European Maritime Day Stakeholder Conference

18-21 May - Gijón (Spain)

Le Danois Bank deep-sea ecosystem (El Cachucho): A first experience on off-shore MPAs

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Introduction

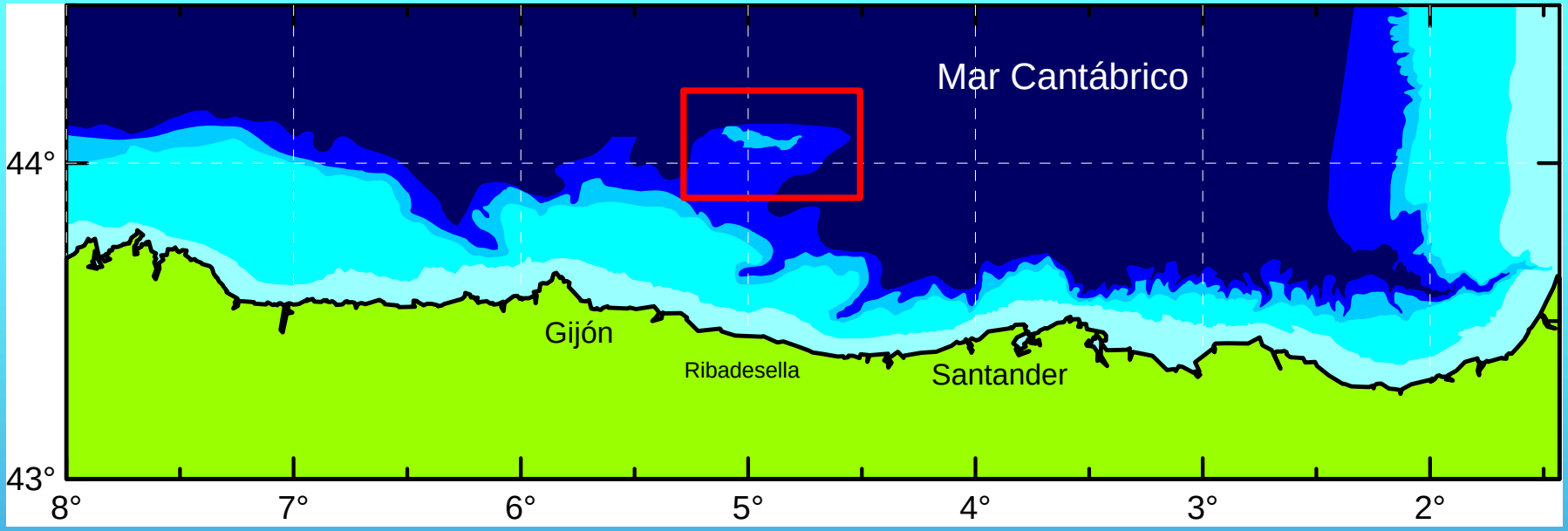
El Cachucho is the first Spanish off-shore Marine Protected Area. The area include Le Danois Bank and their Inner Basin (continental shelf junction).

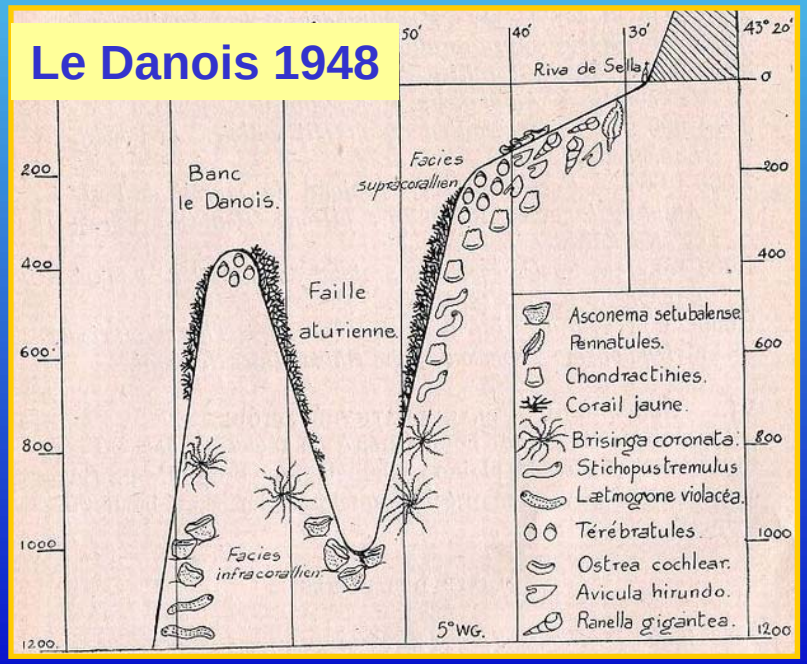
Spain has pioneered work to involve stakeholders, including fishermen and other users, improving everyone's understanding of where and why protection is needed.

To create this MPA an intensive 8-year process has been taken:

- **1 January 2003:** The ECOMARG project start the multidisciplinary study on Le Danois Bank area.
- **30 October 2006:** The Spanish Ministry of the Environment create a Working Group with representatives of stakeholders and other six Ministries to study and prepare the MPA proposal to European Union.
- **3 Mars 2008:** The Ministry of the Environment in conjunction with the Fisheries and Agriculture Ministry presented on European Union the proposal to declare the first off-shore Spanish MPA.
- **25 October 2008:** El Cachucho MPA is included in the OSPAR Network of Marine Protected Areas.
- **2 January 2009:** The Spanish Ministry of the Environment and Rural and Marine Affairs published a new law for Natural Heritage. Specific management of fishing activities, oil exploration, minerals and military activity is proposed in the area.
- **26 January 2009:** The Official Diary of European Union published the new regulations and the protection measures involved El Cachucho MPA.

Geographic location



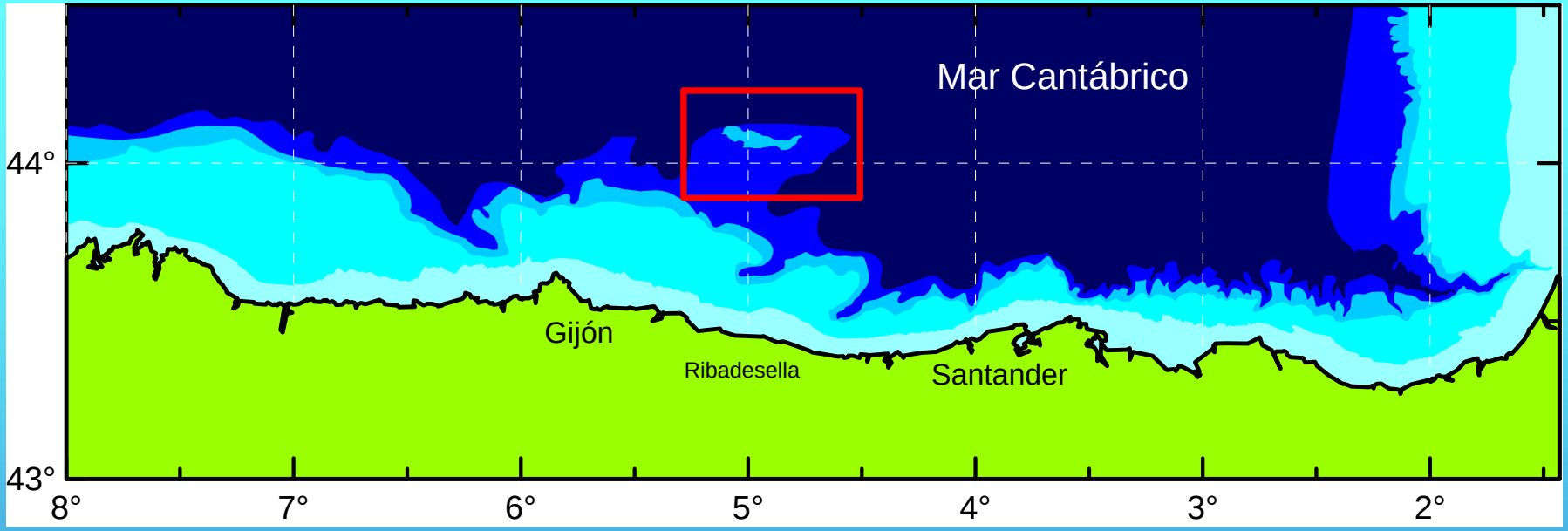


Le Danois Bank is in the North of Spain (Cantabrian Sea), off Ribadesella in Asturias, 65 km from the coast at longitude 5º W.

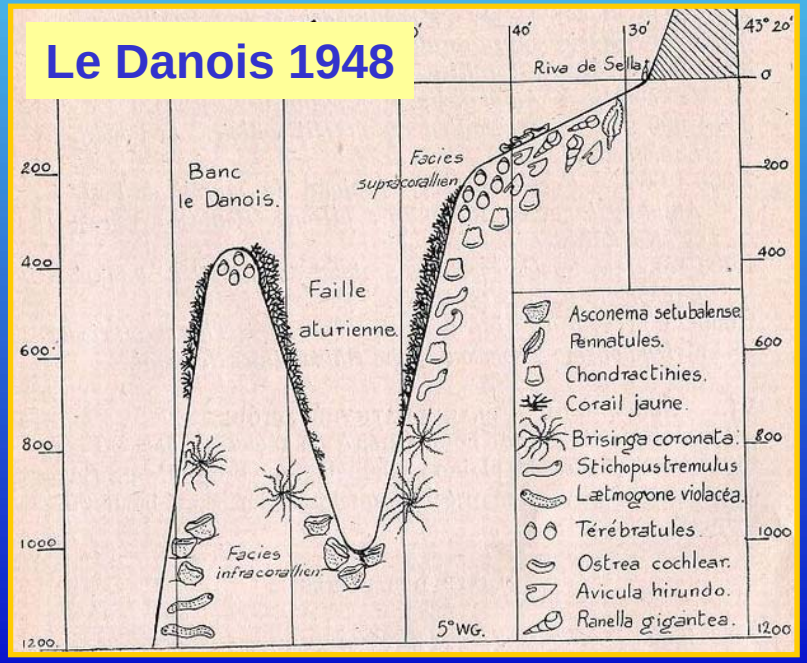
Spanish fishermen know the bank from 1916 (30 years before Le Danois).

The local name of the bank is “El Cachucho” fishing ground.

Geographic location



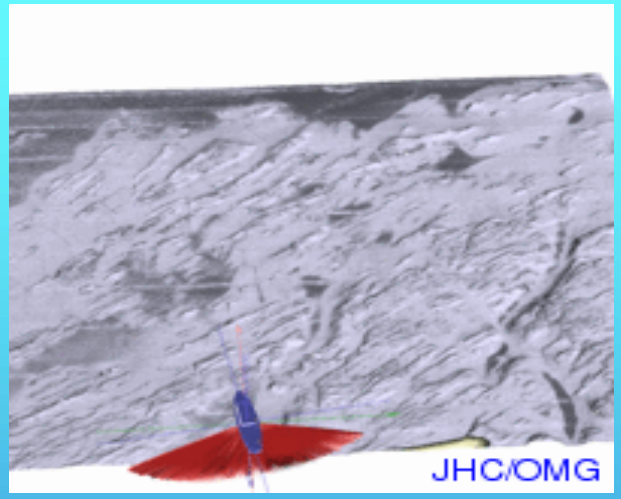
Le Danois 1948



CACHUCHO (*Beryx decadactylus*)

Morpho-sedimentary and bathymetric characteristics

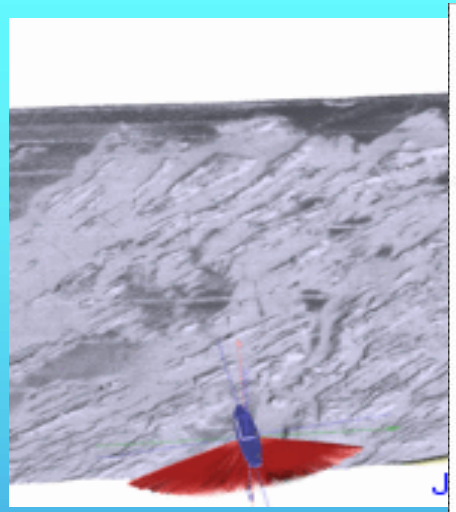
Multibeam methodology



100% Coberture

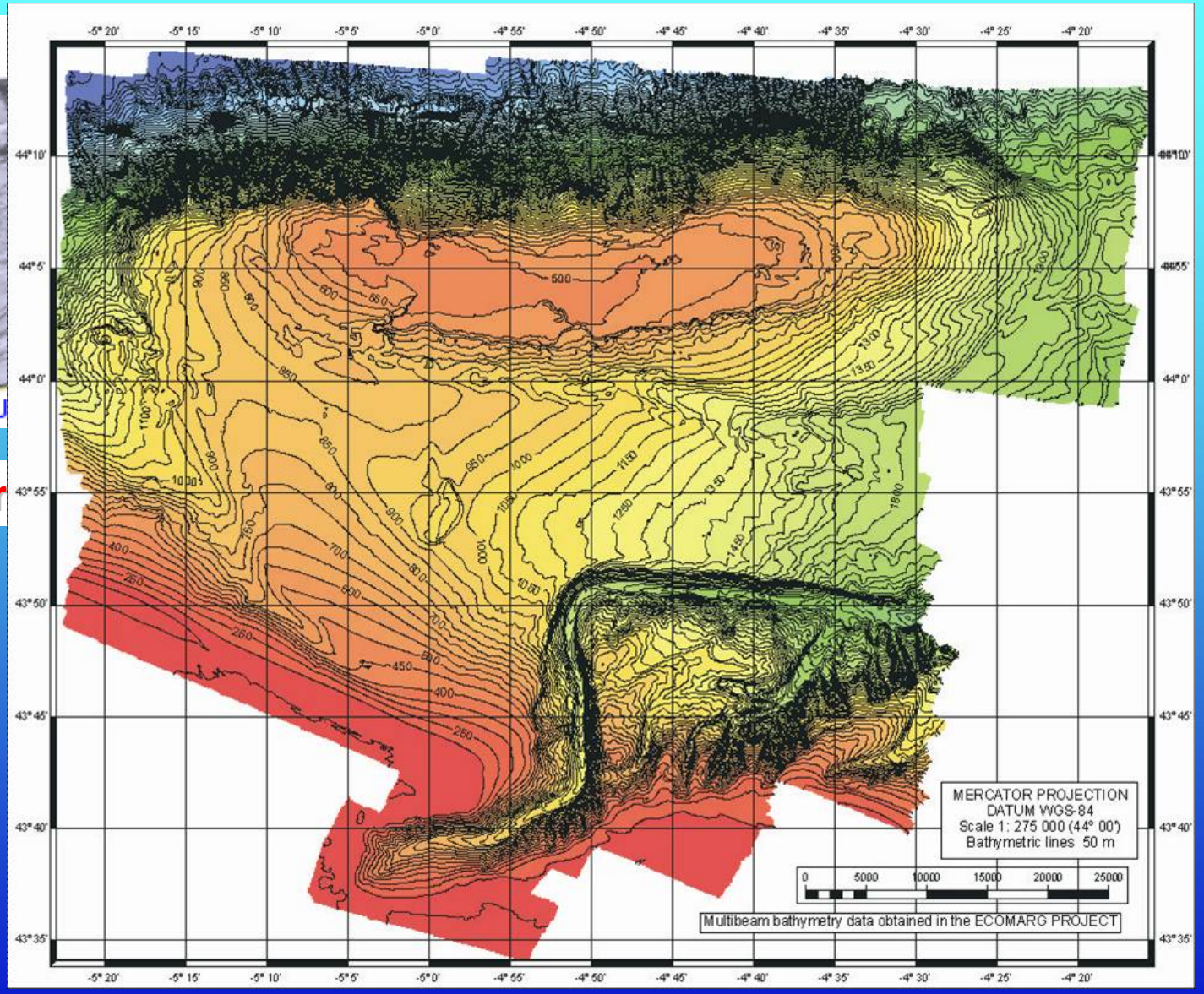
Morpho-sedimentary and bathymetric characteristics

Multibeam methodology



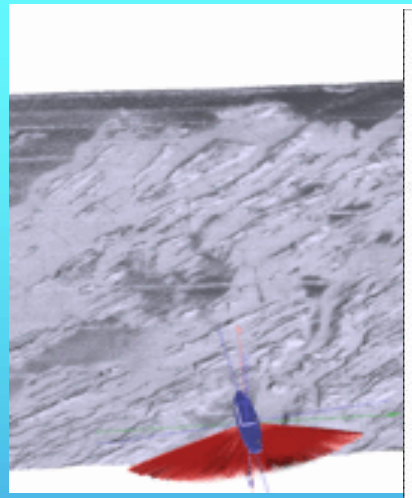
100% Cobertur

Bathymetric map



Morpho-sedimentary and bathymetric characteristics

Multibeam methodology



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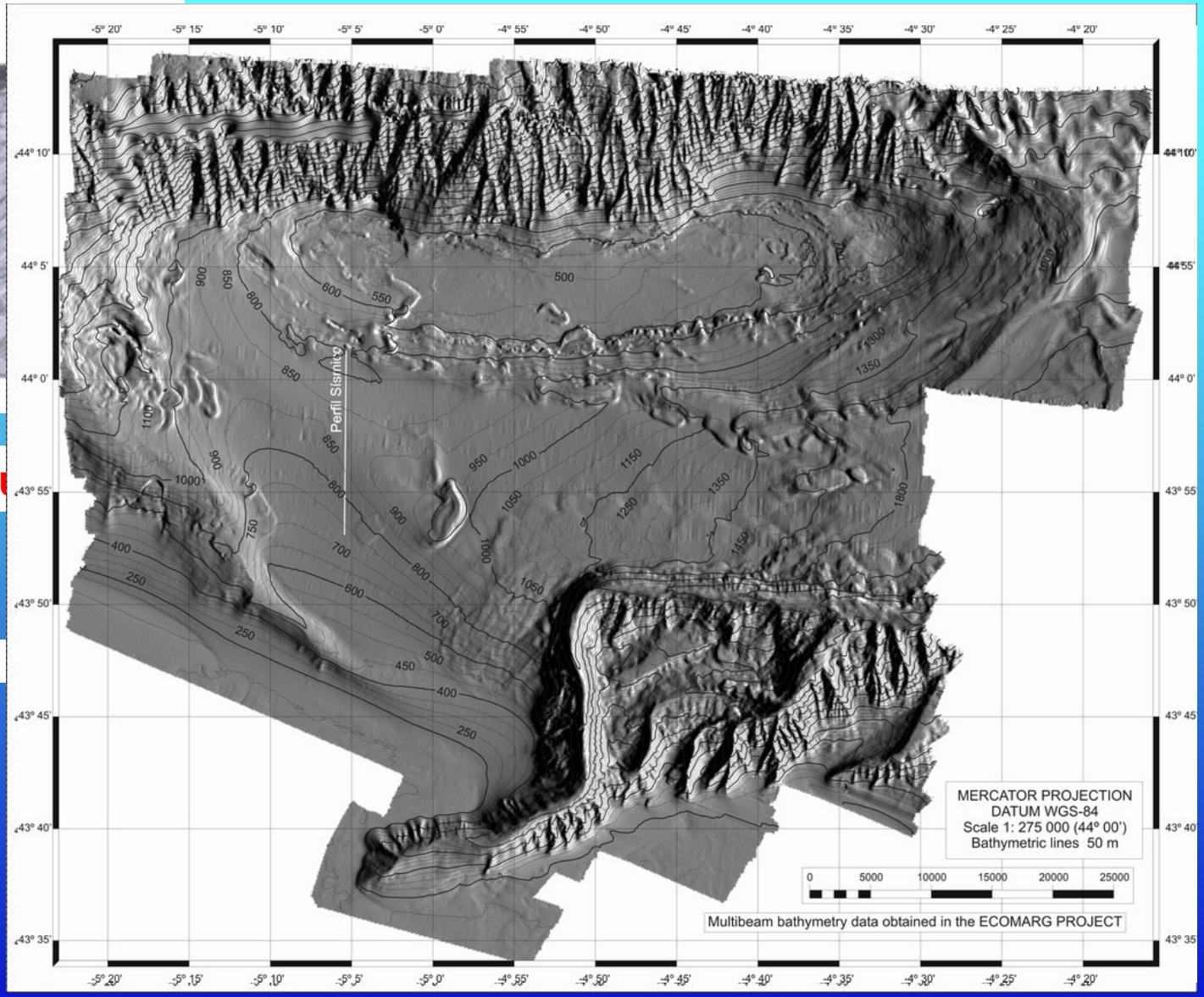
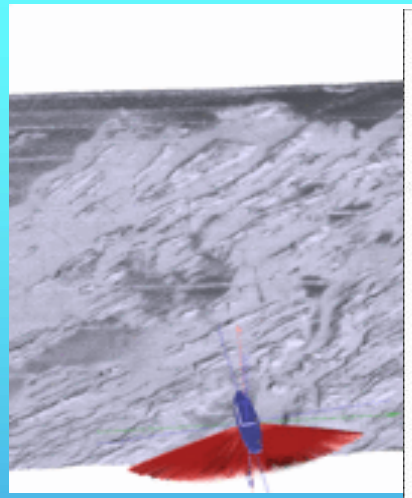
Bathymetric map

Shaded relief map



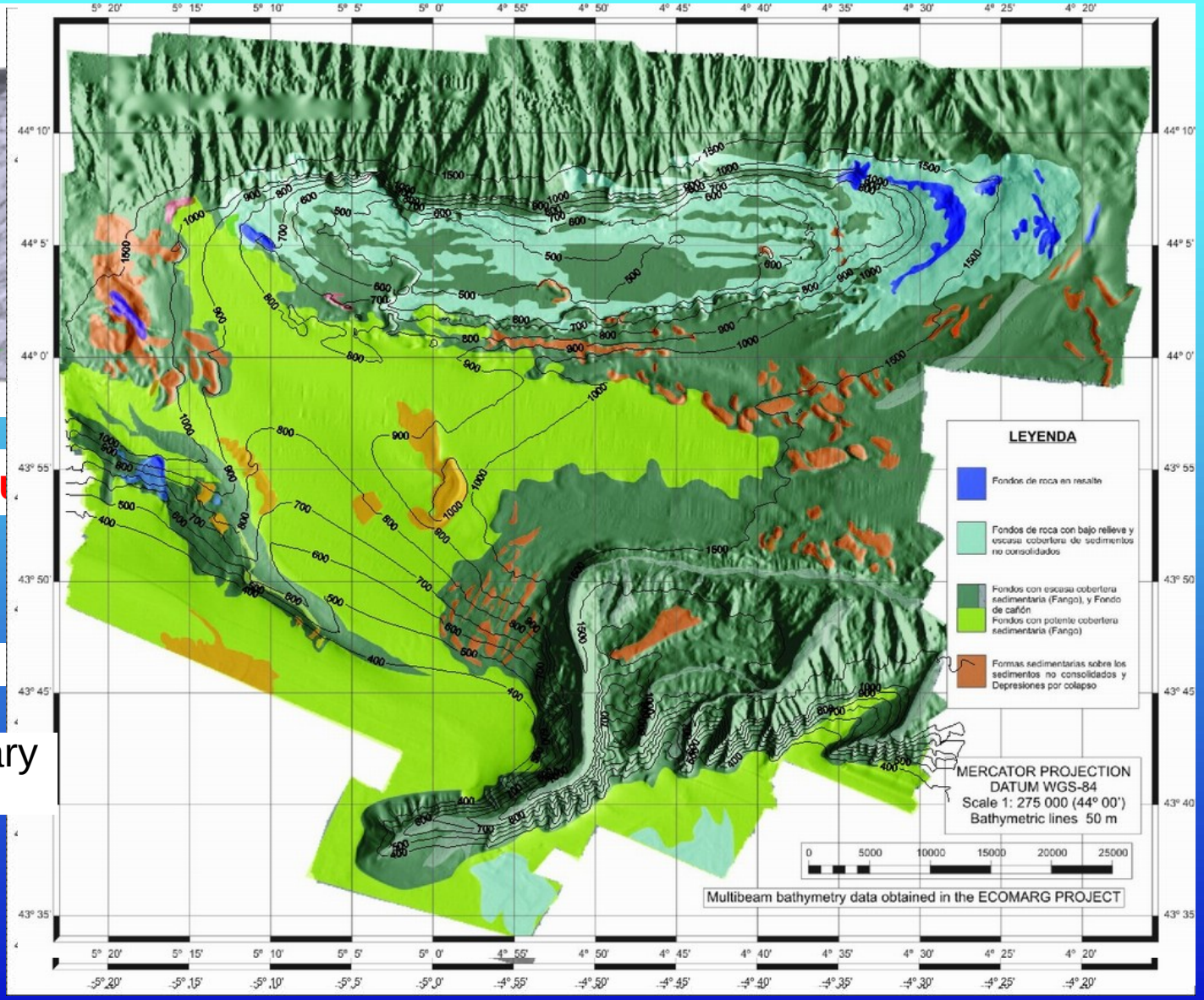
Morpho-sedimentary and bathymetric characteristics

Multibeam methodology



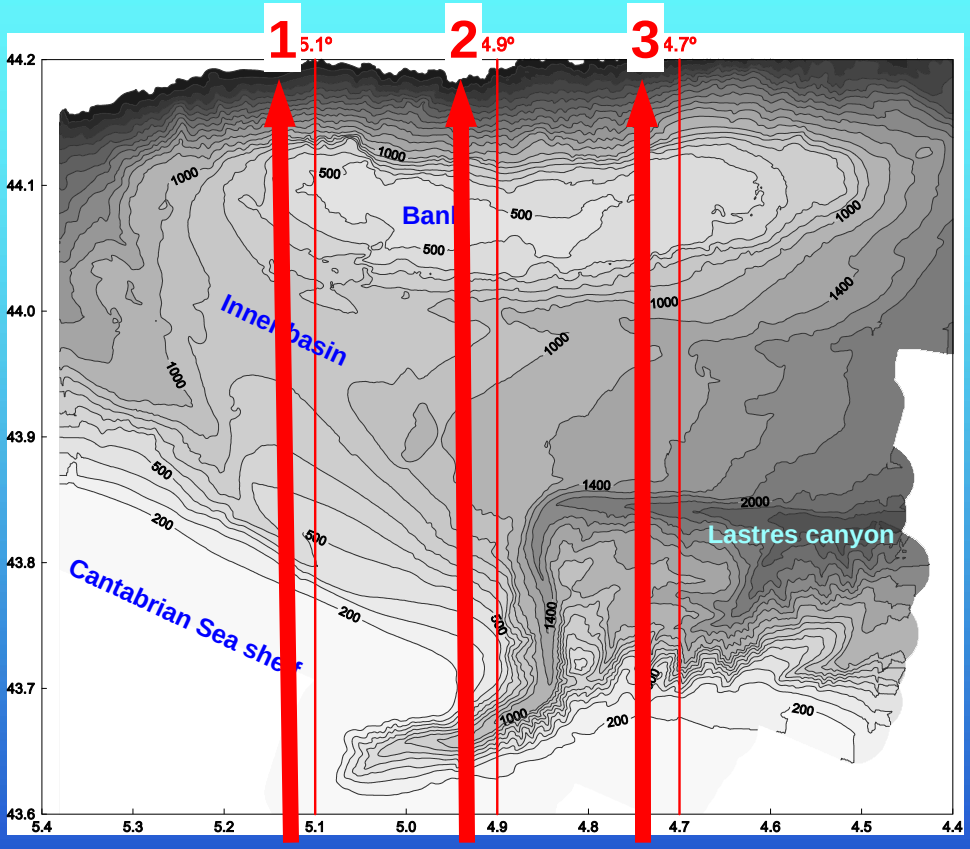
100% Cobertu

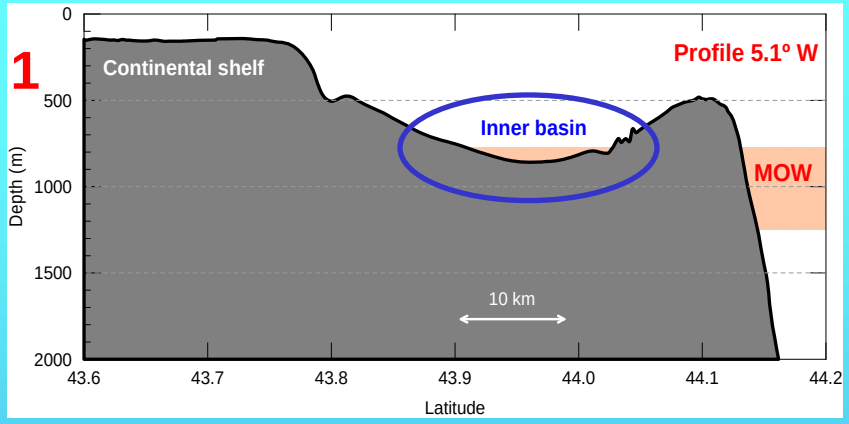
- Bathymetric map
- Shaded relief map
- Morphosedimentary map

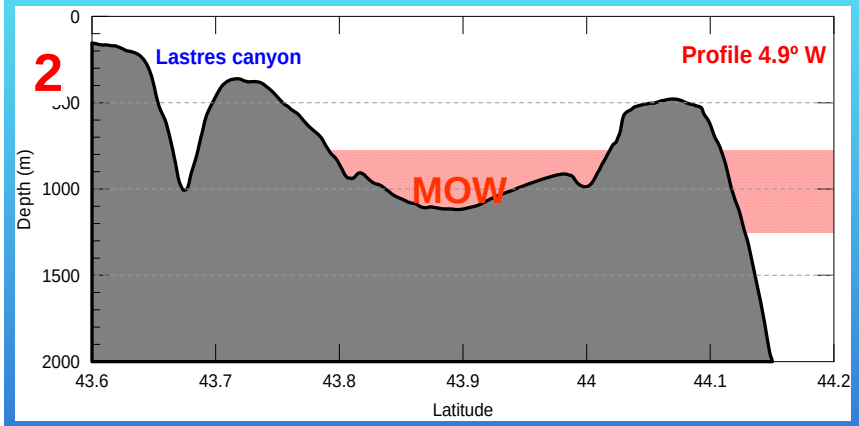


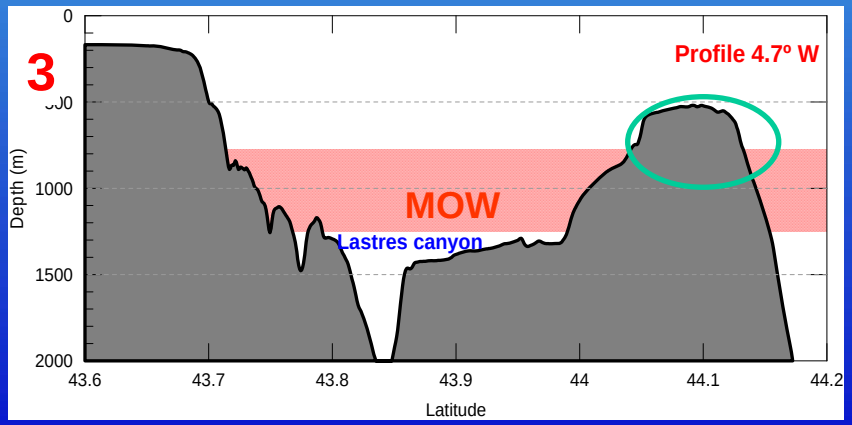
Morpho-sedimentary and bathymetric characteristics

Bathymetric sections









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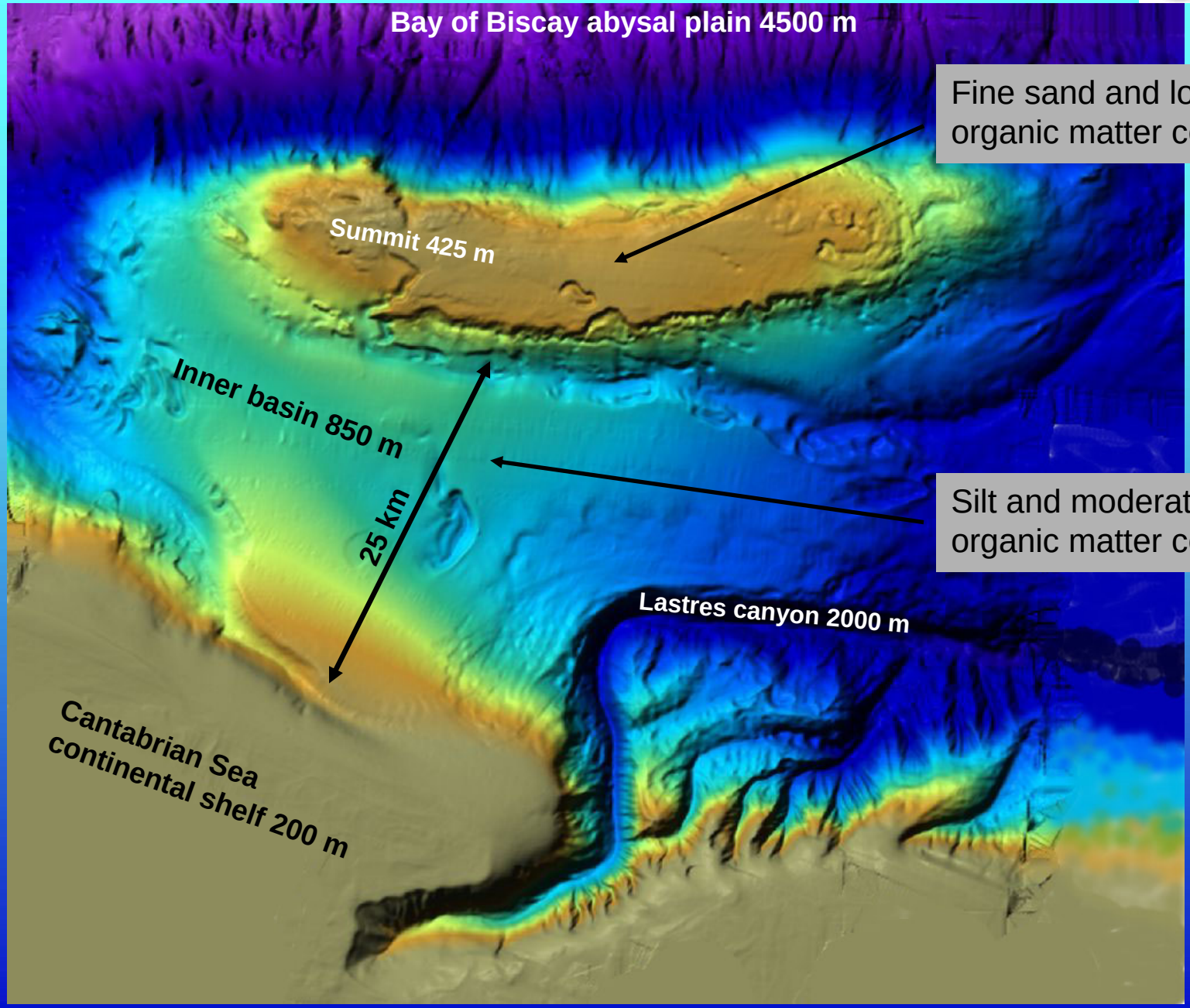

Benthic and demersal communities description

BIOLOGICAL SAMPLING STRATEGY

Rocky grounds

Deep-sea benthic systems are notoriously difficult to sample.

During ECOMARG project, multipurpose stations using different samplers allow to combine data from:

1. **Endobenthic**
2. **Epibenthic**
3. **Suprabenthic**
4. **Benthopelagic** and
5. **Demersal communities**

in the same analysis.

Benthic and demersal communities description

BIOLOGICAL SAMPLING STRATEGY

Rocky grounds

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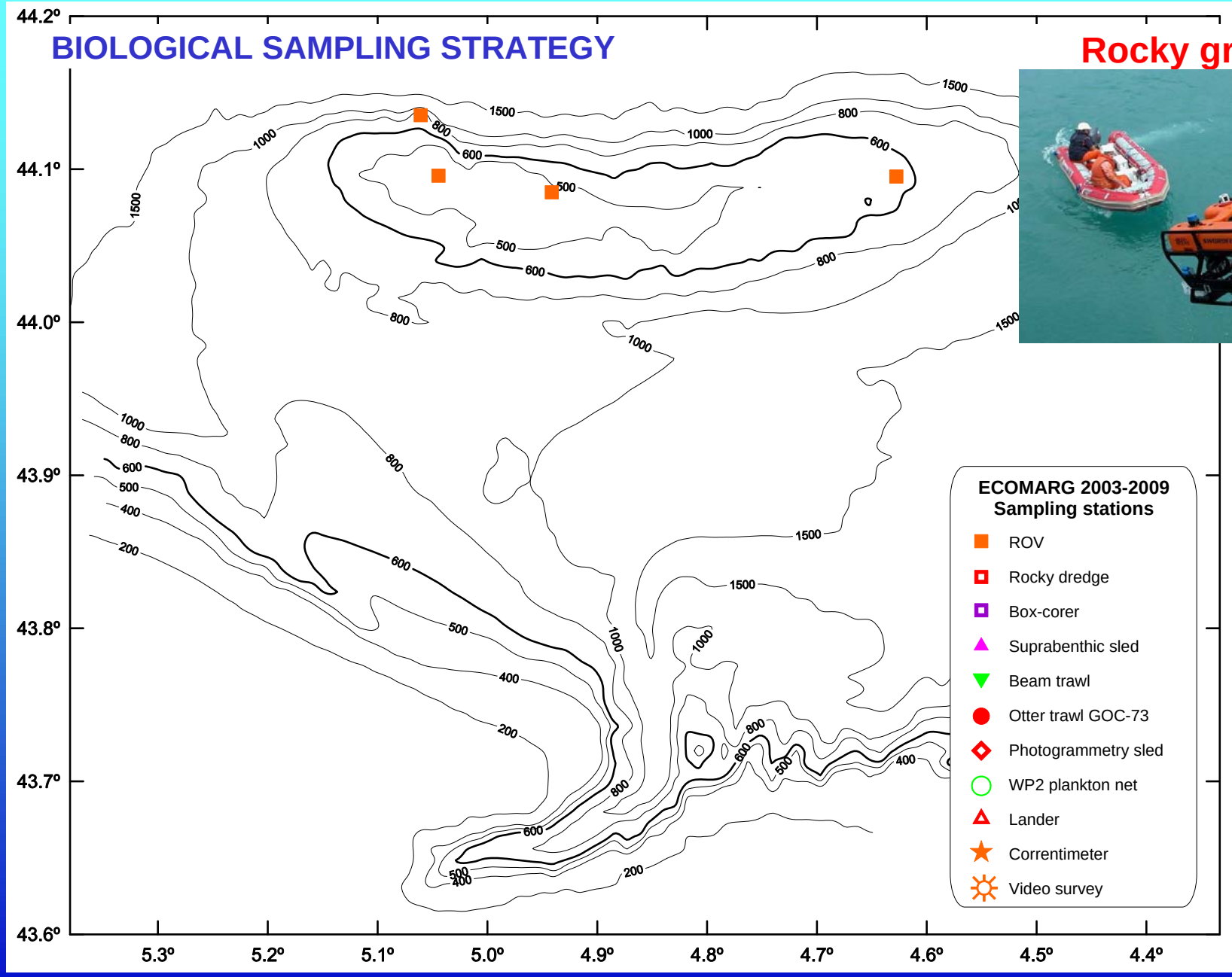
Benthic and demersal communities description

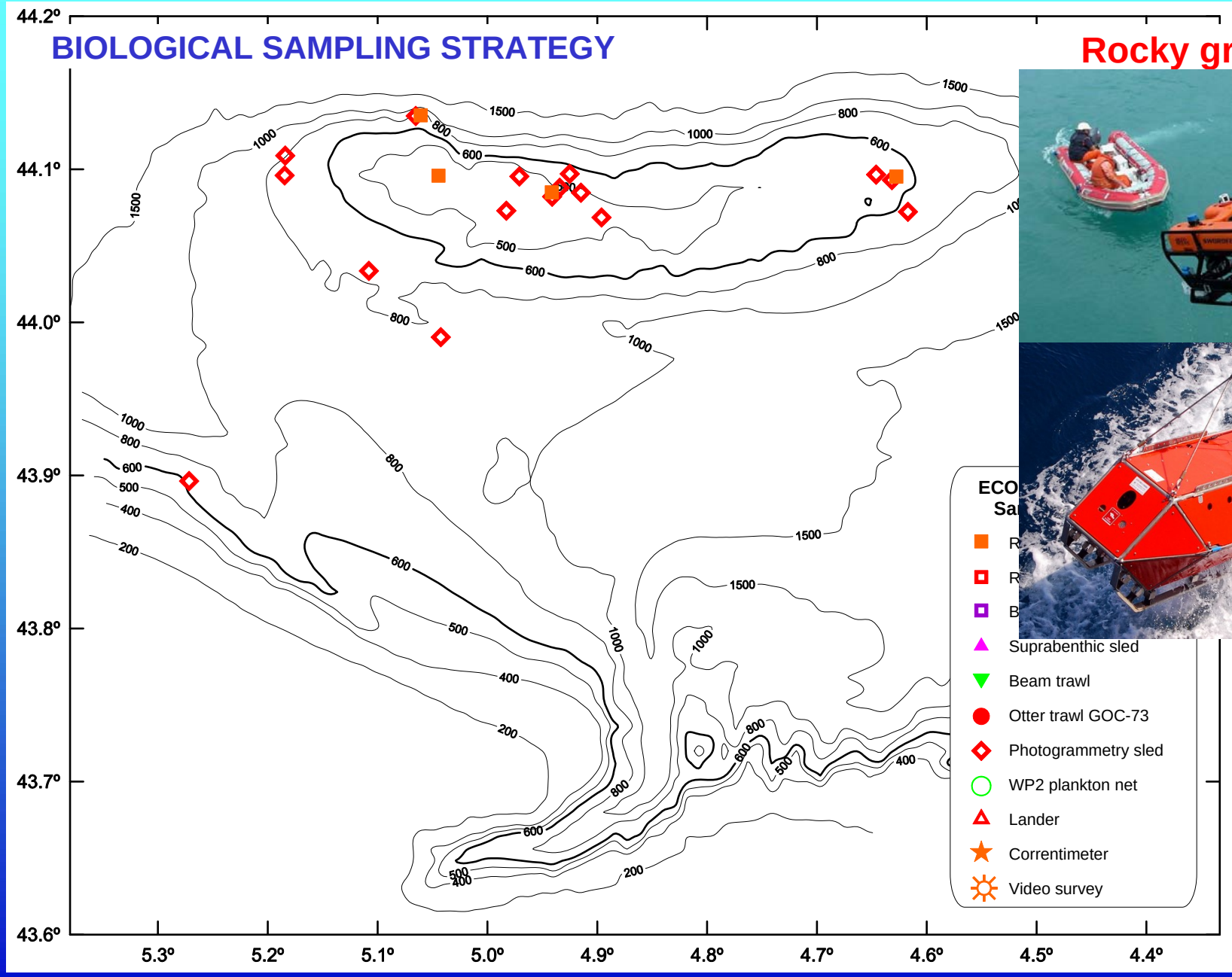
BIOLOGICAL SAMPLING STRATEGY



Rocky grounds

Benthic and demersal communities description

BIOLOGICAL SAMPLING STRATEGY



Rocky grounds

Benthic and demersal communities description

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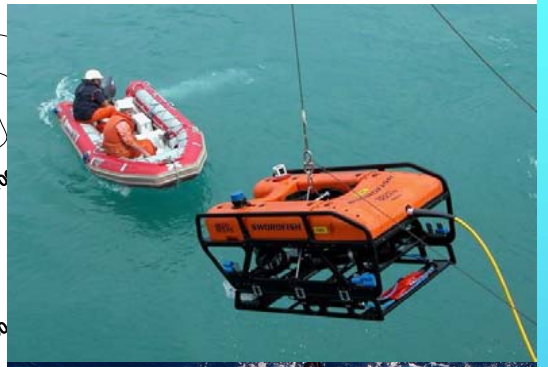
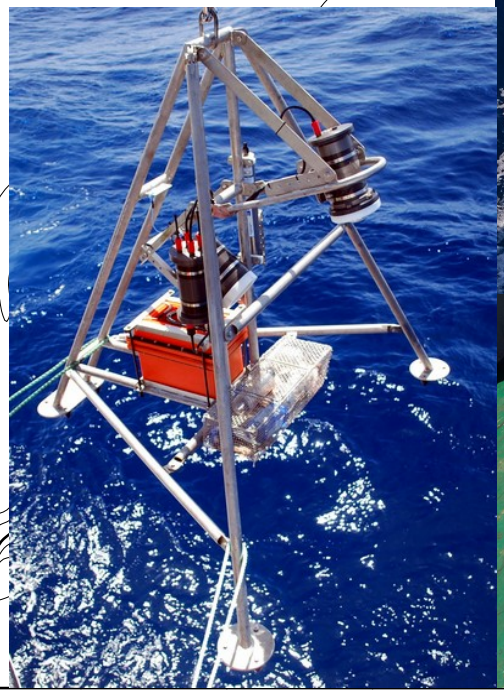
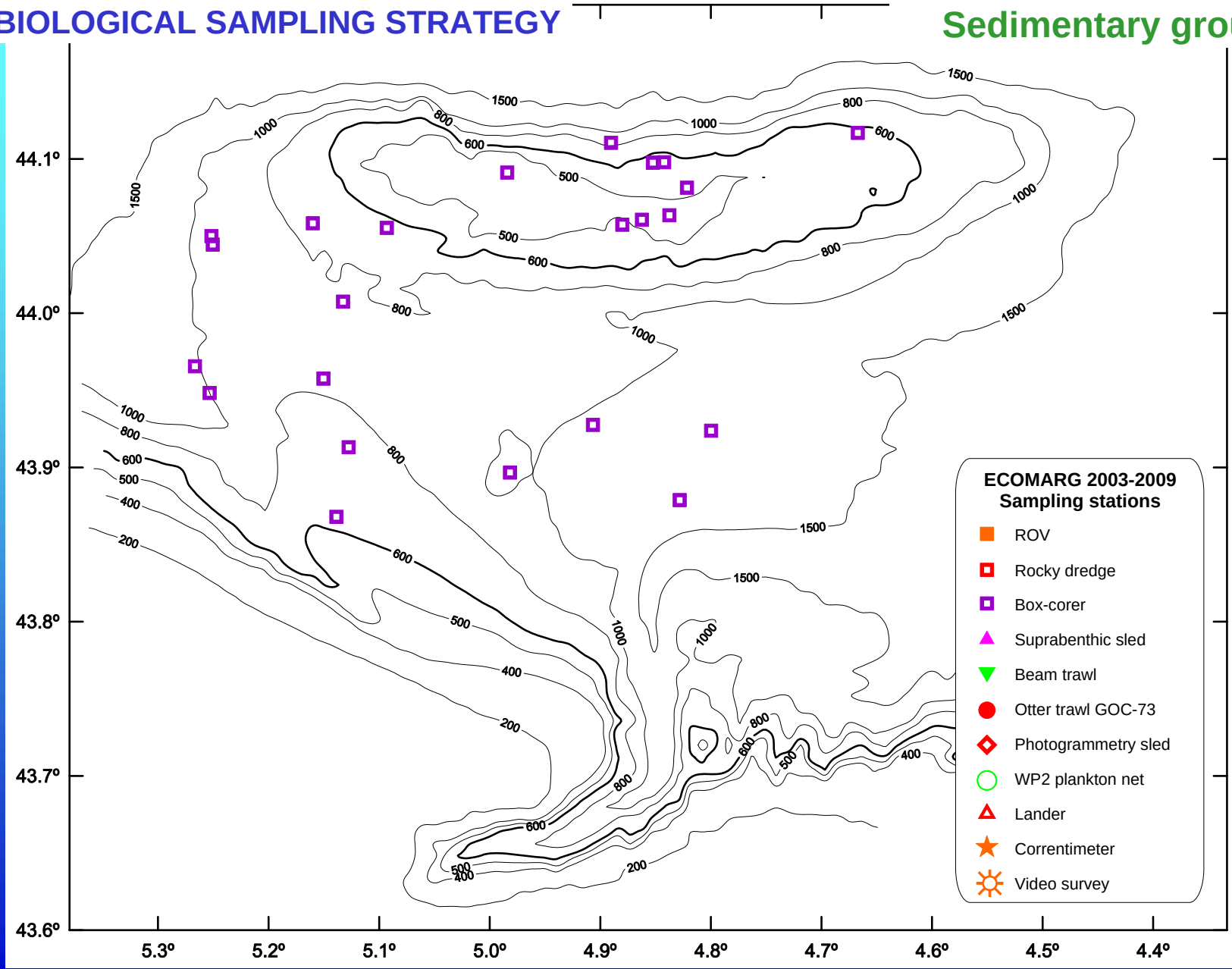




Benthic and demersal communities description

BIOLOGICAL SAMPLING STRATEGY

Sedimentary grounds



Benthic and demersal communities description

BIOLOGICAL SAMPLING STRATEGY

Sedimentary grounds

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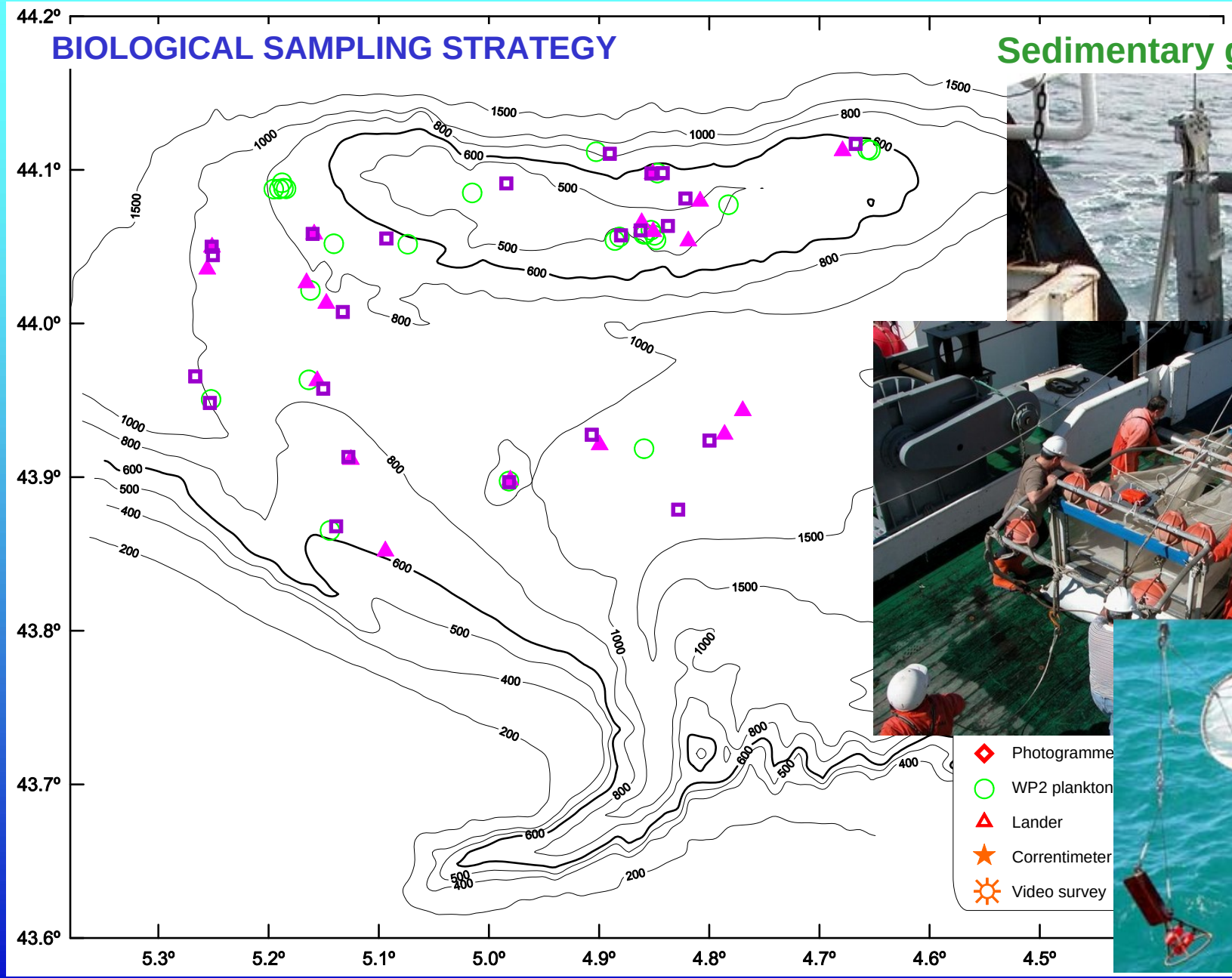


Sedimentary grounds

Benthic and demersal communities description

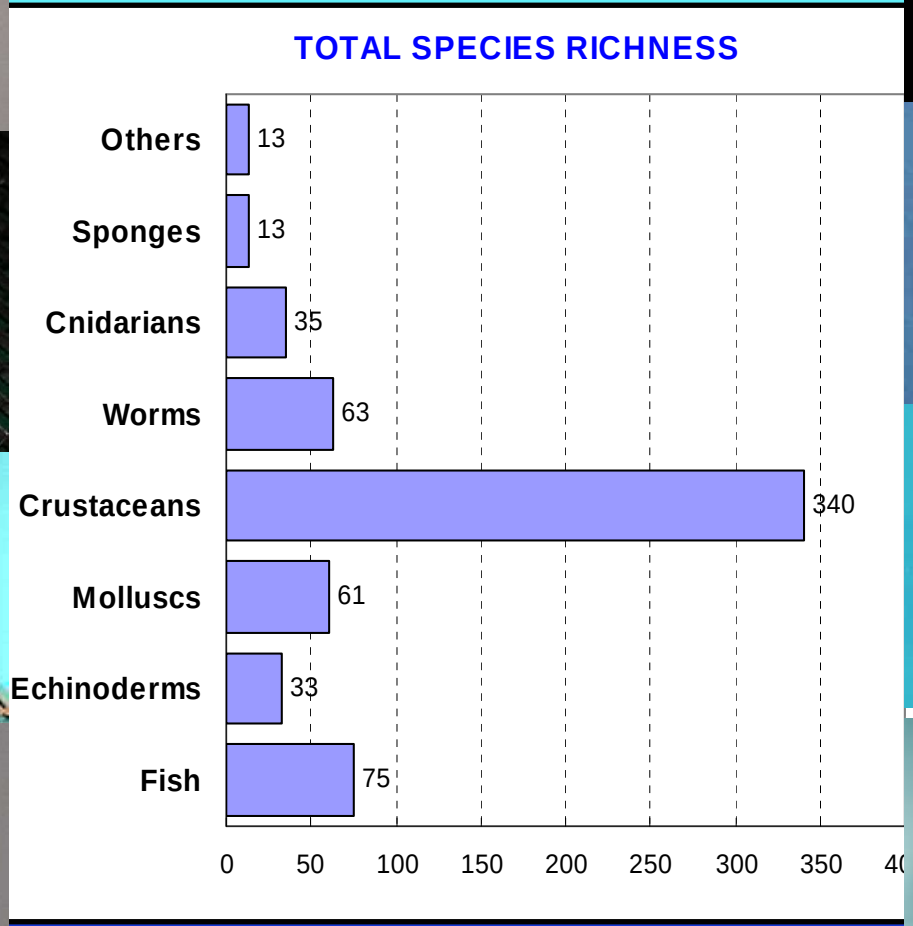
Sedimentary grounds

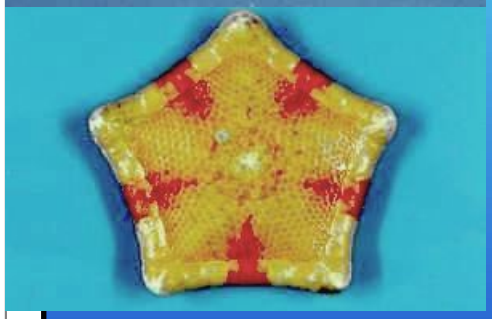
Benthic and demersal communities description

Sedimentary grounds

Benthic and demersal communities description

Hotspot of BIODIVERSITY





Threatened and declining species and habitats

ECOLOGICAL FEATURES SUMMARY

Threatened and/or Declining Habitats of the OSPAR List:

1. Deep-sea sponge aggregations
2. *Lophelia pertusa reefs*
3. Seamounts communities
4. Sea-pen and burrowing megafauna communities

Threatened and/or Declining Species (OSPAR list):

1. Orange roughy (*Hoplostethus atlanticus*)
2. Common Skate (*Dipturus batis*)
3. Basking shark (*Cetorhinus maximus*)
4. Bluefin tuna (*Thunnus thynnus*)

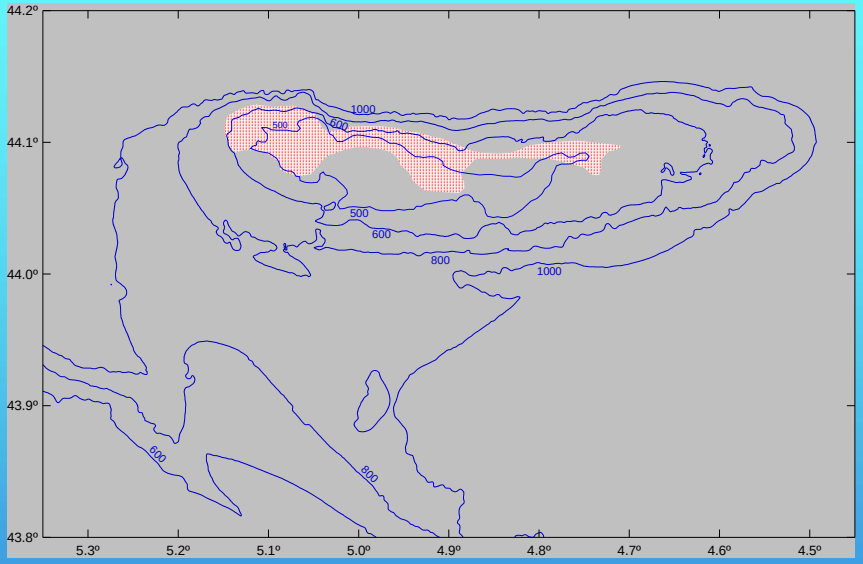
Essential Fish Habitat (EFH):

1. Forkbeard (*Phycis blennoides*) – spawners
2. Blue whiting (*Micromesistius poutassou*) – spawners
3. Anglerfish (*Lophius piscatorius*) - spawners
4. Thornyhead (*Trachyscorpia christulata*) – spawners
5. Blue-mouth (*Helicolenus dactylopterus*) – spawners

Habitat identification and cartography

Callogorgia-Chimaera community

Top of the Bank rocky bottoms



Other species:

Alfonsino (*Beryx decadactylus*)

Blue-mouth redfish (*Helicolenus dactylopterus*)

Cup sponge (*Asconema setubalense*)

Stone sponge (*Geodia megastrella*)

Black-mouth dogfish (*Galeus melastomus*)

Rough-fish (*Hoplostethus mediterraneus*)

Crab (*Bathynectes maravigna*)

Squat lobster (*Munida sarsi*)

Velvet-belly shark (*Etmopterus spinax*)

Sponge (*Phakellia* spp.)

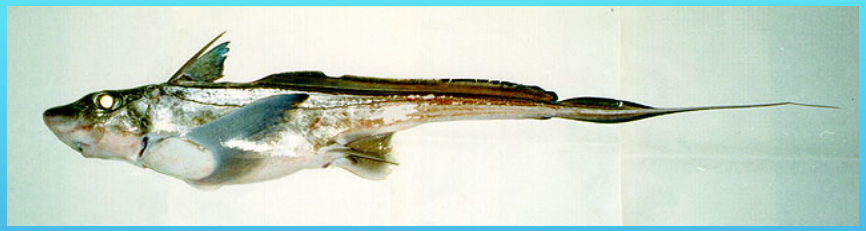
EUNIS habitat type: A6.61 Communities of deep-sea corals

OSPAR: Coral Gardens

Characteristic species:

Gorgonians (*Callogorgia verticillata*)

Rat-fish (*Chimaera monstrosa*)



Habitat environmental characteristics:

Depth: 483.8 ± 22.28 Temperature: 11.00 ± 0.057

Salinity: 35.56 ± 0.003 % Organic matter: 2.95 ± 0.36

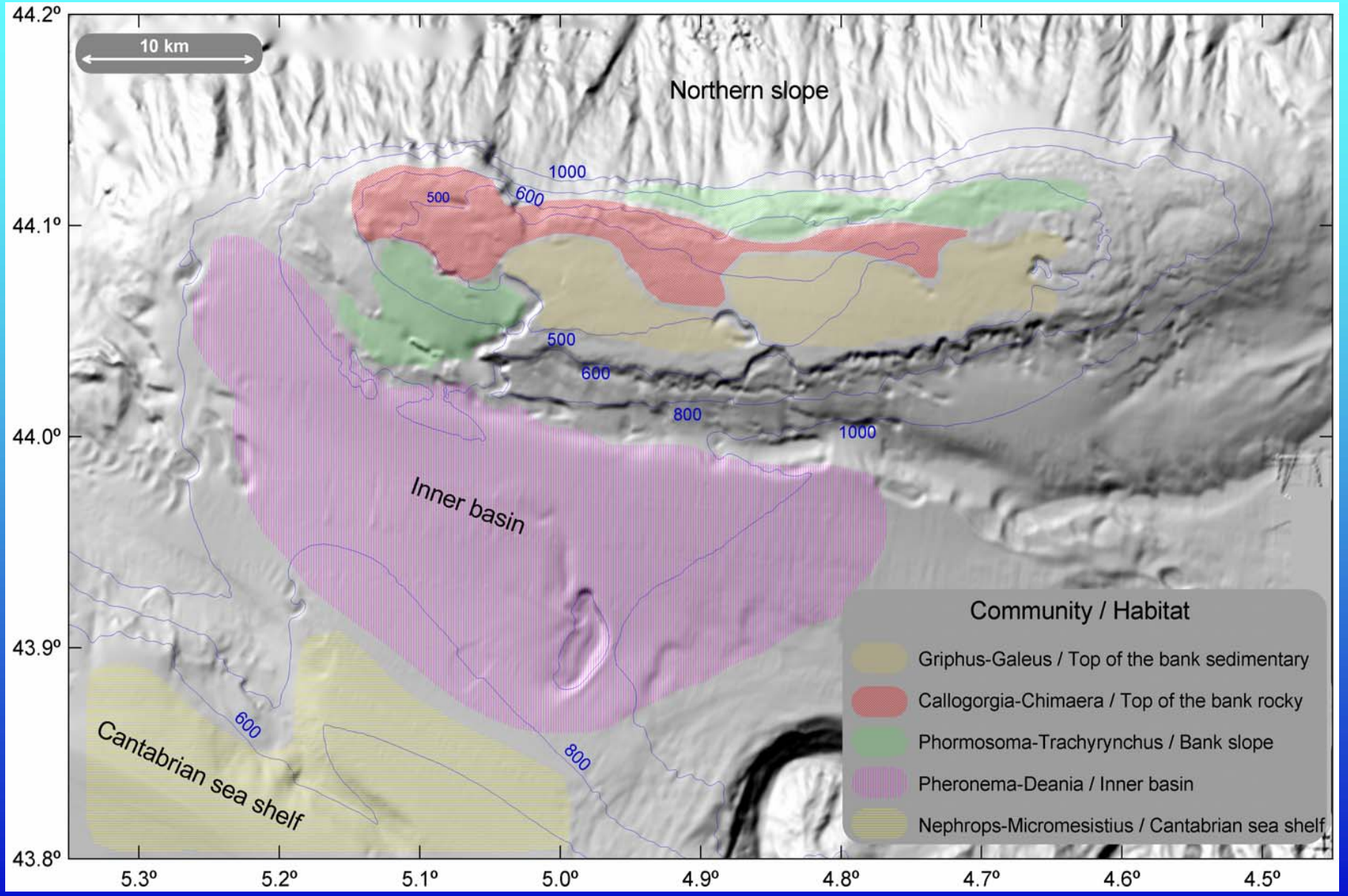
% coarse sands: 2.07 ± 0.41

% medium and fine sands: 79.97 ± 6.17

% mud: 17.96 ± 6.32

Habitat identification and cartography

HABITATS and COMMUNITIES spatial distribution



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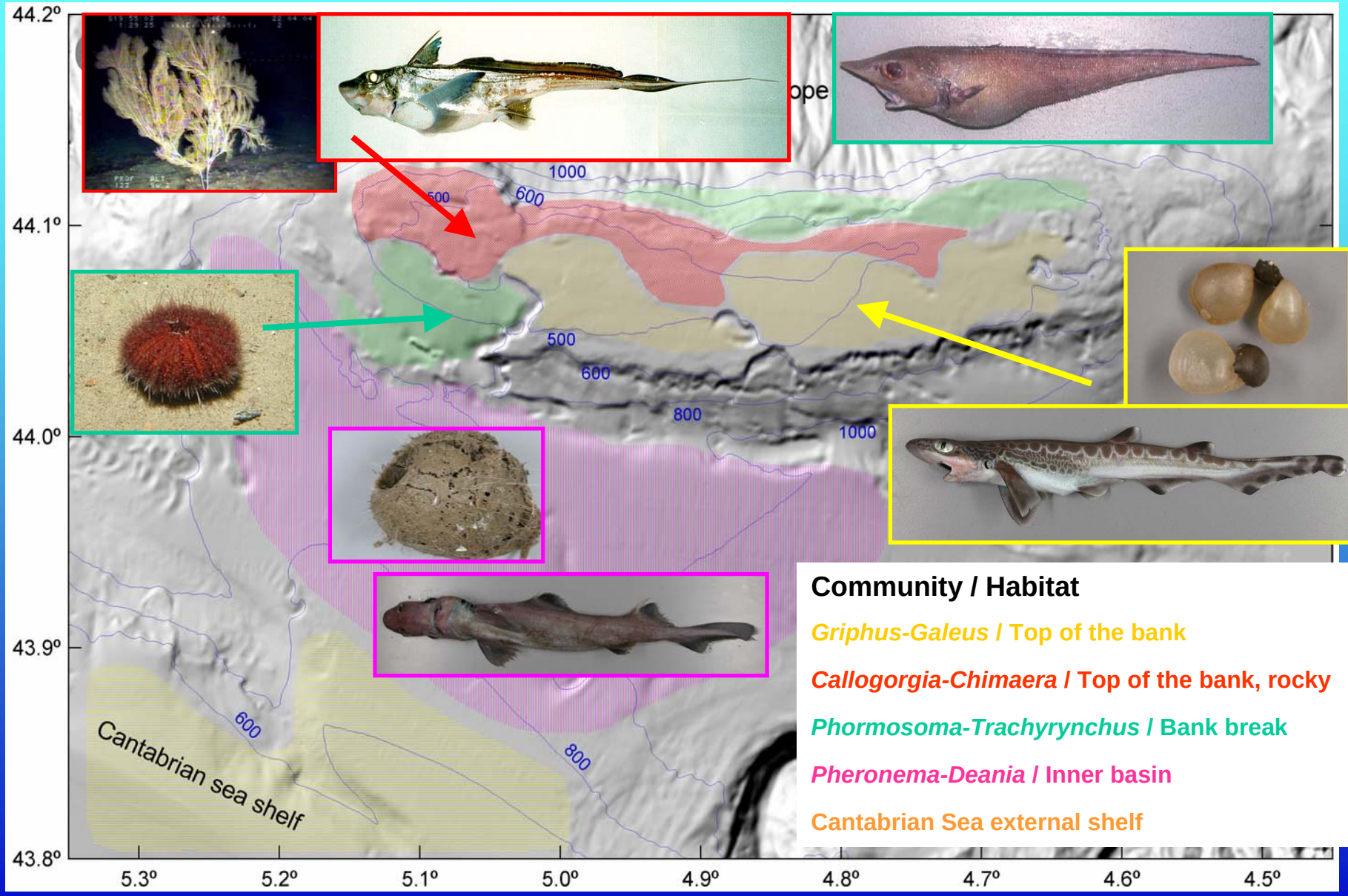
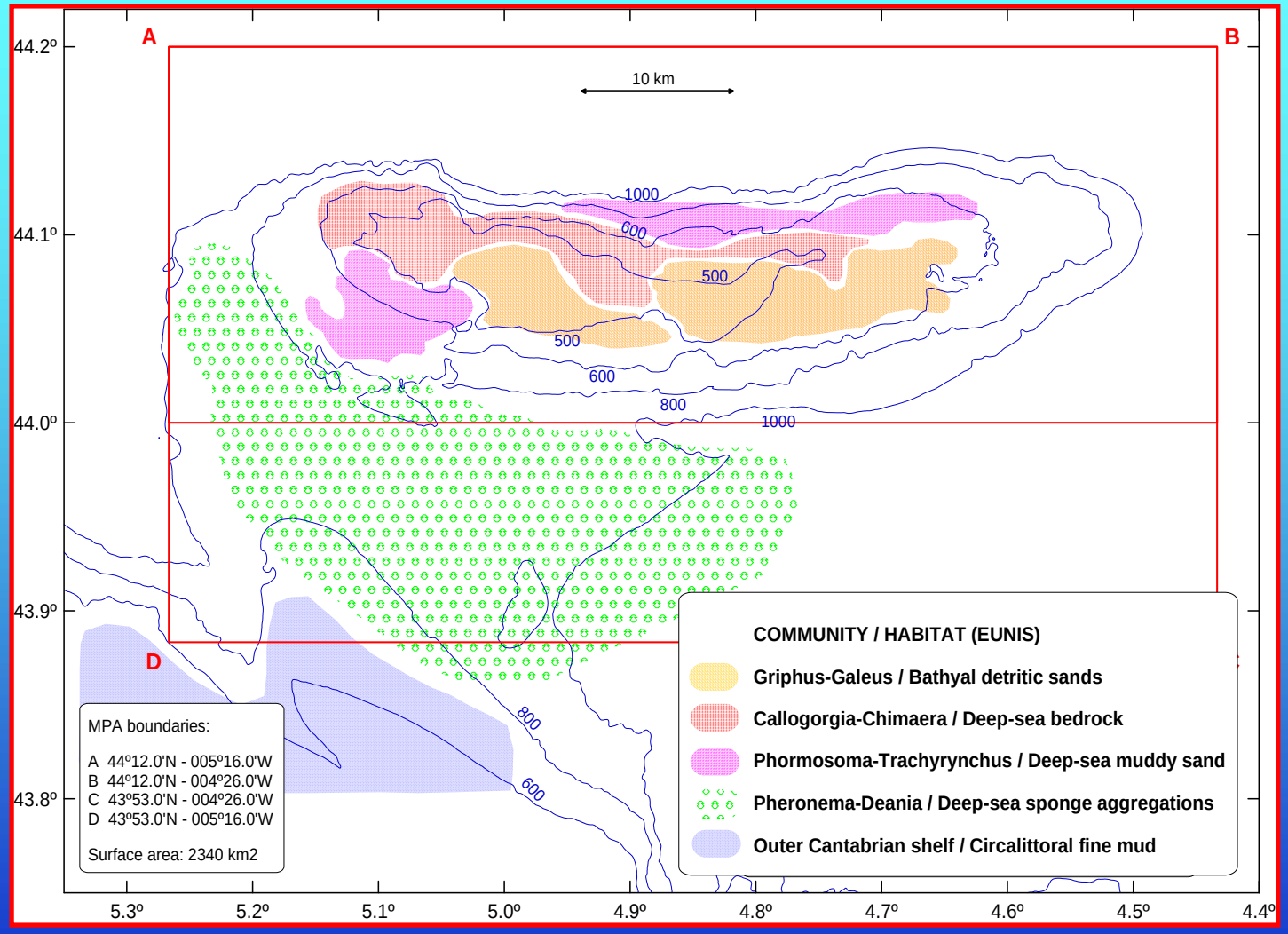


Habitat identification and cartography

Final results used to define the MPA boundaries and protection rules



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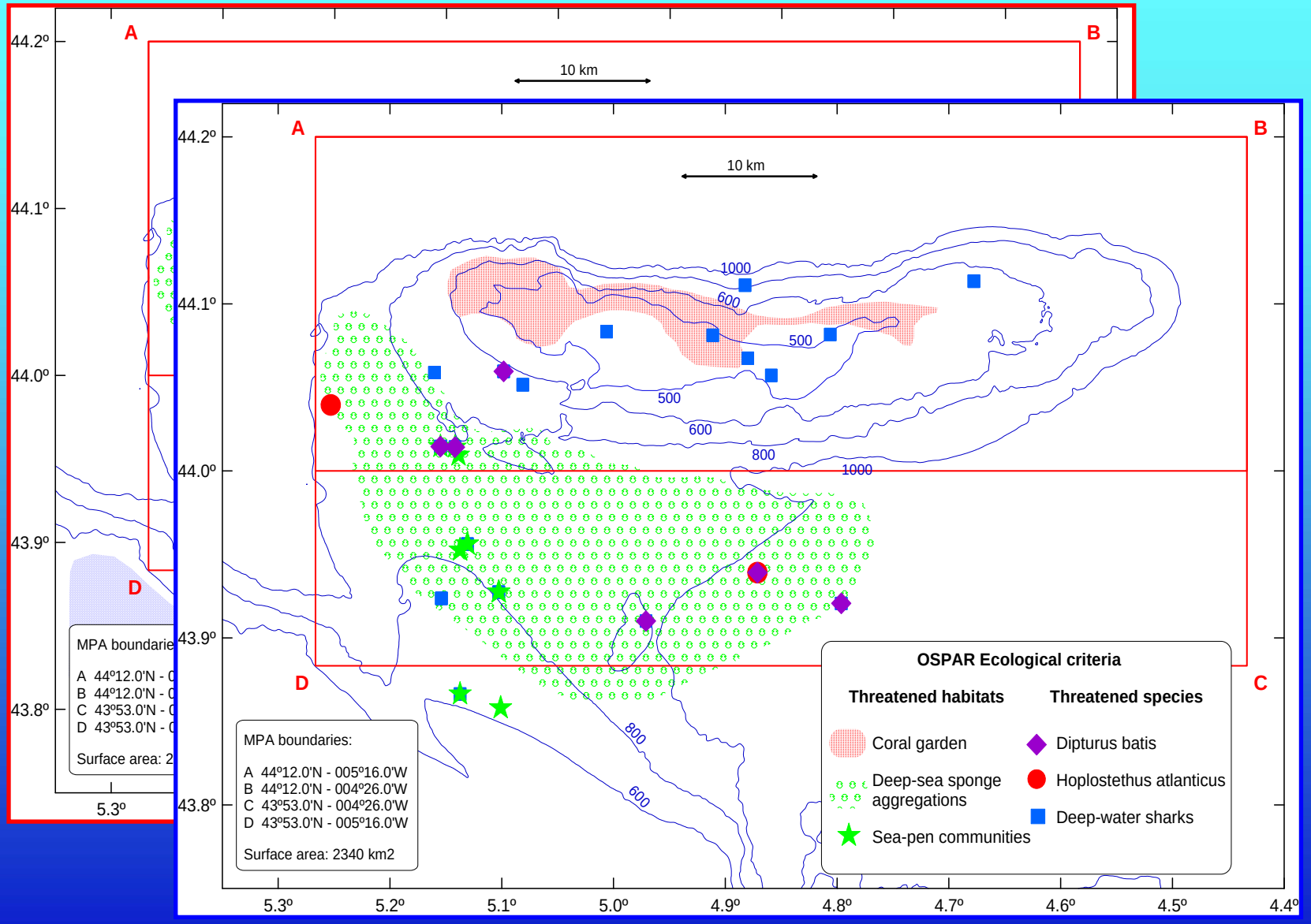

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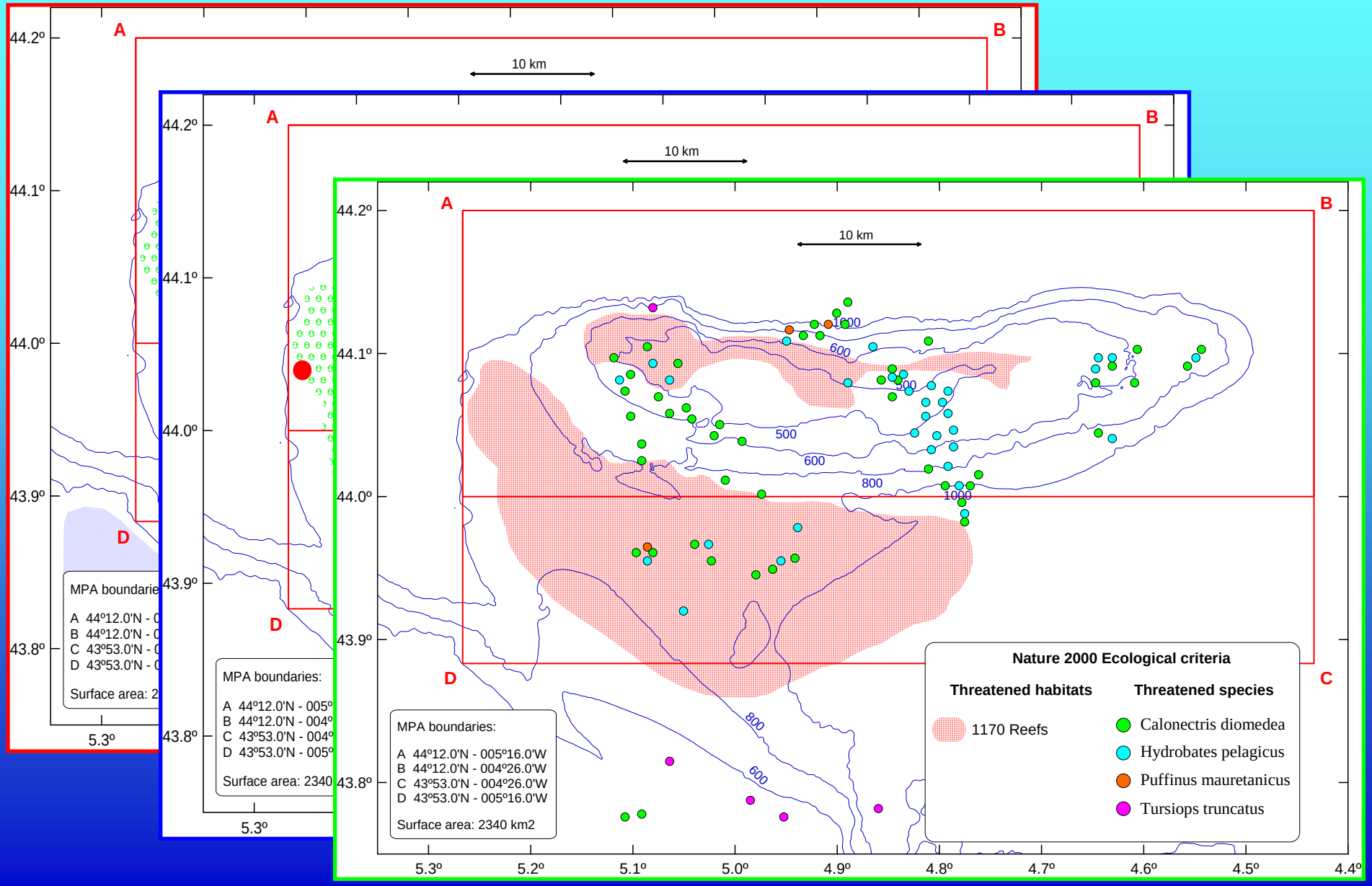


Fisheries in the area

Vessel Monitoring System (VMS) - SGPM

Data from year 2006

Bottom trawl

6 vessels work on Cantabrian shelf area

Gillnets

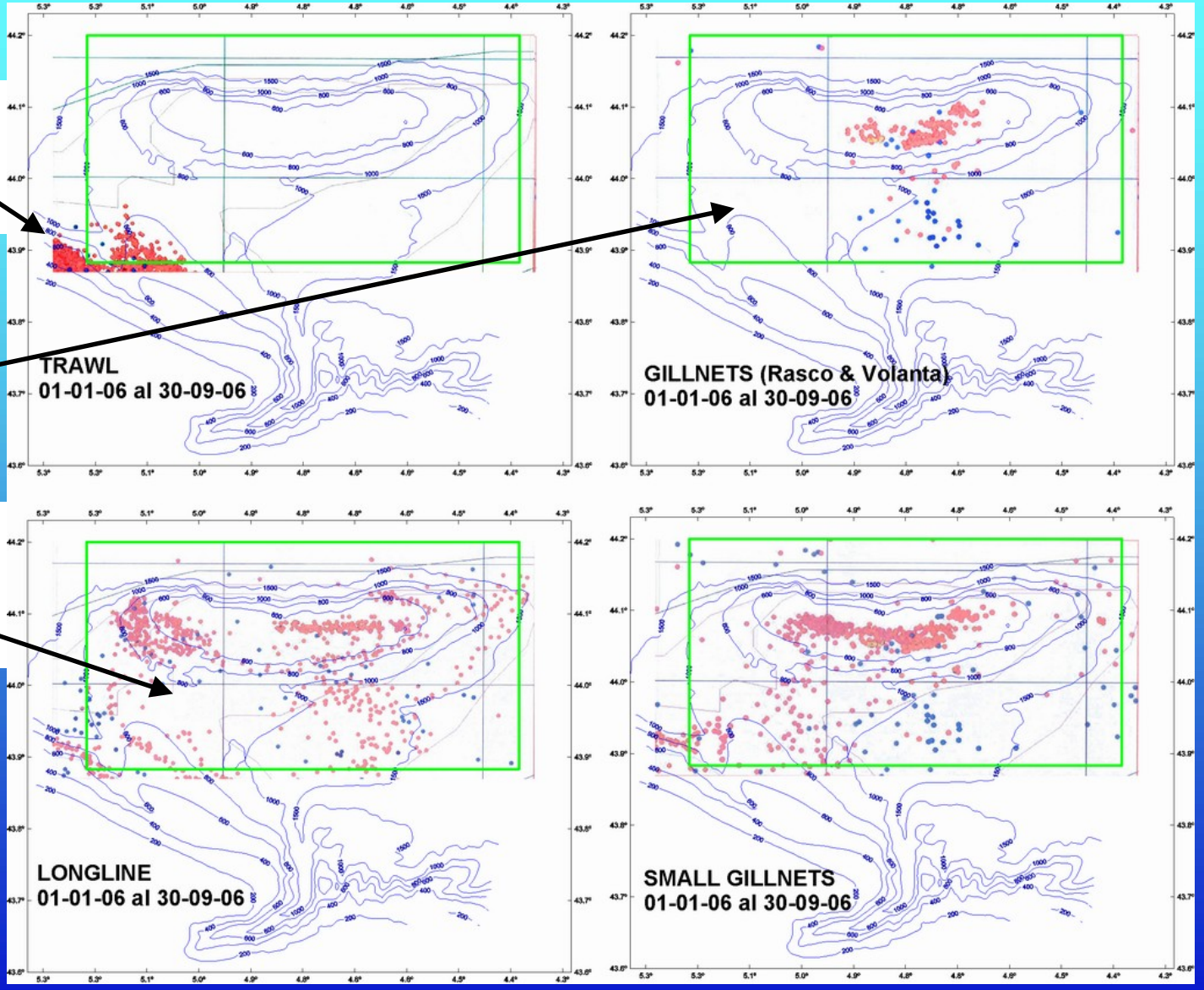
5 vessels “rasco”

1 vessel “volanta”

Longline

4 vessels “demersal”

1 vessel “sharks”



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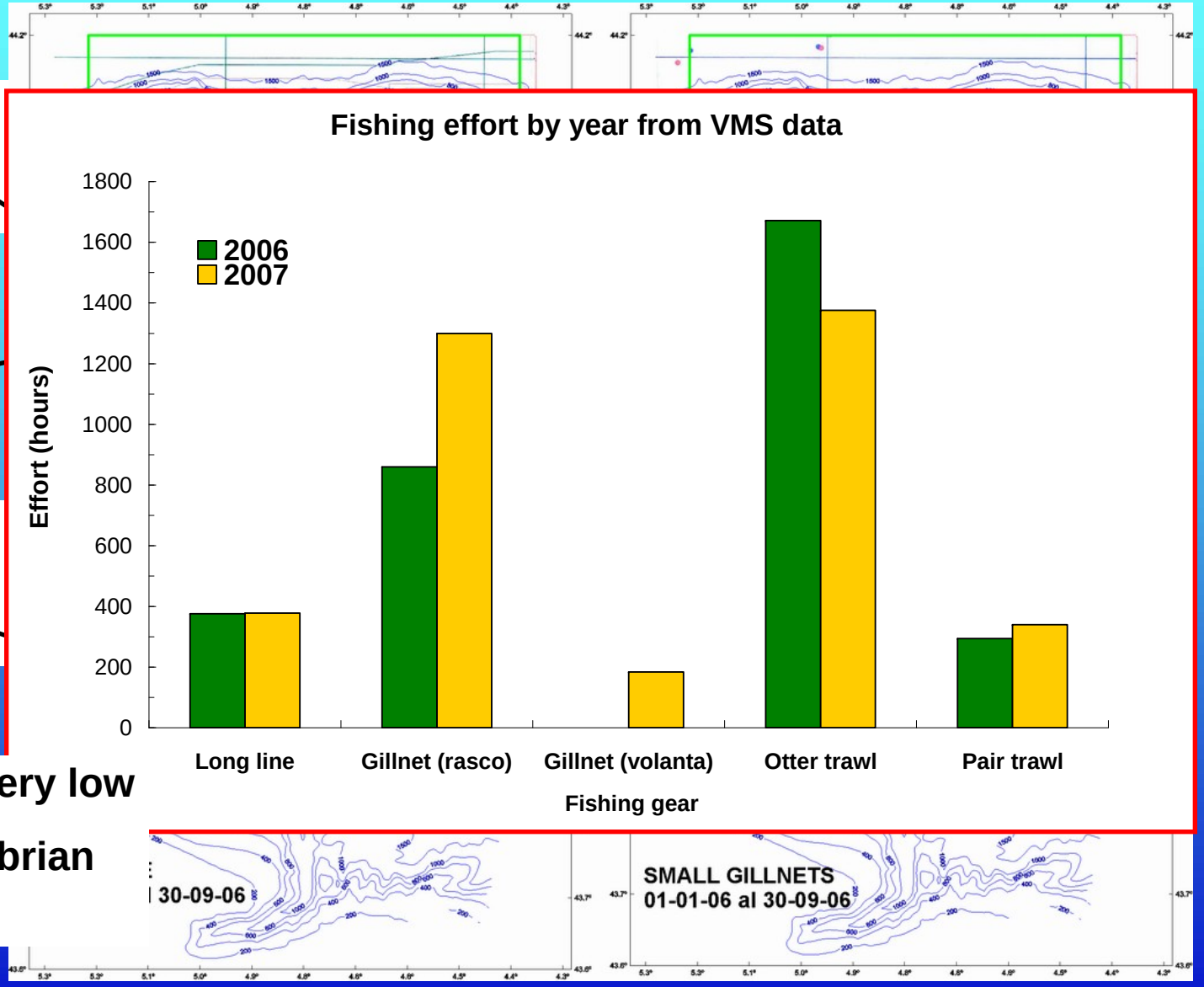
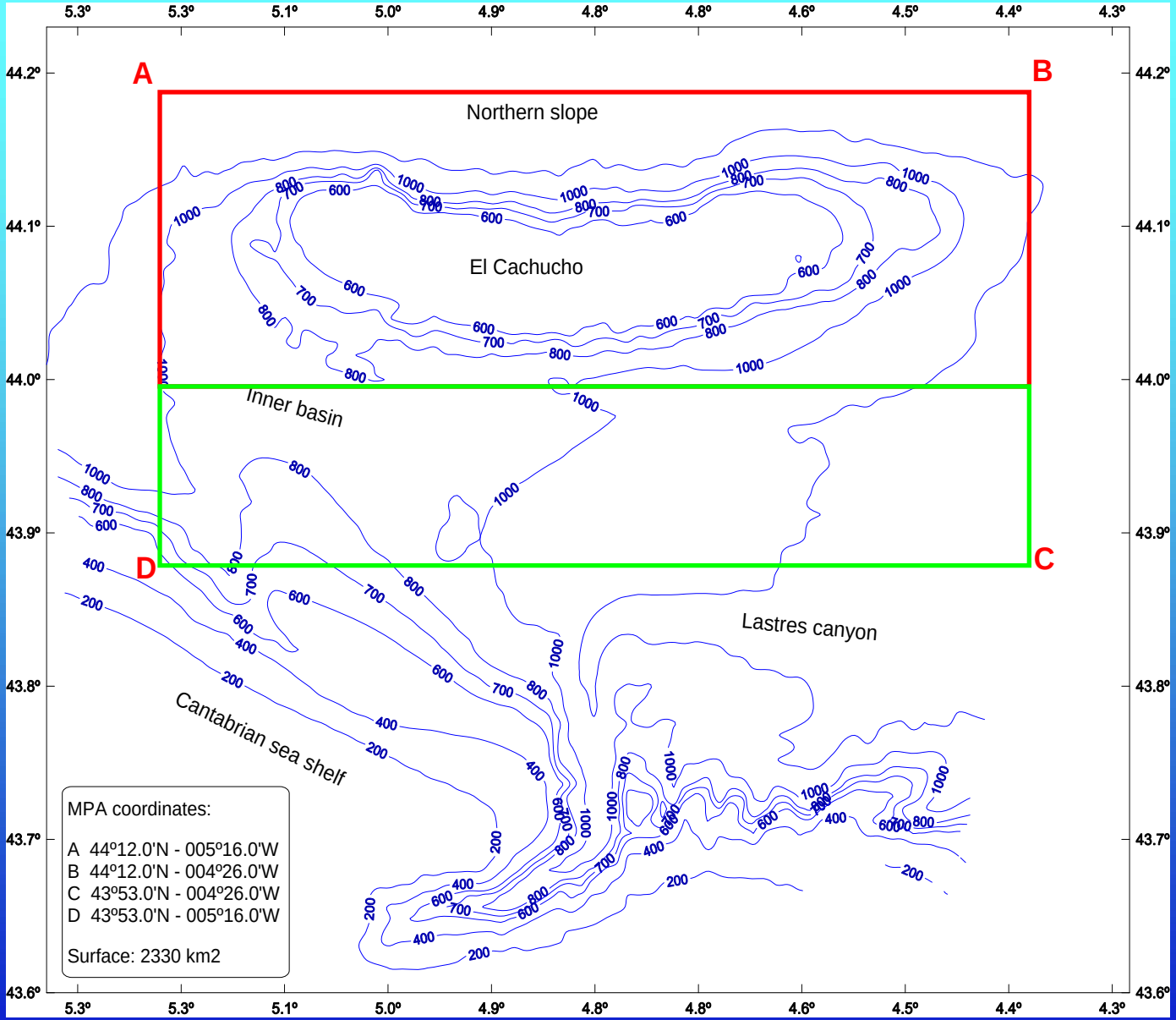


The effort level is very low

In relation to Cantabrian Sea shelf

Management measures and protection status

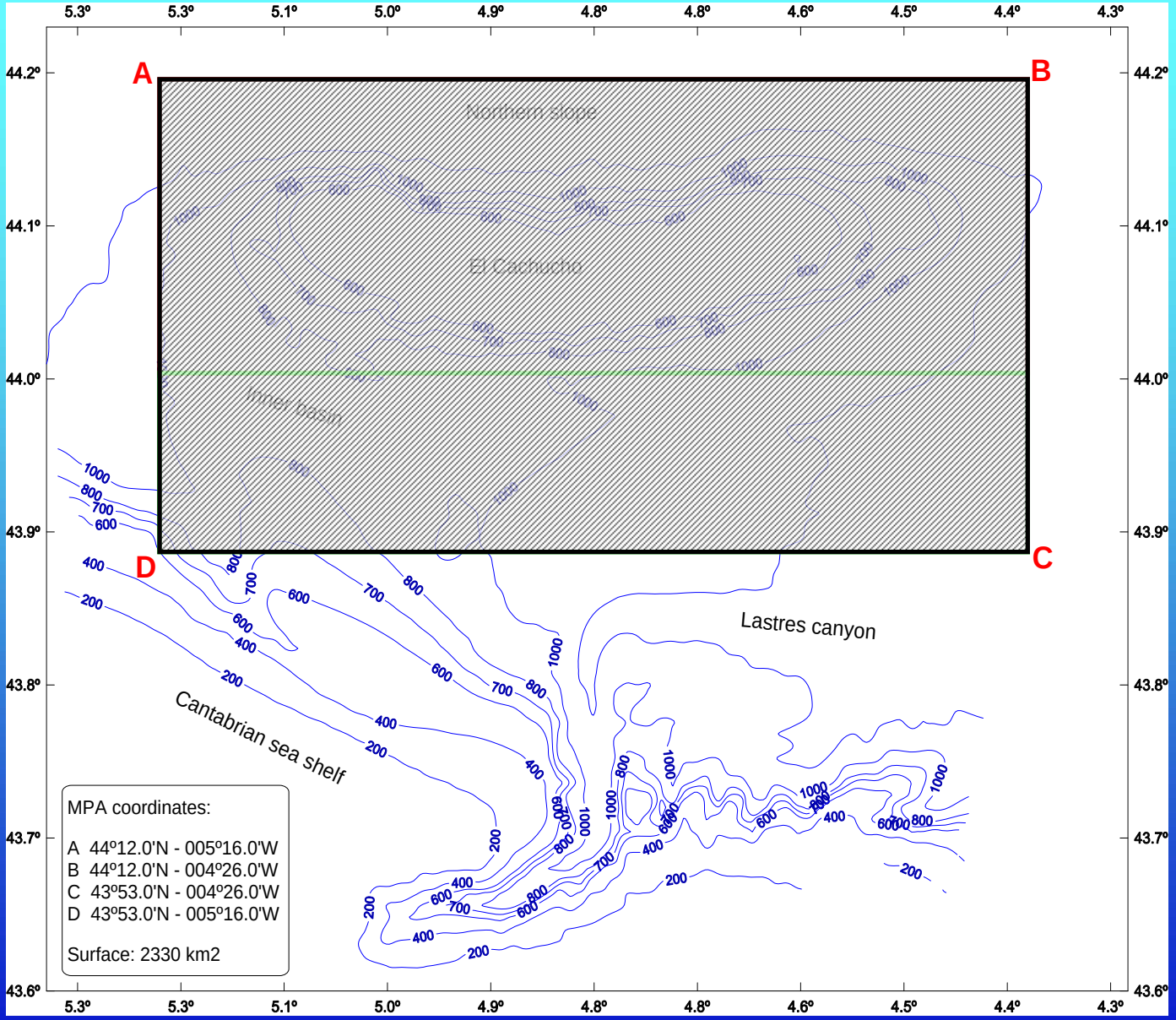


CLOSED AREA

All bottom gears: Trawl, gillnet, longline, traps, etc.

Closed census of longliners will be allowed throughout the southern area of parallel 44º N.

Management measures and protection status



CLOSED AREA

All bottom gears: Trawl, gillnet, longline, traps, etc.

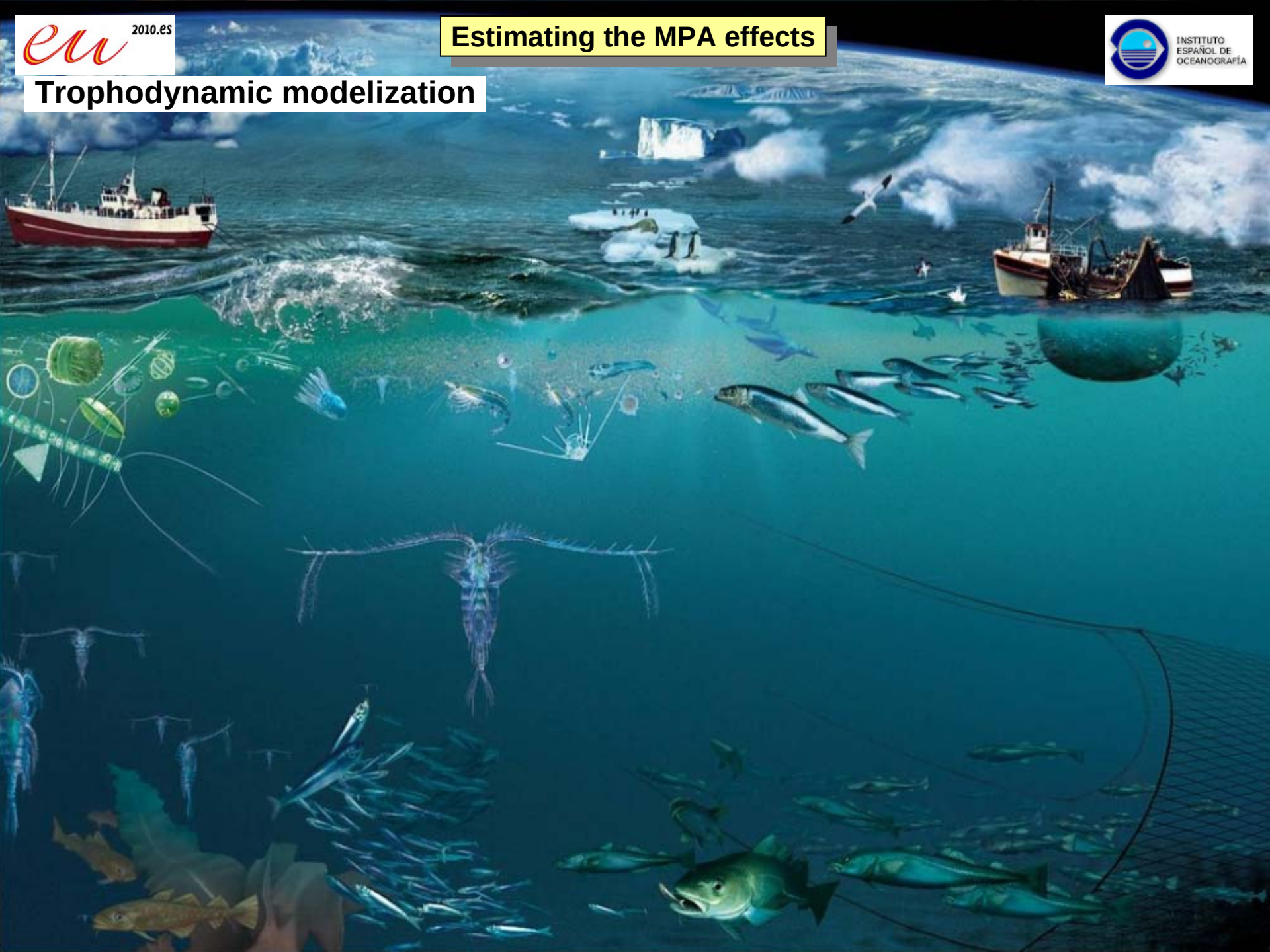
Closed census of longliners will be allowed throughout the southern area of parallel 44º N.

No oil, gas and mining exploration and explotation

No military manoeuvres

Estimating the MPA effects

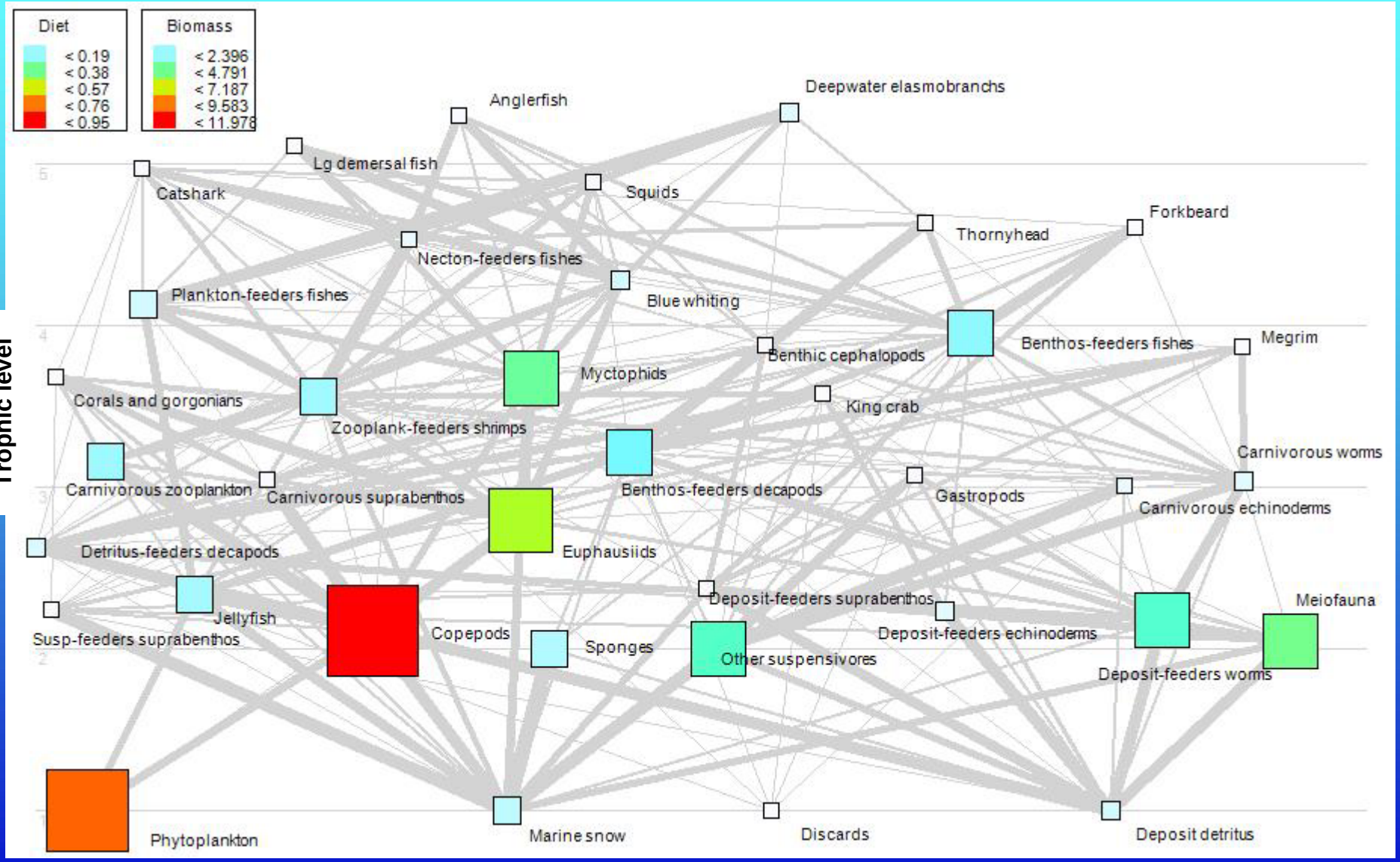
Trophodynamic modelization



Estimating the MPA effects

Trophodynamic modelization

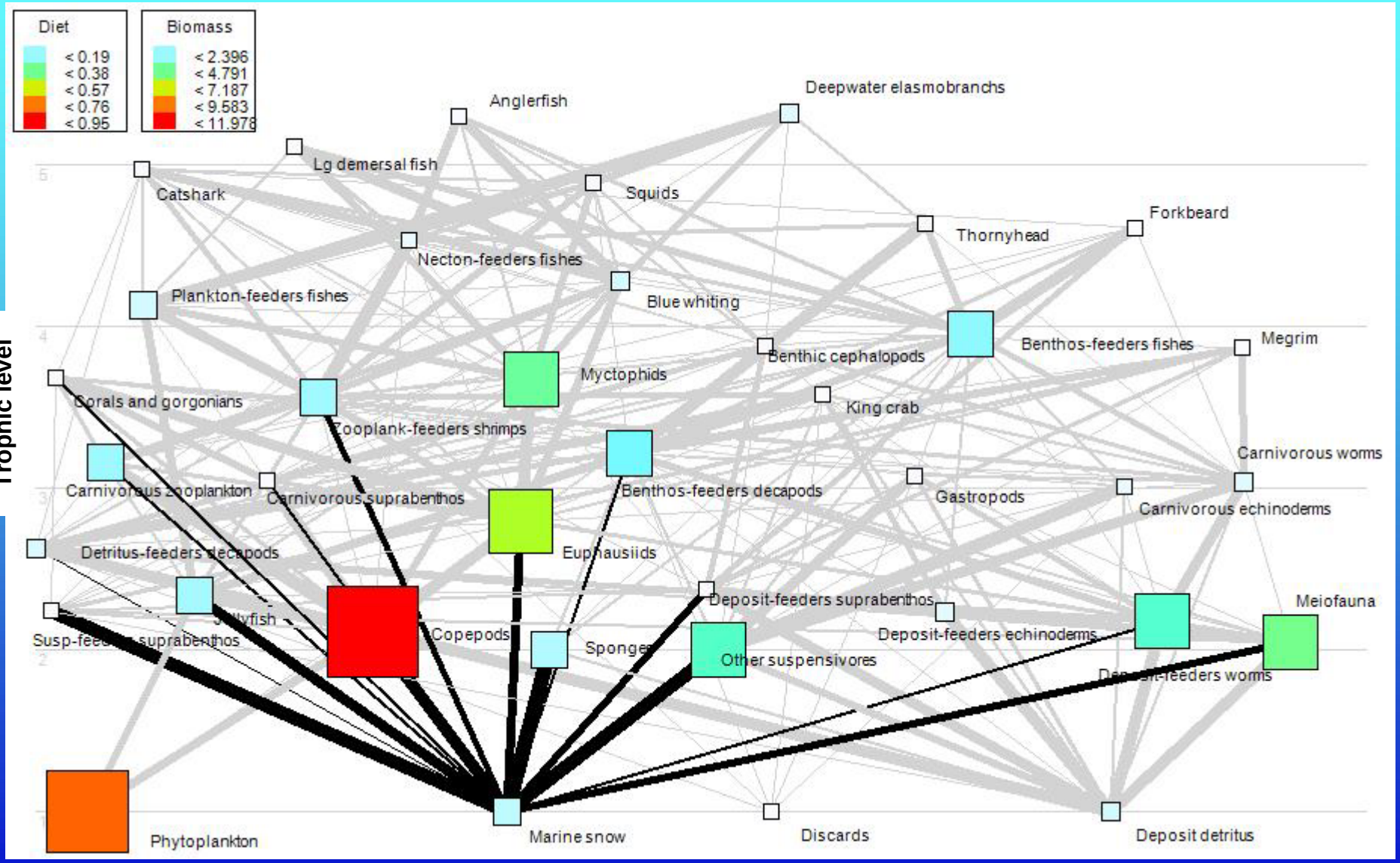
Biomass trophic flows



Estimating the MPA effects

Trophodynamic modelization

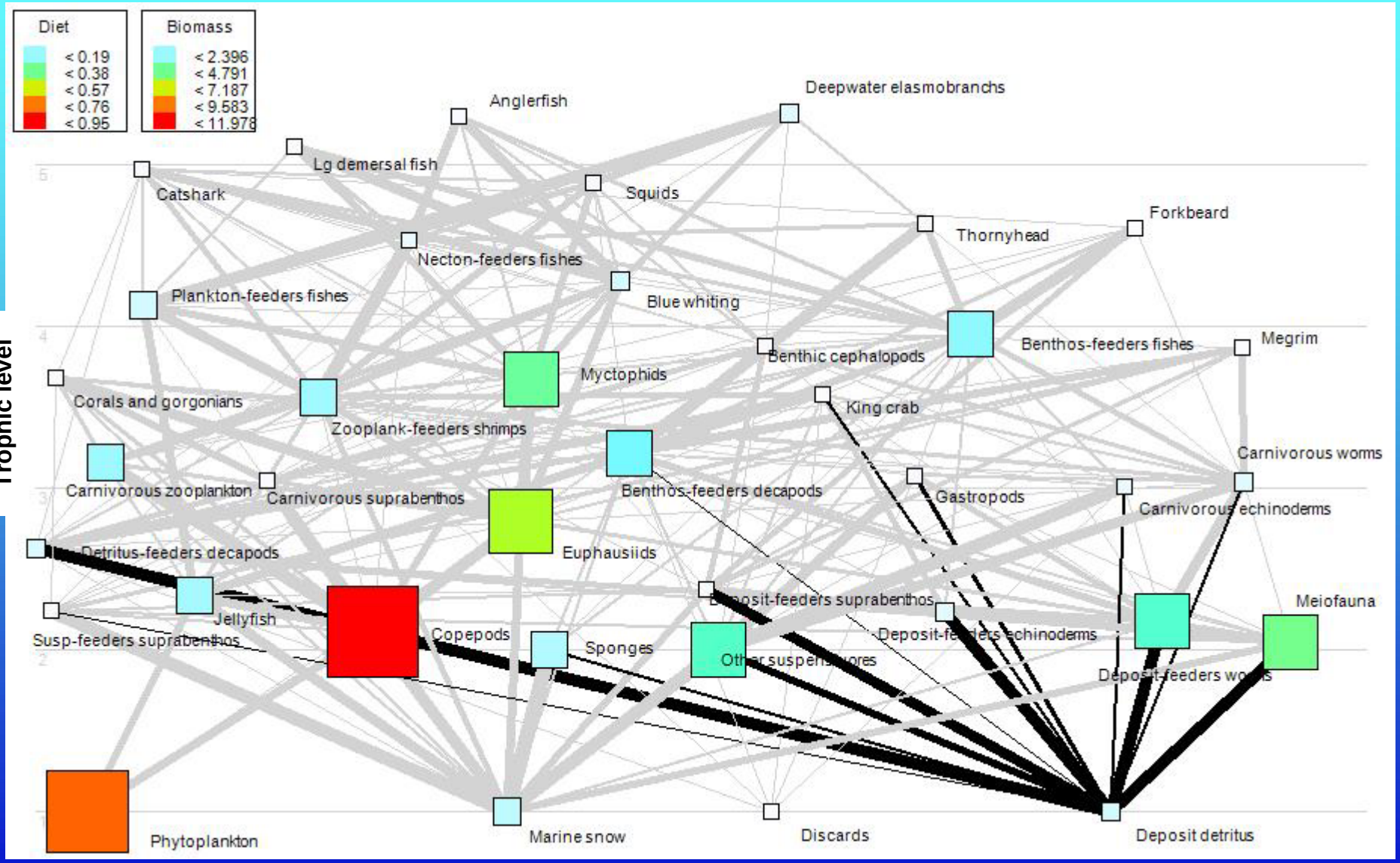
Trophic flows from Marine snow



Estimating the MPA effects

Trophodynamic modelization

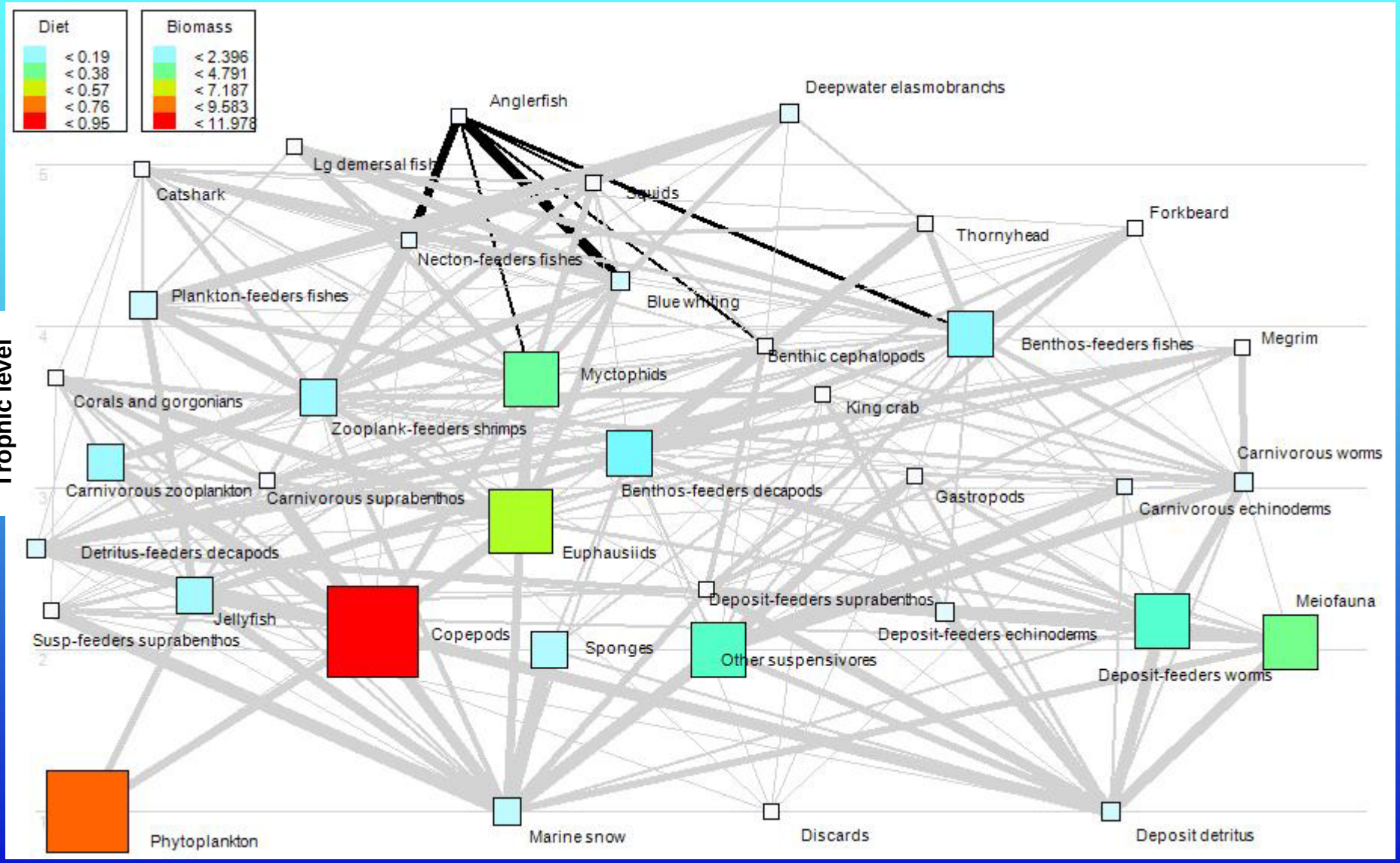
Trophic flows from Deposit detritus



Estimating the MPA effects

Trophodynamic modelization

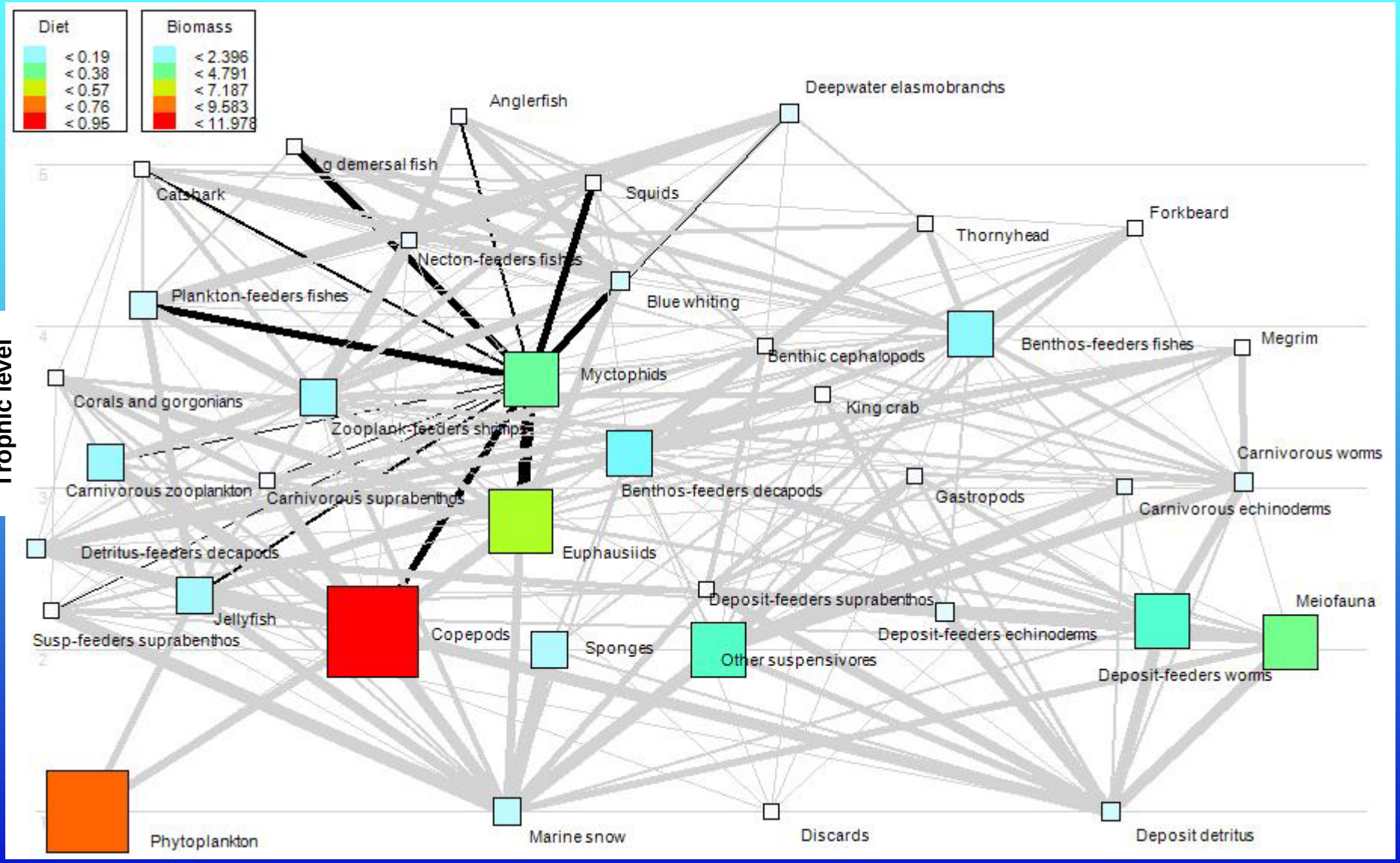
Trophic flows to Anglerfish



Estimating the MPA effects

Trophodynamic modelization

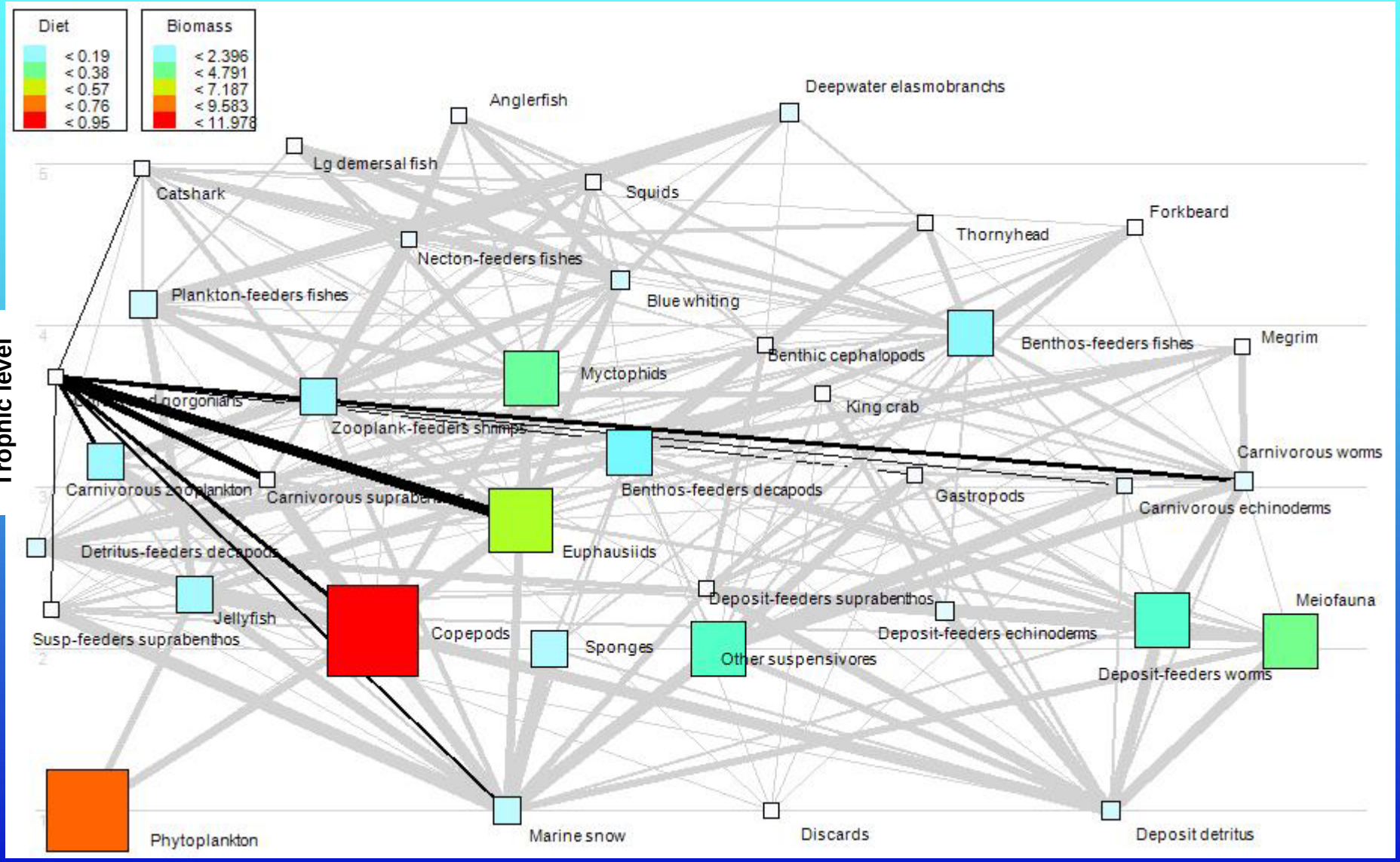
Trophic flows of Myctophids



Estimating the MPA effects

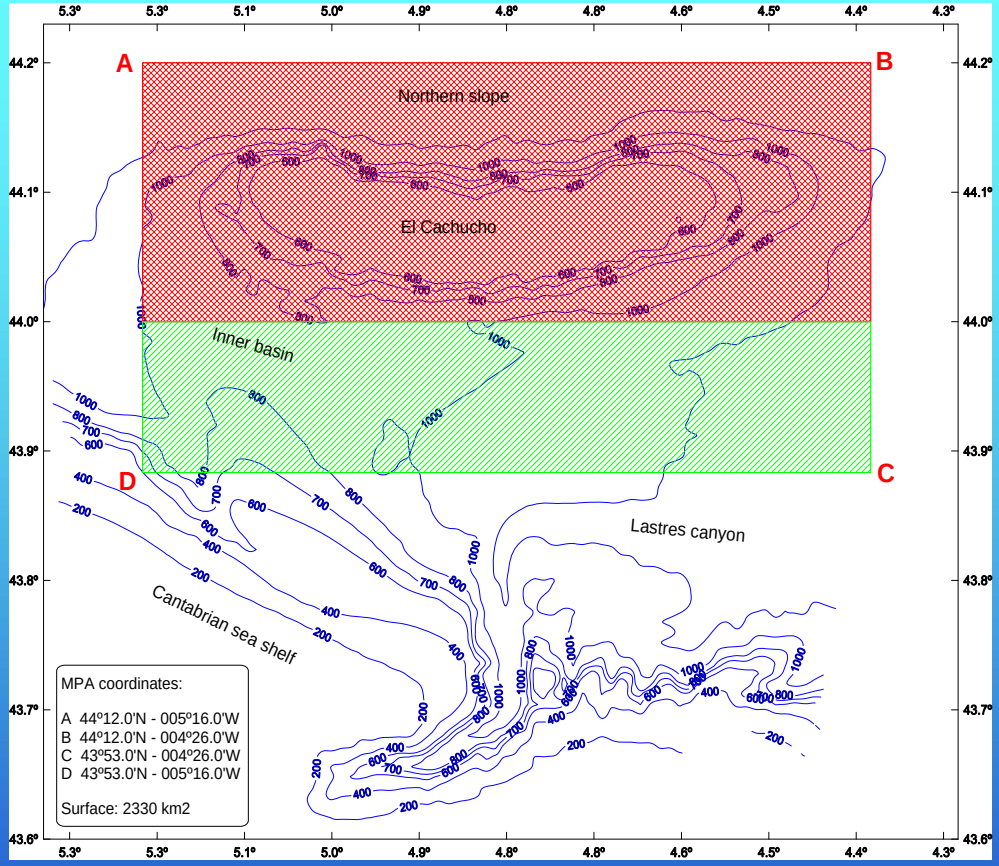
Trophodynamic modelization

Trophic flows to corals



Estimating the MPA effects

ECOSPACE scenario



Estimating the MPA effects

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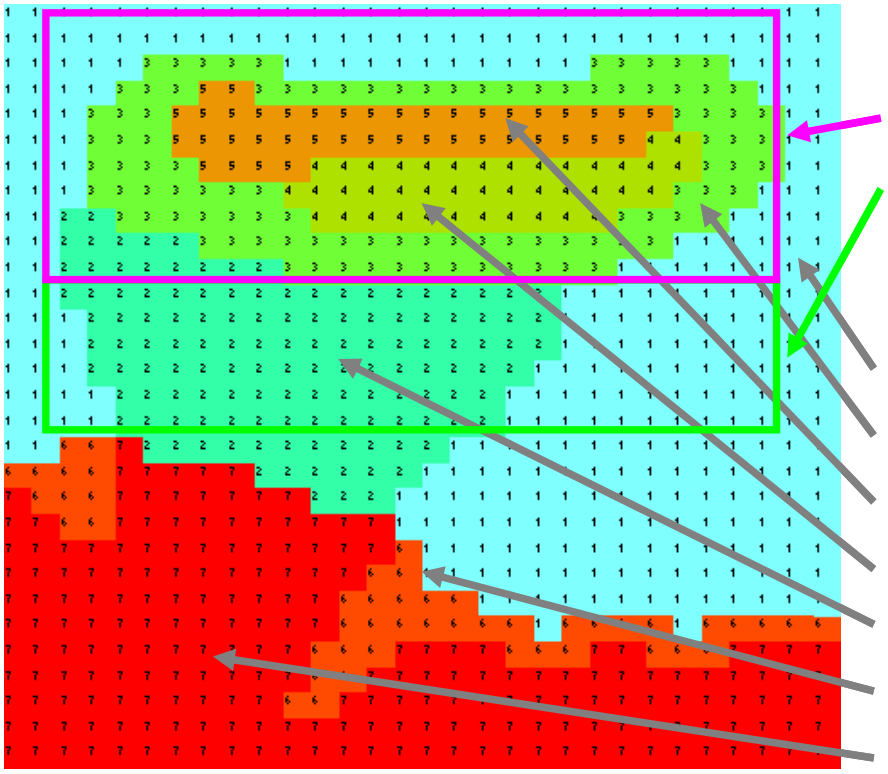


MPA management

No bottom gears

Only long-line

HABITAT:

Oceanic

Bank break

Bank (rocky)

Bank (sandy)

Inner basin

Shelf break

Cantabrian shelf

ECOSPACE Data input

For each species:

Preferred habitats

Dispersal rates

Vulnerability

Advection by currents

……

For each fishery:

Landings

Discards

Habitats used by gear

……

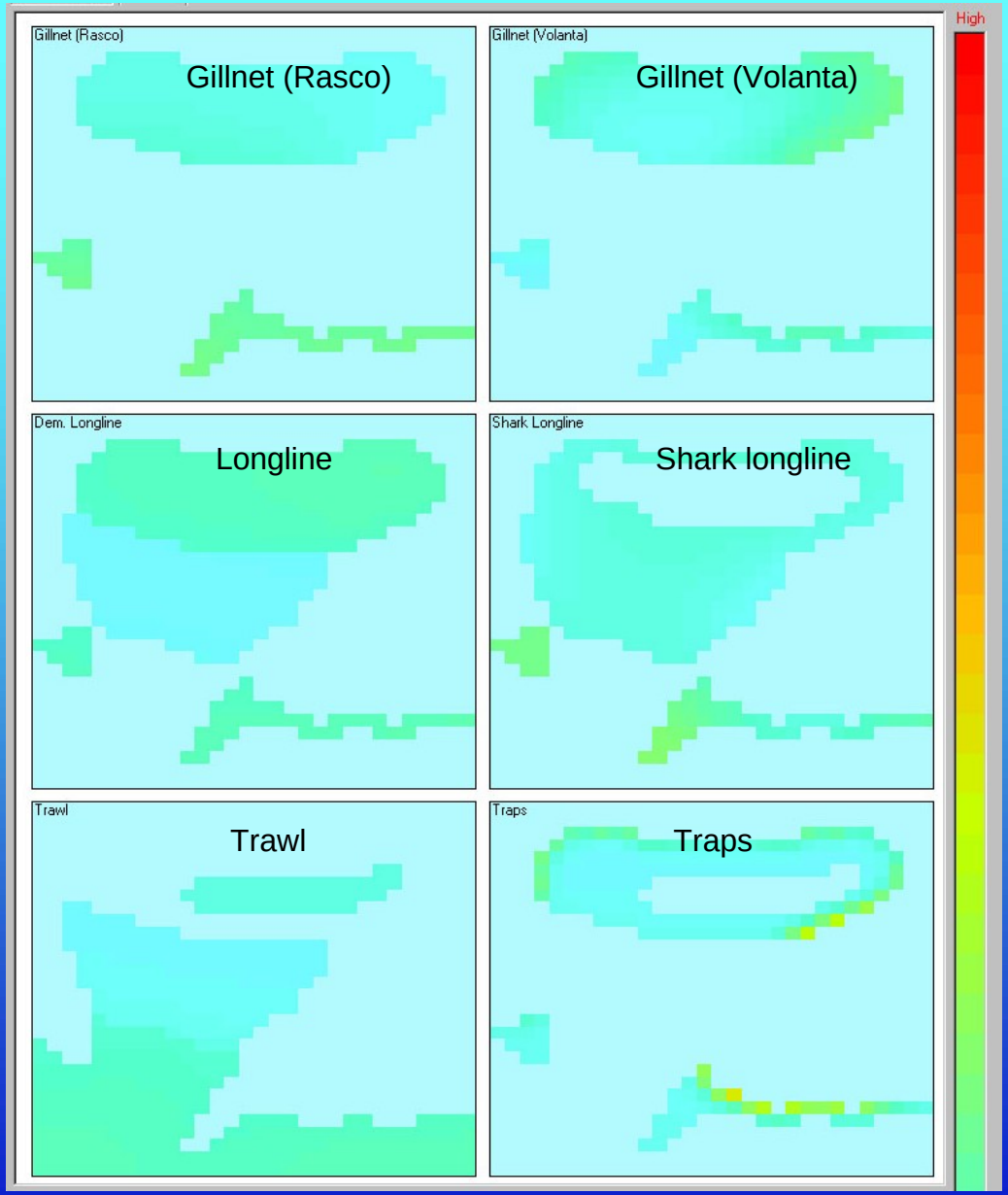
MPA fishery regulations

Estimating the MPA effects

10 years ECOSPACE estimations

Fisheries effort reallocation

The low levels of the effort inside MPA would be transferred to the adjacent continental shelf. However it should be taken into account that the model only consider the area close to the MPA. The MPA would be more efficient if it was created in combination with a proportional effort reduction. Nevertheless, the increase of spawners in the MPA may compensate these effects since a higher available biomass for the continental shelf fisheries is expected (**spillover** and **larval export** effects).



Estimating the MPA effects

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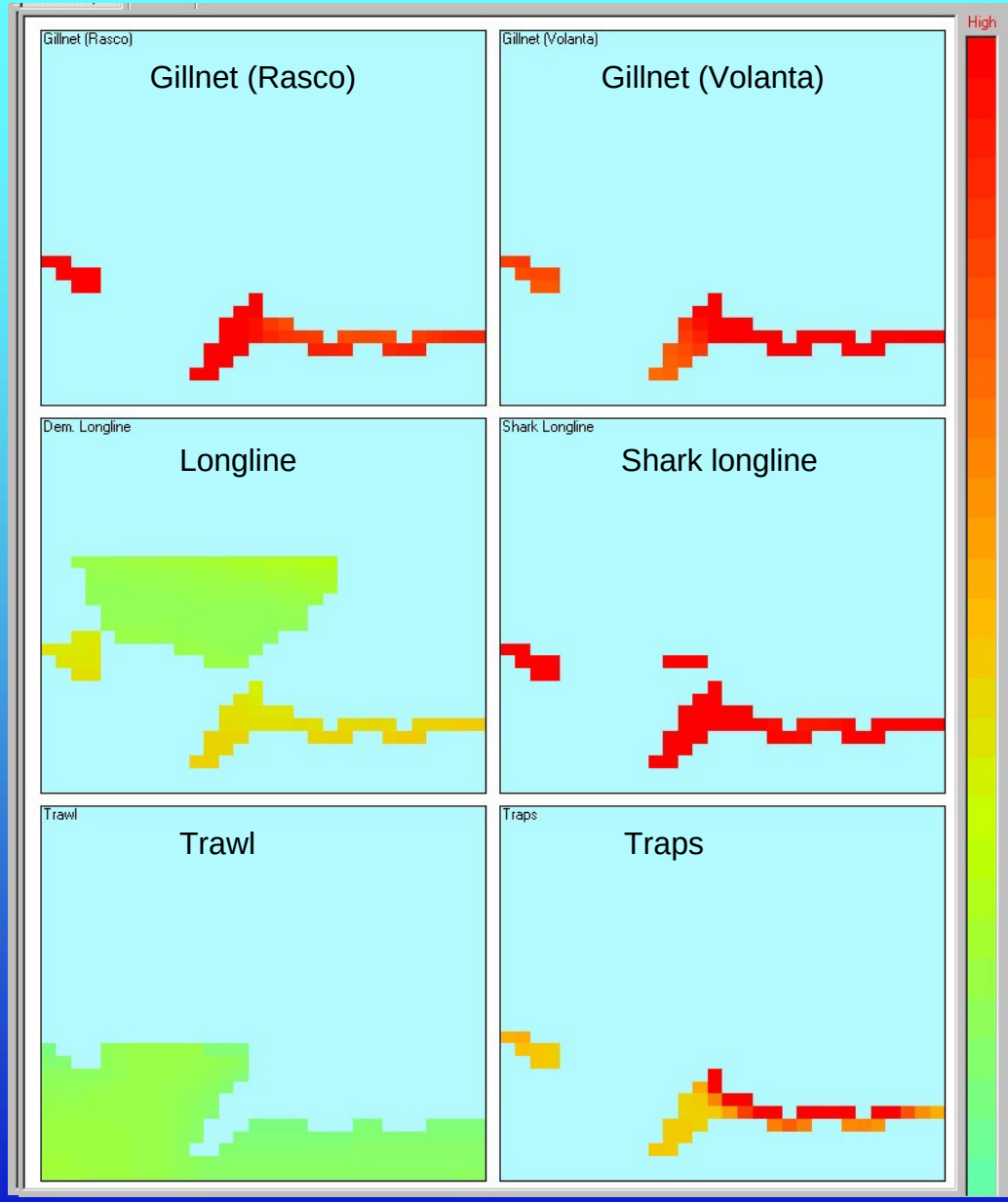

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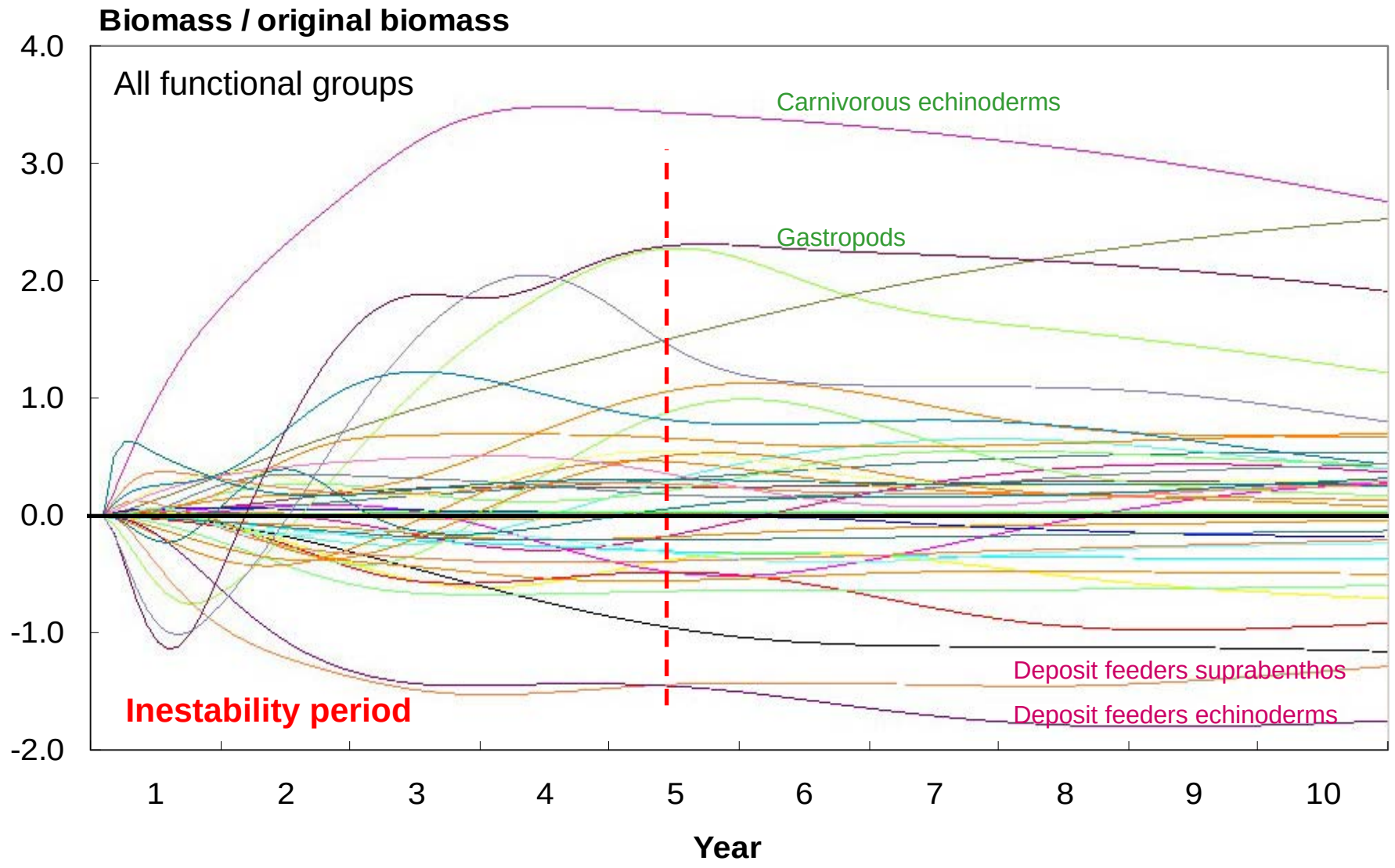

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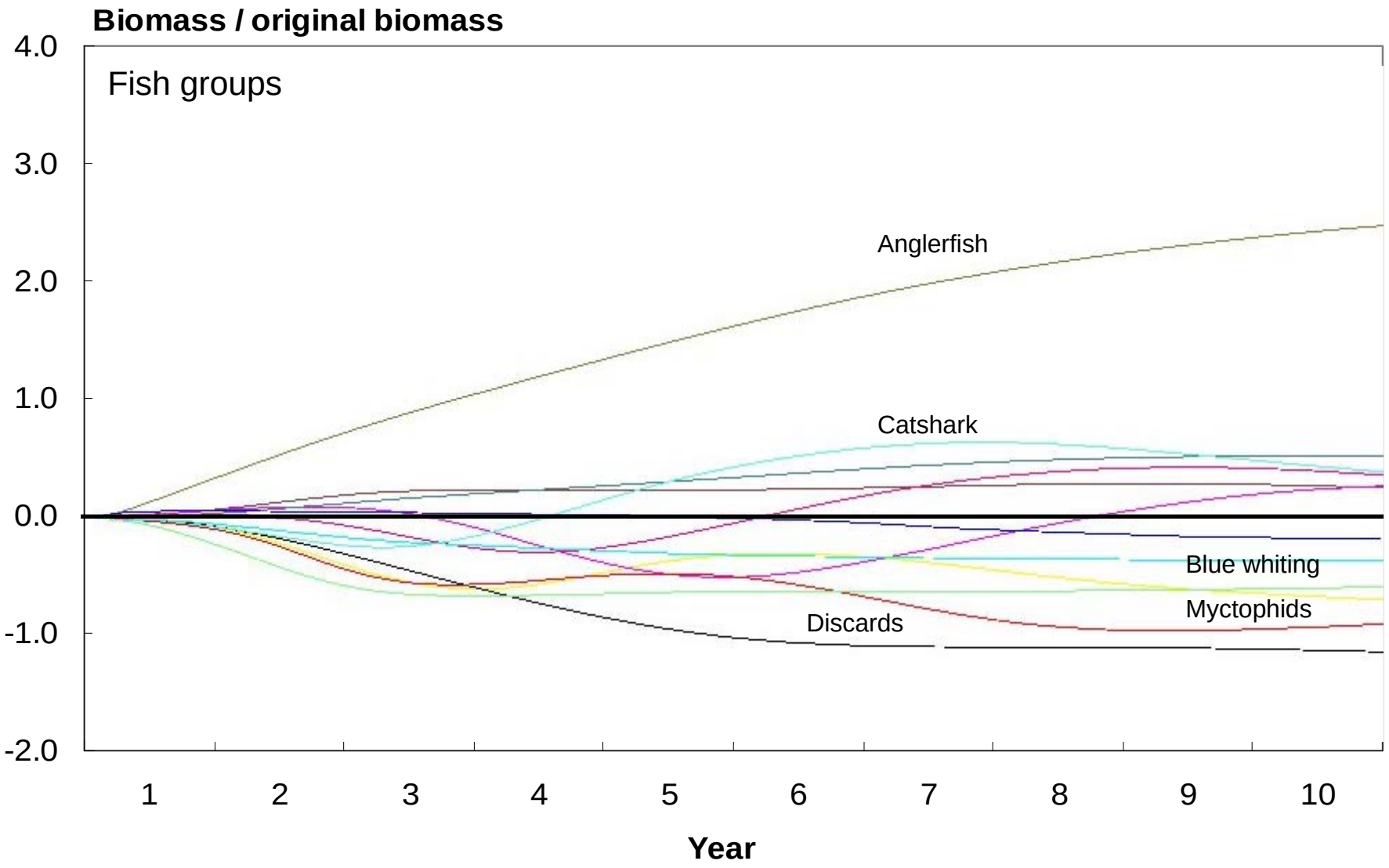


Estimating the MPA effects

Biomass spatial distribution

10 years simulation shows an important increase of biomass (in orange) of fish:

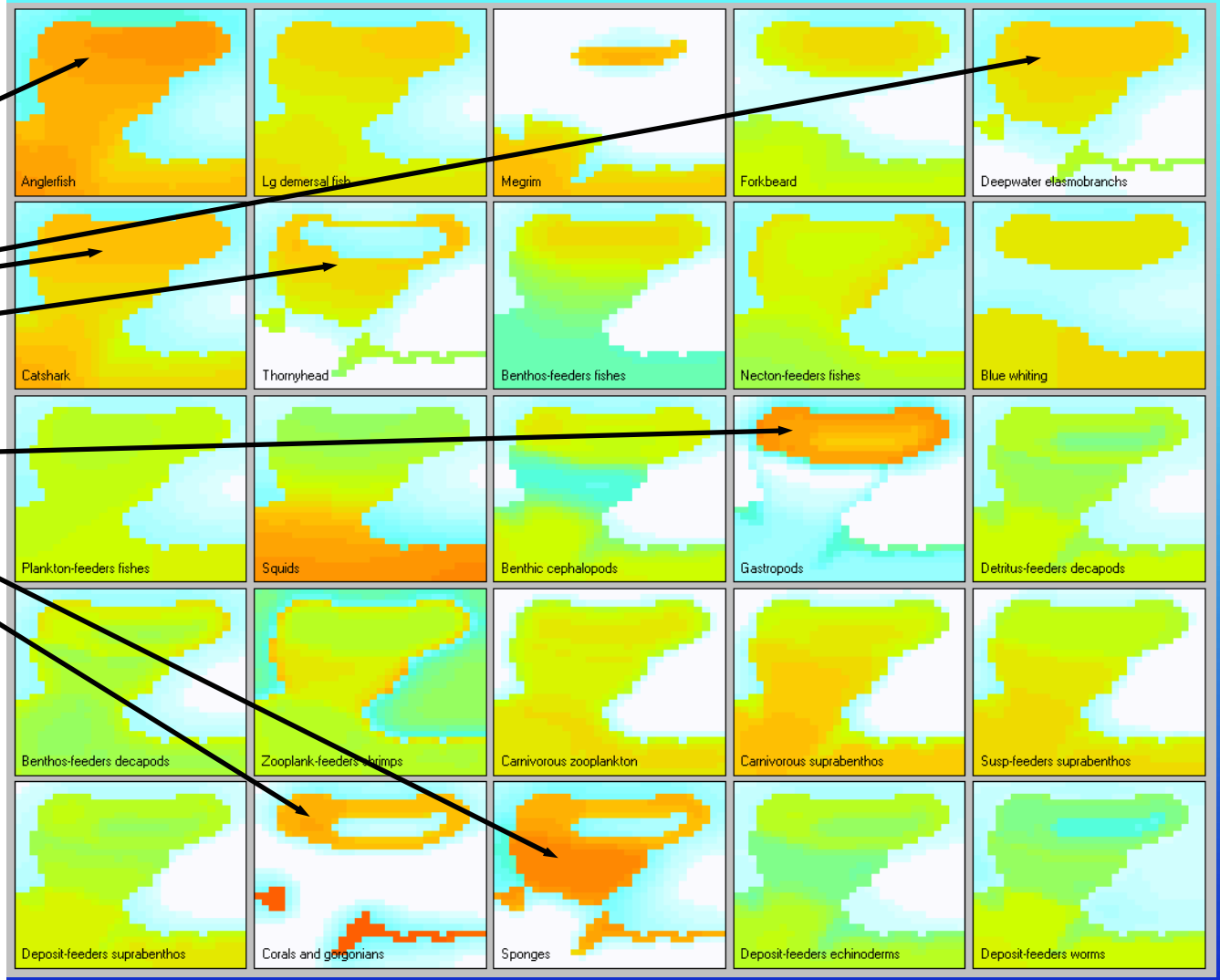
Anglerfish
Deepwater elasmobranc.
Catshark
Thornyhead

and **vulnerable species**:

Gastropods
Sponges
Corals & Gorgonians

is observed on the appropriate habitats of the MPA.

The **spillover effect** increases the biomass of commercial species: **Anglerfish, Megrim, Squids** on the near continental shelf of Cantabrian Sea.



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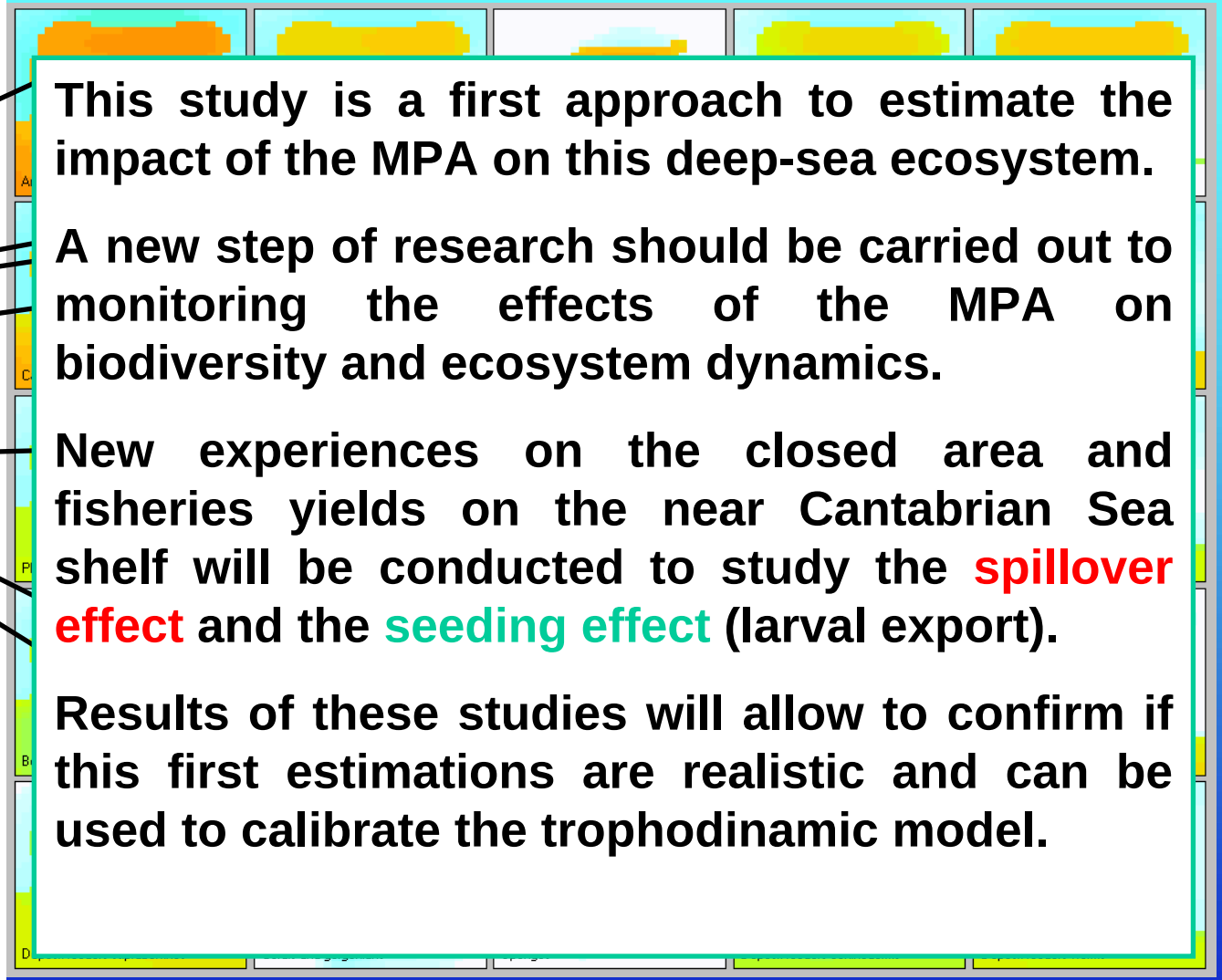


This study is a first approach to estimate the impact of the MPA on this deep-sea ecosystem.

A new step of research should be carried out to monitoring the effects of the MPA on biodiversity and ecosystem dynamics.

New experiences on the closed area and fisheries yields on the near Cantabrian Sea shelf will be conducted to study the spillover effect and the seeding effect (larval export).

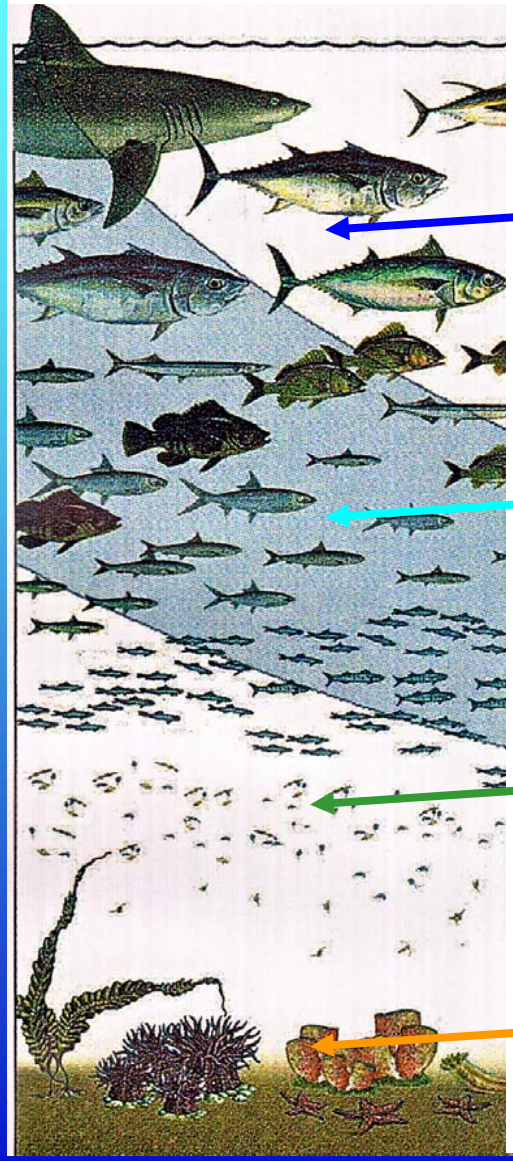
Results of these studies will allow to confirm if this first estimations are realistic and can be used to calibrate the trophodinamic model.

Why are MPAs necessary?

Fishing down marine food webs

Cantabrian Sea ecosystem history

1970 1980 1990 2000 2010 2020 2030



WELL STRUCTURED ECOSYSTEM

Larger fishes (top predators)

Sharks, Tuna, Hake, Monkfish, Red Sea bream

Biomass of planctophagous fish (mackerel, horse mackerel, anchovy, blue whiting) is controlled by predation

Biomass of plancton is controlled by primary production and planctophagous fish

Adequate biogenic benthic habitats to sustain benthic fish and crustaceans populations

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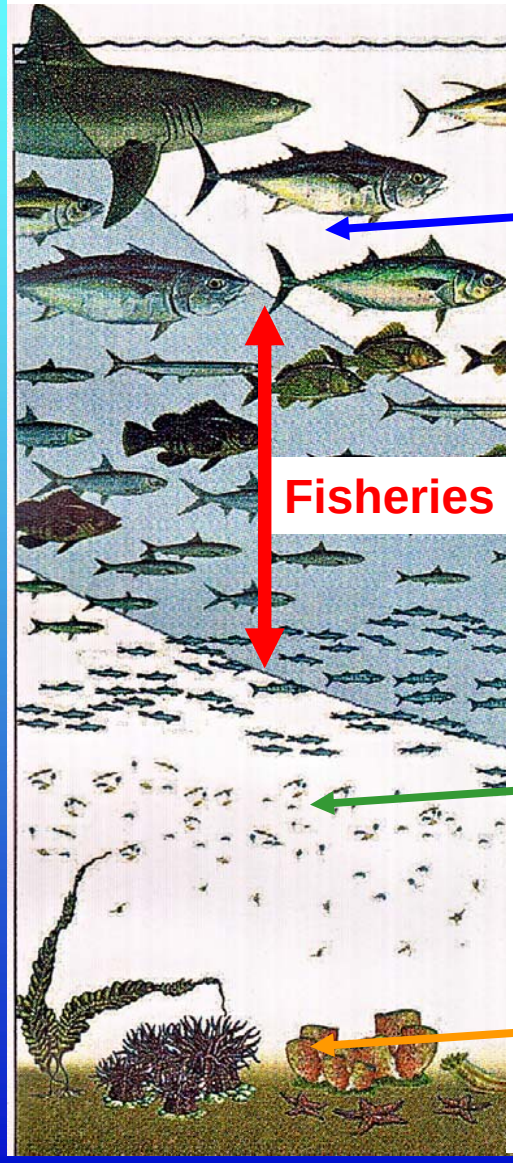

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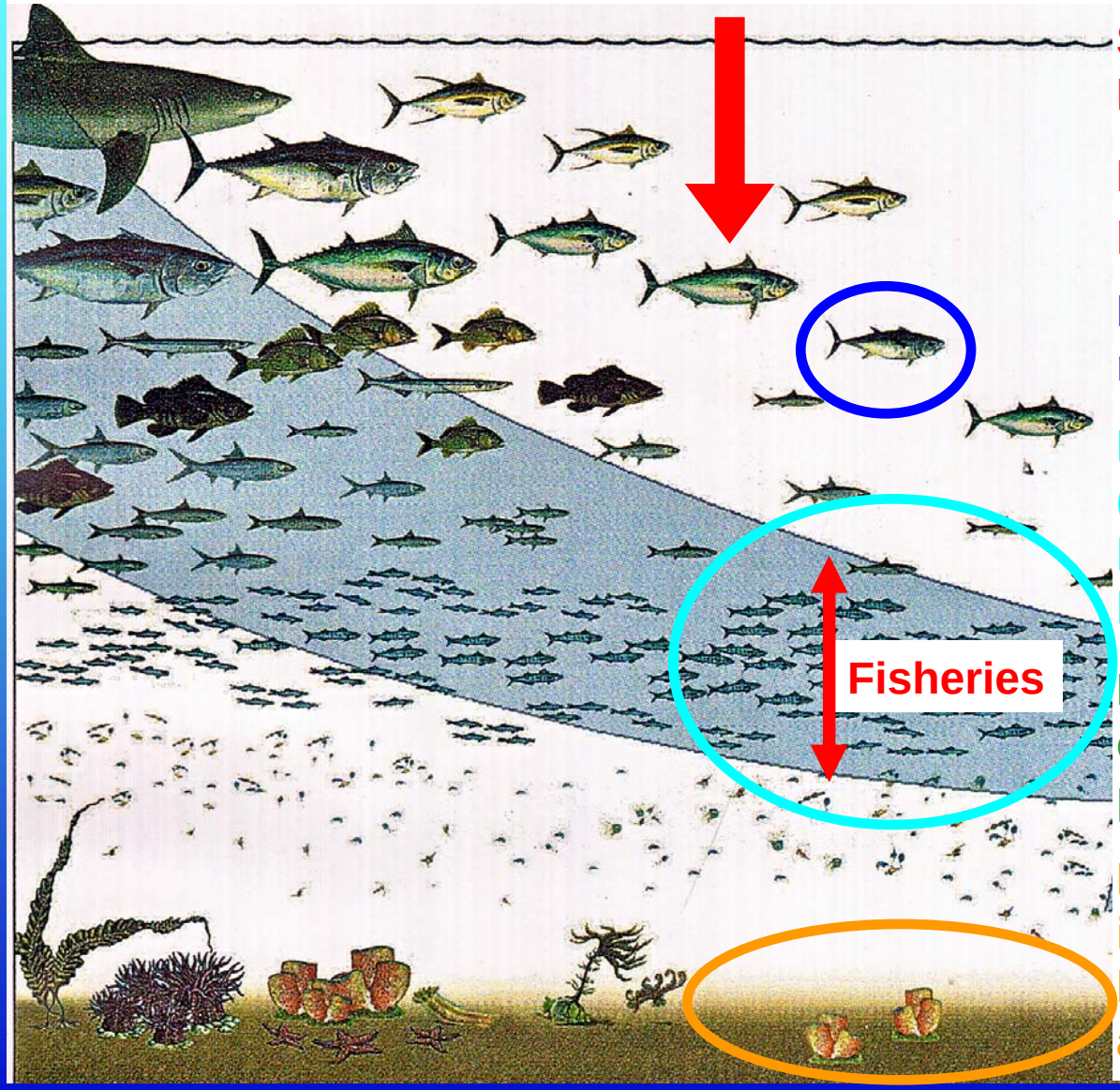

STRONG FISHERIES TOP DOWN CONTROL

Power, GPS, echosounder, plotter, digital charts……

Biomass of top predators reaches minimum levels

Planctophagous fish (mackerel, horse mackerel, blue whiting) reach high biomass levels

Plancton biomass is controlled by planctophagous fish

Deep water fisheries increase the destruction of biogenic benthic habitats and EFH

Why are MPAs necessary?

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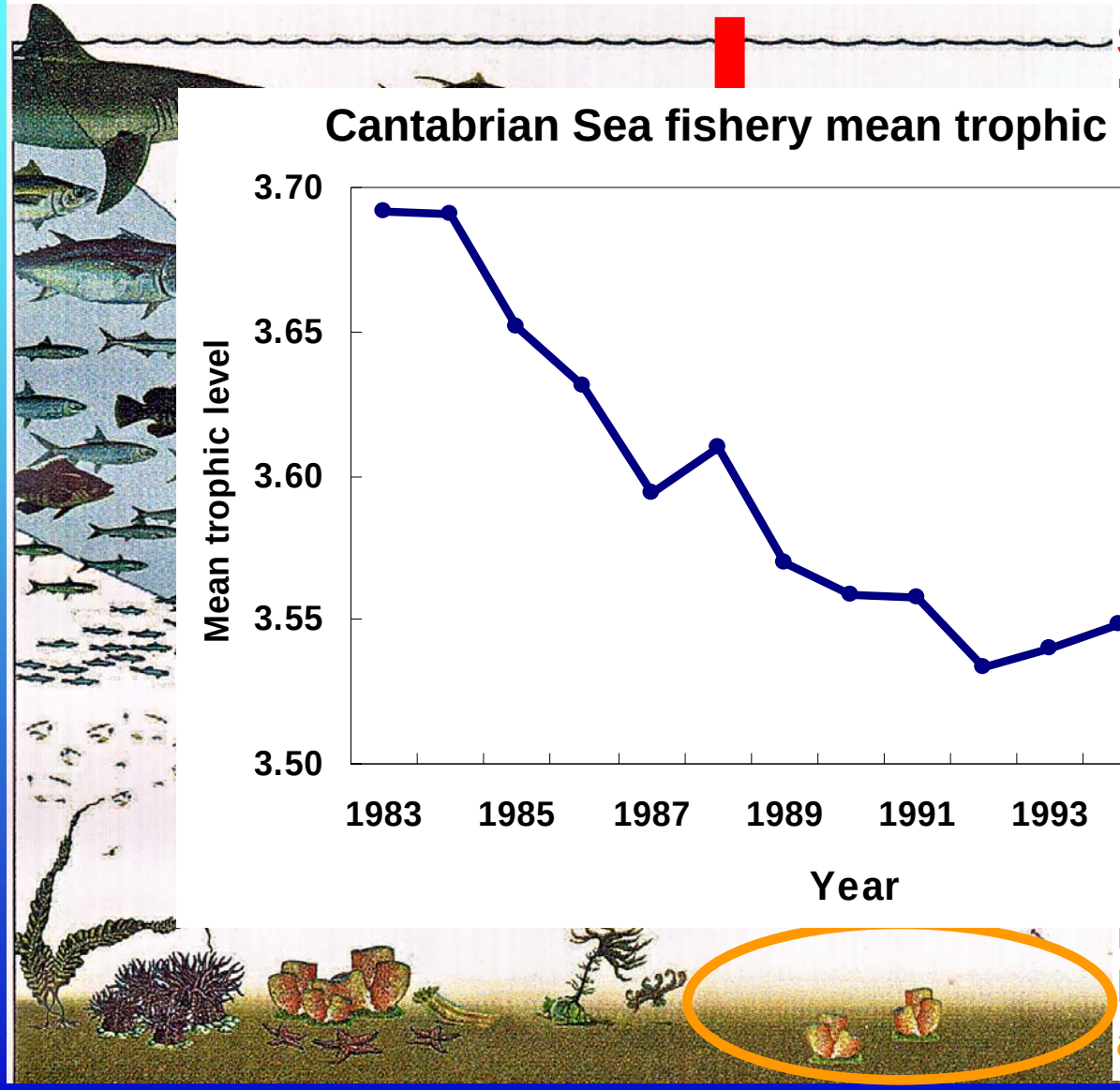

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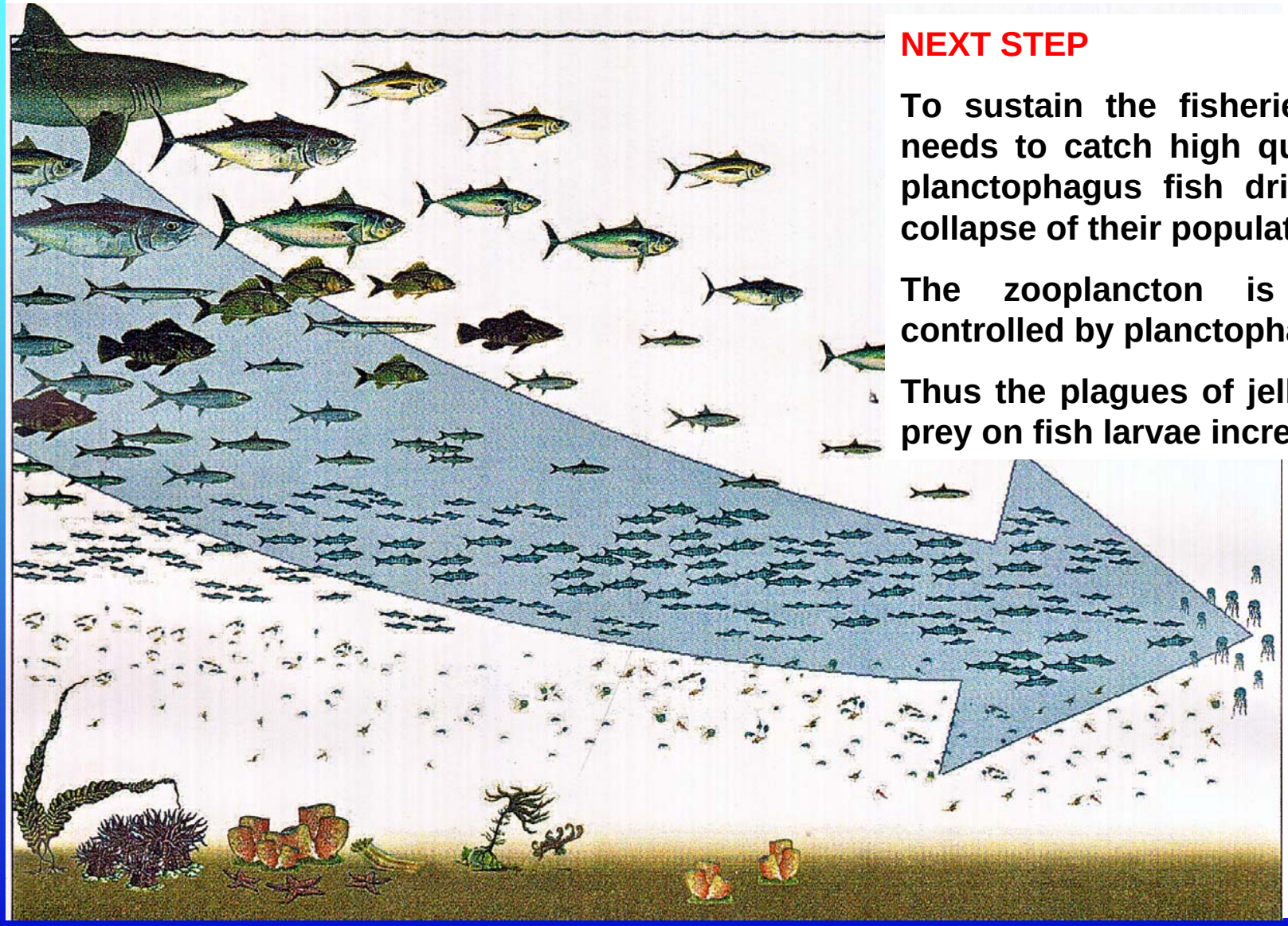

NEXT STEP

To sustain the fisheries the fleet needs to catch high quantities of planctophagus fish driving to the collapse of their populations

The zooplancton is no more controlled by planctophagus fish.

Thus the plagues of jellyfish which prey on fish larvae increase

Why are MPAs necessary?

Fishing down marine food webs

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1970 1980 1990 2000 2010 2020 2030

Viernes 19.02.10
EL DIARIO MONTAÑÉS

En una semana se han subastado 2,1 millones de kilos de verdel

Mientras aguarda que se modifique el reparto de las capturas, la flota ha percibido una media de 0,47 euros el kilo por sus desembarcos en las lonjas de la región

:: TEODORO SAN JOSÉ

SANTANDER. Apenas se lleva una semana de costera del verdel (o sarda) y la flota ya ha puesto a la venta en las lonjas de Cantabria más de 2,1 millones de kilos de ese pescado. Al ser las primeras partidas de la campaña, el precio medio en primera subasta ha sido de 0,47 euros el kilos, una buena cotización que, no obstante, poco tardará en ir a la baja a nada que se mantenga este tal sumaba 2.144.755 kilos de verdel, cuando hace doce meses ya se llevaban 1,7 millones de kilos.

En la lonja de Santoña se han desembarcado 1.100.000 kilos, a una media de 0,46 euros el kilo en esa primera venta; lo subastado en la de Colindres asciende a 798.000 kilos, que se han pagado a una media de 0,49 euros, mientras que en la lonja de Santander la contabilidad suma unas subastas de 246.755 kilos, a una media de 0,46 euros.

Con ese precio medio y capturas, la semana ha sido provechosa y rentable para la flota, pero a este ritmo se corre el riesgo de inundar lonjas, almacenes y mercado y, por tanto, de que apenas se pague el precio de salida. La cotización por debajo de los 0,25 euros el kilo volvería a repetir escenas de barcos retirando sus capturas de las subastas y tirándolas al vertedero, o quedando amarrados por no compensarles salir a faenar.

Y no sólo eso. Se corre el riesgo de que, a este ritmo, la flota española no tarde en alcanzar el cupo asignado por la CE a España, fijado en 26 millones de kilos. De modo que la flota tendrá que regularse por sí misma y rebajarse el cupo diario o salir menos días a la mar; u ondear la bandera indicativa de mantener los barcos amarrados a puerto si no quiere que la costera se les reduzca a un mes de faena.

El 'Ratonero' des

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Only two ways are possible:

1. **To continue with the present trends and convince people to change food habits and eat plancton and jelly fish**
2. **Try to recover the status of the ecosystem in the 70's**

If we chose the 2 option is necessary:

1. **Restore the predator-prey equilibrium and the sustainable fisheries**
2. **Recover the essential fish habitats and their biodiversity**

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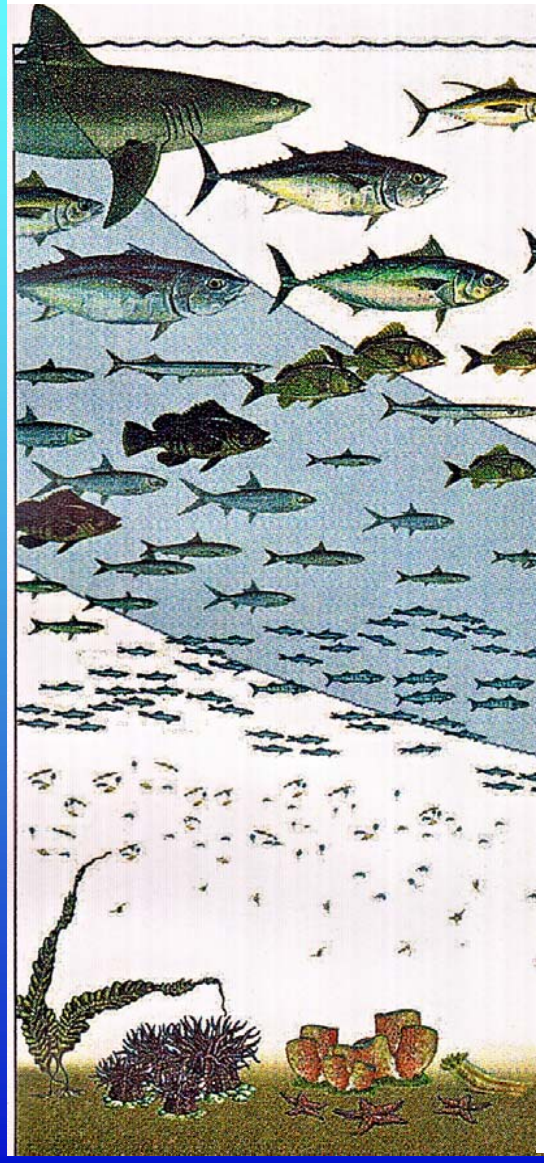

Marine Protected Areas (MPAs), joint with other management measures such as effort reduction, try to restore the ecosystems equilibrium

Marine Protected Areas try to recover a minimum of surface of valuable habitats necessary to guaranty the sustainability of marine biodiversity and the populations dynamics

The progressive implantation of a coherent net of Marine Protected Areas on our waters will need a high support and effort by all the sectors involved, however the future of our seas strongly depends on the compromise level acquired.

ECOMARG Research team

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA

Thank you very much