# An ecosystem approach for studying the impact of offshore wind farms: the Dieppe-Le Tréport case study

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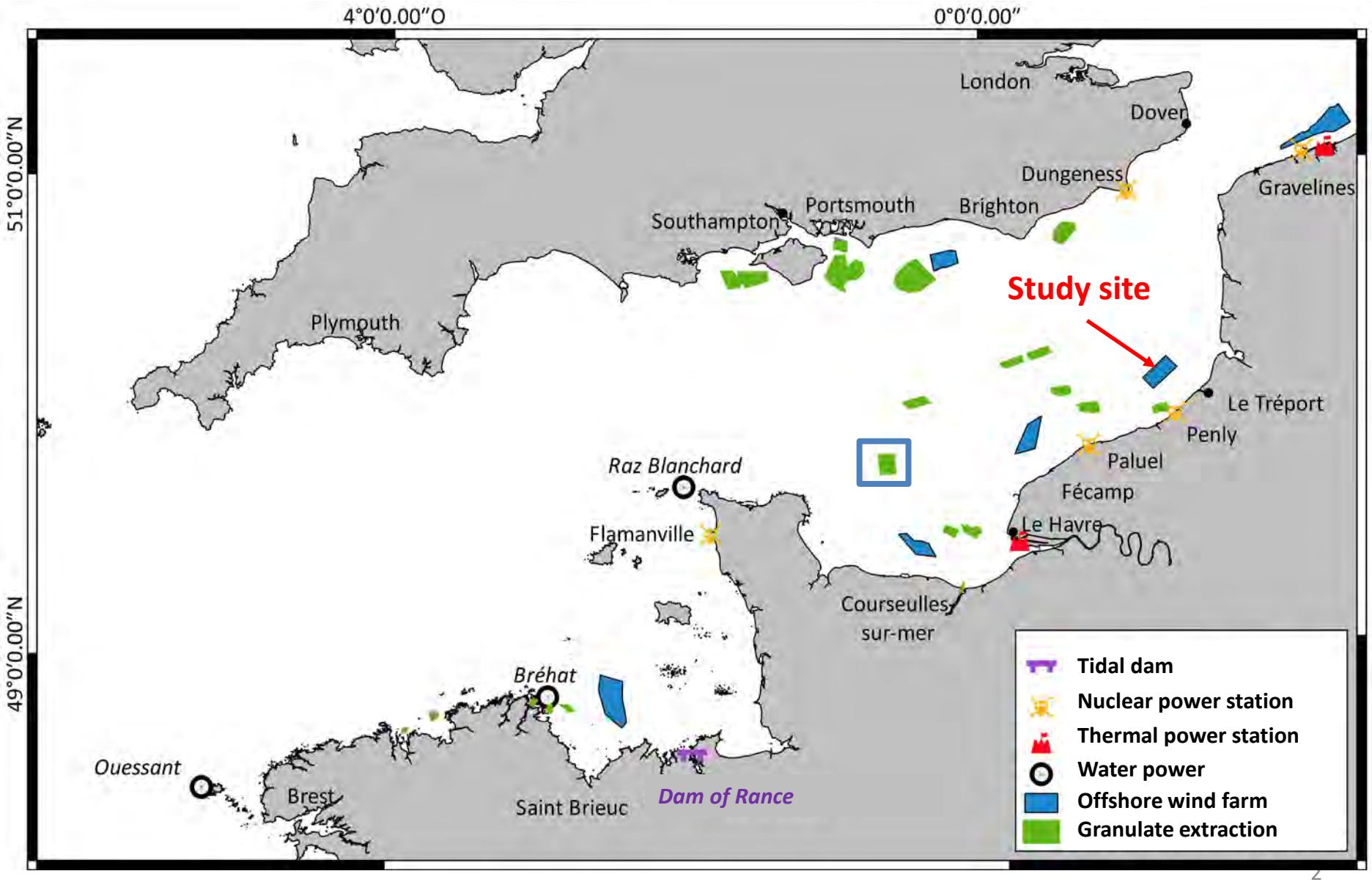
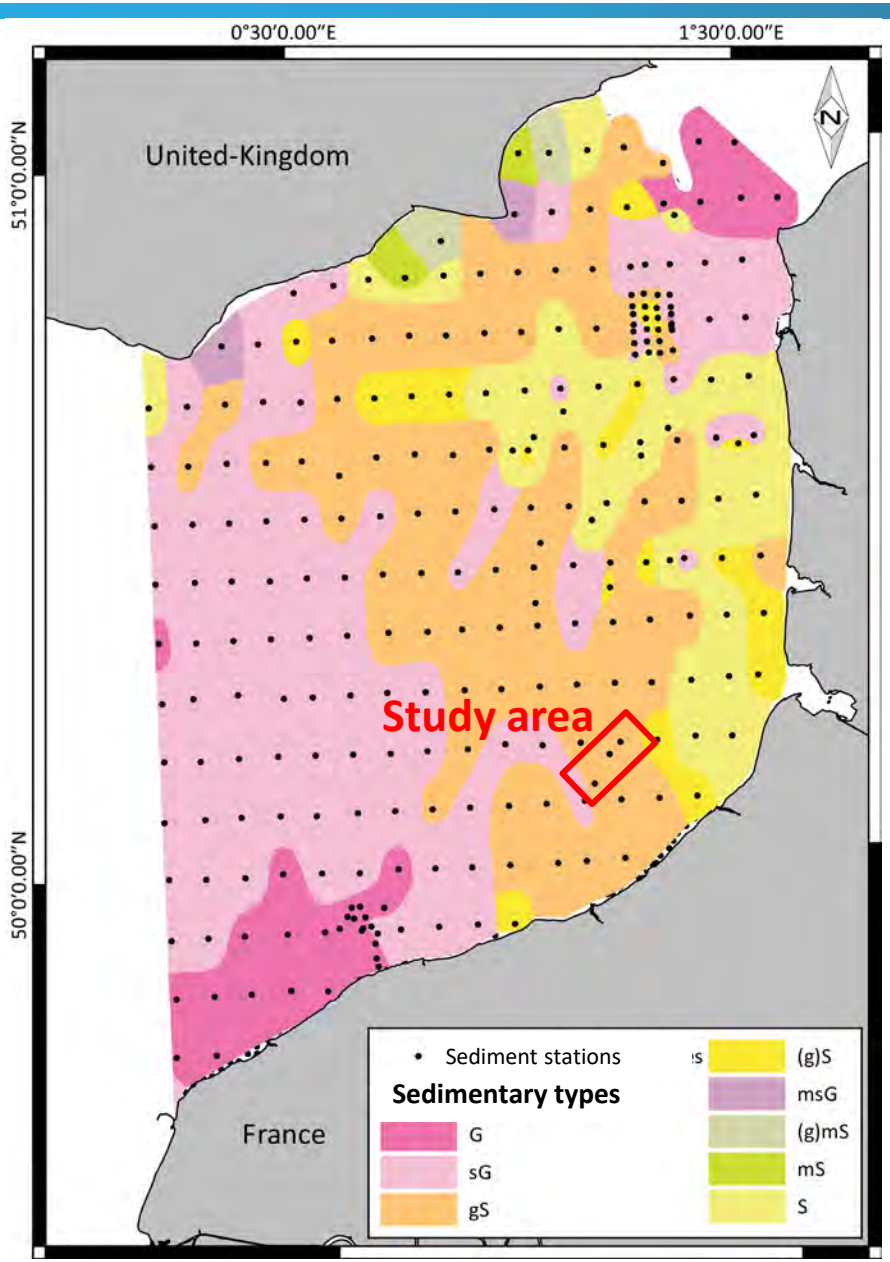
# Human activities along the English Channel



# Context: French Offshore Wind Farms (OWF) development




| | |
|---|---|
| Capacity | 496 MW |
| Number of turbines | 62 |
| Foundation type | **Jacket** |
| Distance from shore | More than 10 km |
| Area | 50 Km² |
| Commissioning | 2026 |

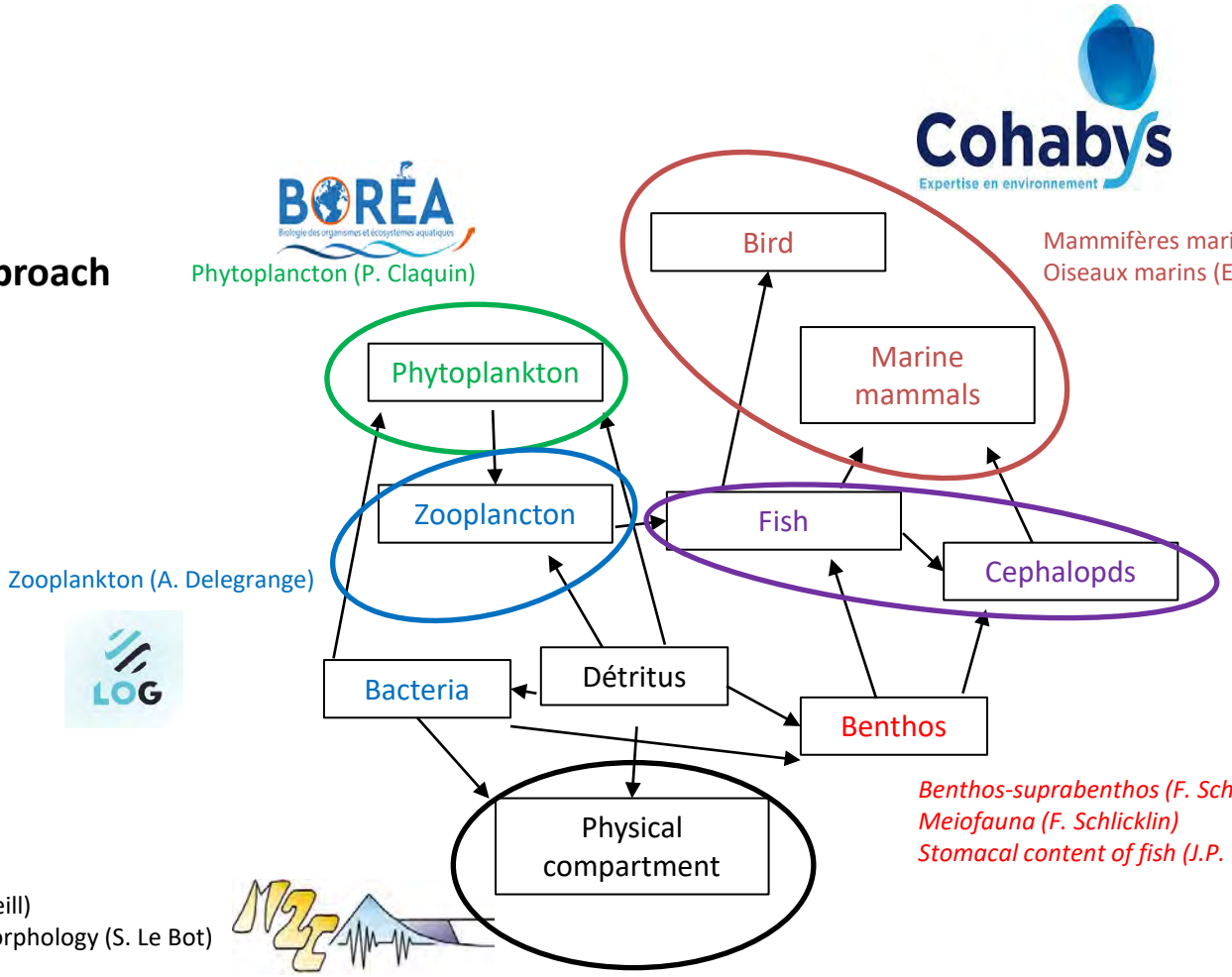
- **3 major sedimentary types (Folk) :**
  - sandy Gravel (sG) : 4,167 km²
  - gravelly Sand (gS) : 3,535 km²
  - Sand (S) : 1,601 km²

  **83 %**
- **other sedimentary type : 1,869 km²**
- **Localisation of the OWF on three sediment type**

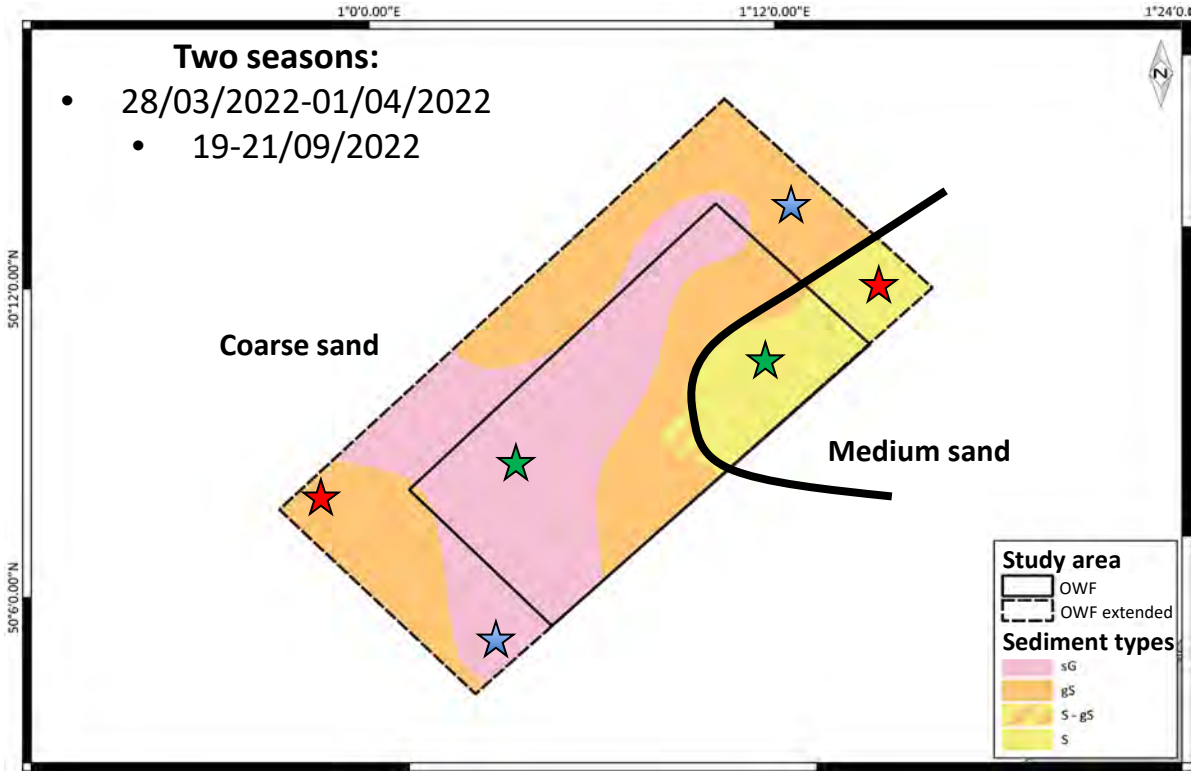
# Problematic

- Opportunity of an ecosystemic approach before offshore wind farm construction.
- Study of the whole ecosystem and links between the different compartments.
- Link between demersal fish and the benthos/suprabenthos.

**Phase 1: Isotopic approach (2022-2023)**



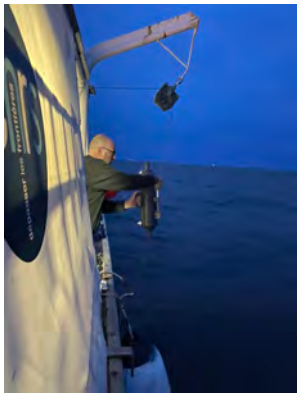
# Phase 1 - Sampling Strategy




| | ★ | ★ | ★ |
|---|---|---|---|
| Organic matter | | | |
| Phytoplankton | | | |
| Zooplankton | | | |
| Suprabenthos | | | |
| Benthos | | | |
| Meiofauna | | | |

**Sorting directly after sampling**

**Freezing by species, habitat and season**

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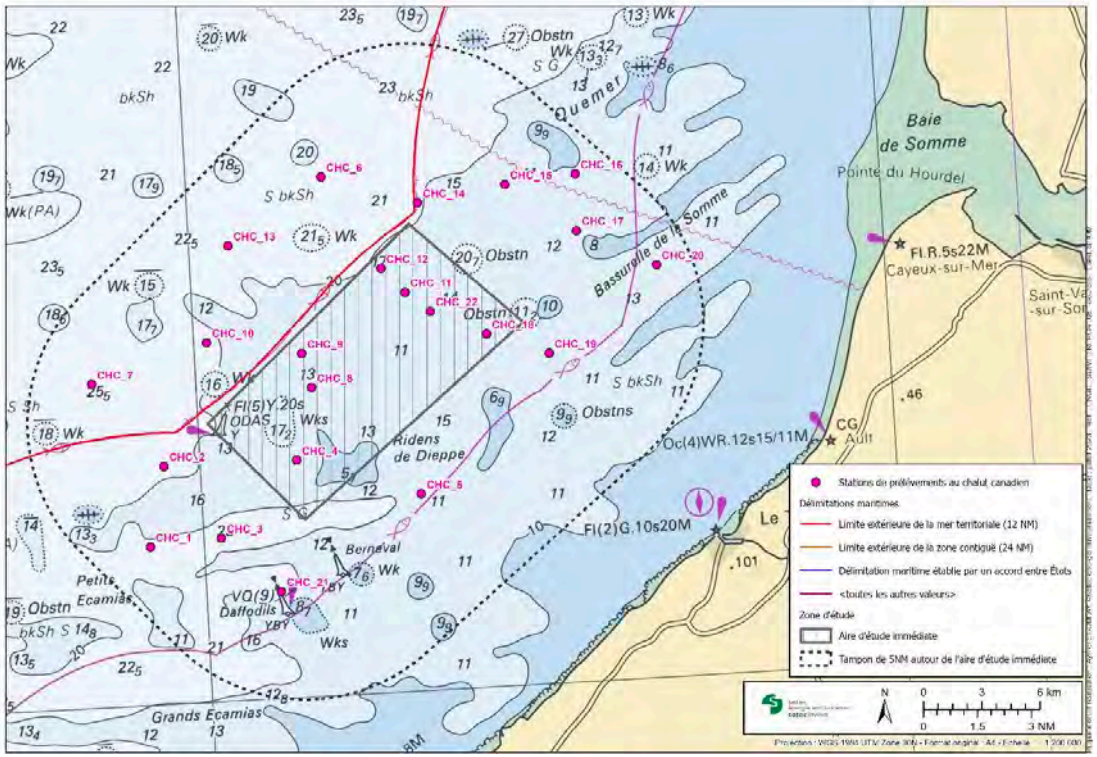



**Two seasons:**

- 22-23/09/2022
- 21-22/04/2023

22 Canadian trawls hauls

## Demersal fishes

**Sorting directly after sampling**

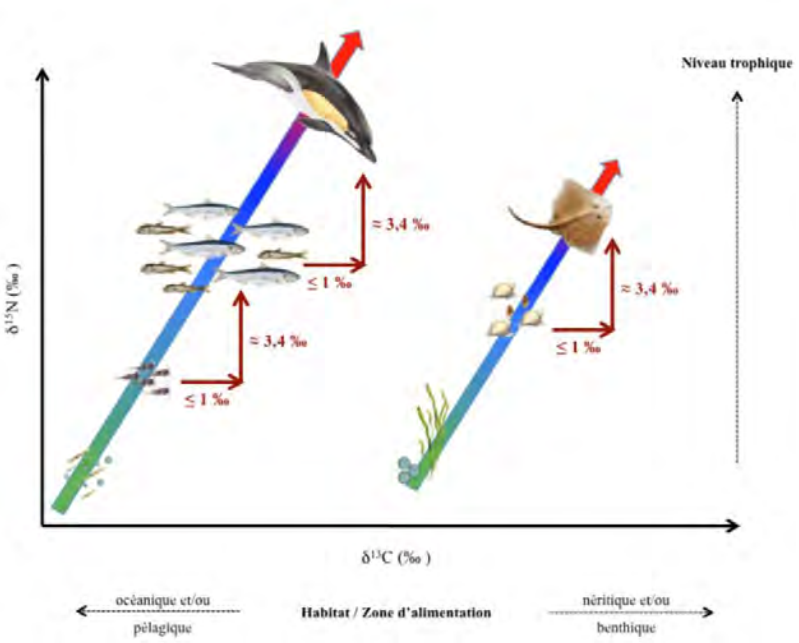
**Freezing by species, habitat and season**

**Stomach contents analyzed** (3,000)

# Phase 1 – Isotopic analyses

Isotopic analyses were performed on the different biological compartments :

- Zooplancton (copepods, larvae)
- Meiofauna (2 taxa)
- Suprabenthos (2 taxa or more depending on the season and the sedimentary habitats)
- Benthos (15 taxa)
- Demersal Fish (9 or more depending on the season and the sedimentary habitats)
- Marine mammmals (2 taxa)
- Marine birds




**Biological campartments** were sampled

- during **2 seasons** (winter and spring)
- on **2 sedimentary habitats** (coarse and medium sand)

**Aim :**

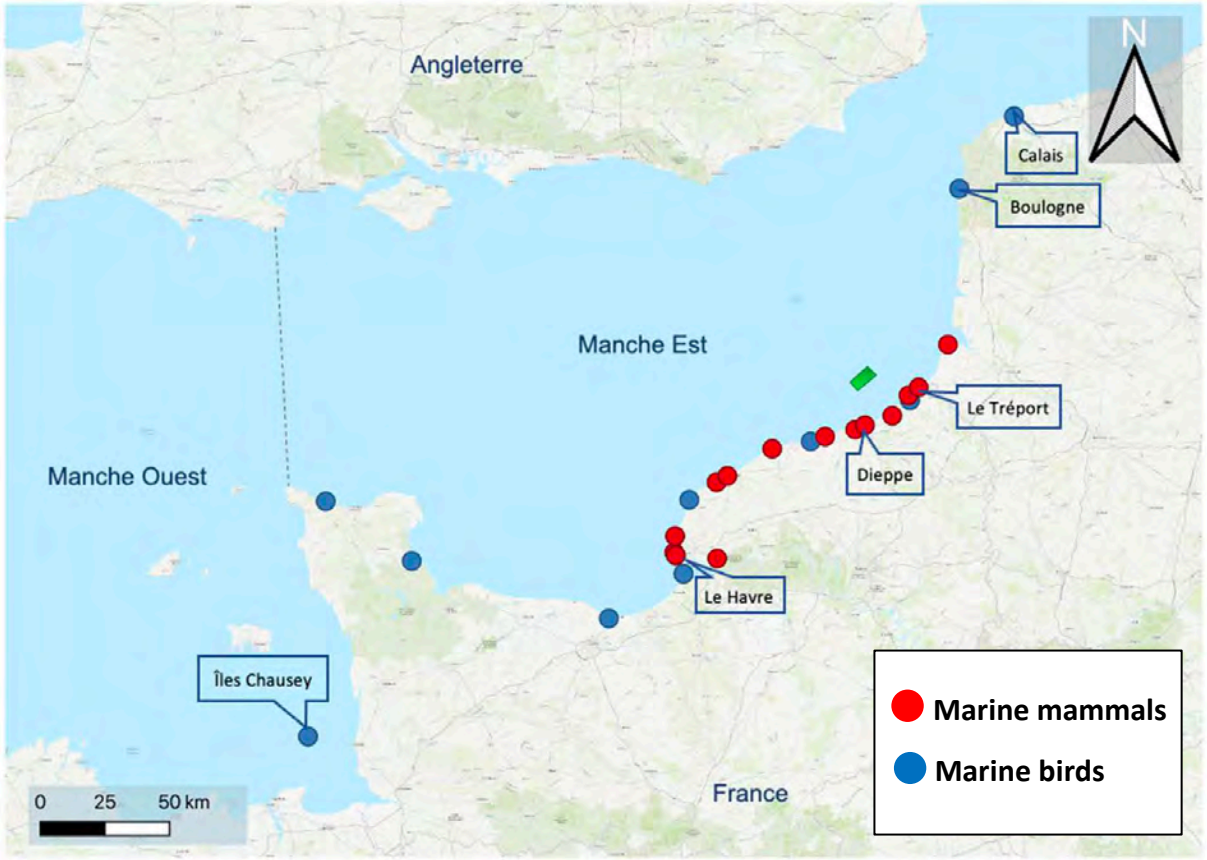
**Spatial characterization** of the different biological compartment trophic diet : **sedimentary habitat effect**

**Temporal characterization** of the different biological compartment trophic diet : **seasonal effect**

δ15N values → define the trophic level of each species

δ13C values → identify their position relative to the pelagic or the benthic trophic pathways

# Phase 1 - Sampling Strategy




## Marine birds and mammals

Marine mammals:

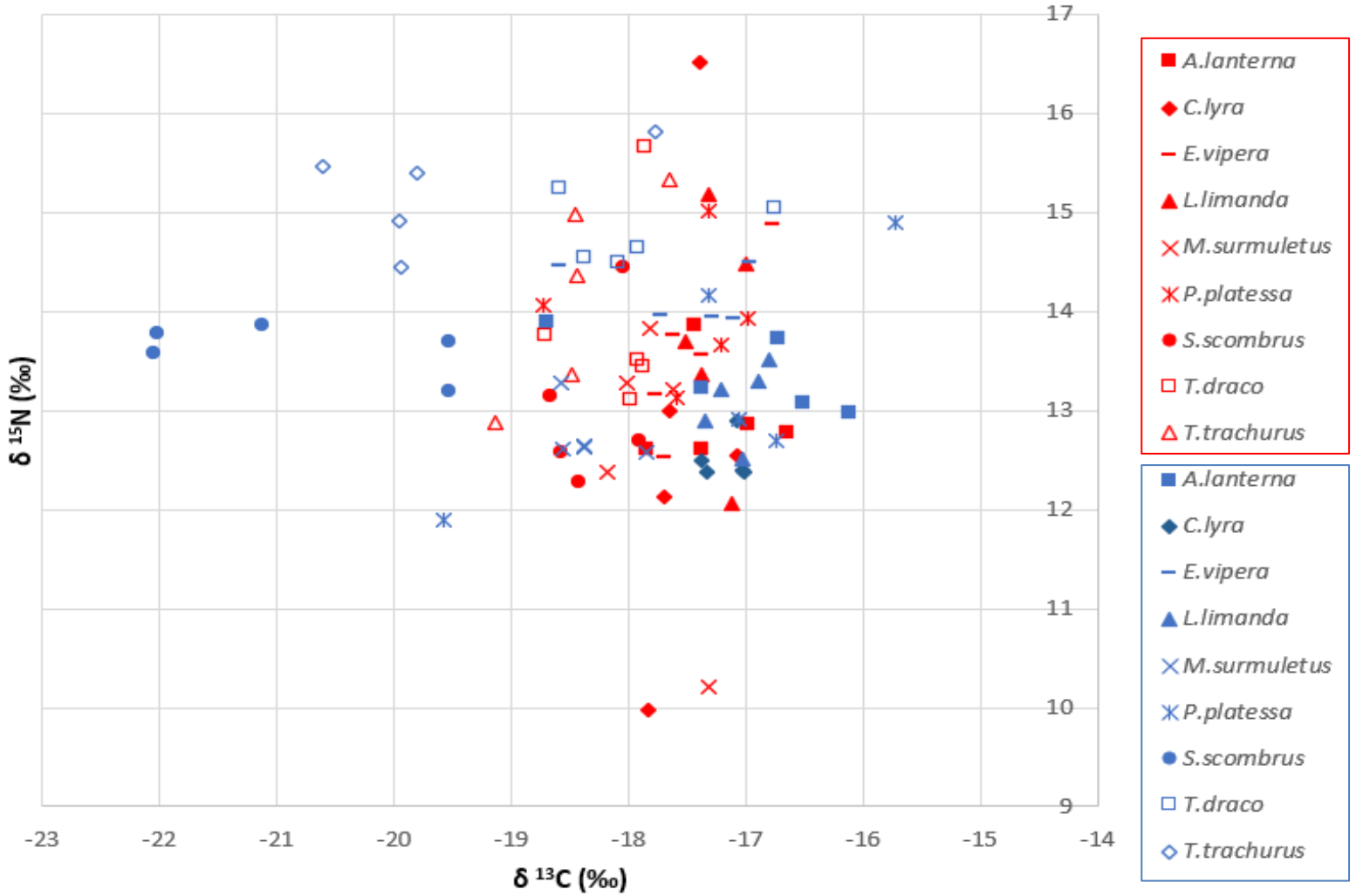
- National Stranding network (2016-2022)

Marine birds:

- MSFD contaminants sea birds (2021)
- Association for the defense of the environment (CHENE) (2022-2023)

# Phase 1 – Isotopic analyses – *Preliminary results on fish*

## Temporal characterization (i.e medium Sand)




March 2022

September 2022

# Phase 1 – Isotopic analyses – *Preliminary results on fish*

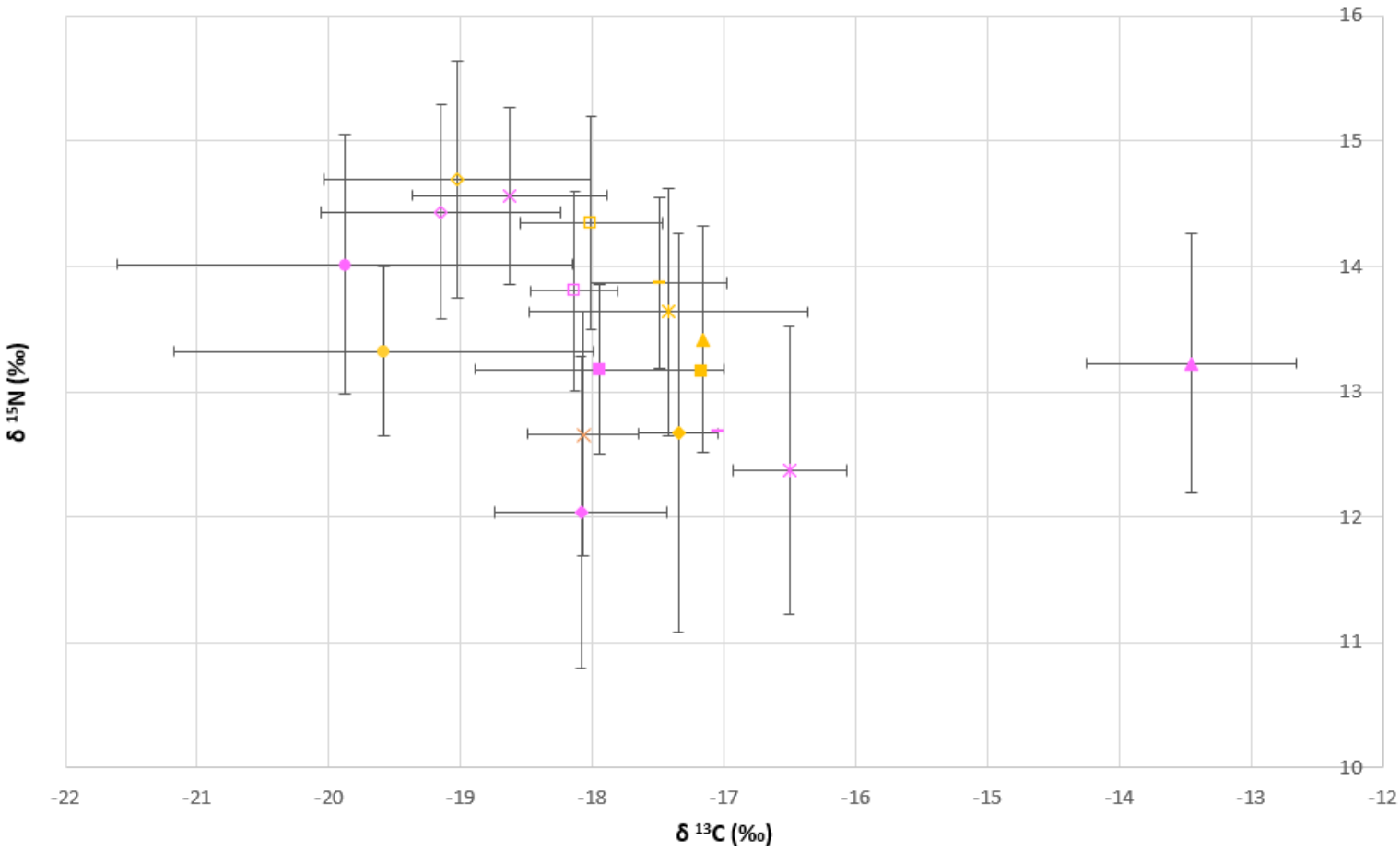
**Spatial characterization:** comparison between the two sedimentary habitats

**coarse sand**

- *Arnoglossus laterna*
- *Callionymus lyra*
- *Echiichthys vipera*
- *Limanda limanda*
- *Mullus surmuletus*
- *Pleuronectes platessa*
- *Scomber scombrus*
- *Trachinus draco*
- *Trachurus trachurus*

**medium sand**

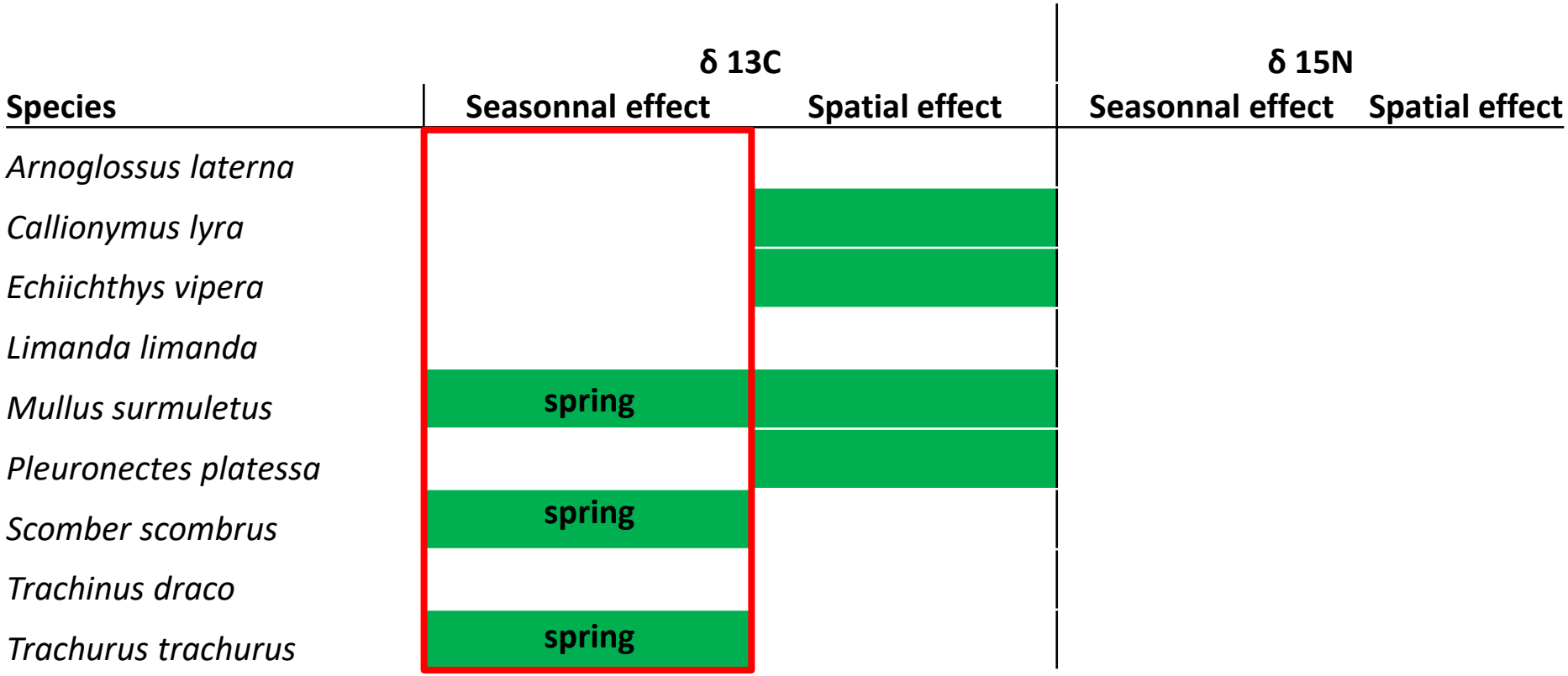
- *Arnoglossus lanterna*
- *Callionymus lyra*
- *Echiichthys vipera*
- *Limanda limanda*
- *Mullus surmuletus*
- *Pleuronectes platessa*
- *Scomber scombrus*
- *Trachinus draco*
- *Trachurus trachurus*



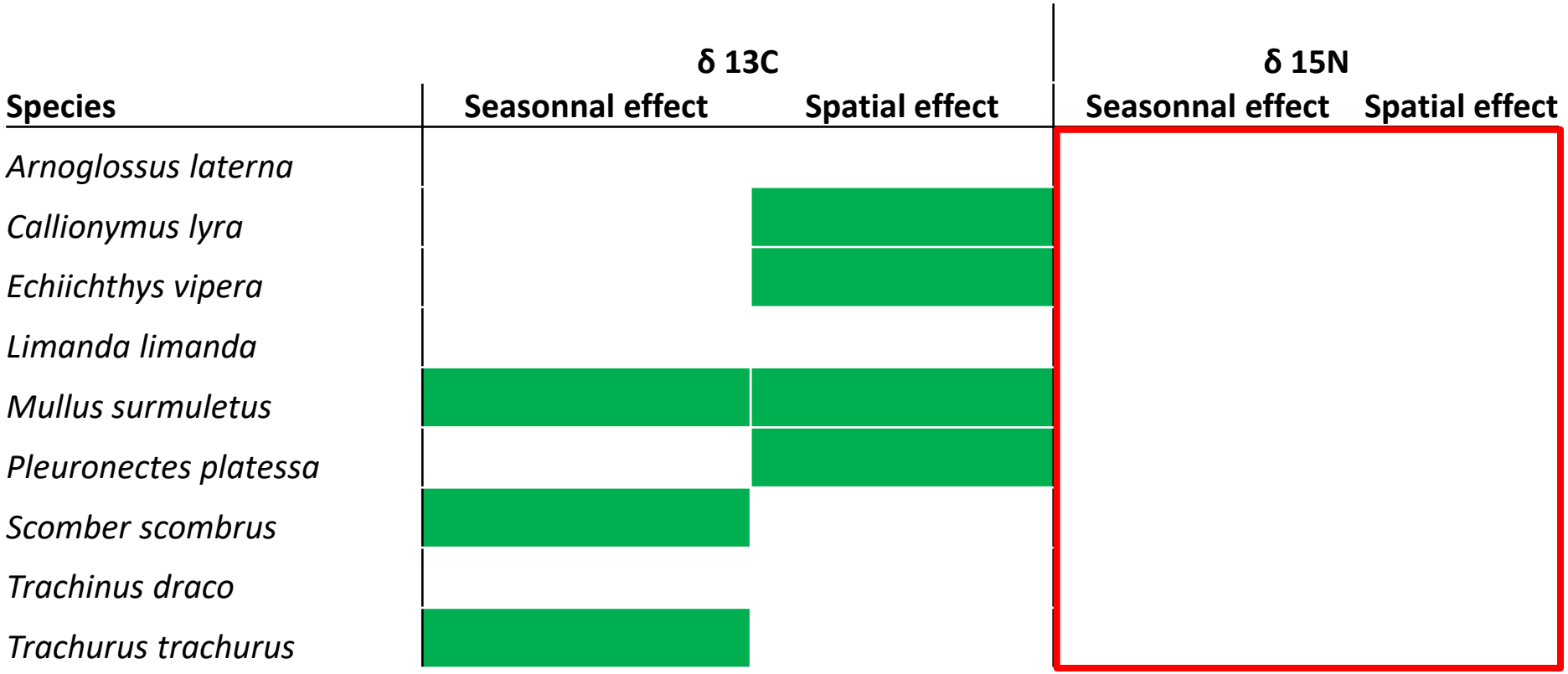
# Phase 1 – Isotopic analyses – *Preliminary results on fish*

| | δ 13C | | δ 15N | |
|---|---|---|---|---|
| **Species** | **Seasonnal effect** | **Spatial effect** | **Seasonnal effect** | **Spatial effect** |
| *Arnoglossus laterna* | | | | |
| *Callionymus lyra* | | **medium sand** | | |
| *Echiichthys vipera* | | **coarse sand** | | |
| *Limanda limanda* | | | | |
| *Mullus surmuletus* | | **medium sand** | | |
| *Pleuronectes platessa* | | **coarse sand** | | |
| *Scomber scombrus* | | | | |
| *Trachinus draco* | | | | |
| *Trachurus trachurus* | | | | |

# Phase 1 – Isotopic analyses – *Preliminary results on fish*

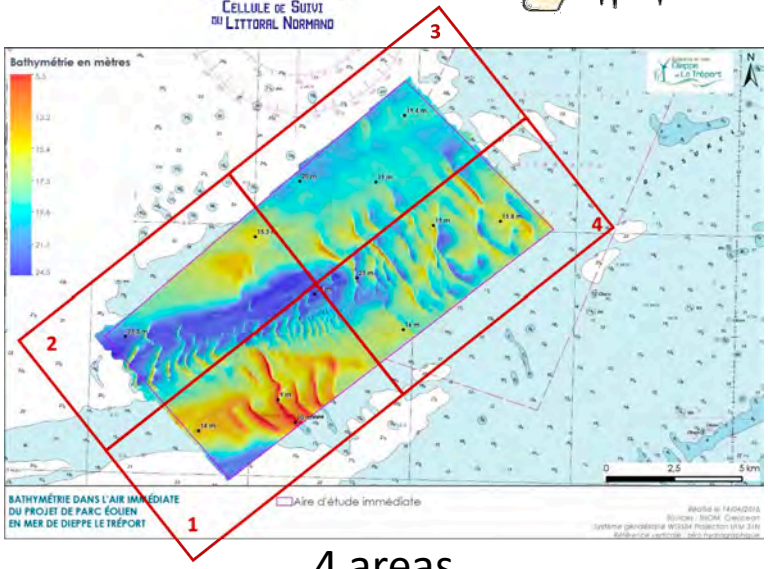


# Phase 1 – Isotopic analyses – *Preliminary results on fish*



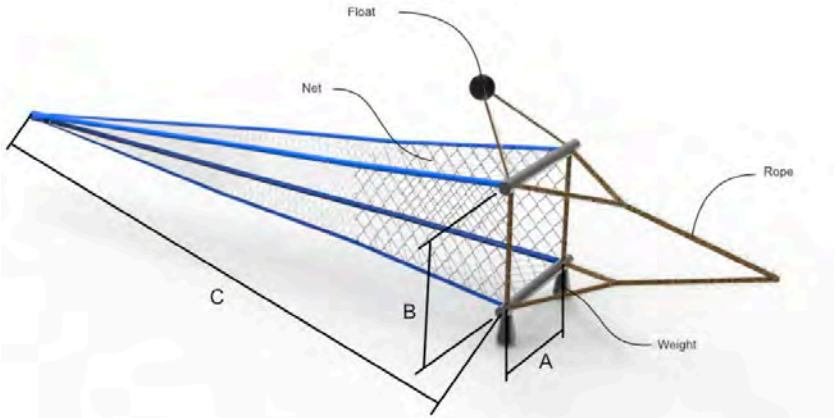
# **Phase 2 - Prey-predator link** between pelagic fishes and marine birds (2023/2024)

Lack identified in the pelagic fish compartment: important element in understanding the diet of marine birds and mammals in the functioning of the ecosystem




4 areas

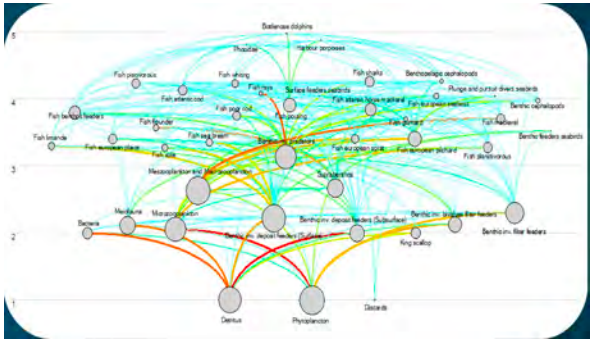
2 seasons: october 2023 / march 2024




Pelagic trawl

- Coupling fish/mammals observations with pelagic fishes sampling
- Isotopic and stomacal analyses on pelagic fishes

# Phase 3 – Thesis (2024-2027)



1

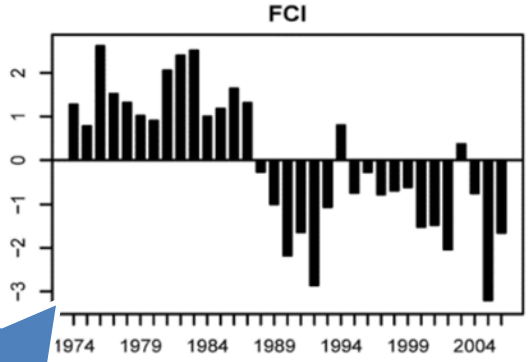
Quantitative model:

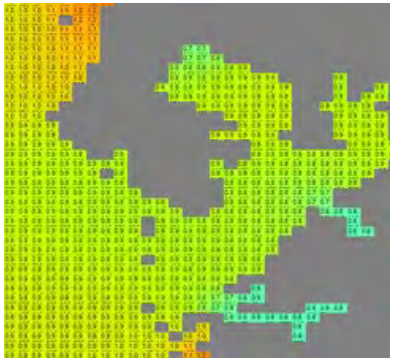
**Ecopath :** Static image of the ecosystem

2

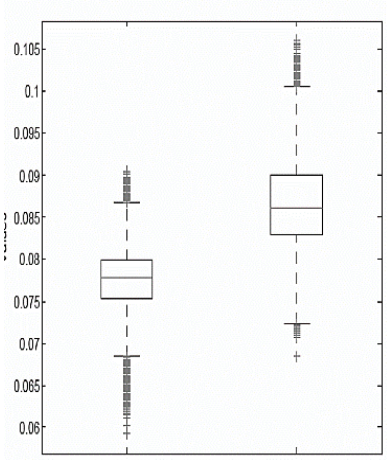
Quantitative model

**Ecosim / Ecospace** : **temporal and spatial simulation**



3




FCI (recycling)

**Modeling of the ecosystem by integrating physical forcing (current map)**

collaboration with A.C. Bennis (M2C) and N. Niquil (BOREA)

# Thank you for your attention!

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« GIS Eolien en Mer »