Operationalising Ecologically or Biologically Significant Marine Areas (EBSA) criteria for ecosystem-based conservation and management

Lukyanova, O., Pouso, S., García-Barón, I., Borja, A., Bas, M., Cormier, R., Katsanevakis, S., Neuenfeldt, S., Stelzenmüller, V., & Galparsoro, I.

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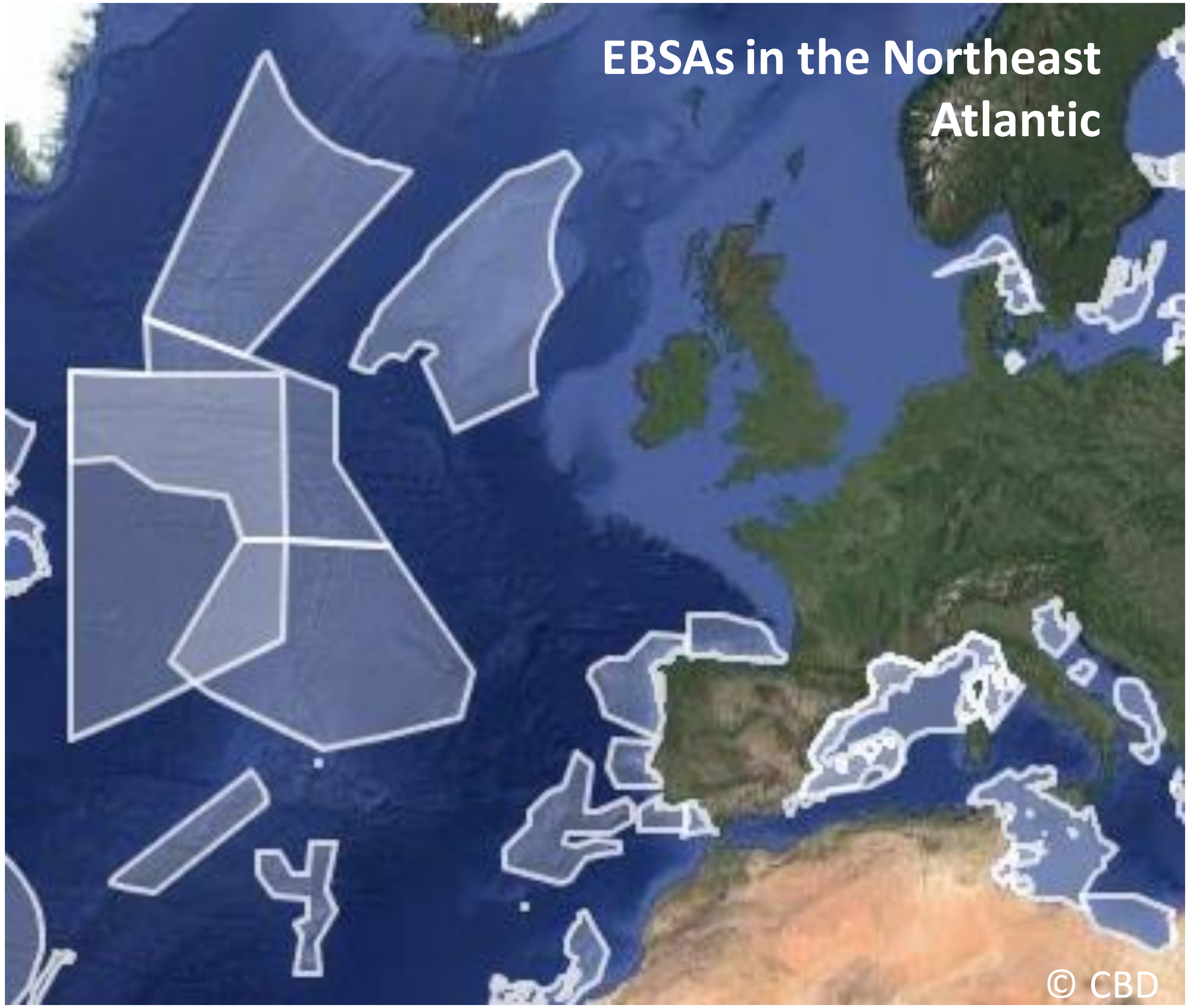
Online

Why EBSAs?

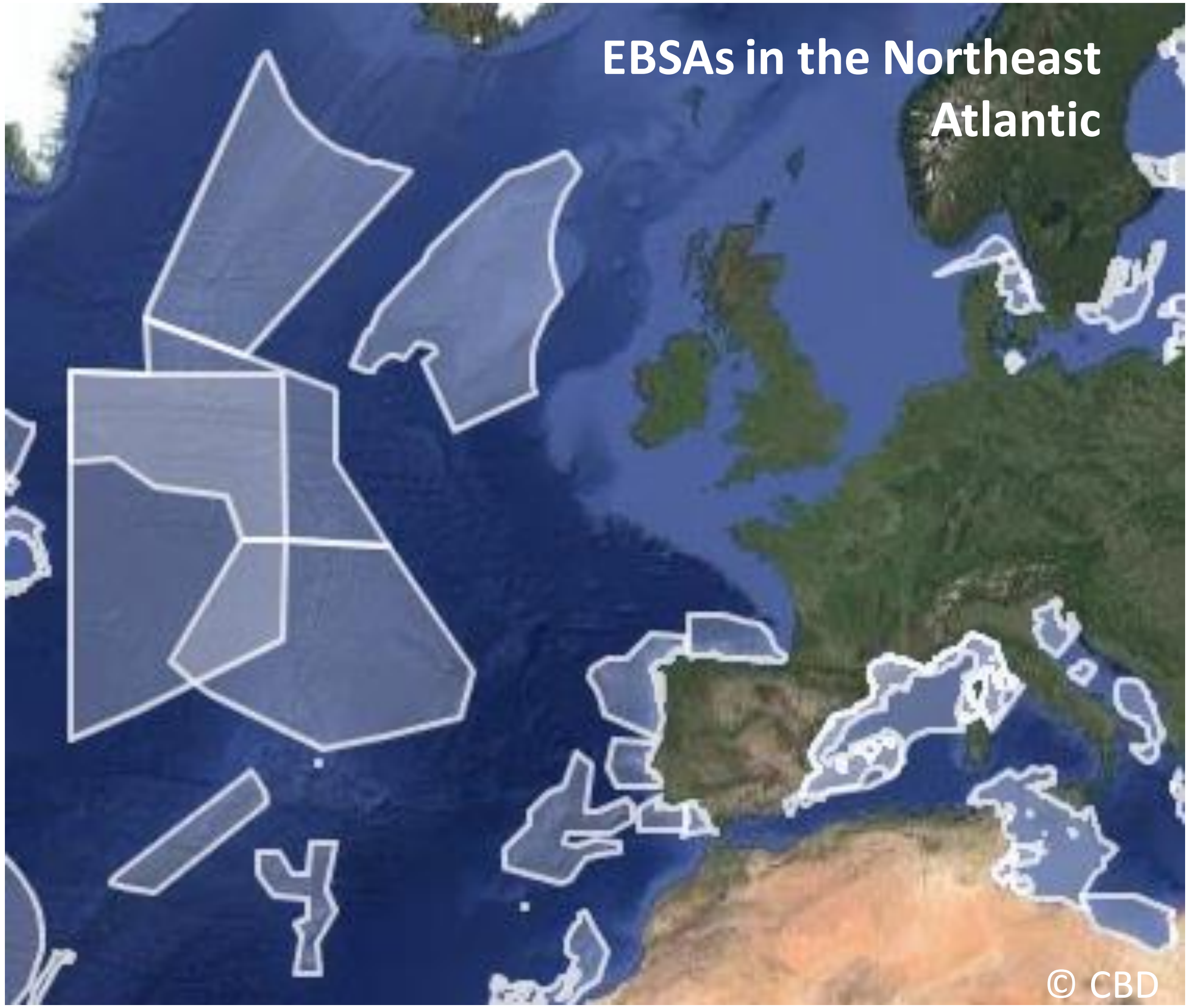
EBSAs are described based on **seven criteria,** adopted by **CBD in 2008**

1. Uniqueness or Rarity
2. Special importance for life history stages of species
3. Importance for threatened, endangered or declining species and/or habitats
4. Vulnerability, Fragility, Sensitivity, or Slow recovery
5. Biological Productivity
6. Biological Diversity
7. Naturalness

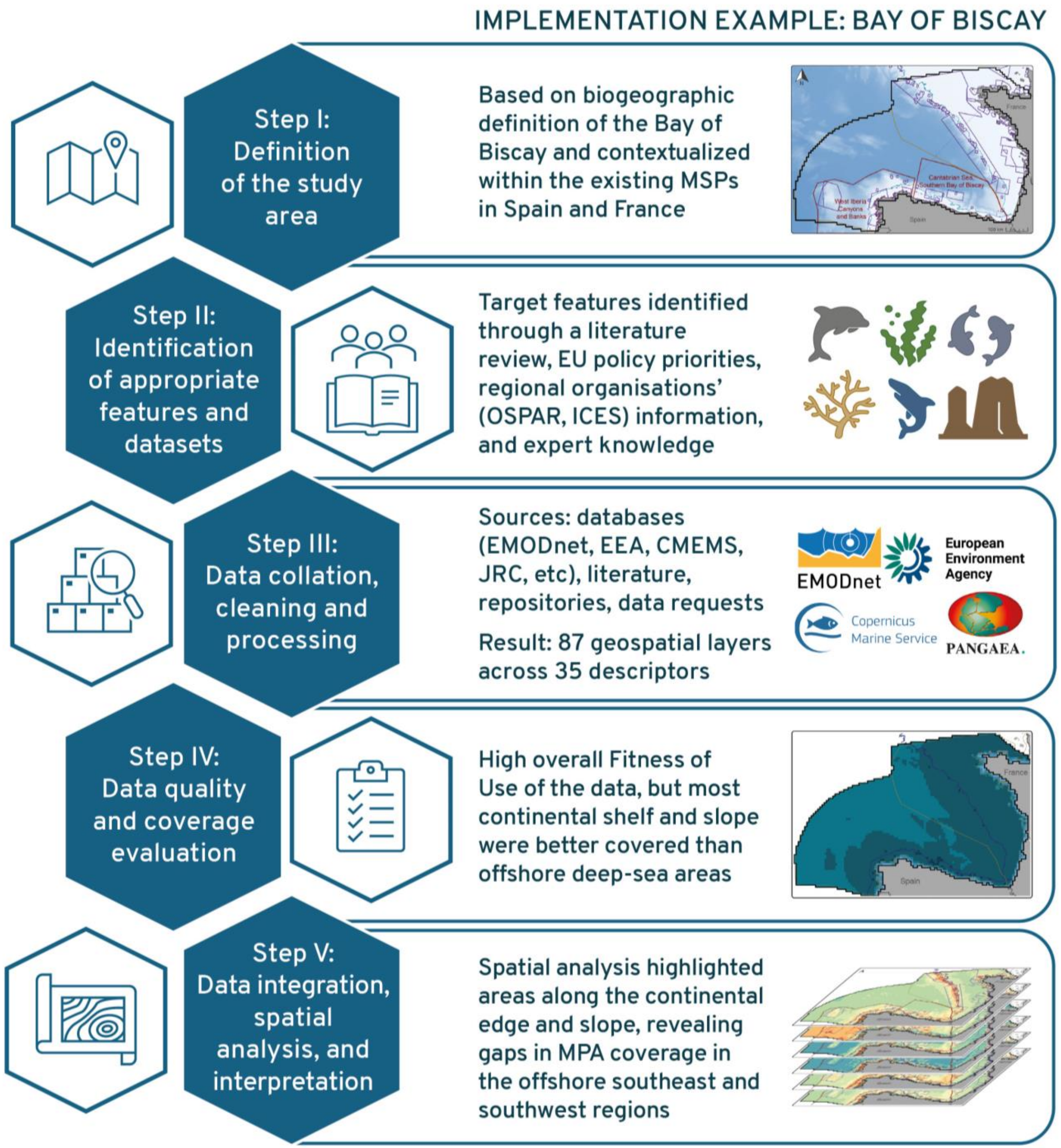


Why EBSAs?

- EBSA criteria **shift the focus** from particular species and habitats to **areas and processes crucial for ecosystem functioning** and **services**
- **Regional approach**
- **Broad definitions** allow for **flexibility and adaptability**, but **complicate local-scale implementation**
- CBD EBSAs are **not legally binding**, and most **do not have any management measures**
- **Size and configuration** often hinder their implementation **in local or regional area-based planning**



Operationalisation framework



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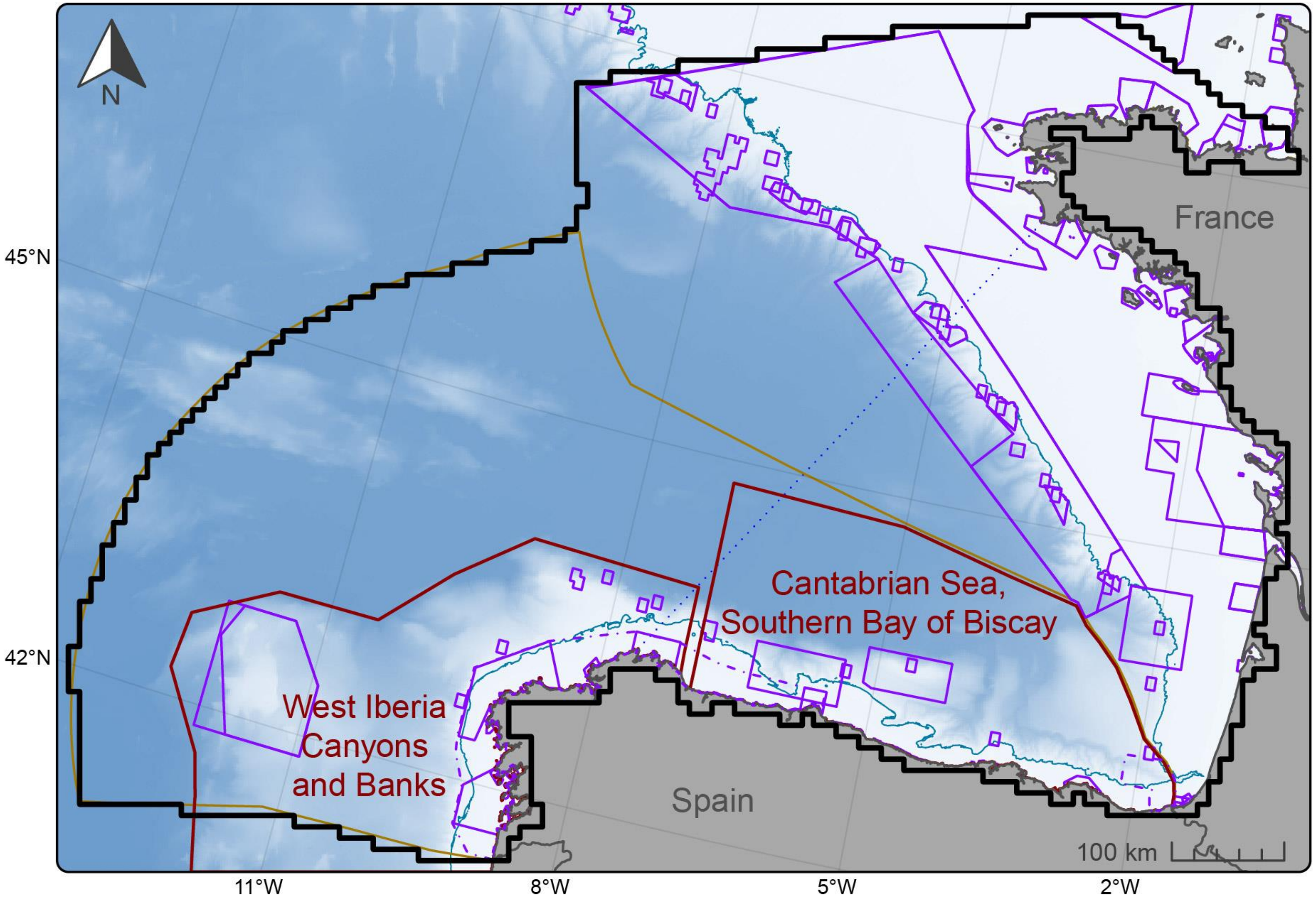
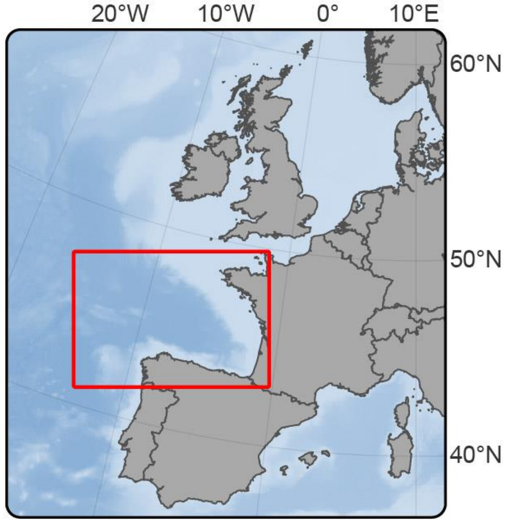
Study area: Bay of Biscay





II Conservation features

EBSA criteria

1. Uniqueness or Rarity
2. Special importance for life history stages of species
3. Importance for threatened, endangered or declining species and/or habitats
4. Vulnerability, Fragility, Sensitivity, or Slow recovery
5. Biological Productivity
6. Biological Diversity
7. Naturalness

What specifically? →

Review of the CBD documentation and EBSA identification practice + scientific literature to **identify possible features**

What specifically in BoB ? →

Expert consultation and **literature review** to identify specific features for the Bay of Biscay

II Conservation features

EBSA Criteria	Target Descriptors	Target Features
Uniqueness or rarity	Submarine geomorphology	Canyons, seamounts and knolls
	Unique and rare habitats	Coral reefs, deep-sea sponge aggregations, pockmark fields, sea caves
		Habitats hosting unique (sub-)populations
Special importance for life-history stages of species	Breeding areas	Seabird breeding colonies and foraging range around them
		Marine mammals breeding areas (*Tursiops truncatus* , etc)
	Spawning areas	Spawning areas of the keystone species (*Merluccius merluccius* , *Lophiiformes*)
		Spawning areas of other fish including commercially important species (*Scomber*
	Recruitment and nursery areas	Juvenile concentrations of the keystone species, which are also commercially
		Juvenile concentrations of other commercially important species (*Scomber*
		Juvenile concentrations of elasmobranchs
		Juvenile concentrations of marine mammals
	Habitats and geomorphology features known to serve as spawning, nursery and feeding areas	Estuaries, inlets and bays, sandbanks, mud- and sandflats, reefs, caves, canyons,
		Seagrass beds, kelp forests
Importance for threatened, endangered or declining species and/or habitats	IUCN European Red List species	Seabirds
		Marine mammals
		Elasmobranchs
		Deep-sea fishes
		Demersal and pelagic fishes
		Reptiles
		Benthic species
	Birds protected under the Birds Directive	All naturally occurring seabirds
	Species and habitats protected under the Habitats Directive in the Marine Atlantic region in Spain and France	7 habitats: Sandbanks (1110), Reefs (1170), Pockmarks (1180), Caves (8330),
		40 species: 1 anthropod, 1 fish, 28 mammals, 1 mollusc, 5 reptiles, 2 non-vascular
		All naturally occurring cetaceans
	Recruitment and nursery areas of IUCN European	Recruitment areas and juvenile distributions of species
	OSPAR list	37 species and habitats listed as under threat and/or in decline in OSPAR Region IV (Bay of Biscay and Iberian Coast)
	Vulnerable Marine Ecosystems (VME) habitats and indicator species as identified by ICES	VME habitats and indicator species present in the Bay of Biscay: Coral Gardens, Cold-water coral reefs, Anemones, Xenophyophores, Crinoids, Sponges, Sea-pen and burrowing megafauna.
	Submarine geomorphology features known to	Canyons, seamounts and knolls (all as proxies)

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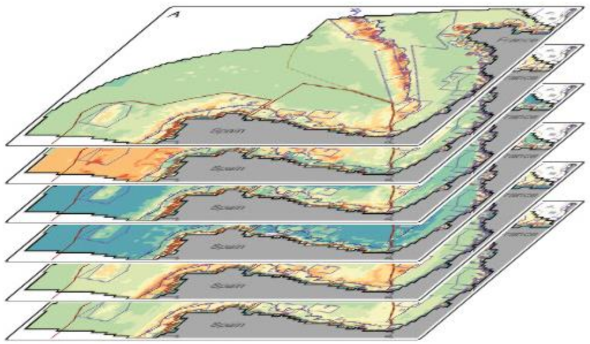
III Data collation, cleaning and processing

By far the most **complex, time-consuming,** and **tedious** part

- Requires **diverse datasets**: environmental monitoring, surveys, fish stock assessments, etc.
- In the EU, a lot is available through **public repositories**
- **Outreach** to research institutes, NGOs, and experts
- Use of **proxy indicators** or **expert knowledge**

Data inclusion criteria

- Data that were **readily available** or provided upon request
- Met **quality standards** and included comprehensive metadata
- **Spatially covered** most of the Bay of Biscay, or the spatial distribution of a given feature

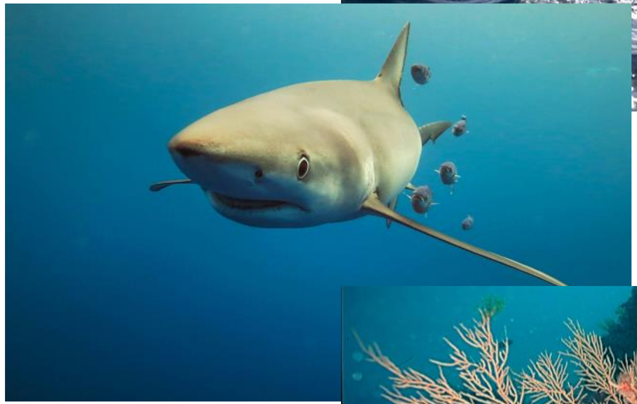


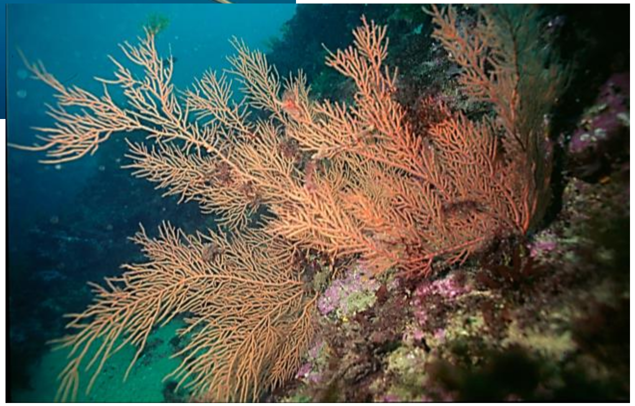
III

Bay of Biscay dataset

154 geospatial data layer collated guided by **EBSA Criteria**, including**:**

- **35 species** distributions (seabirds, cetaceans, elasmobranchs, corals, sponges)
- **47 areas of special importance for life-history stages of species** (spawning, breeding, nursery areas)
- **46** benthic and coastal **habitats**
- **19 vulnerable marine ecosystems** / indicators
- Biodiversity **indicators** (species and habitat richness)
- Regions of locally high **productivity**
- Assessments of **biodiversity status** and cumulative anthropogenic **pressures**





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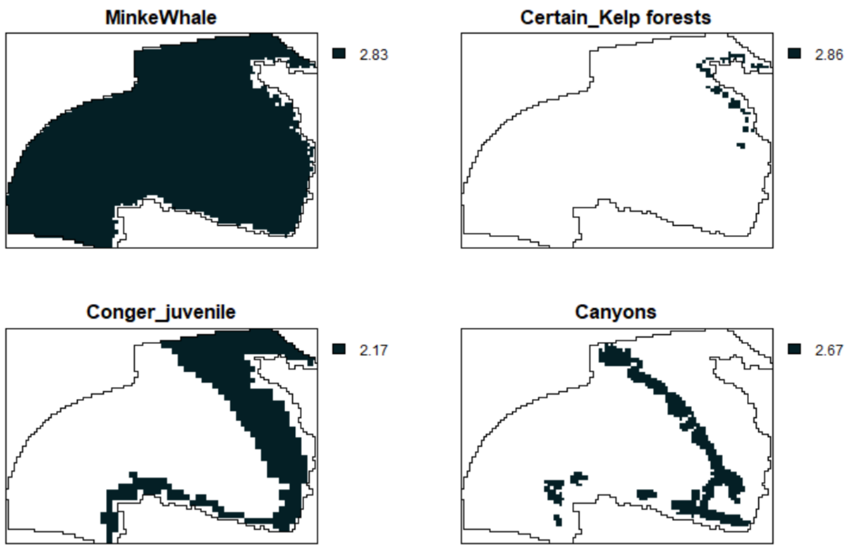
IV Data quality and coverage evaluation

Major gaps

- Data on **elasmobranchs** (sharks and rays)
- Data on **non-commercial fish** species
- Data on **deep-sea** species and habitats
- Some **keystone** species distribution and **spawning/recruitment areas** (e.g., *Lophiiformes*)
- Good-quality / -resolution **biodiversity assessments**
- **Productivity** in the **deep sea**
- **Naturalness** assessments

IV Data quality and coverage evaluation

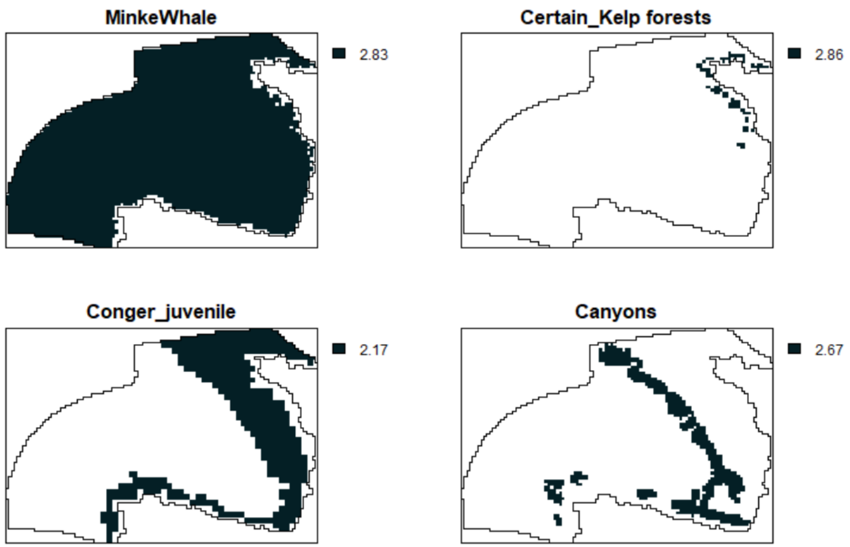
- Each data layer is evaluated based on **seven indicators** across **three components**.
- Fitness for Use Score (FUS) is calculated as the **mean of relevant indicators' scores**
- FUS is assigned as **a uniform value across the feature 's spatial layer extent**

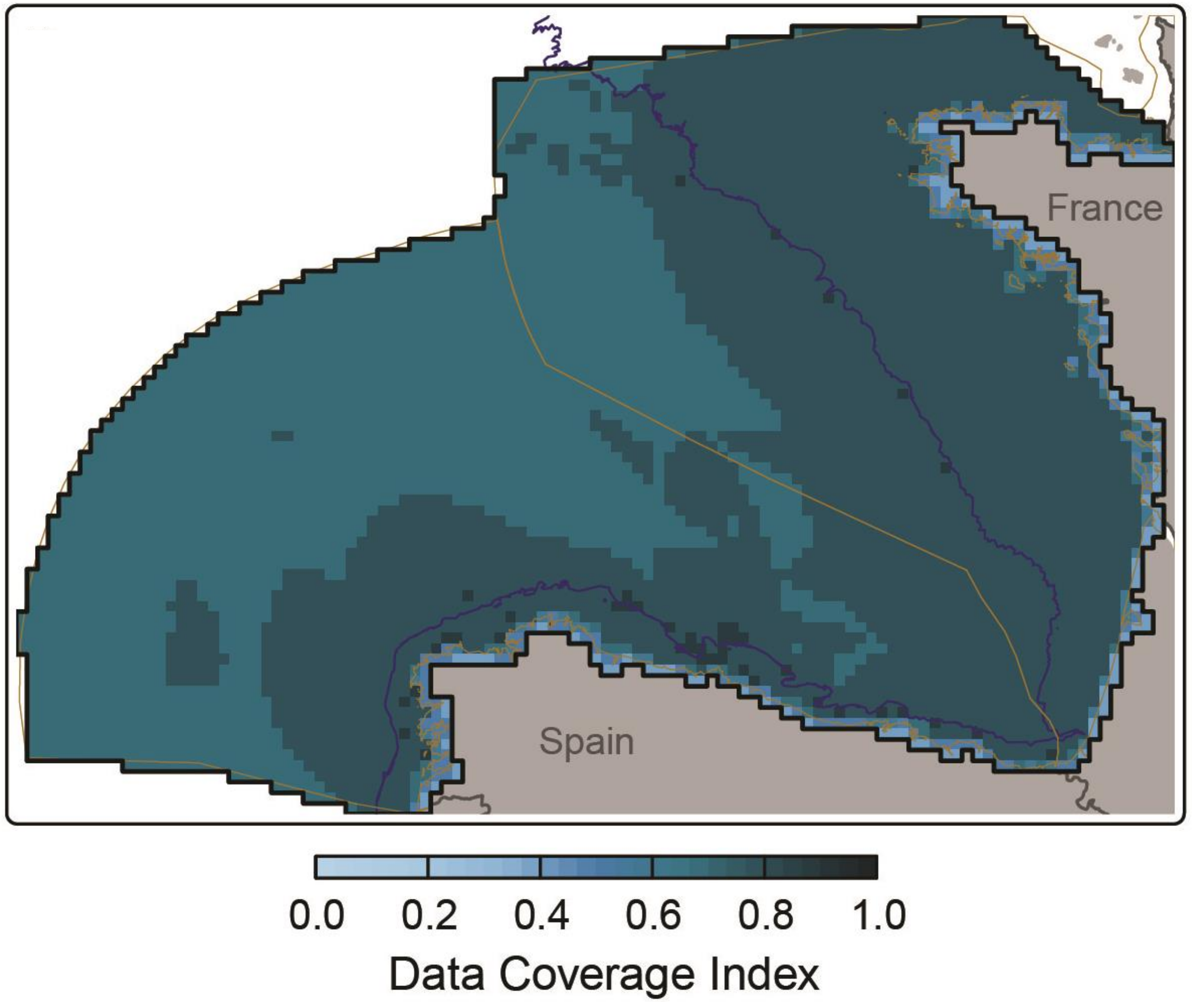


Assessment components	Indicators	Fitness for Use Score		
		Low = 1	Medium = 2	High = 3
Data source	Data collection method	Proxy and non-validated models	Modelling	Empirical
	Data collection purpose	The data on feature was collected incidentally and there is limited accuracy and coverage	The data on feature was collected incidentally but is relatively well-covered by the dataset	Data was collected specifically for the feature with adequate and consistent sampling across space and time
Spatial aspects	Spatial accuracy	Limited reflection of spatial distribution and variability of a feature	Partial reflection of spatial distribution and variability of a feature	Adequately reflects the spatial distribution and variability of a feature
	Spatial resolution	Significantly coarser than the analysis resolution	Slightly coarser than the resolution of the analysis, but does not introduce any major uncertainty	Less or equal to analysis resolution
Temporal aspects	Spatiotemporal variability	Limited reflection of spatiotemporal variations of a feature	Partial reflection of spatiotemporal variations of a feature	Adequately reflects the spatiotemporal variations of a feature
	Period covered	Less than 5 years of data	5-10 years of data	More than 10 years of data
	Recency	More than 30 years old	10-30 years old	Less than 10 years old

IV Data quality and coverage evaluation

- Data Coverage Index (DCI) is a **sum of the FUS** values of all layers **divided by the maximum possible score** (i.e., if each layer would get a FUS of 3) for each given cell.
- Indicates spatial coverage and fitness for use of the dataset, with **higher scores denoting areas with more and better-quality data**.



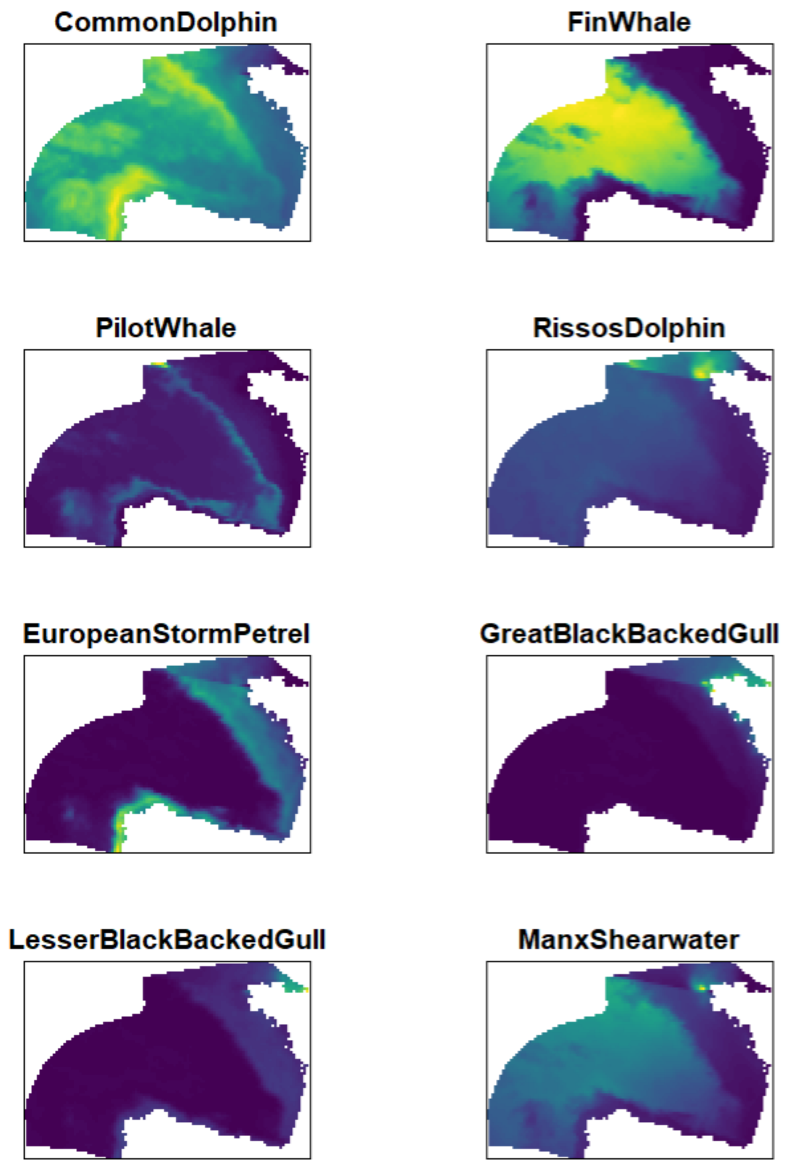


V Spatial analysis: Mapping EBSAs

1. **Delphi Method** to assign relevant EBSA criteria to each feature (including cases where a feature served as a proxy)

   → Some features met more than one criterion

EBSA Criteria	Nº of layers
Uniqueness or rarity	27
Special importance for life-history stages of species	83
Importance for threatened, endangered or declining species and/or habitats	108
Vulnerability, fragility, sensitivity, or slow recovery	65
Biological productivity	35
Biological diversity	69
Naturalness	17



V Spatial analysis: Mapping EBSAs

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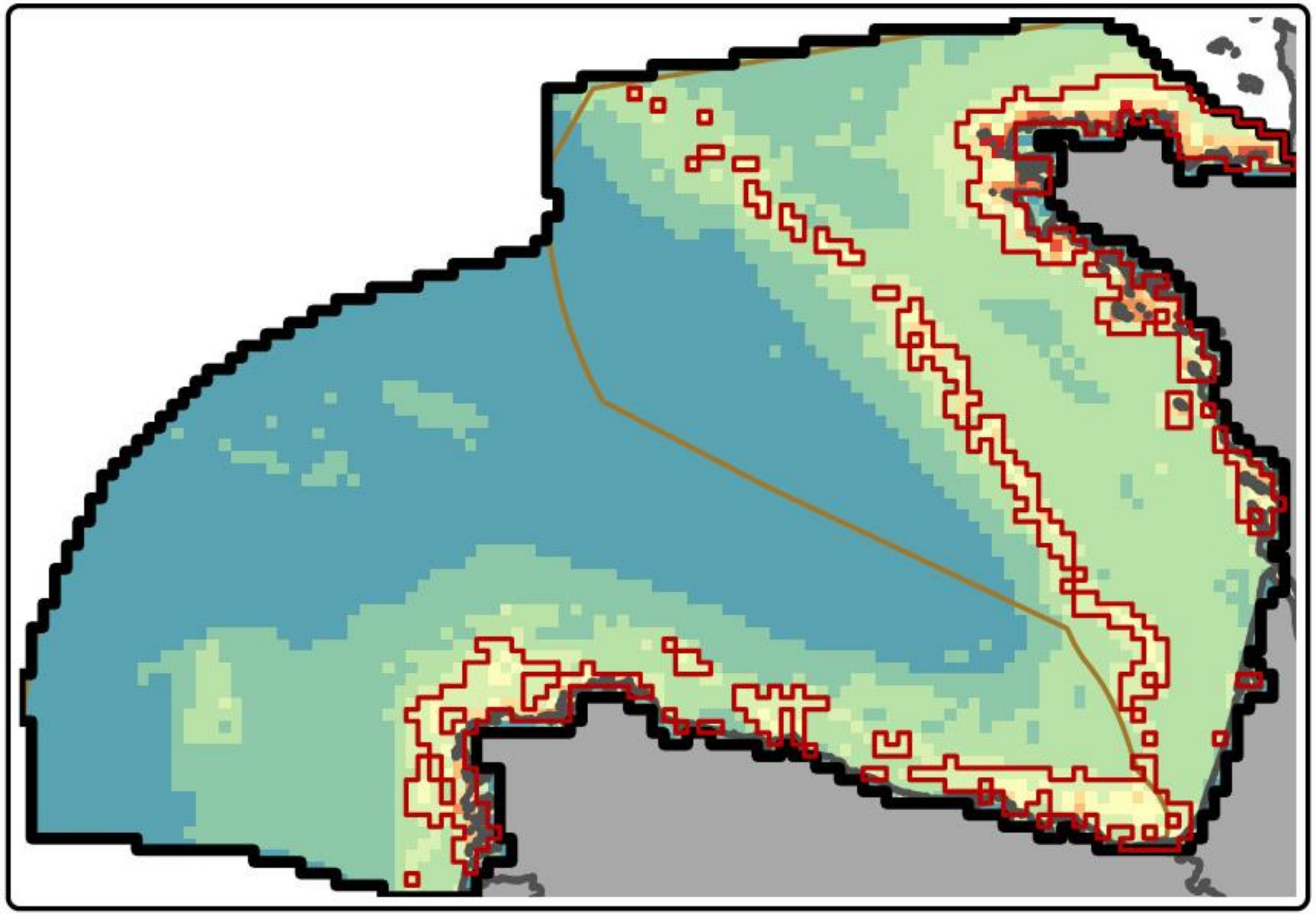
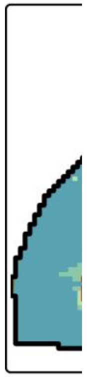
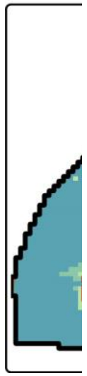
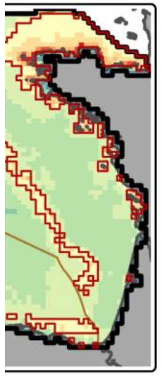
Special importance for life–history stages of species



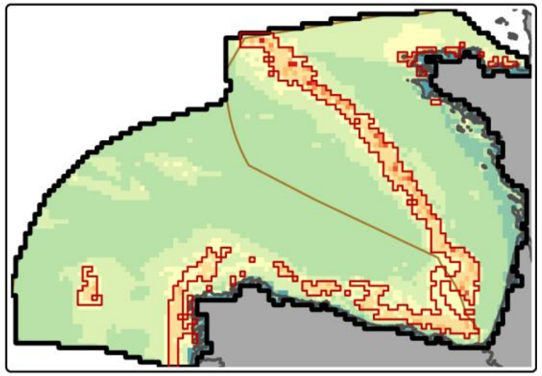


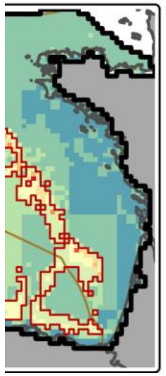


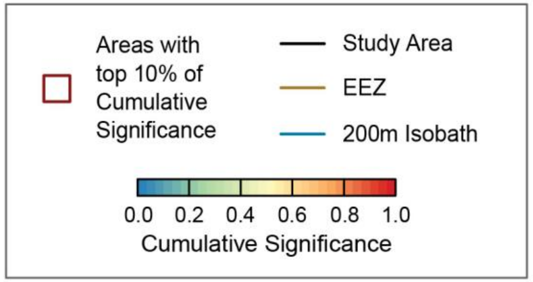
endangered
or habitats



Vulnerability, fragility, sensitivity, or slow recovery



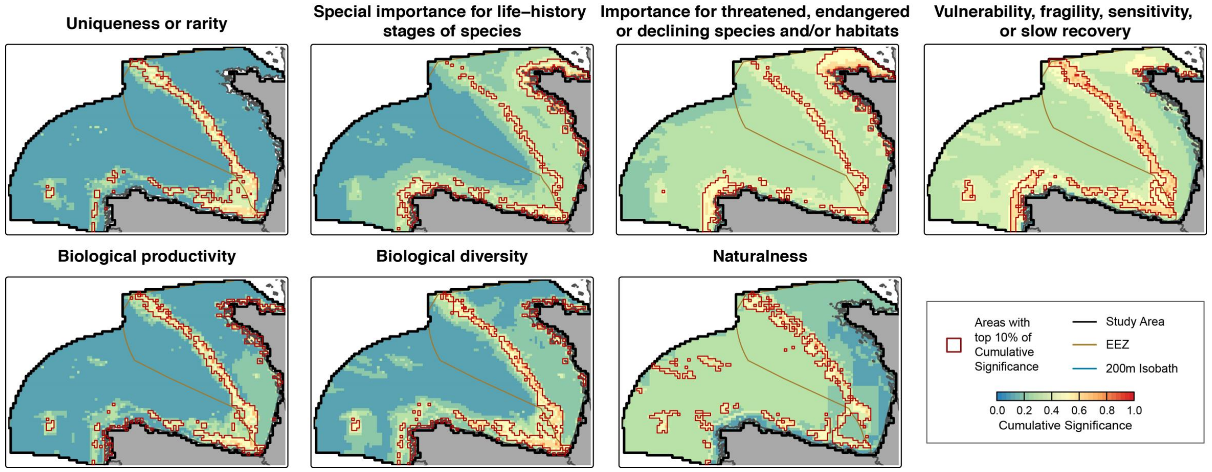


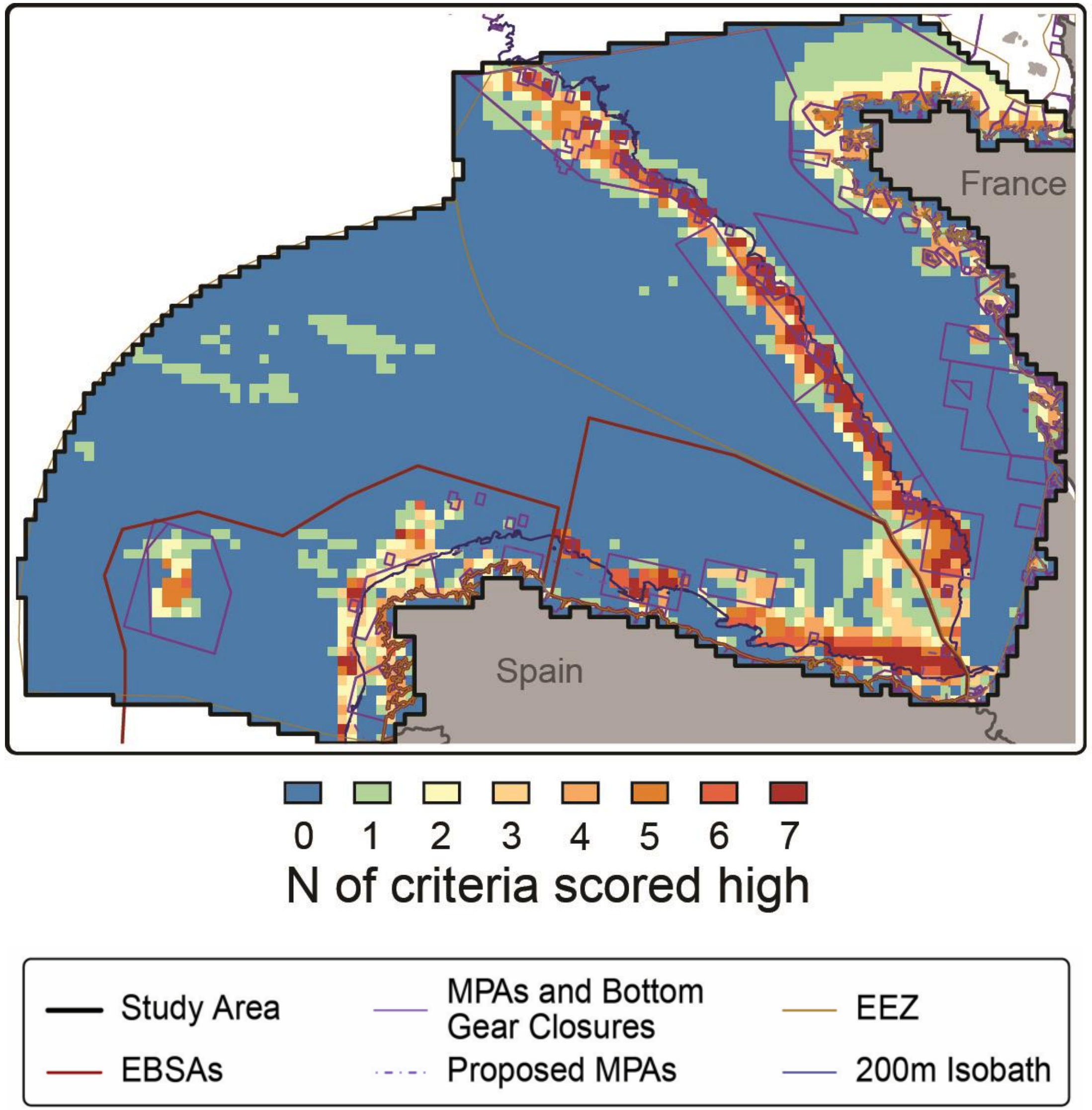


V Spatial analysis: Mapping EBSAs

3. A summary map:

- Extract the **high-scoring grid cells (top 10%)** per criterion
- Integrate into a summary map -> the **number of high-scoring criteria per cell** (ranging from 0 to 7)





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How can these results be used?

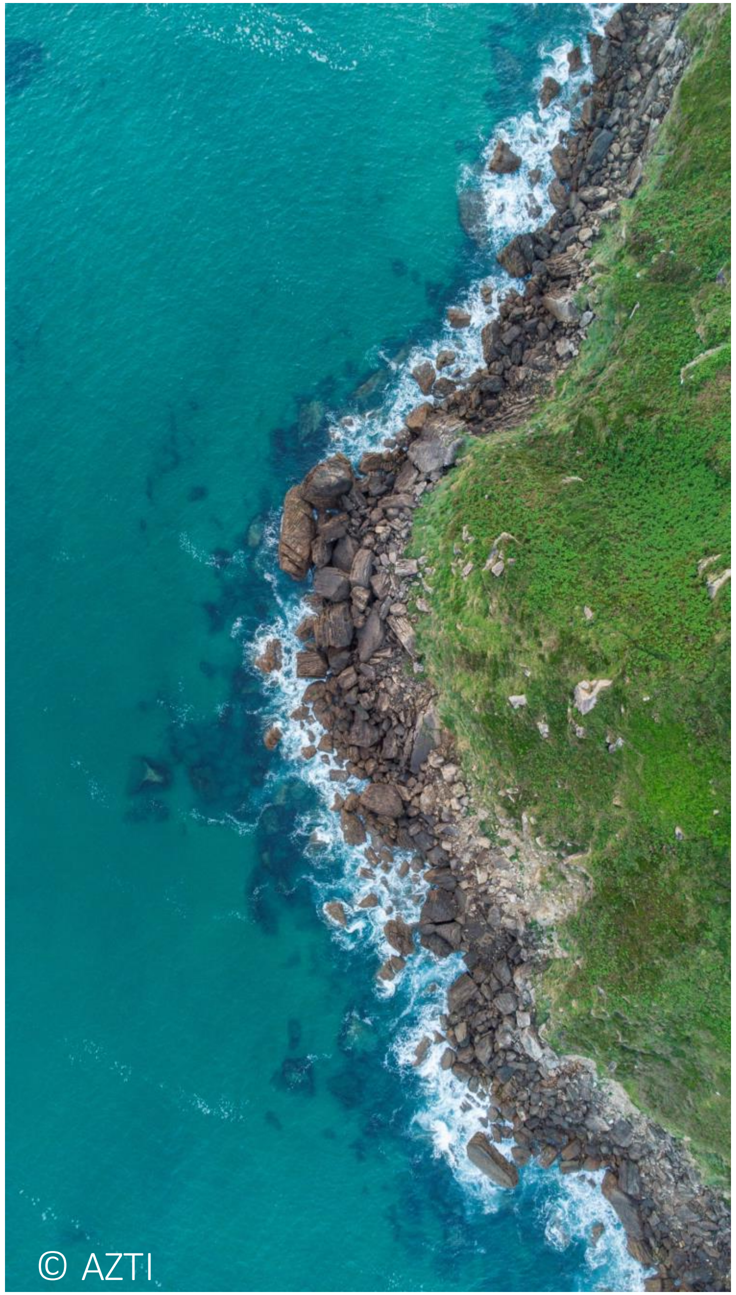
Highlight the hotspots of ecological significance, at a **finer spatial resolution** and level of **specificity** than most CBD EBSAs

→ **Criteria-based actions,** e.g., areas scoring high for **"Importance for threatened, endangered or declining species and/or habitats"** or **"Vulnerability, fragility, sensitivity, or slow recovery"** may require **special attention** and **site-specific action** to ensure the persistence of the underlying ecosystem elements

→ **Data-driven approach** allows for pinpointing the **specific ecological features, processes, and functions** represented by the highlighted areas

→ **MPA coverage** assessment: While many highlighted areas overlap with existing MPAs, **key gaps remain** (e.g., off Galicia, off Brittany, southeast of the Bay)

→ Guides further **research on pressures, vulnerabilities, risks**, and identification of the **activities** that require additional management strategies



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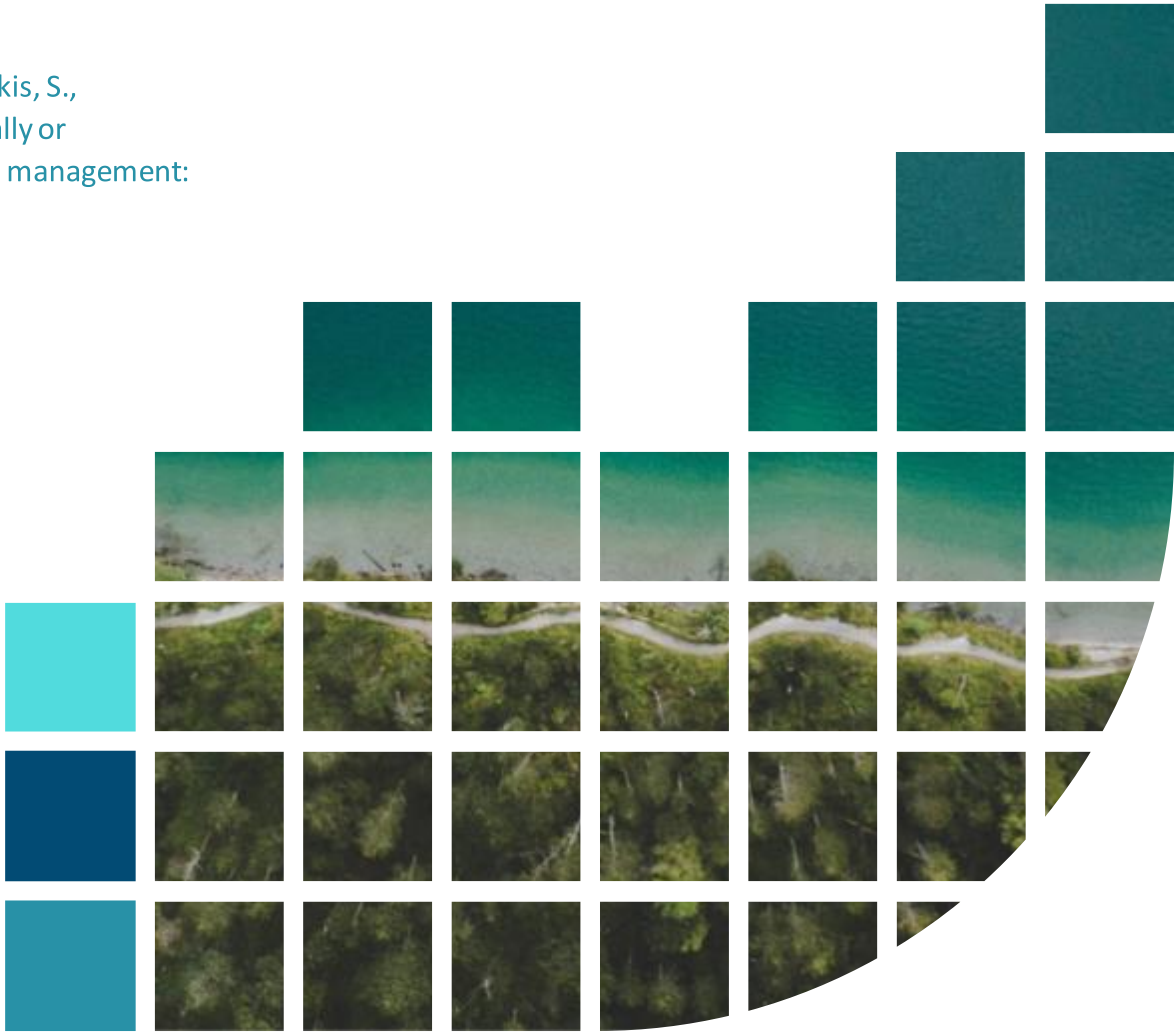

Thank you!

Olga Lukyanova: olukyanova@azti.es

Sarai Pouso: spouso@azti.es

Ibon Galparsoro: igalparsoro@azti.es

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