# EUSeaMap

## Broad-scale seabed habitat maps

## for integrated management in European waters

Andy Cameron (JNCC) on behalf of the EUSeaMap consortium

EMODnet
European Marine Observation and Data Network

GeoSeas workshop – 9th October2012
Cork, Ireland

# Background

- What: EMODnet & EUSeaMap?
- Why?

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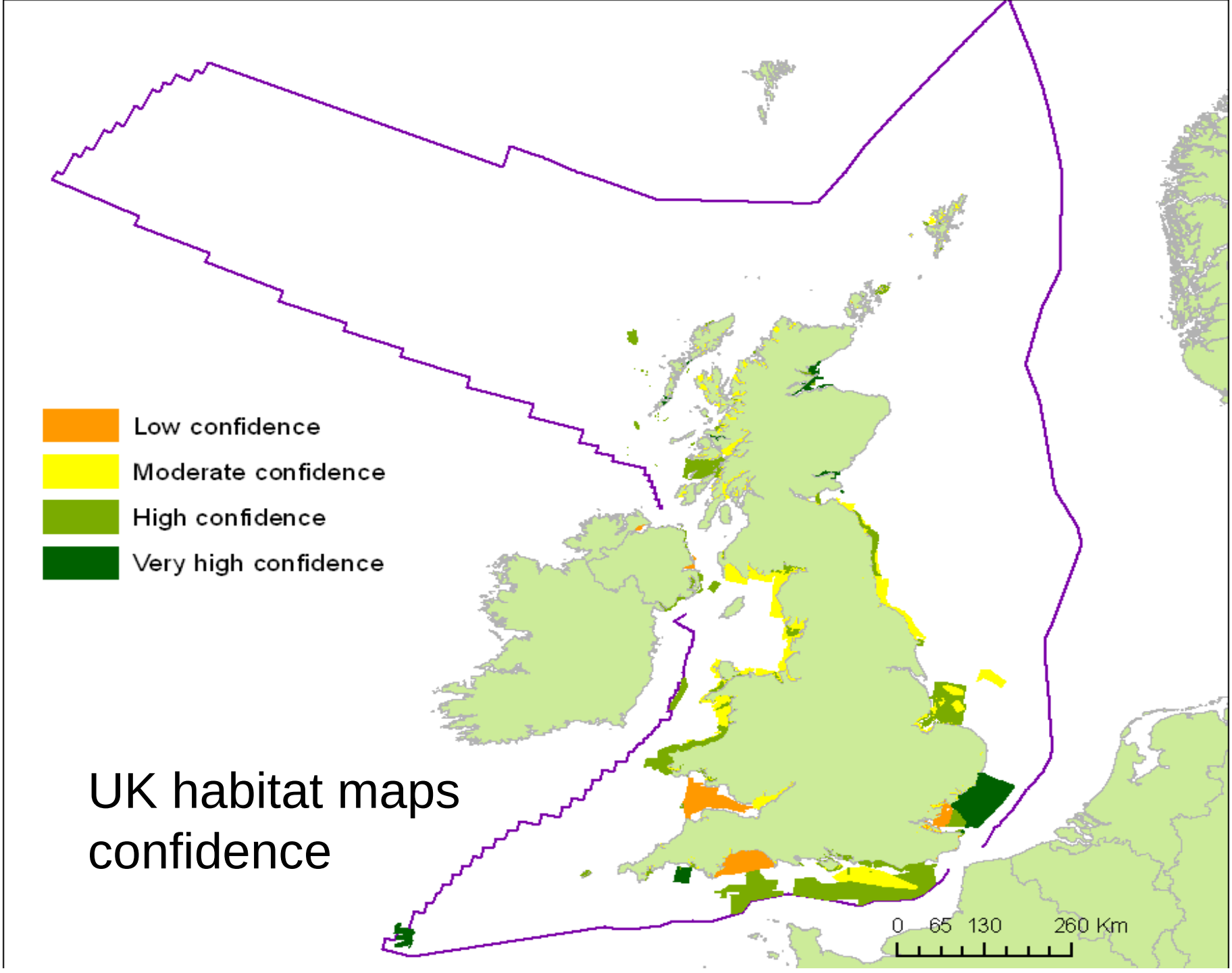
# EMODnet design principles

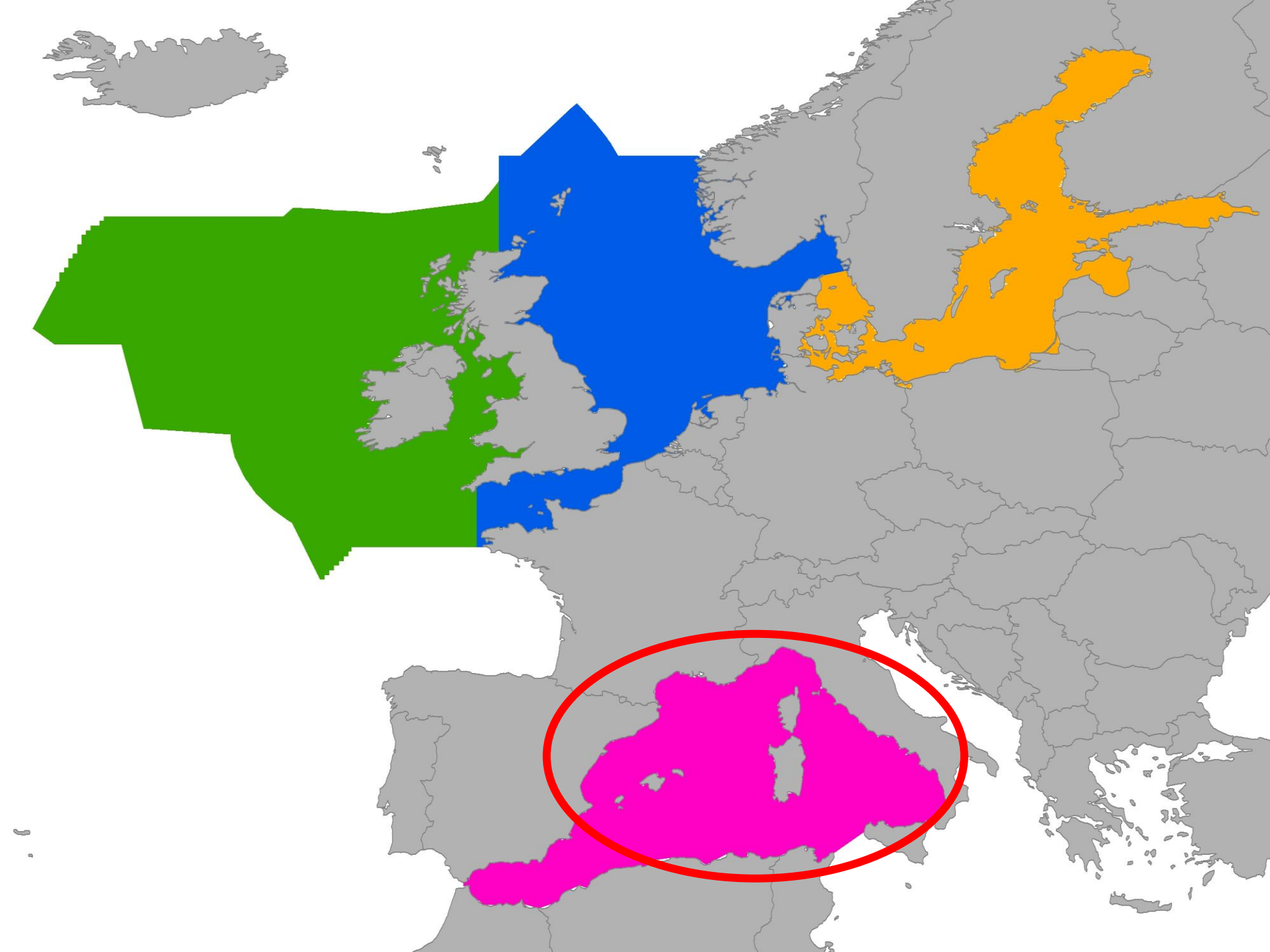
- **collect data once** and use it many times
- develop **standards** across and within disciplines
- process and validate data at different levels. Structures are already developing at national level but **infrastructure** at sea-basin and European level is needed
- provide **sustainable financing** at an EU level so as to extract maximum value from the efforts of individual Member States
- **build on existing efforts** where data communities have already organised themselves
- develop a **user-driven decision-making** process for priorities
- accompany data with statements on **ownership, accuracy and precision** and
- recognise that marine data is a **public good** and discourage cost-recovery pricing from public bodies

# EMODnet projects

- In 2008, the EC issued two calls for preparatory actions to test the 'proof of concept' for a full EMODnet project
- Funded by maritime policy preparatory action (not FP)
- First urEMODnet call subdivided into 'lots'
  - Hydrography/bathymetry
  - Geology
  - Biology
  - Chemistry
  - Physical properties (addition 2010)
- Second call to establish a broadscale habitat map of Europe




# UK habitat maps confidence



# EUSeaMap: the process

- EUNIS
- Input data used/developed
- Assess confidence in predictions

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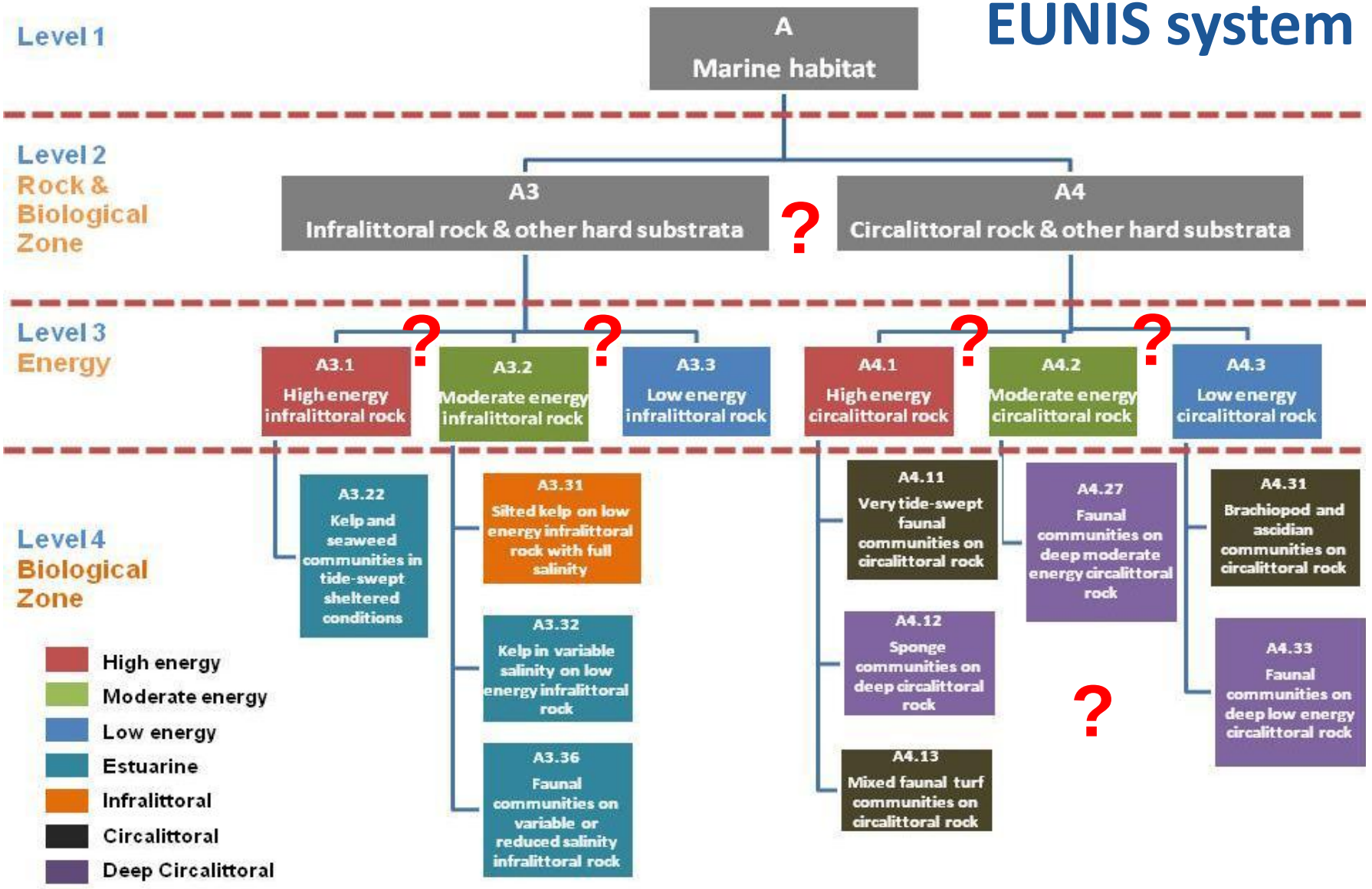
# EUNIS system



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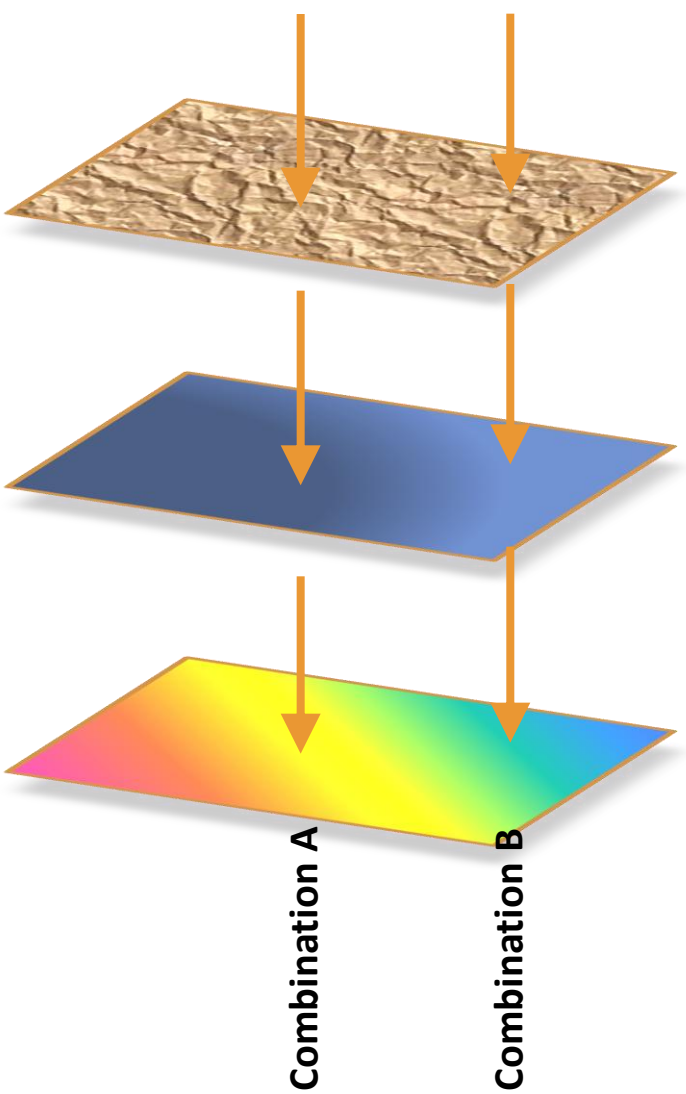



e.g. Depth

e.g.
Seabed salinity

e.g.
Sediment type

Biologically relevant?

Represented in EUNIS?

**Other possible parameters:**

- Energy at seabed (waves, currents)
- Light penetration
- Seabed temperature
- Oxygen levels
- Stratification

# Requirements:

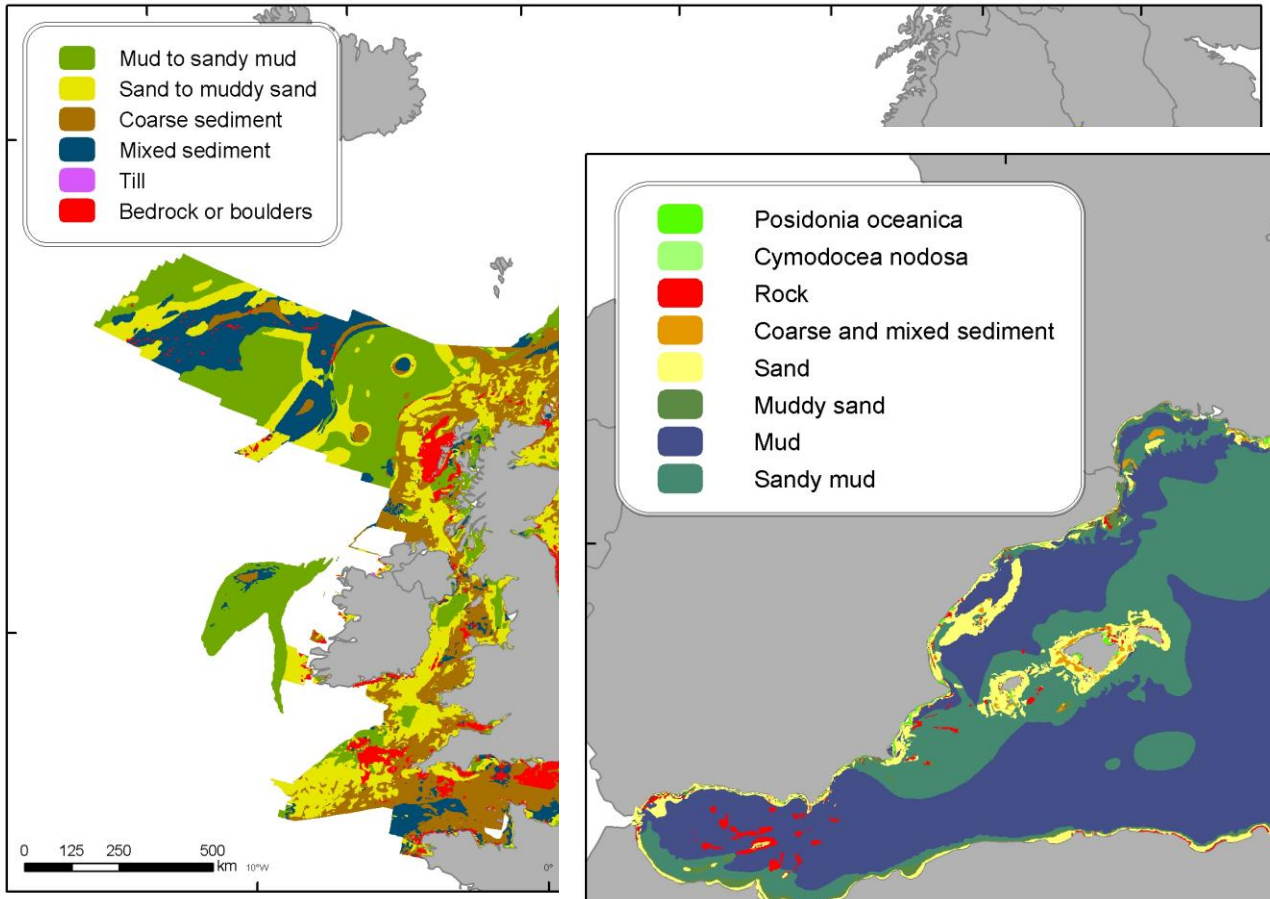
1. Full coverage layers – physical data

2. Thresholds – biological (habitat or reference species) data

3. Confidence – physical and biological (habitat) data

# 1. Full coverage layers – physical data

## Substrate



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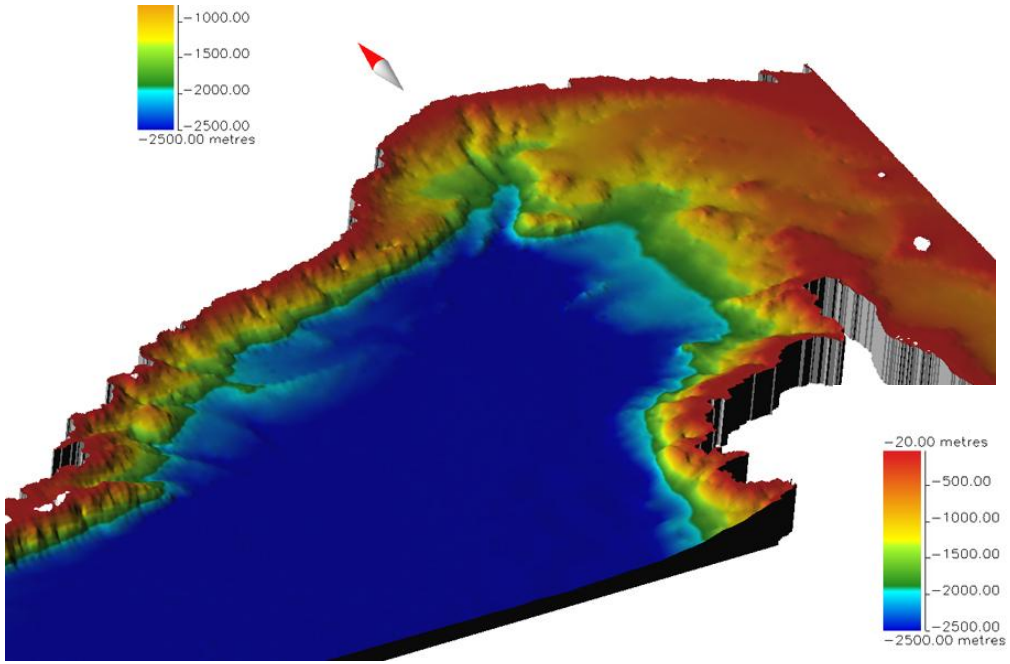
# Bathymetry

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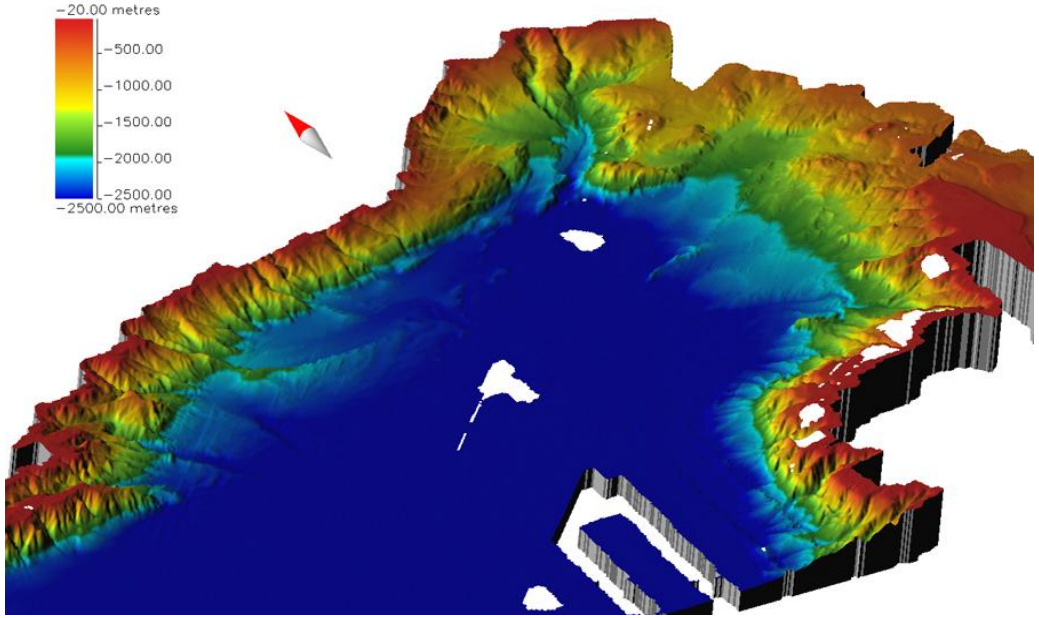


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**Comparison for Ligurian Sea**

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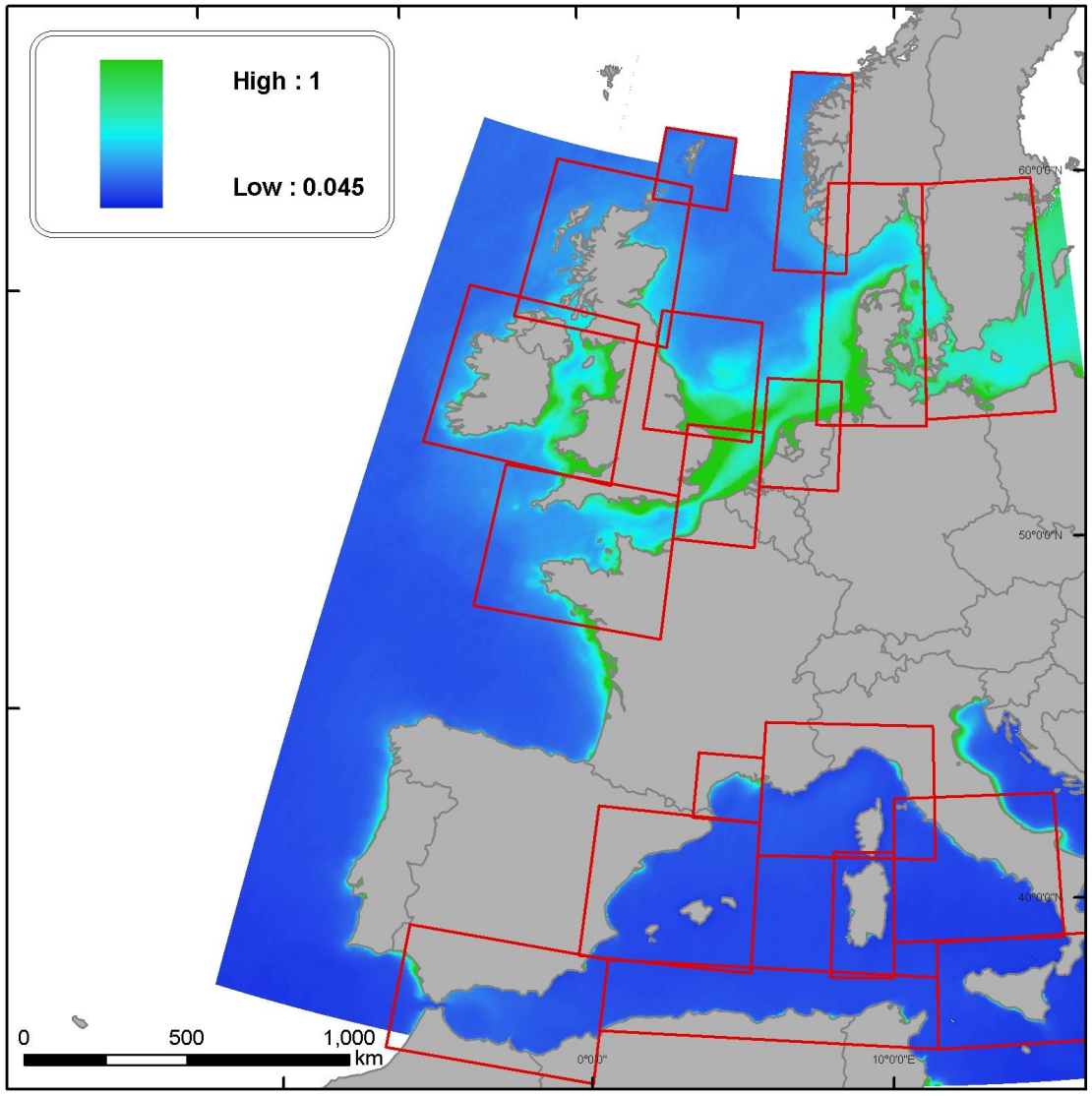


# Light attenuation

- MESH – seaWiFS (9km)
- UKSeaMap2010 –
  AquaMODIS (4km)
- EUSeaMap – MERIS
  250m (coastal waters)
  1km (offshore)
- Baltic: Improved secchi depth layer

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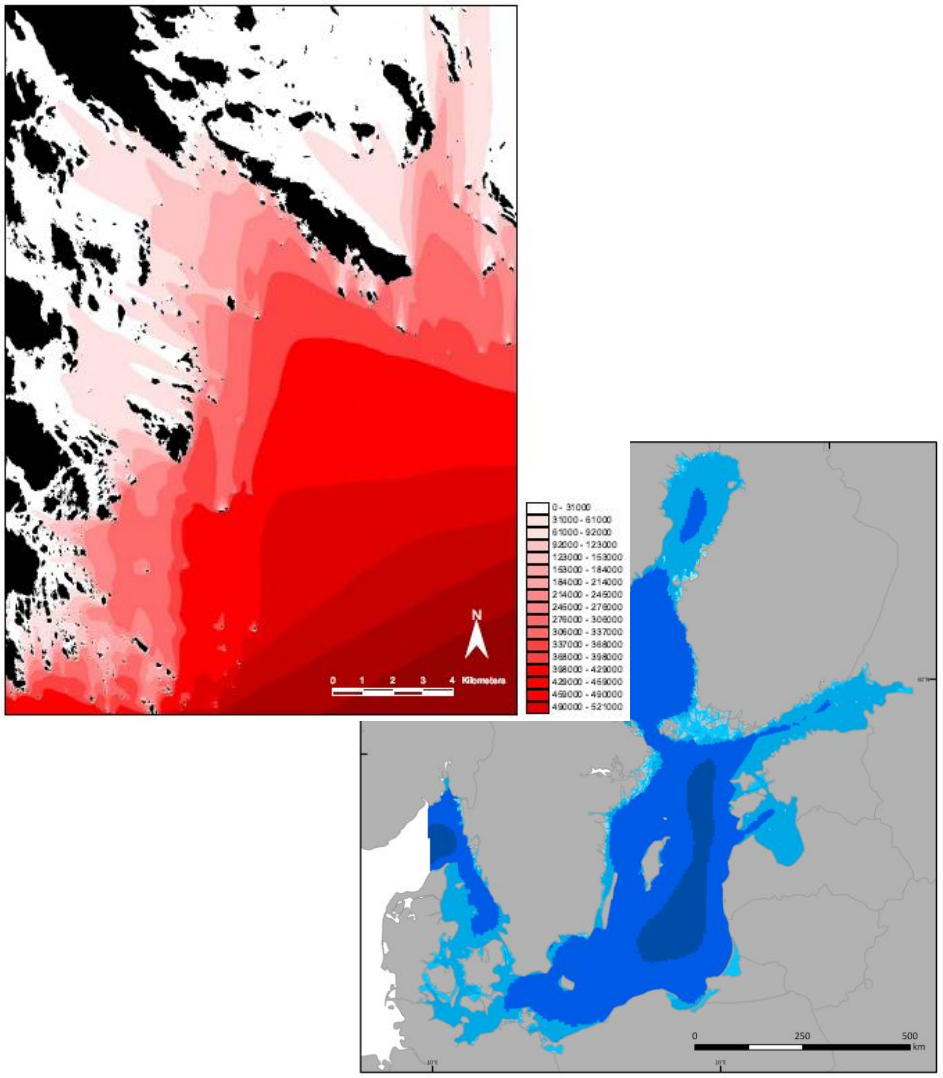


# Energy

- Kinetic energy (function of orbital/current velocity) at the seabed for waves and tidal currents
- North/Celtic – Hydrographic models ProWAM (12.5km) and DHI/ABPMer (100m)
- Baltic - Hydrographic models (DHI 3HS) and SWM
- Multiple statistics

**Also…** **Salinity, Halocline, improved wavebase**

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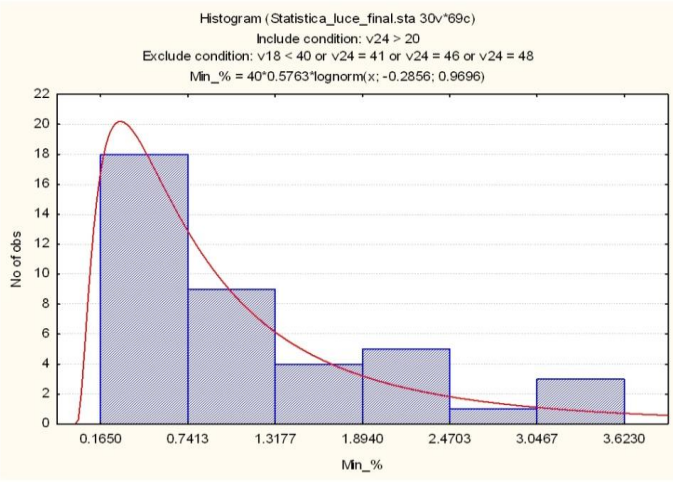
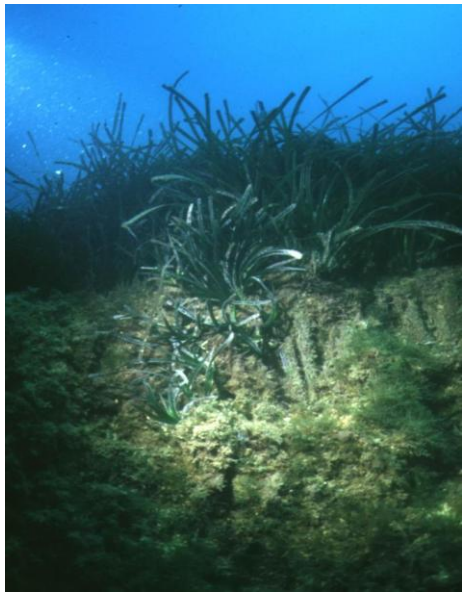
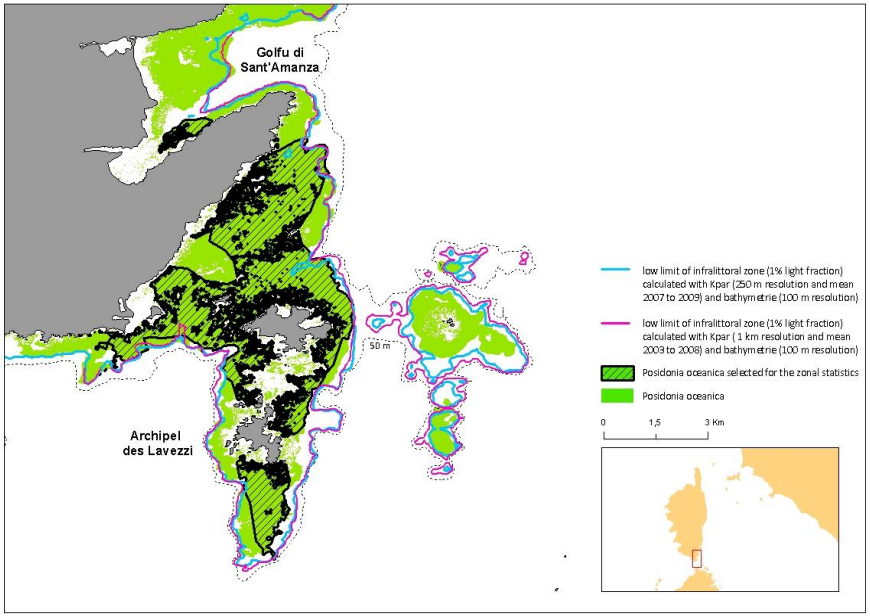
# Thresholds

- e.g. Infra/circa boundary – W Med
- Healthy status *Posidonia oceanica* meadows
- Minimum % light values within meadows





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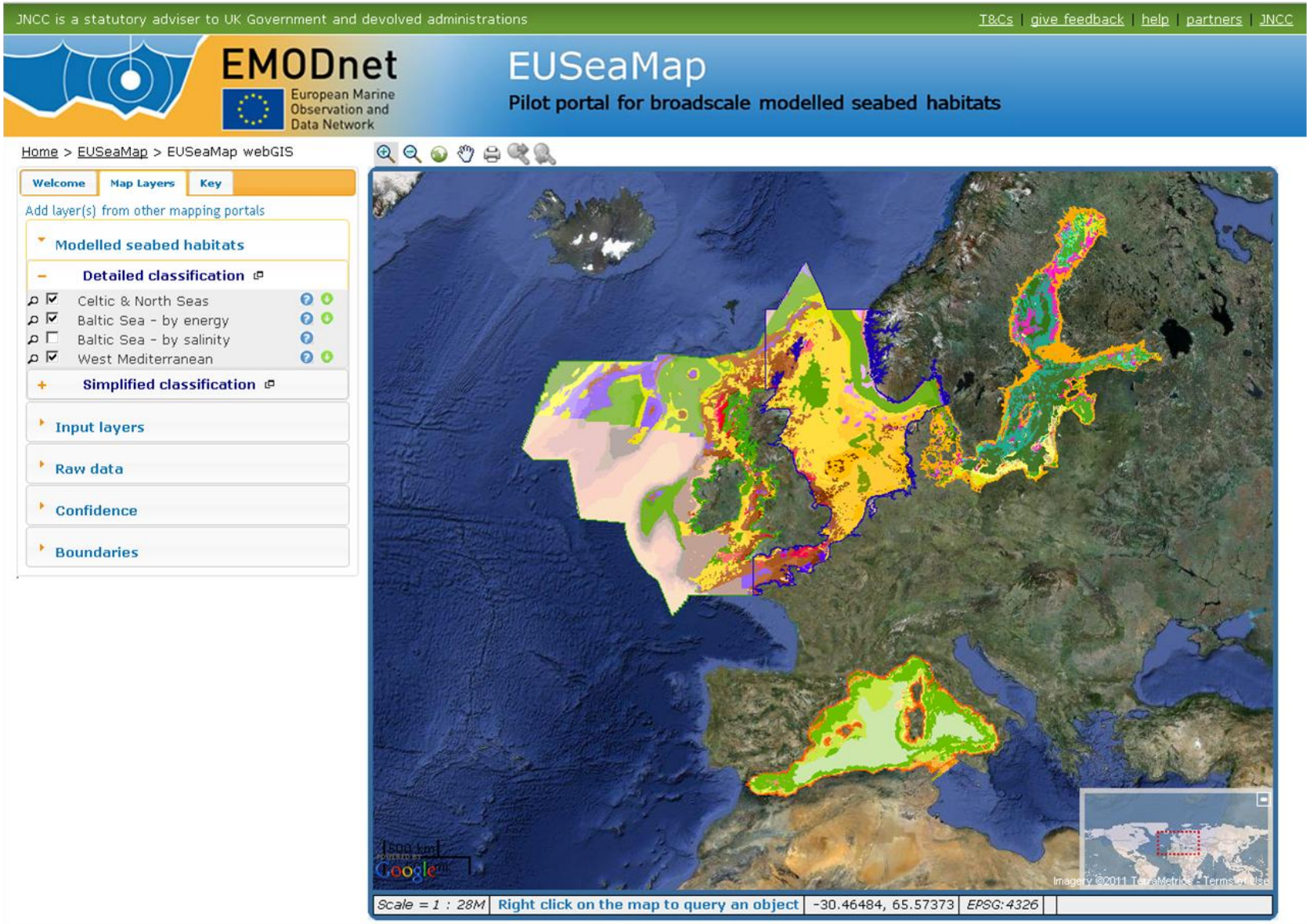
JNCC is a statutory adviser to UK Government and devolved administrations
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EUSeaMap
Pilot portal for broadscale modelled seabed habitats
Home > EUSeaMap > EUSeaMap webGIS
Welcome
Map Layers
Key
Add layer(s) from other mapping portals
Modelled seabed habitats
Detailed classification
Celtic & North Seas
Baltic Sea - by energy
Baltic Sea - by salinity
West Mediterranean
Simplified classification
Input layers
Raw data
Confidence
Boundaries
Scale = 1 : 28M
Right click on the map to query an object
-30.46484, 65.57373
EPSG:4326

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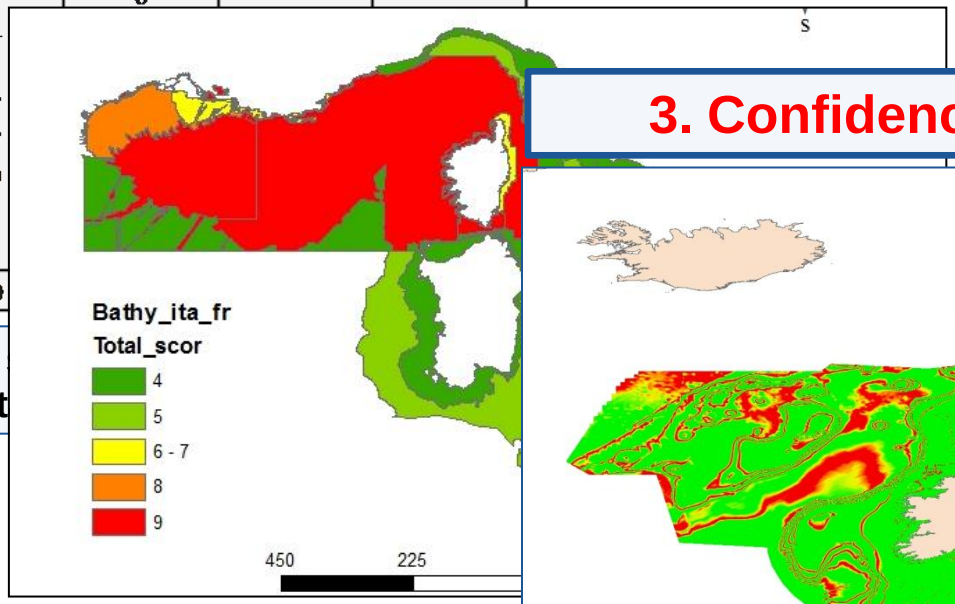
# Confidence: 3 approaches

## 1. Validation by external data

| Class Name | References Totals | Classified Tota | Number | Producers | Users |
|---|---|---|---|---|---|
| Class 0 | 0 | 2 | | | |
| A5.13 | 0 | 3 | 0 | — | — |
| A5.23 | 12 | 14 | | | |
| A5.33 | 0 | 1 | | | |
| A5.38 | 15 | 17 | | | |
| A5.39 | 30 | 17 | | | |
| A5.46 | 16 | 19 | | | |
| A5.47 | 3 | 2 | | | |
| A6.511 | 3 | 3 | | | |
| TOTAL | 79 | 79 | | | |

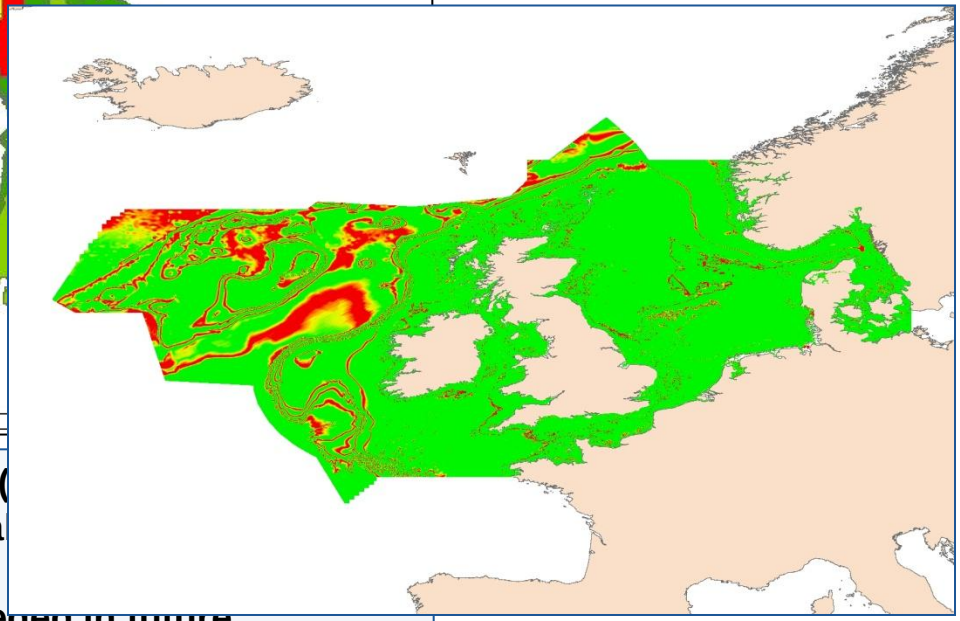
Accuracy percentage
between modelled dat

## 2. Assessing quality of source data



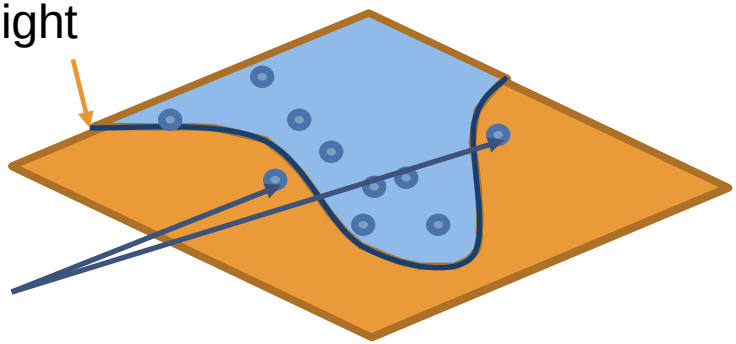

Scoring of key source data (
substrate) gives good visua
confidence in habitat maps,
improvements are most nee

## 3. Confidence in thresholds



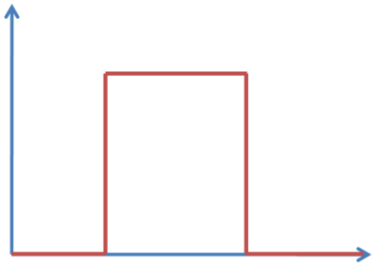
Cell by cell measure of confidence by the model using fuzzy classifiers to visualise confidence in transitional areas

‘Crisp’ Threshold limit,
e.g. 200m depth or 1% light

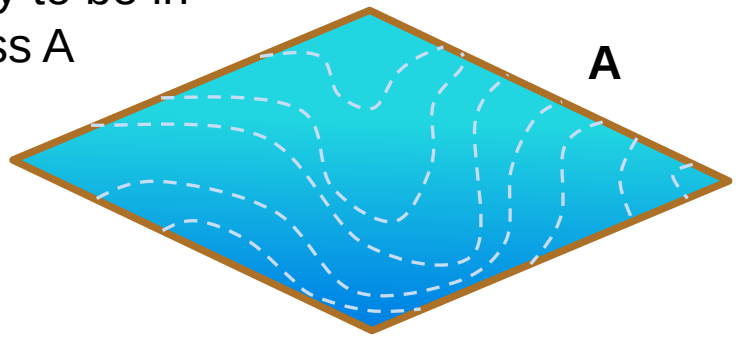


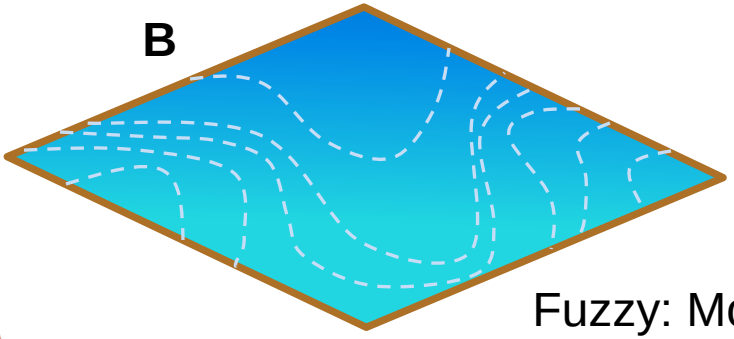
‘Outlier’ habitats

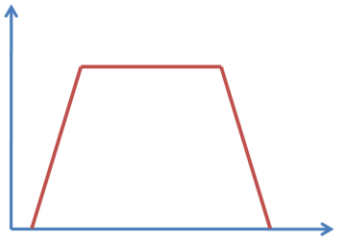
Binary - Either
class A or class B



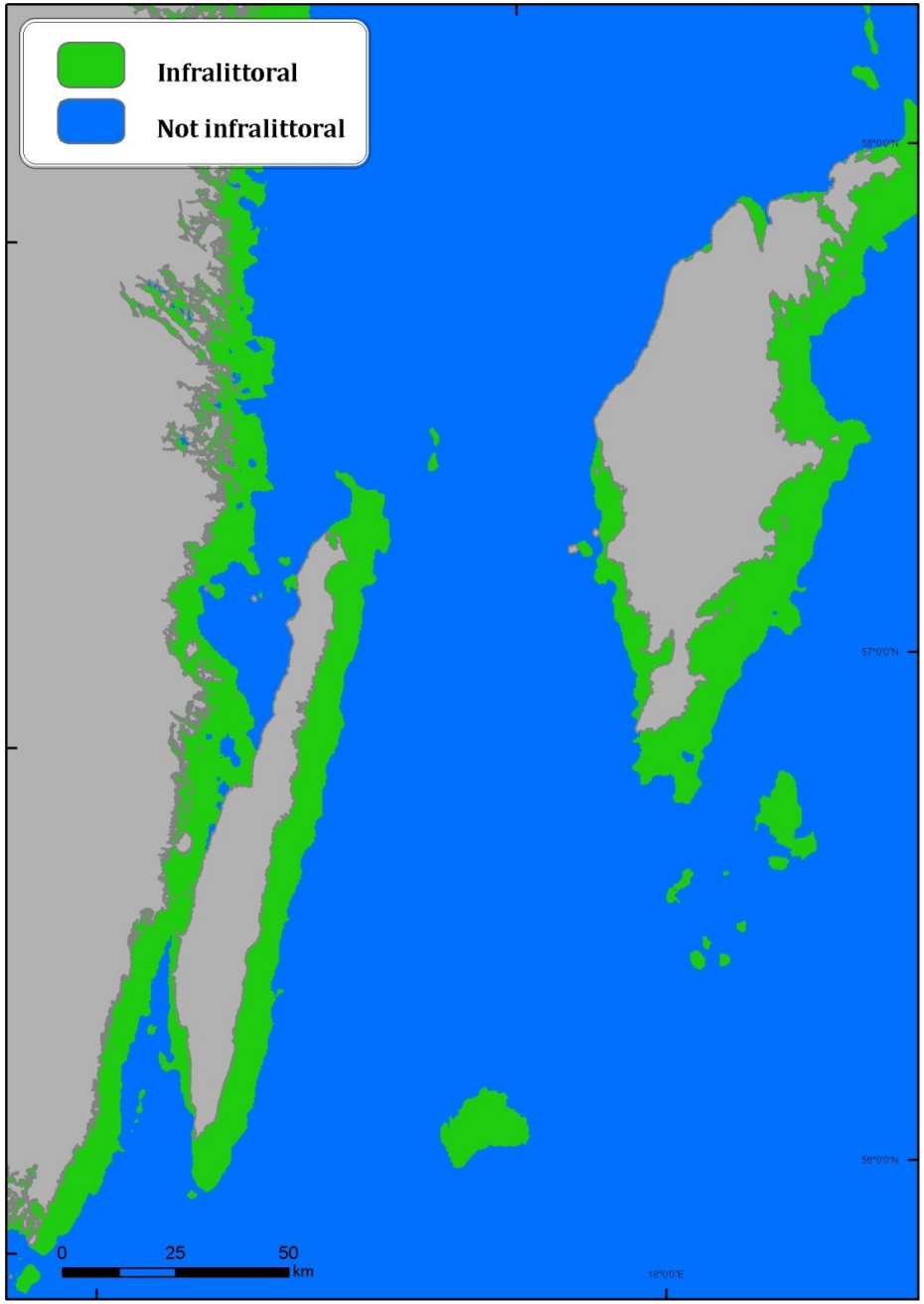
Fuzzy: More
likely to be in
Class A

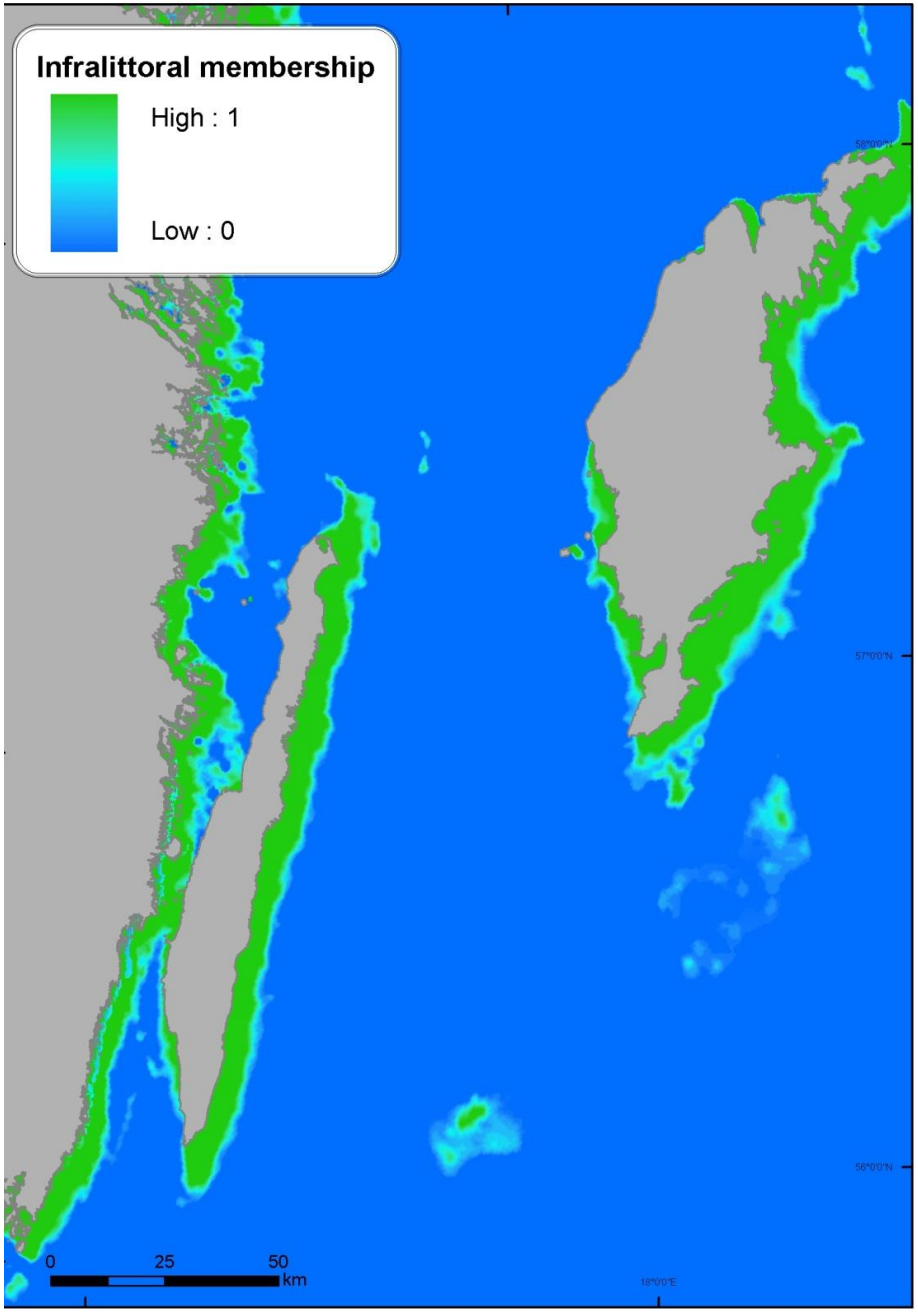


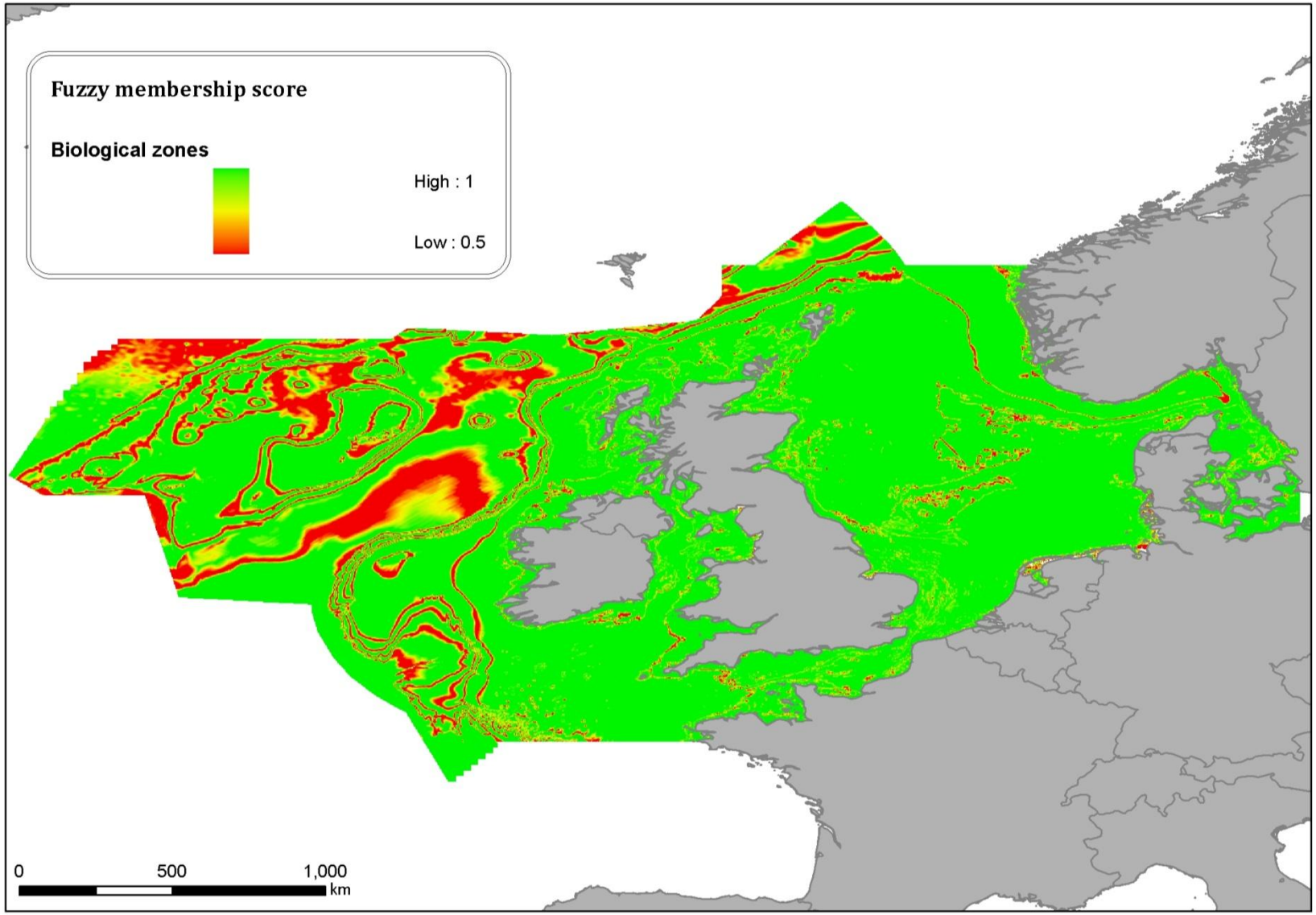



Fuzzy: More
likely to be in
Class B


Infralittoral
Not infralittoral
58°0'0"N
57°0'0"N
56°0'0"N
18°0'0"E
0
25
50
km


Infralittoral membership
High : 1
Low : 0
58°0'0"N
57°0'0"N
58°0'0"N
18°0'0"E
0
25
50
km


Fuzzy membership score
Biological zones
High : 1
Low : 0.5
0
500
1,000
km

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# Applications

- Initial Assessment and GES
- MPAs
- Vulnerability and Monitoring

- **MSFD Initial Assessments, GES etc.**

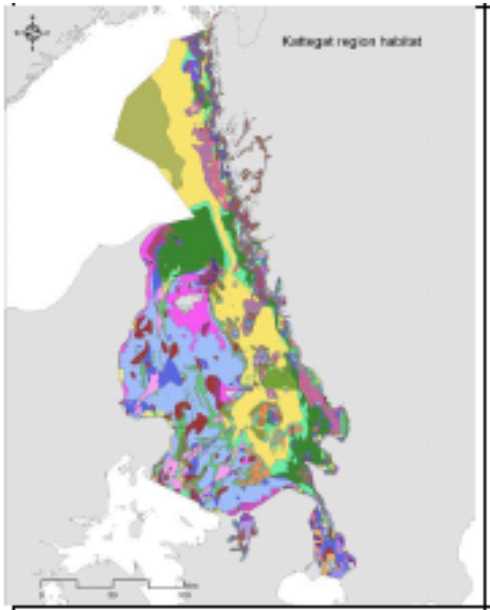



*Figure 66 Broad scale habitat map of the Kattegat area.*

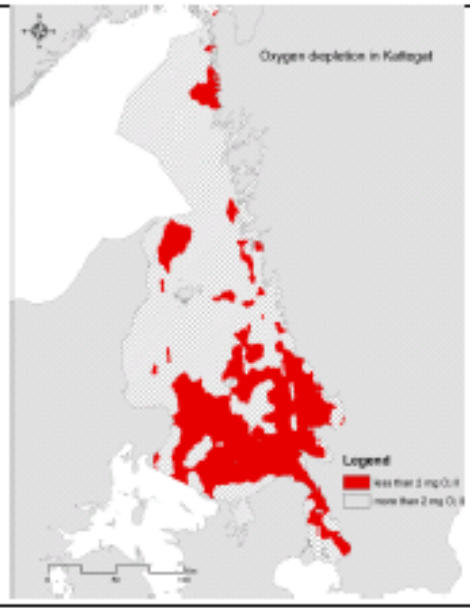
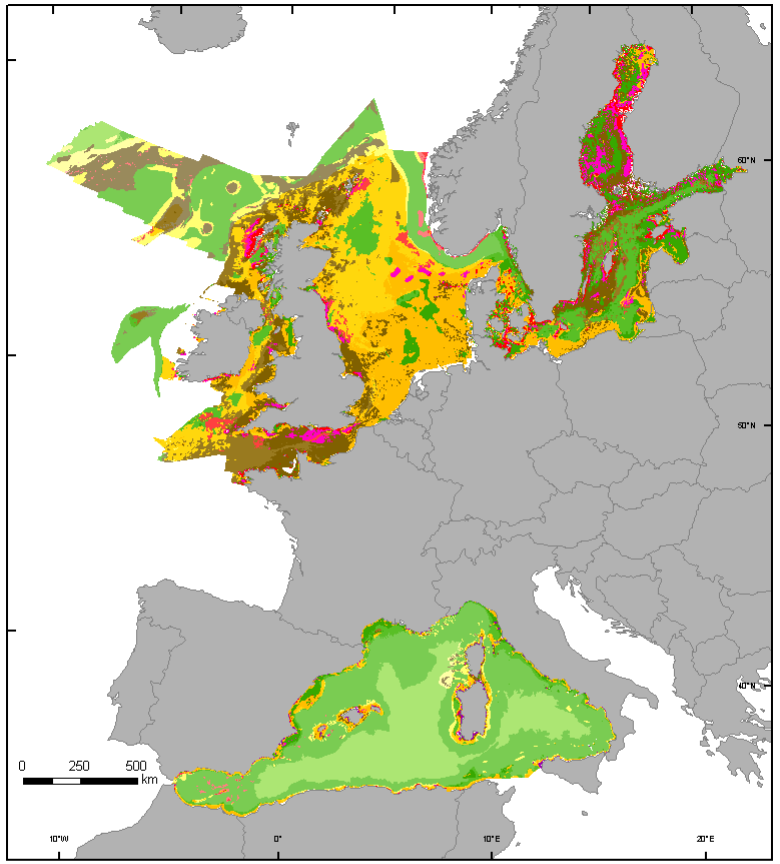
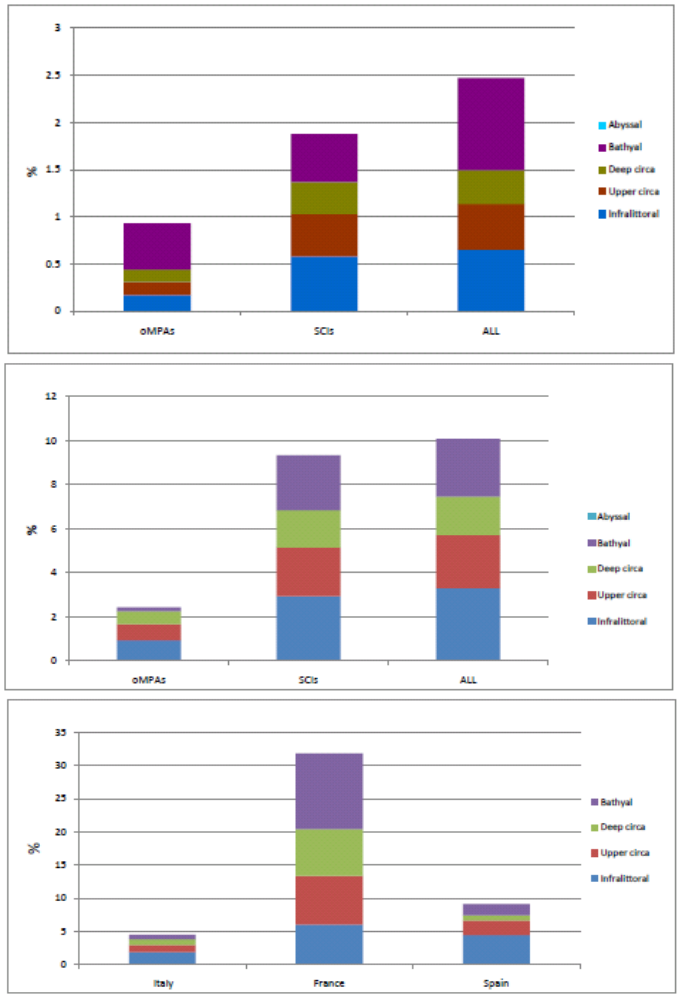


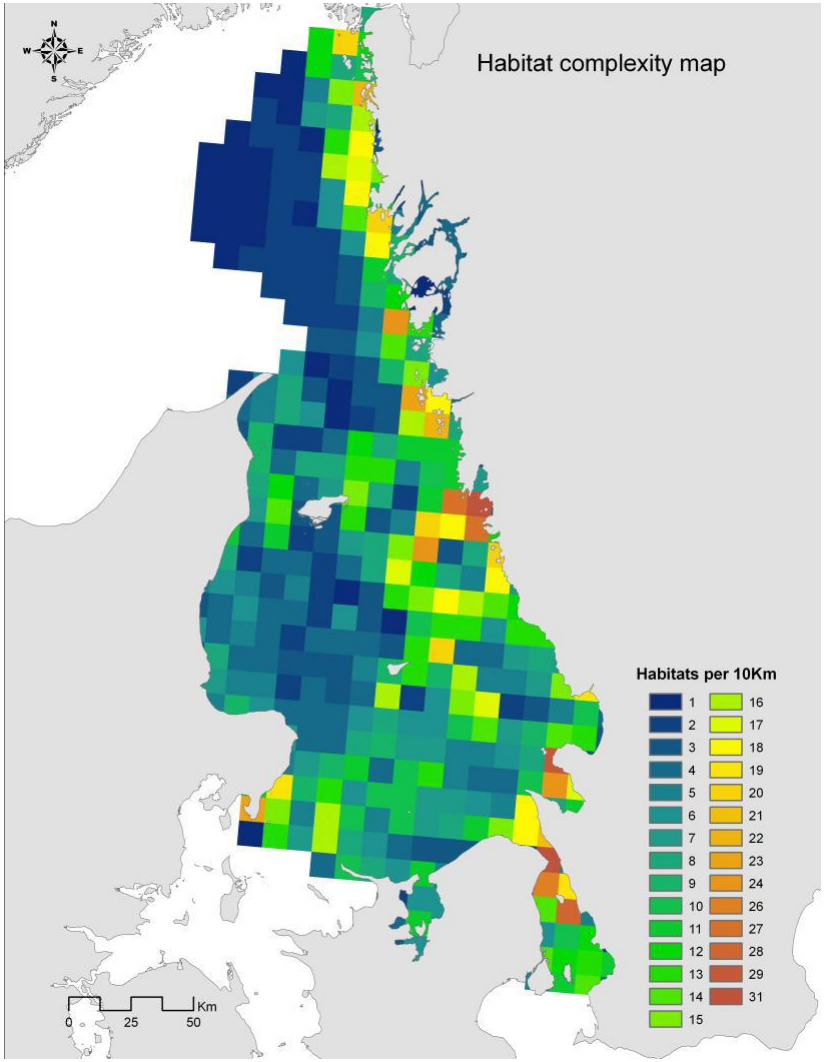

*Figure 67 Area where the oxygen concentration falls below 2mg$O_2$/l at least once in a 9-year period.*




- **Representative networks of MPAs**

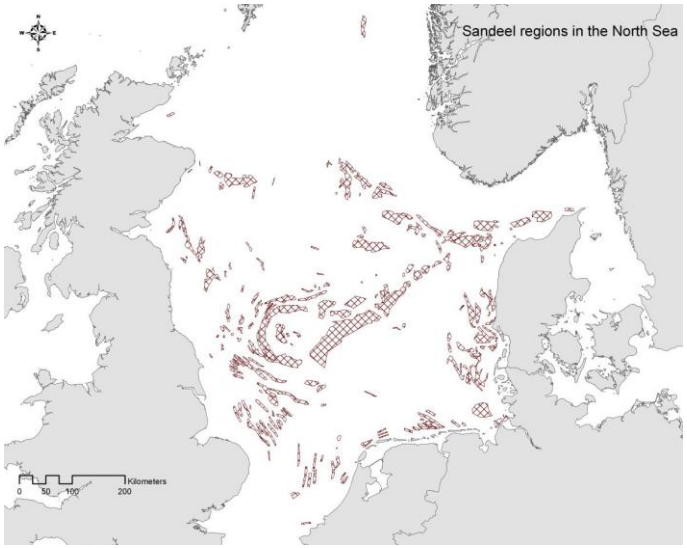


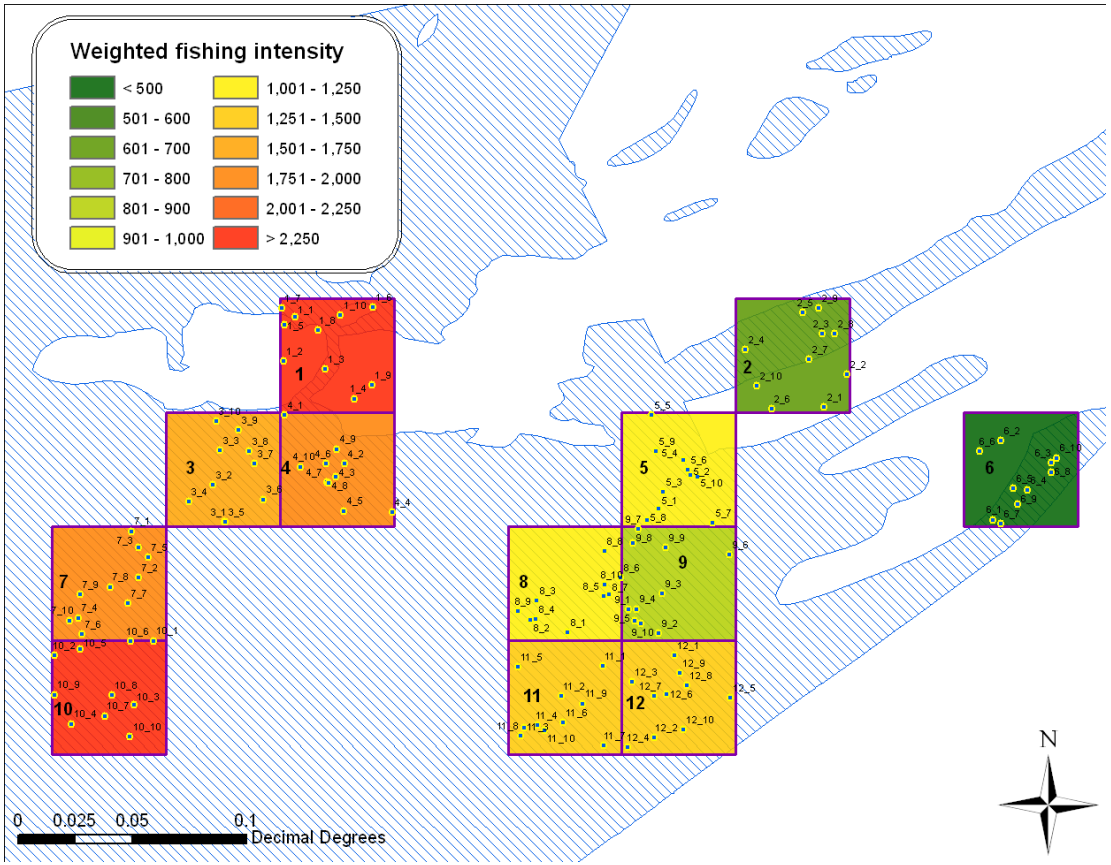

*Proportions by biological zone for Mediterranean*

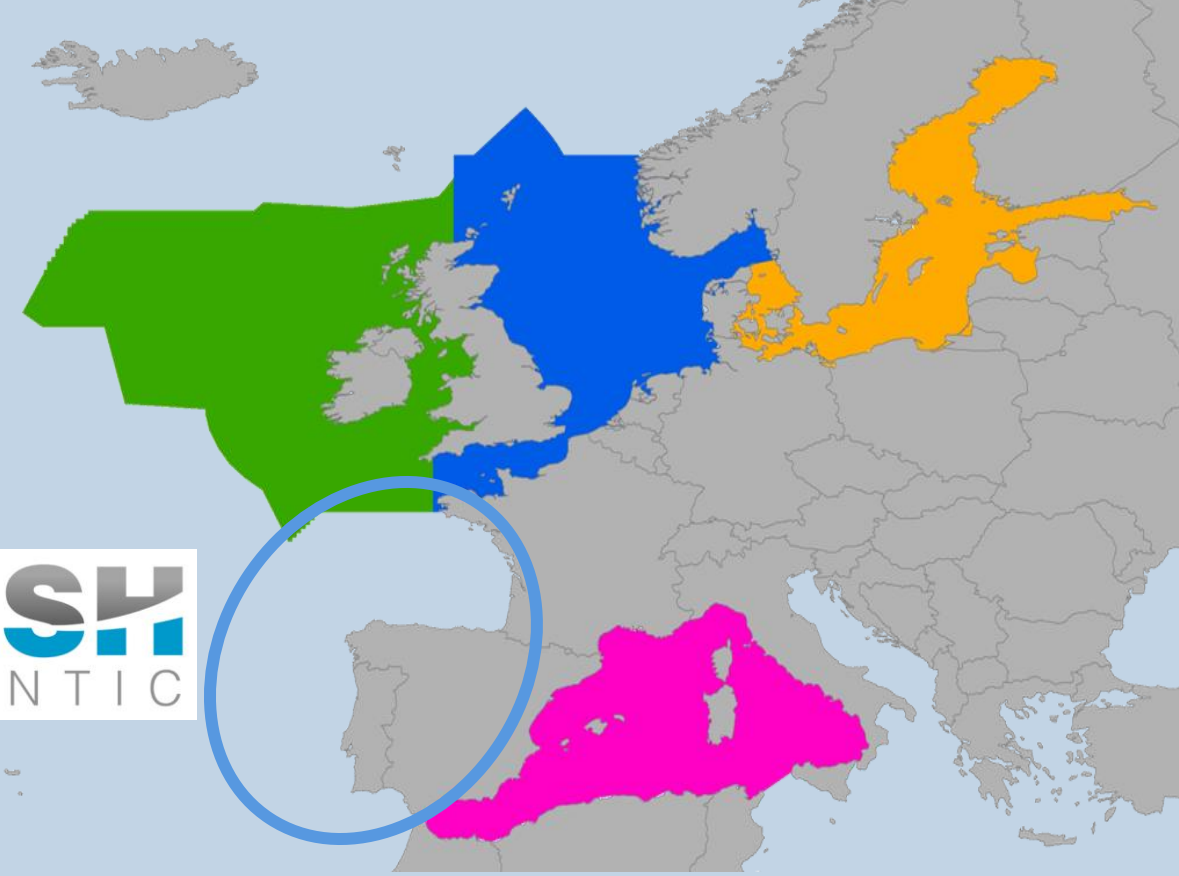



*Number of habitats present in a 10-km grid indicating highly diverse areas.*

- **Vulnerability and monitoring**





MESH ATLANTIC

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# Next steps

- Extended coverage – MESH Atlantic and EMODnet phase II
- Improved data
- Improved methods - biology links and confidence
- Fine-scale maps
- Applications

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## Project partners:

JNCC
Joint Nature Conservation Committee

Ifremer

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DANISH MINISTRY OF THE ENVIRONMENT
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