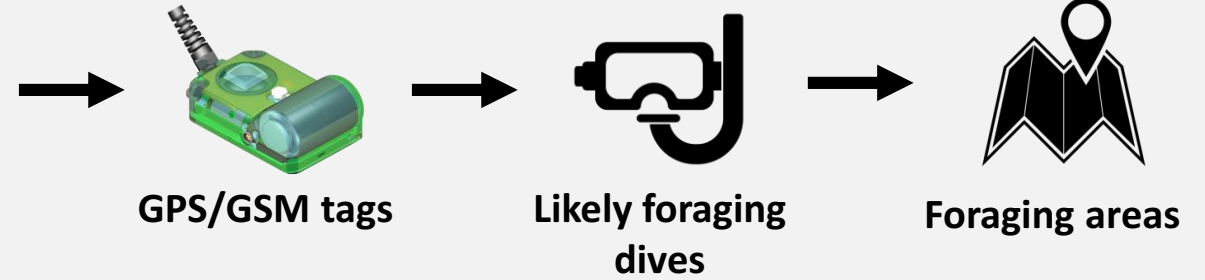
Individuals captured  
(2008 & 2012)



9 Harbour seals



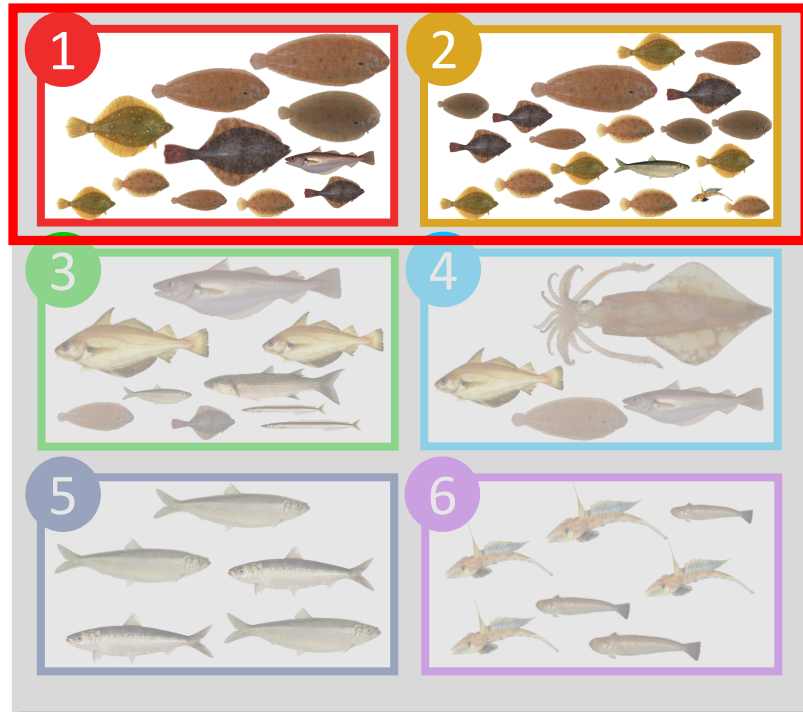
11 Grey seals



# All results are consistent



Dietary clusters



**Dietary overlap** = benthic flatfish



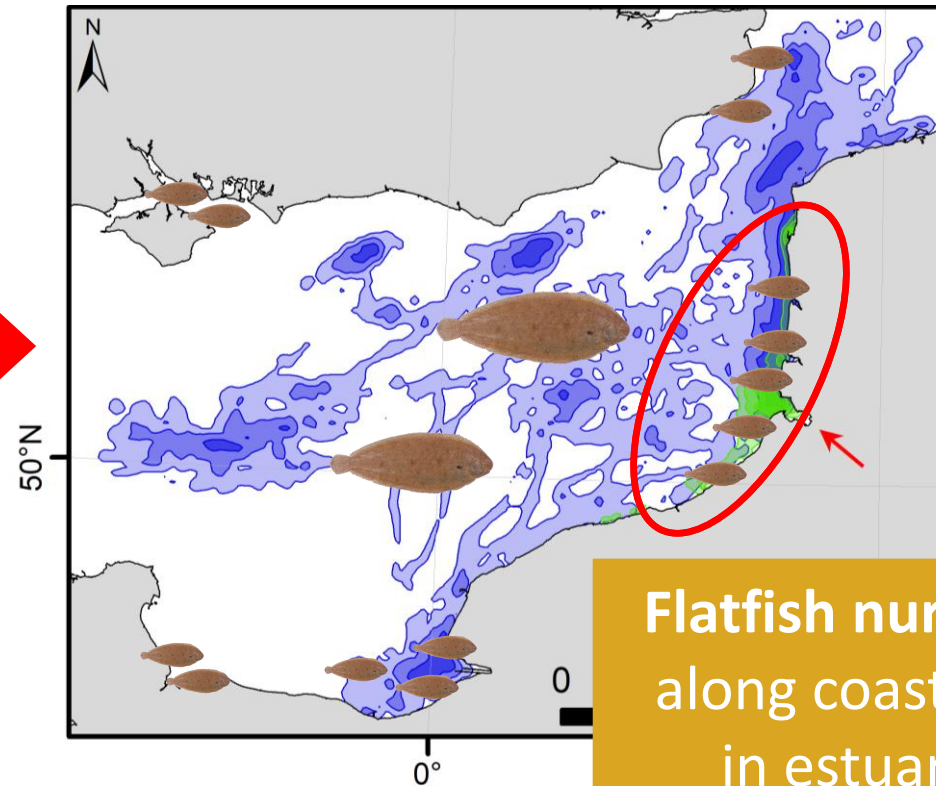
Foraging areas



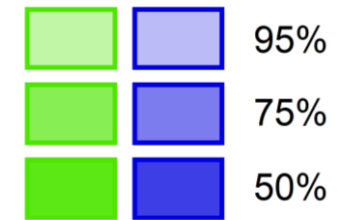
9 Harbour seals



11 Grey seals

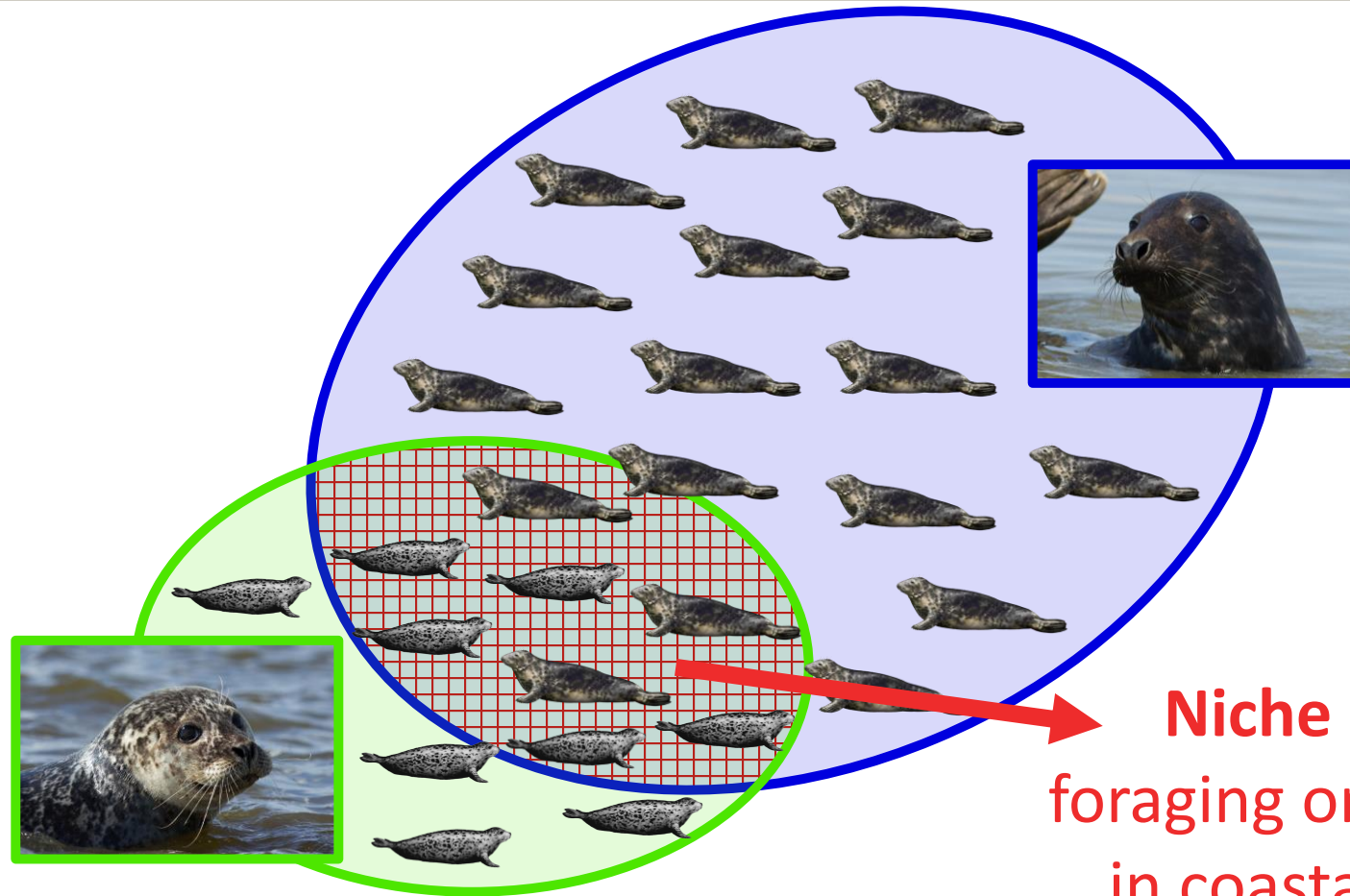


Kernel densities of likely foraging dives



**Flatfish nurseries**  
along coasts and  
in estuaries

# An interspecific trophic overlap : a potential for trophic competition



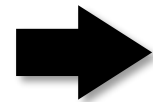
**Niche overlap:**  
foraging on flatfish  
in coastal waters



↘ **flatfish supply**

(↘ 80% fish biomass for last 30y.)

↗ **seal numbers**



**Competitive interactions that could have deleterious effects on harbour seal colonies?**

## Some references

- Blanchet M et al. (2014) Harbour seal *Phoca vitulina* movement patterns in the high-Arctic archipelago of Svalbard, Norway. *Aquat Biol* 21:167–181.
- Brasseur SMJM et al. (2015) Rapid recovery of Dutch gray seal colonies fueled by immigration. *Mar Mammal Sci* 31:405–426.
- Brasseur SMJM et al. (2018) Echoes from the past: Regional variations in recovery within a harbour seal population. *PLoS One* 13:e0189674.
- Granquist SM, Hauksson E (2019) Population Estimate, Trends and Current Status of the Icelandic Harbour Seal (*Phoca vitulina*) Population in 2018. REYKJAVÍK, Iceland.
- ICES (2021) Working Group on Marine Mammal Ecology (WGMME). ICES Scientific Reports.
- McLean MJ et al. (2019) Functional reorganization of marine fish nurseries under climate warming. *Glob Chang Biol* 25:660–674.
- Mikkelsen B (2007) Present knowledge of grey seals (*Halichoerus grypus*) in Faroese waters. *NAMMCO Sci Publ* 6:79–84.
- Planque Y et al. (2020) Comparing the horizontal and vertical approaches used to identify foraging areas of two diving marine predators. *Mar Biol* 167:25.
- Planque Y et al. (2021) Trophic niche overlap between sympatric harbour seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) at the southern limit of their European range (Eastern English Channel). *Ecol Evol* 11:10004–10025.
- Poncet S et al. (2021) Recensement des colonies et reposoirs de phoques en France en 2020 et 2021.
- Riou P (2001) Relative contributions of different sole and plaice nurseries to the adult population in the Eastern Channel: application of a combined method using generalized linear models and a geographic information system. *Aquat Living Resour* 14:125–135.
- Russell DJF et al. (2019) Monitoring long-term changes in UK grey seal pup production. *Aquat Conserv Mar Freshw Ecosyst* 29:24–39.
- SCOS (2019) Special Committee on Seals: Scientific Advice on Matters Related to the Management of Seal Populations: 2019. St Andrews, Scotland, UK.
- SCOS (2020) Special Committee on Seals: Scientific Advice on Matters Related to the Management of Seal Populations: 2020. St Andrews, Scotland, UK.
- Selleslagh J et al. (2009) Fish composition and assemblage structure in three Eastern English Channel macrotidal estuaries: A comparison with other French estuaries. *Estuar Coast Shelf Sci* 81:149–159.
- Thompson D et al. (2019) The status of harbour seals (*Phoca vitulina*) in the UK. *Aquat Conserv Mar Freshw Ecosyst* 29:40–60.
- Vincent C et al. (2017) Grey and harbour seals in France: Distribution at sea, connectivity and trends in abundance at haulout sites. *Deep Sea Res Part II Top Stud Oceanogr* 141:294–305.
- Wilson LJ, Hammond PS (2019) The diet of harbour and grey seals around Britain: Examining the role of prey as a potential cause of harbour seal declines. *Aquat Conserv Mar Freshw Ecosyst* 29:71–85.



# Thank you!

## Results published in an article in *Ecology and Evolution*

Planque Y, Spitz J, Authier M, Guillou G, Vincent C, Caurant F (2021) Trophic niche overlap between sympatric harbour seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) at the southern limit of their European range (Eastern English Channel). *Ecology and Evolution*. 11:10004-10025 <https://doi.org/10.1002/ece3.7739>



→ All **R scripts** freely available on **GitHub** repositories:

[https://github.com/YannPlanque/Diet Cluster and Overlap](https://github.com/YannPlanque/Diet_Cluster_and_Overlap)

[https://github.com/YannPlanque/Isotopic Niche Overlap](https://github.com/YannPlanque/Isotopic_Niche_Overlap)

[https://github.com/YannPlanque/Foraging Areas with Dive Data](https://github.com/YannPlanque/Foraging_Areas_with_Dive_Data)

→ All **data** available on **SeaNoe** repositories:

<https://doi.org/10.17882/76780> ; <https://doi.org/10.17882/76528> ; <https://doi.org/10.17882/80016>