Trophic ecology of the Balearic shearwater in the Bay of Biscay

Beñat Iglesias[1], Paco Bustamante[2], Jerome Fort[2], Adrien Lambrechts[3], Maite Louzao[1]

1. **AZTI Marine Research, Basque Research and Technology Alliance (BRTA)**

2. **Littoral Environnement Et Sociétés (LIENSs), UMR 7266, CNRS-La Rochelle Université**

3. **Office Français de la Biodiversité (OFB)**

Séminaire du
plan national d'actions
en faveur du Puffin des Baléares

Background

- Balearic shearwaters visit the BoB during non-breeding season

- They seem to feed on epipelagic and demersal species, but no stomach content analysis published in the BoB

- Fisheries discards seem to be important in their diet

- Stable isotopes reveal trophic relationships and habitat use

- Bayesian isotopic mixing models estimate food source contributions

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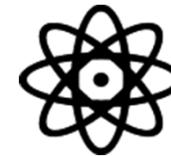
Sample collection (predator)

Balearic shearwater (*Puffinus mauretanicus*)

- Blood samples of 30 individuals captured with a netgun in Mor Braz (France)

- Part of the National Action Plan 2021-2025 for the Balearic shearwater

- August 2022

- Stable isotope analysis (δ^{13}C and δ^{15}N) at LIENSs

Mor Braz
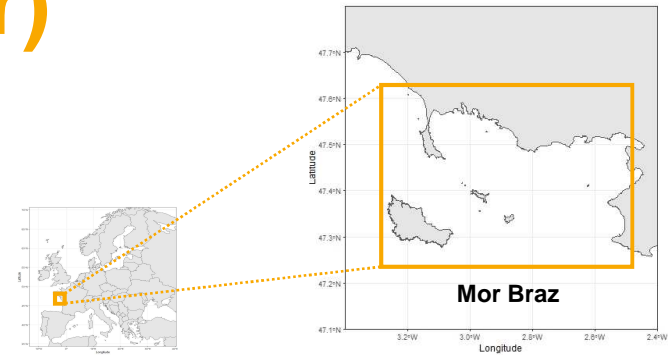
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MATERIAL & METHODS

Sample collection (prey)

Prey selection criteria

- Potential prey selected in a previous study conducted in the BoB (Meier et al. 2017)

  - *Sardina pilchardus*
  - *Engraulis encrasicolus*
  - *Trachurus trachurus*
  - *Scomber scombrus*
  - *Micromesistius poutassou*

  - *Trisopterus spp*
  - *Merluccius merluccius*
  - *Microchirus variegatus*
  - *Loligo spp*

Tracking, feather moult and stable isotopes reveal foraging behaviour of a critically endangered seabird during the non-breeding season

Rhiannon E. Meier[1]*, Stephen C. Votier[2], Russell B. Wynn[1], Tim Guilford[3], Miguel McMinn Grivé[4], Ana Rodríguez[5], Jason Newton[6], Louise Maurice[7], Tiphaine Chouvelon[8,9], Aurélie Dessier[8] and Clive N. Trueman[10]

- Trophic evidence found in previous stomach content analysis study conducted in the Mediterranean sea (Louzao et al. 2015)

  - *Nyctiphanes couchii*

EVIDENCE OF KRILL IN THE DIET OF BALEARIC SHEARWATERS
PUFFINUS MAURETANICUS

MAITE LOUZAO[1,2], DAVID GARCÍA[3,4], BENEHARO RODRÍGUEZ[3,5] & PERE ABELLÓ[6]

Prey

MATERIAL & METHODS

Sample collection (prey)

Isotopic data acquisition

- **From Iglesias et al. 2023**

Influence of seasonal variability on the trophic structure of pelagic communities

Beñat Iglesias[1*], Maite Louzao[1], Eneko Bachiller[1], Lucía López-López[2], María Santos[1], Guillermo Boyra[1], Eider Andonegi[1], Unai Cotano[1] and Izaskun Preciado[2]

- **From Chouvelon et al. 2012**

Revisiting the use of $\delta^{15}N$ in meso-scale studies of marine food webs by considering spatio-temporal variations in stable isotopic signatures – The case of an open ecosystem: The Bay of Biscay (North-East Atlantic)

T. Chouvelon[a], J. Spitz[a,b], F. Caurant[a], P. Mèndez-Fernandez[a], A. Chappuis[a], F. Laugier[a], E. Le Goff[a], P. Bustamante[a,*]

- **From López-López et al. 2017**

Does upwelling intensity influence feeding habits and trophic position of planktivorous fish?

Lucia Lopez-Lopez[a,*], Izaskun Preciado[a], Isabel Muñoz[a], Moira Decima[b], Juan Carlos Molinero[c], Elena Tel[d]

MATERIAL & METHODS

Diet estimation

Bayesian isotopic mixing models

- **MixSIAR** R package (Stock and Semmens 2016) to estimate the diet

  - **Diet to tissue discrimination factor (DTDF):** $\delta^{13}C = 0.9 \pm 0.5‰$ and $\delta^{15}N = 1.7 \pm 0.5‰$ (Ramos et al. 2009)

  - A **mixing polygon** was built to identify predator individuals whose isotopic composition might not align with the expected prey sources

  - Prey **grouping** to strength the model accuracy

    1. Taxonomic groups: fish, cephalopod or crustacean

    2. Horizontal habitat: oceanic or neritic

    3. Vertical habitat: epipelagic, demersal or benthic

    4. Trophic level: low, mid or high
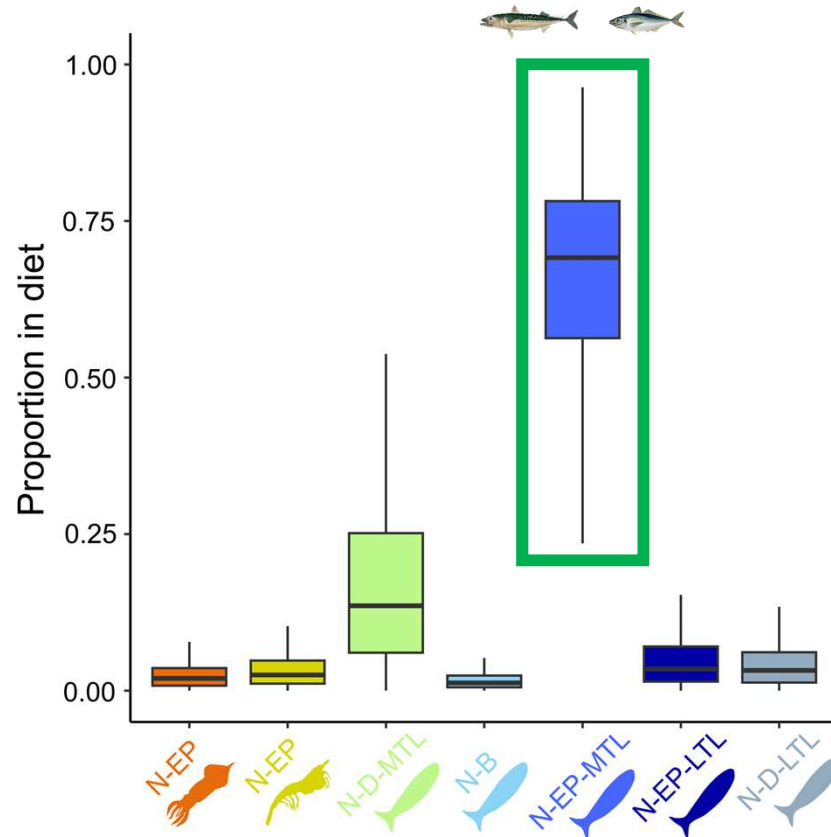
Mixing polygon

All individuals inside

- White dots: Balearic shearwater individuals

- Coloured dots: potential prey species

- Each color: prey group
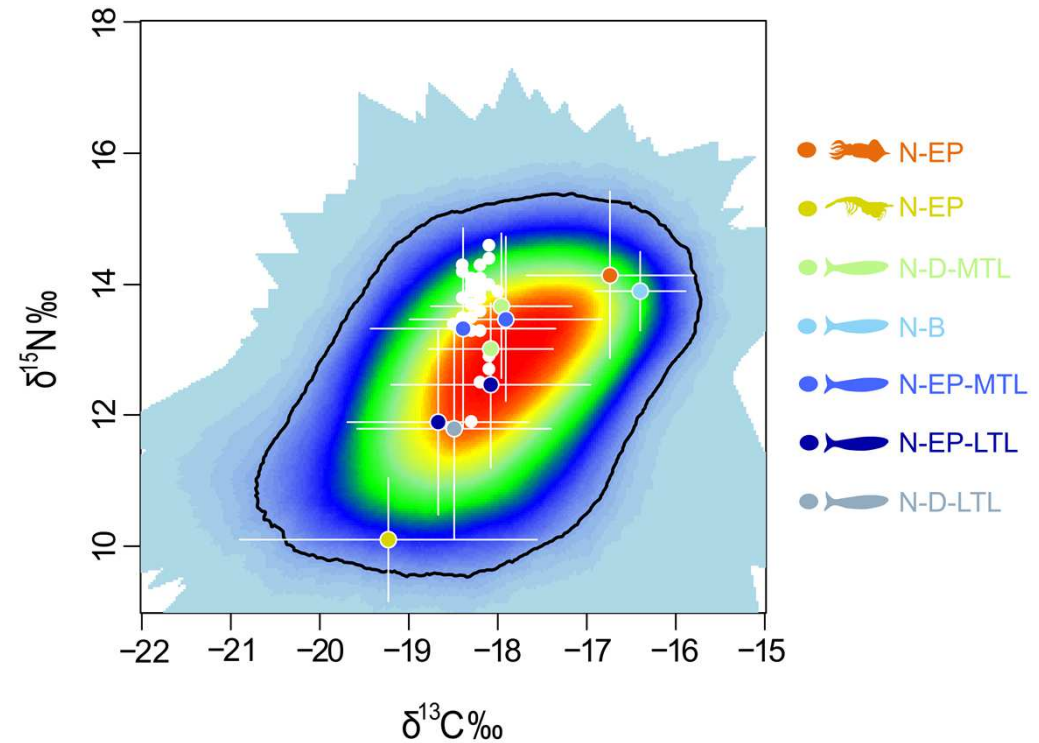
Diet proportion

- Highest proportion (65.4%) for epipelagic mid-trophic level fish (*T. trachurus* and *S. scombrus*)

- 17.6% for demersal mid-trophic level fish (*M. merluccius* and *Trisopterus spp*)

- Low proportion for remaining prey (<5%)

Conclusions

- Piscivorous species

- Preference for epipelagic fish (+70%): swimming and hunting abilities or foraging on discarded fish

- Importance of fishing discards: Approximately a quarter of their diet composition consisted of demersal and benthic species (23.7%)

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DISCUSSION