MPA EUROPE WILL MAP THE OPTIMAL LOCATIONS FOR MARINE PROTECTED AREAS (MPAs) IN EUROPEAN SEAS.

https://youtu.be/9qJBbNiC7ls

PROJECT STUDY AREA & OUTCOMES
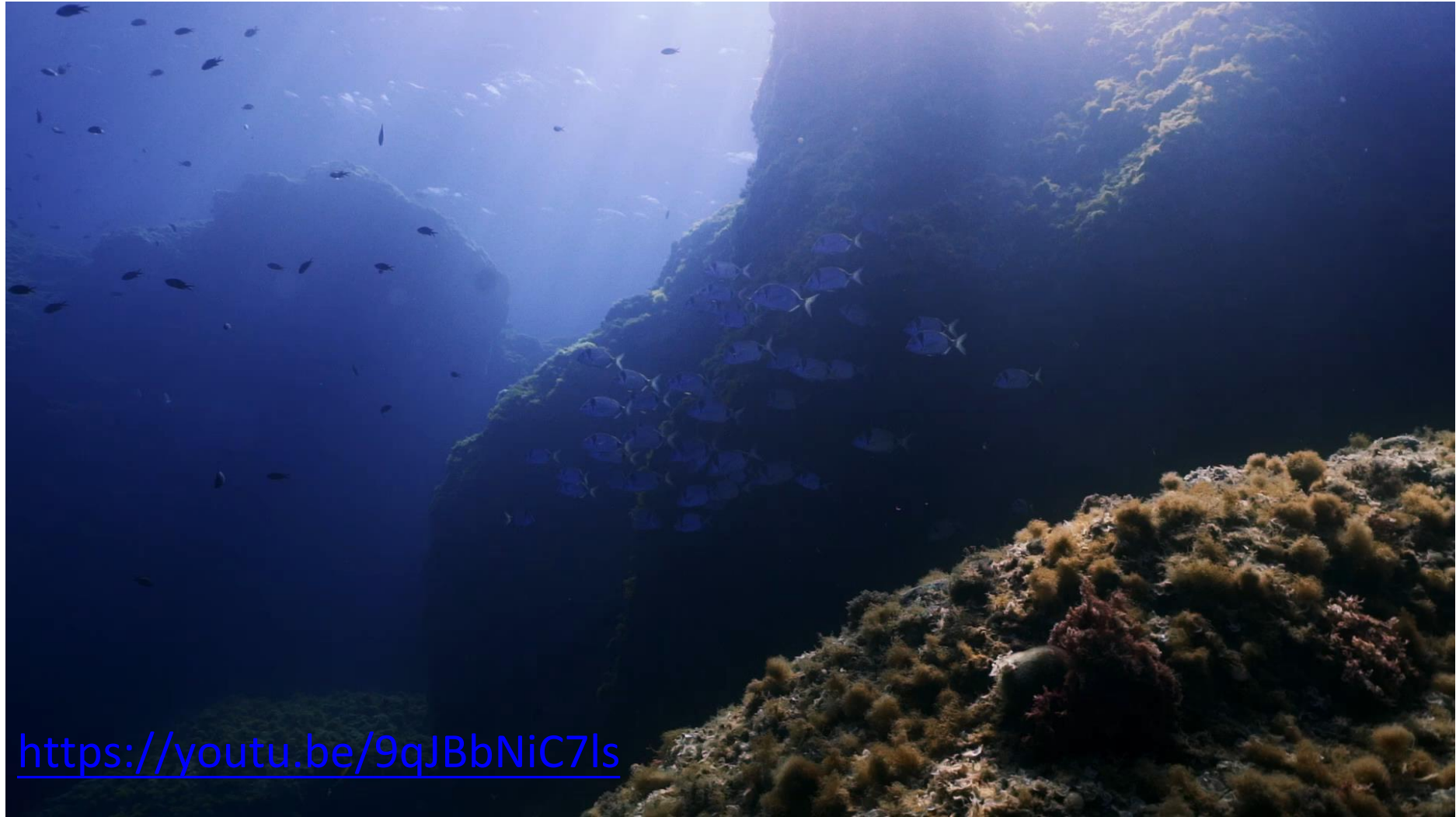
- Maps of an optimal MPA network in European seas **prioritised for biodiversity protection** and **blue carbon** benefits

- Maps of **species richness** in European seas **based on multiple indicators**, including actual observed data, statistical estimators, and modelled geographic range maps

- **Potential geographic distributions of important biogenic habitats** in European seas

- The **first data-driven classification of ecosystems** in shallow and deep European seas based on a new comprehensive dataset of high-resolution environmental layers for bioclimatic modelling

- An **online European marine biodiversity atlas** for use by researchers, students, teachers, and in Marine Spatial Planning by policy makers, industry and NGOs

PROJECT STAKEHOLDERS

PROJECT COMPONENTS

Carbon sequestration, storage and deposition based on the environmental conditions, habitats, and species present

Develop **blue carbon scoring system** supporting management of blue carbon

Connectivity modelling (present)

Climate velocity (recent and future)

Design **MPA networks covering 10% and 30% of European seas** that maximise coverage of biodiversity and blue carbon

30 000 SPECIES
Environmental niche modelling
Estimate **richness**

Benthic habitats (EMODNET)
Modelled **habitat distributions**

Two way process with marine spatial planners and other interested parties to formulate **regional or national case studies**, ensuring project traceability, transparency and reproducibility

Environmental data (Copernicus)

Project website, peer-reviewed scientific papers, workshops, conference, fact sheets, policy brief for stakeholders

Biodiversity & environmental data

Presence/Absence

Environmental layers

SDMs

$$\text{logit}(\pi_i) = \alpha + \sum_{j=1}^{p} \beta_j X_{ij}$$

Predicted presence

Occurrence probability

Niche

Environment

Predicting potential distribution

2001

2100

Zurrel 2022

Distribution maps for ~15,000 marine species from Europe

Biogenic habitat maps, considering the SDMs

Conservation status of species and habitats **(Red List)**

Occurrence information from OBIS and GBIF (new pipelines for seamless data integration between both providers)

OBIS OCEAN BIODIVERSITY INFORMATION SYSTEM

Environmental data from Bio-ORACLE v3 (high-resolution ~5 km)

New CMIP6 scenarios SSP1, SSP2, SSP3, SSP4 and SSP5

Species range shifts

Two periods: 2050 / 2100

6

Variable
Temperature
Salinity
Sea Ice Cover
Sea Ice Thickness
Sea Water Velocity
Mixed Layer Depth
Diffuse Attenuation Coefficient
PAR
PAR at bottom
Oxygen
pH
Iron
Phosphate
Nitrate
Silicate
Total phytoplankton
Chlorophyll
Topographic (slope)
Topographic (roughness)
EMODnet Bathymetry
Sedimentation Rates
Seabed Substrates
Distance to coast
Distance to closest port
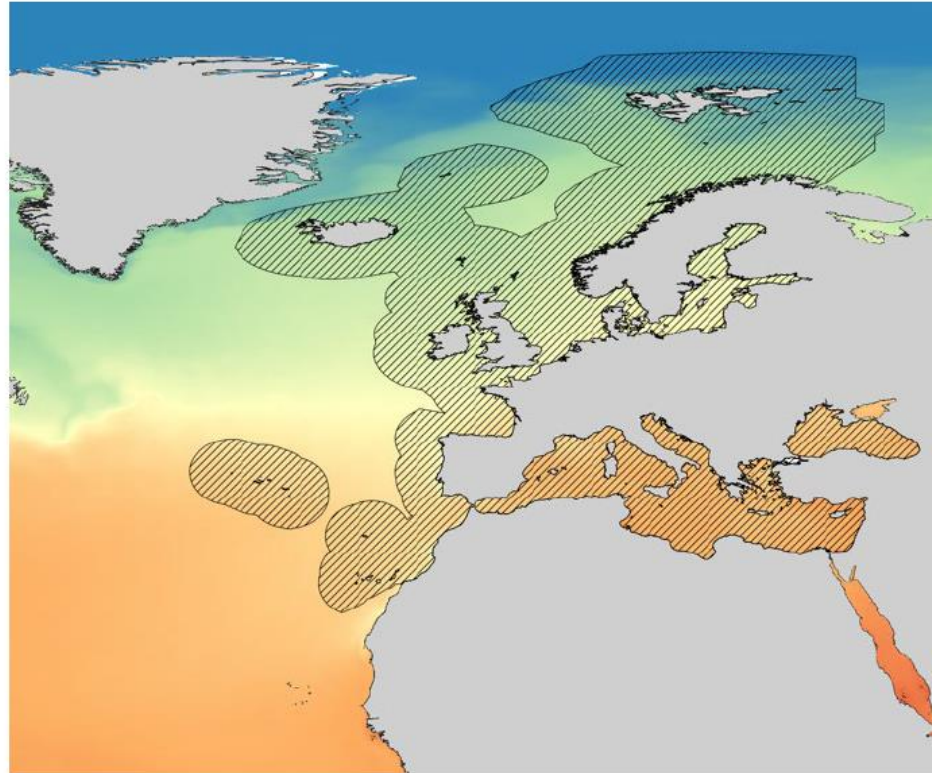
Present-day sea surface temperature
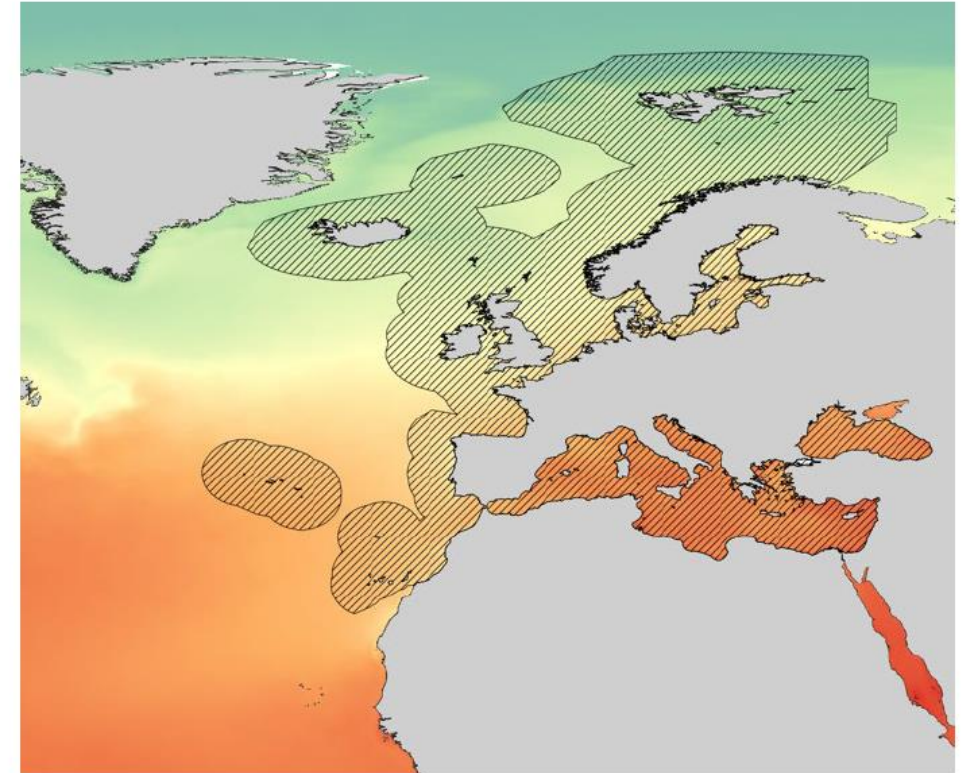
Future (decade 2090) sea surface temperature

Example of data layer produced for the European Seas.
Colour gradients reflect spatial differences in temperature
from today (left) to 2090 (right)

SPECIES DATA
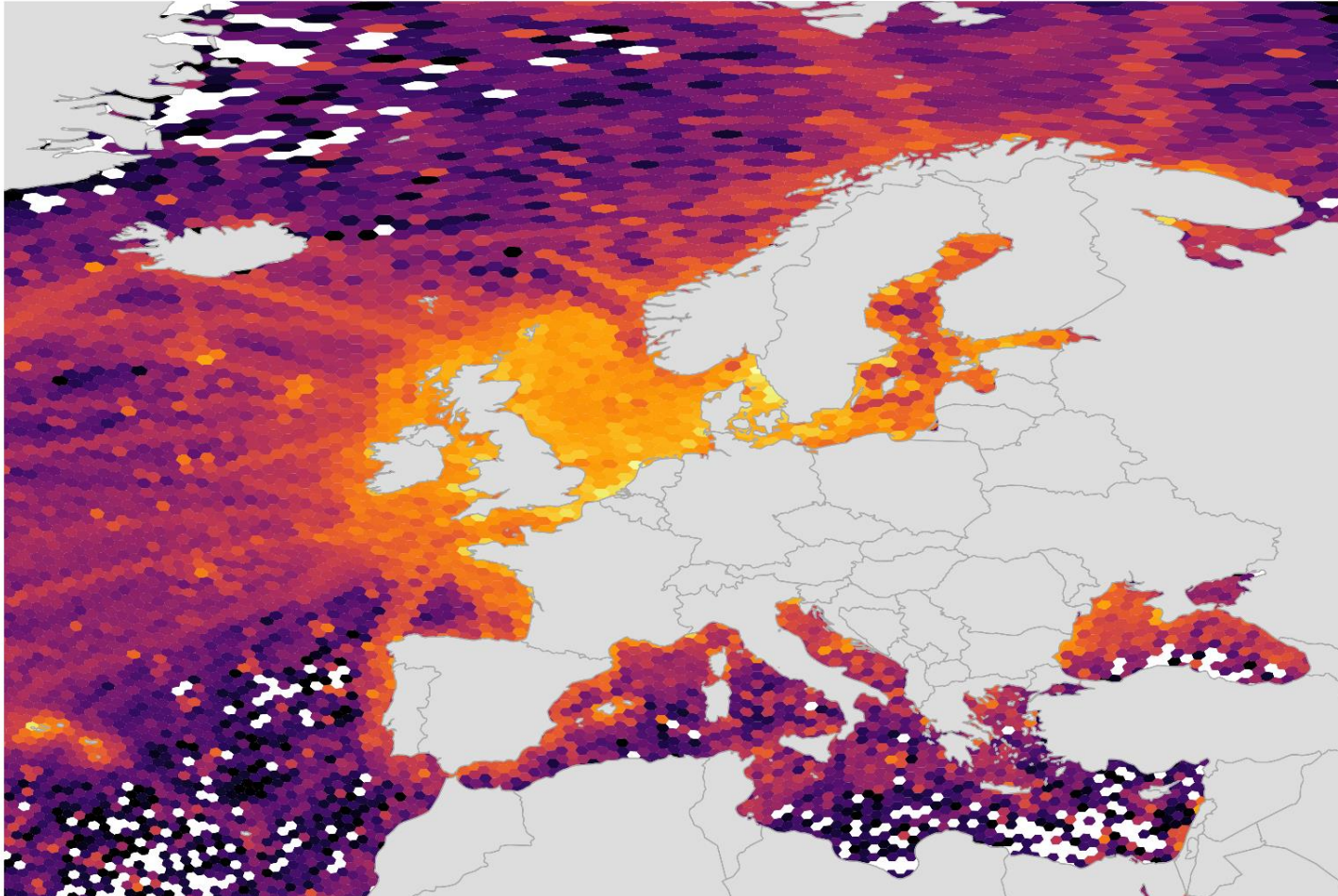
SOURCE OF ADDITIONAL SPECIES DATASETS
(into OBIS)

- Peer
- BioTIME
- GBIF
- Dryad
- Literature
- ...

The density of marine species distribution data already available in OBIS, including ~ 30,000 species from 1526-2021 (yellow is more, purple is fewer records).

80 CONTRIBUTORS

33 DATASETS

33,650 ENTRIES

5156 Locations

19 EU countries
11 Non-EU countries
High Seas

SOURCES OF ADDITIONAL BLUE CARBON DATASETS

PANGAEA.

SeaDataNet

EMODnet
European Marine Observation and Data Network

Geo-Seas

...

BRACKISH TIDAL — 1449 entries
SHORELINE — 567 entries
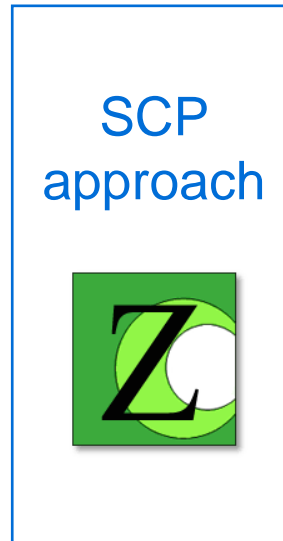MARINE SHELF — 11,001 entries
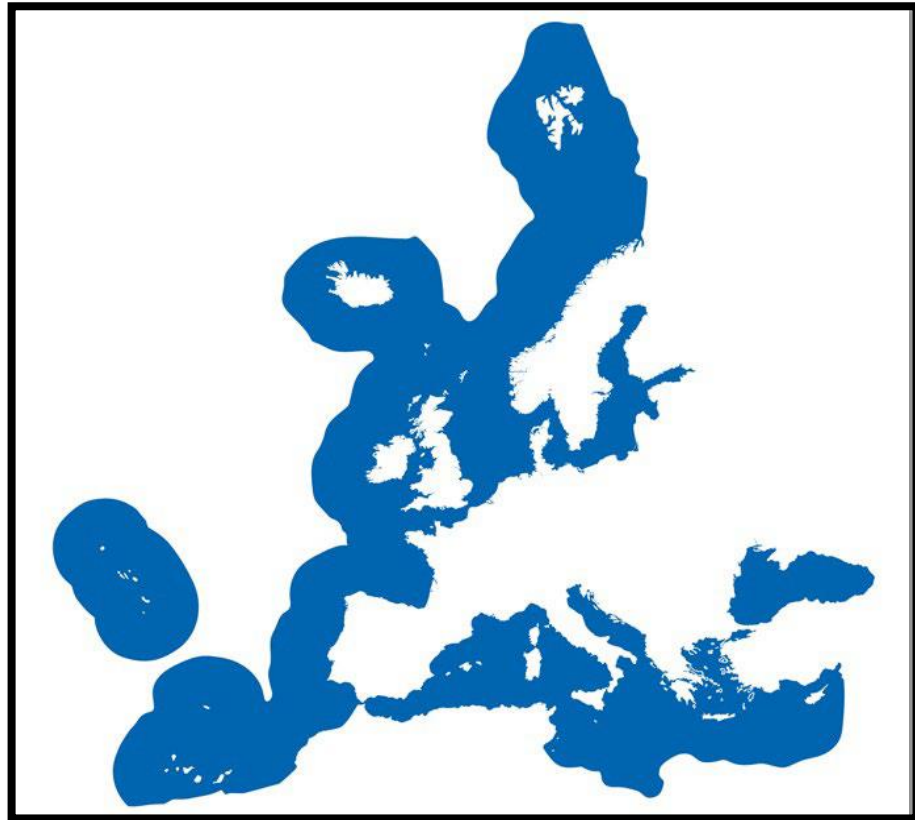DEEP SEA — 1196 entries
NOT YET DEFINED — 8973 entries
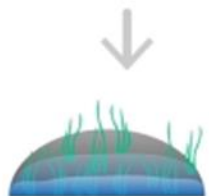
Saltmarsh sediments — 1387 entries
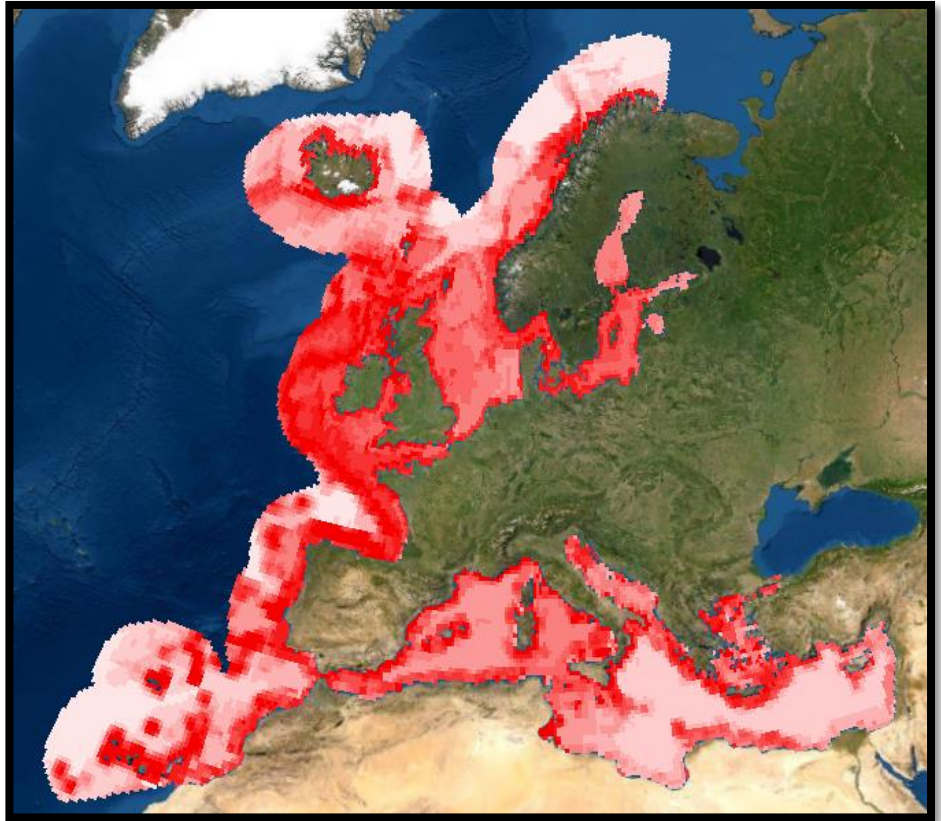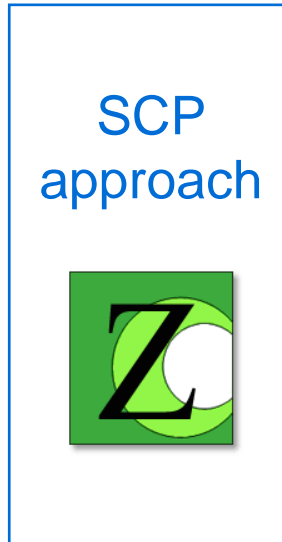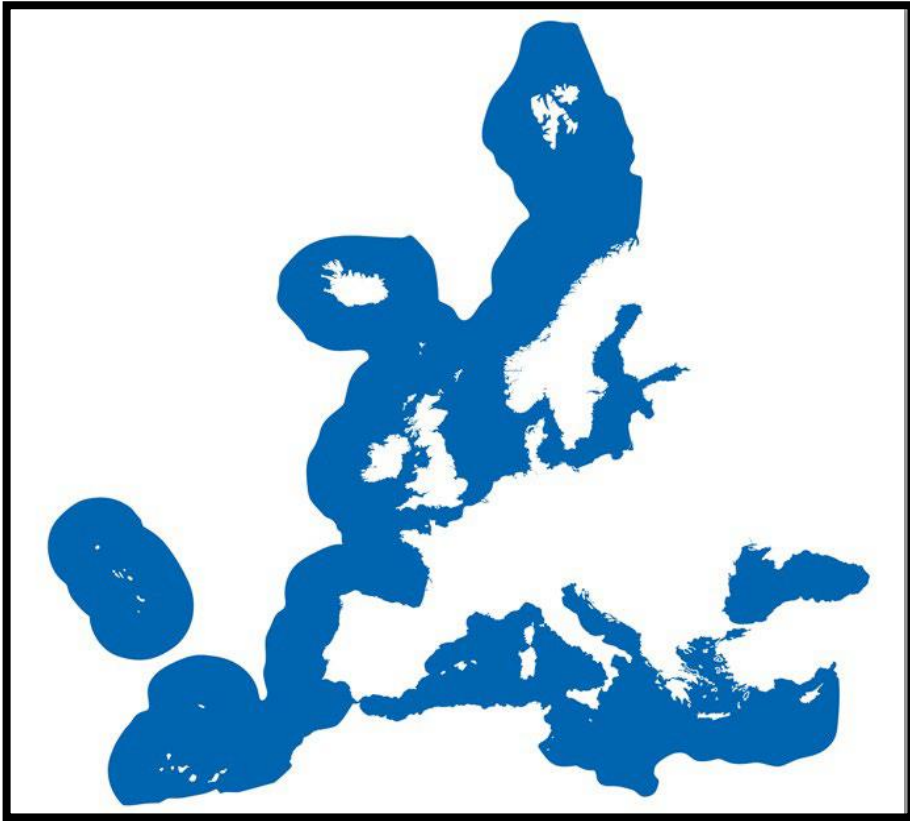Seagrass sediments — 4200 entries
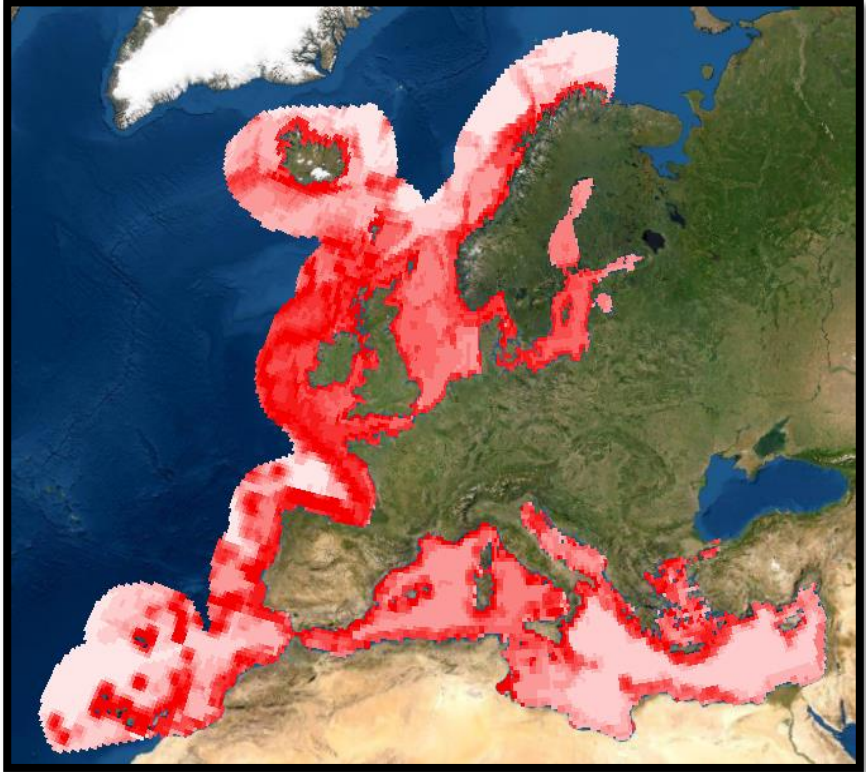
Standardised and complete data layers

SCP approach

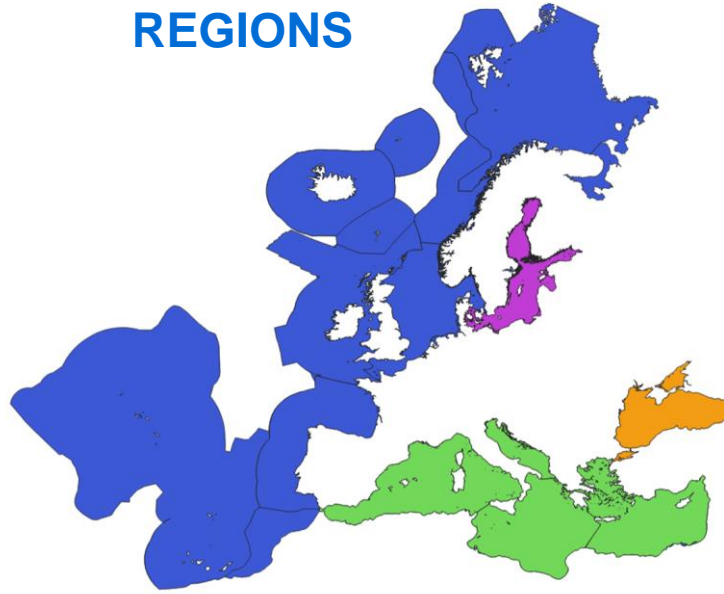MPA EUROPE PROPOSE PRIORITY AREAS TO PROTECT (A) BIODIVERSITY AND (B) BLUE CARBON

Standardised and complete data layers

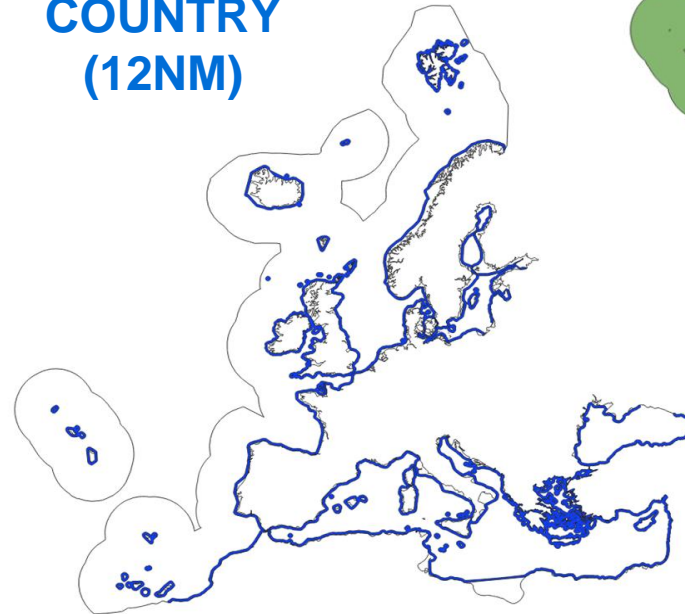Hypothetical example of prioritised areas; darker red being higher priority

SCP approach

REGIONS

COUNTRY (EEZ)

COUNTRY (12NM)

Kelp
Coral
Mangroves
Seagrass
Richness in
realms endemicity
Rugosity

Zhao et al (2020) *Biological conservation*

HOPE FOR AT LEAST

80%

REPRESENTATIVE BIODIVERSITY
within 10% and 30%
of each sea area

Kelp
Coral
Mangroves
Seagrass
Richness in
realms endemicity
Rugosity

Zhao et al (2020) *Biological conservation*
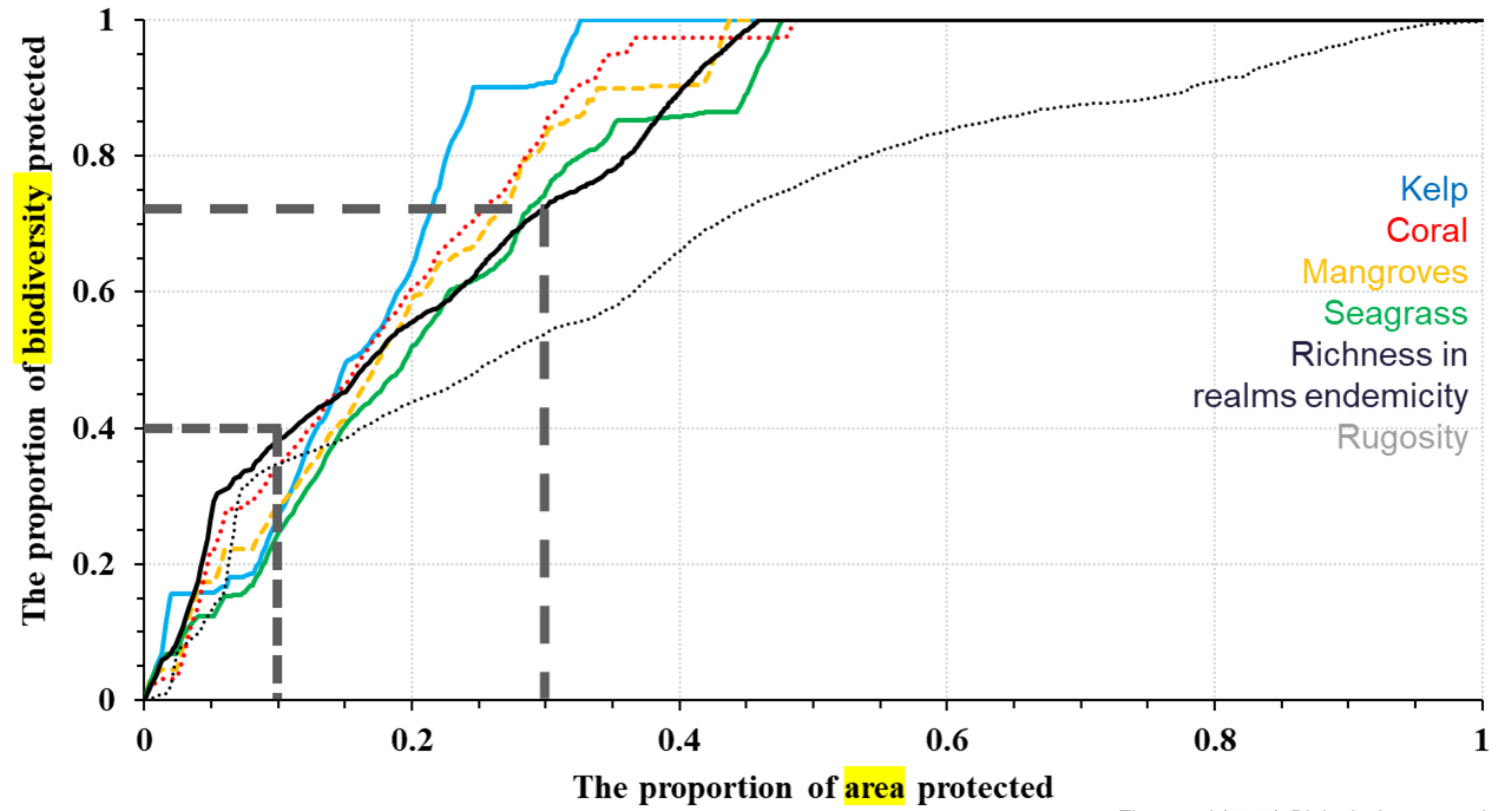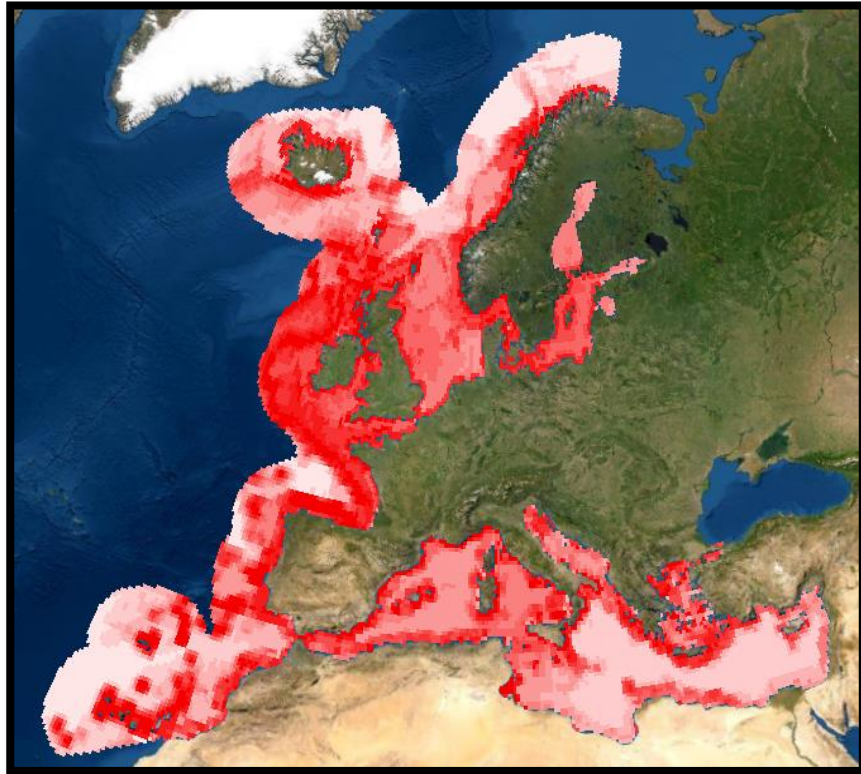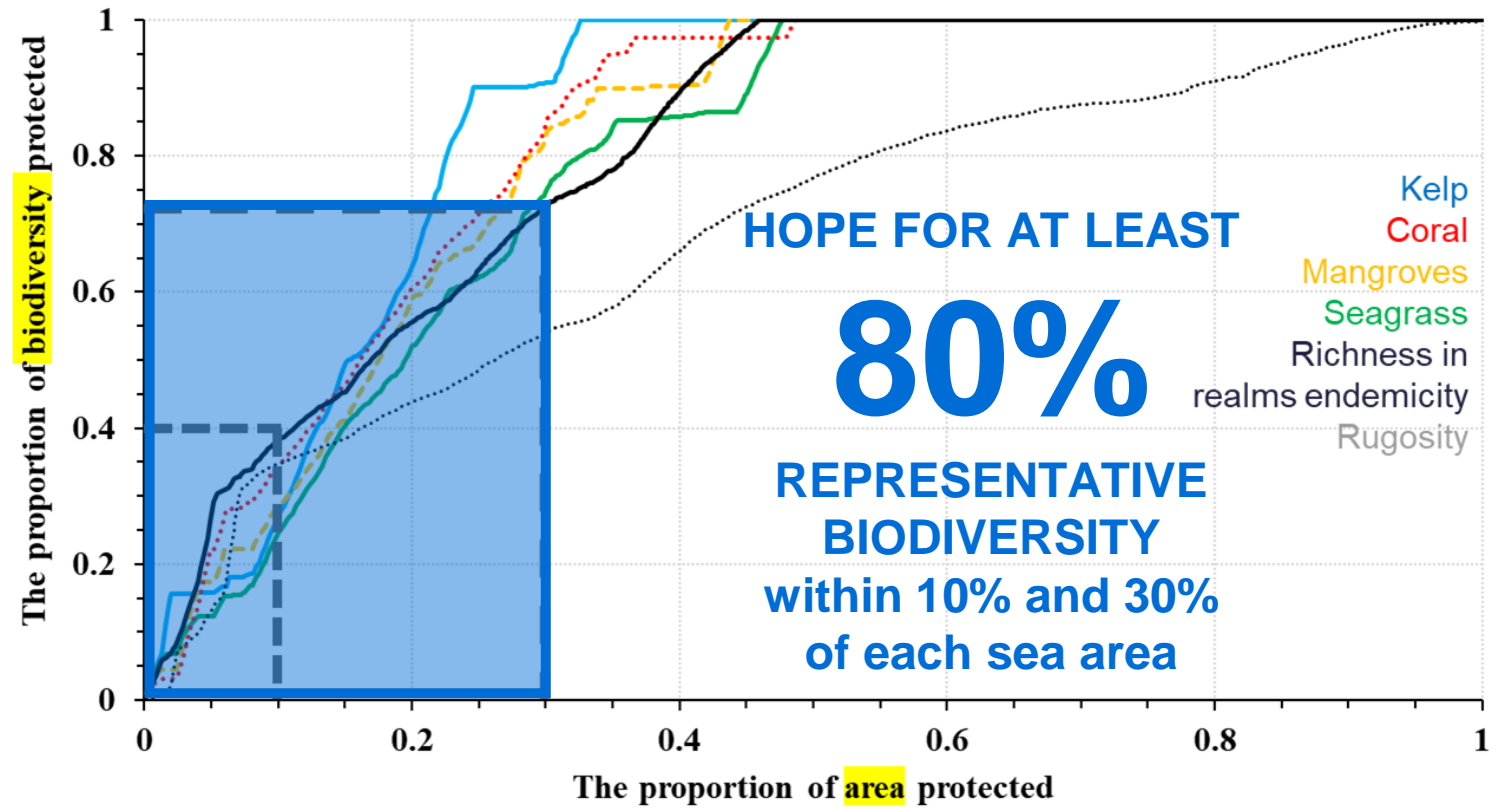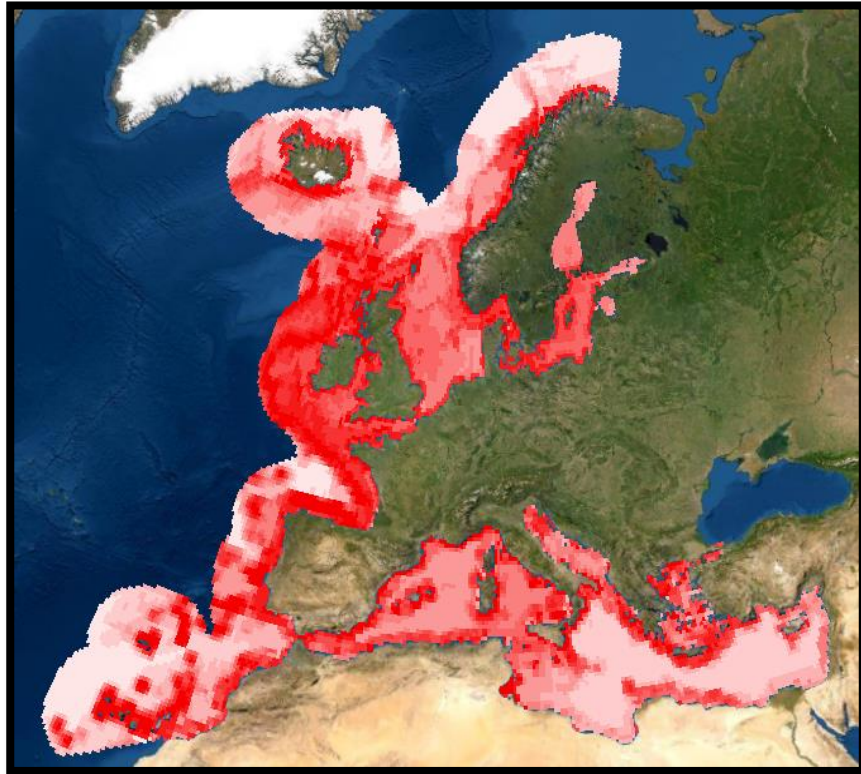
3.1.   Day 1, Targets on protected areas

3.1.1. Topics and questions

Topic – Complete the existing MPA network

- What existing information or methods, especially scientific, can be used to define new areas for designation?
- What other information relating to designation of additional areas have you found useful?

Topic – Improve coherence of the network

- How are you assessing coherence in your MPA network?
- What needs or opportunities are there for co-operation about assessment of MPA networks across national boundaries?

Topic – Identify and develop strictly protected areas

- Which species or habitats are likely to benefit most from strict protection?
- What are the main benefits of strictly protected areas for different stakeholders ('win-win' opportunities)?

Topic – Ensure adequate management of protected areas

- How are you going to monitor and ensure effective management of MPAs in your network?
- What opportunities exist for co-operation in addressing management challenges, especially for wide-ranging species or where pressures are transboundary

Seminar report

Marine introductory seminar
for the pledge and review process
in the context of commitments
under the EU Biodiversity Strategy for 2030

9-10 December 2021

Online

Atlantic and Macaronesian

- Will use **standardised spatially comprehensive** representing species ranges, biogenic habitats (biomes) and functional ecosystem units

- Will map **representative network at 5 km** resolution indicating coherence

- Will map **oceanographic connectivity** (models of current velocity that account for prevailing wind conditions)

- Will **prioritise biogenic habitats** for which data layers exist at:
  - European scale (e.g. seagrass, maerl, kelp, fucoids, corals)
  - upper levels of EUNIS that cover all seabed habitats

- Will **replot predicted species ranges based on climate change scenarios** to indicate:
  - how well the representative biodiversity areas (**RBAs**) will still be relevant in the future
  - where areas of refugia and high loss and gain (**turnover**) of species may exist

- Will run **prioritisation to select best 10% and 30%** at:
  - all Europe
  - main sea basins
  - EEZ
  - territorial sea levels

- Will **ignore political boundaries** but these can be overlaid to show cross border areas of priority

TIMELINE

Legend:
- Plan or Report ● ◆ Dissemination & Communication materials
- Paper ▲ ● Databases & maps

2023

JANUARY — START OF PROJECT

FEBRUARY
- WP1 Data management plan
- WP1 Kick-off meeting report
- WP7 Website & social media

JUNE
- WP2 Marine environmental data compilation
- WP3 New data published into OBIS
- WP7 DEC Plan

AUGUST
- WP2 Paper on European coast's wave exposure index

DECEMBER
- WP2 Marine ecosystem classification for near seabed waters
- WP3 Maps and models of biogenic habitats distributions published into EMODnet
- WP4 Carbon storage in marine biogenic habitats database
- WP4 Carbon storage in marine non-biogenic sediment habitats database

OCTOBER
- WP2 Marine ecosystem classification for surface waters
- WP3 Maps and models of species environmental niches and geographic distributions published into OBIS

2024

FEBRUARY
- WP2 Depth-integrated marine ecosystem classification
- WP4 Carbon storage within and beyond biogenic habitats

APRIL
- WP2 Paper on marine ecosystem classification for surface and near seabed waters of Europe
- WP3 Species and habitats conservation status database
- WP4 Scoring system for carbon storage within and beyond marine biogenic habitats

DECEMBER
- WP2 Climate velocity map for European seas under current conditions
- WP5 Paper on the spatial relationships between measures of biodiversity and environmental conditions
- WP7 Dissemination articles for children

JUNE
- WP4 Map of carbon storage capacity in European marine habitats
- WP5 Marine environment and ecosystem, species distribution and habitats, and blue carbon layers ready for prioritisation analysis
- WP2 Current connectivity maps of European seas

2025

FEBRUARY
- WP5 Prioritisation analysis based on biodiversity variables

APRIL
- WP2 Climate velocity map for European seas under future climate change scenarios
- WP5 Prioritisation analysis based on blue carbon scores
- WP6 Four regional case studies synthesising stakeholder views identified and outlined, meeting end user needs

JUNE
- WP3 Paper on marine species and habitat distribution models
- WP5 Prioritisation analysis based on biodiversity variables and blue carbon
- WP7 Four dissemination videos

JULY
- International Conference on MPA and MSP

DECEMBER
- WP5 Paper on the MPA networks in European seas based on the prioritisation analysis for biodiversity conservation and blue carbon
- WP6 Policy brief on how the proposed MPA network supports MSP in Europe regarding biodiversity and blue carbon

OCTOBER
- WP2 Paper on how the proposed MPA network accommodates connectivity through current and climate velocities, now and under climate change scenarios
- WP5 Online atlas for MSP

2026

APRIL — END OF PROJECT
- WP1 International cooperation report
- WP1 Final data management plan
- WP7 Impacts of DEC activities and updated DEC plan

THANK YOU
https://mpa-europe.eu/

MARINE PROTECTED AREAS EUROPE

ANNA M ADDAMO –
anna.m.addamo@nord.no

BELINDA BRAMLEY -
belindabramley@gmail.com