EBSAs driving coherent conservation planning: Lessons Learned

Stefan Neuenfeldt, DTU Aqua

Funded by the European Union

EBSA criteria

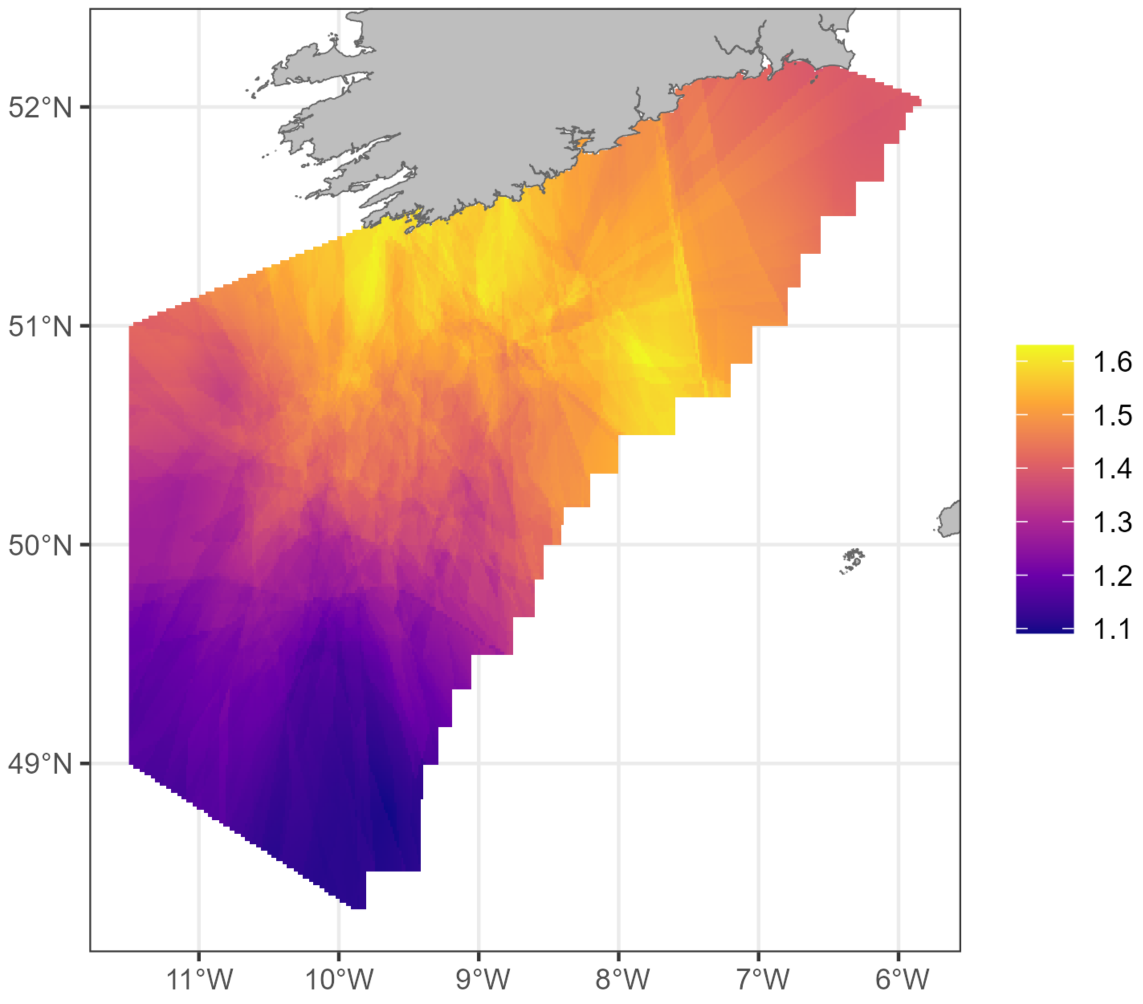
EBSA criterion	Systematic conservation Planning (SRC) elements (Harris et al. 2019)	MarinePlan metrics (for discsussion)
Uniqueness	**Unique sites or features** are considered as "irreplaceable" in an SCP context, and thus will always be selected because they are the only place where targets for that feature can be met.	
Special importance for life history stages of species	Usually, these **sites of importance** are included in the spatial prioritisation as an explicit feature (e.g., turtle nesting beaches) with a representation target.	
Importance for threatened, endangered or declining species and/or habitats	All habitat types and species that are included in the spatial prioritisation have their own representation target. **Features (habitats, species) that are threatened or declining** will have few options where these targets can be met, and thus will have high selection frequency.	
Vulnerability, fragility, sensitivity or slow recovery	e.g., **vulnerable marine ecosystems**	

Quantifying selected EBSA criteria in MarinePlan

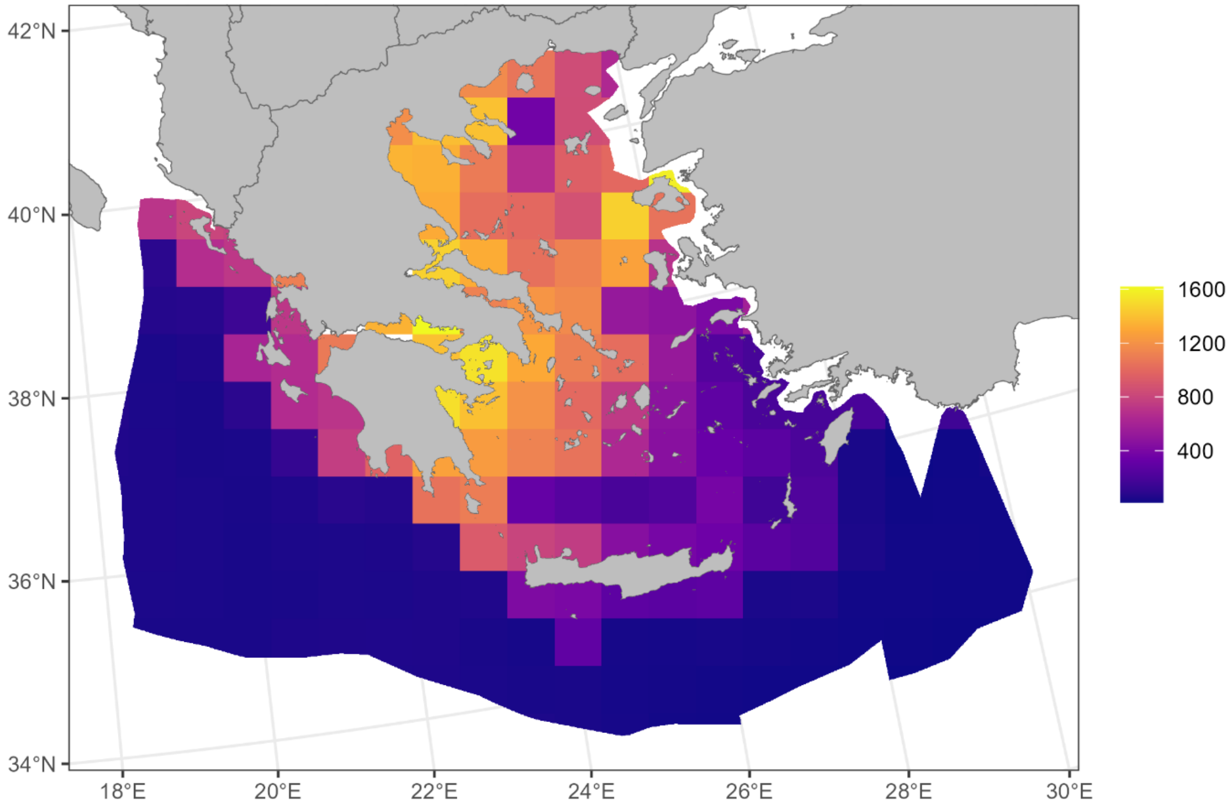
EBSA criterion	Systematic conservation Planning (SRC) elements (Harris et al. 2019)	MarinePlan metrics (for discsussion)
Biological productivity	**Productivity** can be included either as a map of chlorophyll-a intensity (or similar), from which the areas with higher values will be preferentially selected to meet targets, or it could be included as a feature map of upwelling cells with a representation targe	Chl-a measurements, productivity from spatially explicit models, maybe also commercial catch data?, acoustic and fisheries survey data. → directly comparable with MSFD
Biological diversity	Sites with high biological diversity can be mapped either as a separate feature with a target or if multiple **biodiversity** layers are included in the spatial prioritisation, then diverse areas will be preferentially selected because they are efficient sites in which biodiversity targets can be met	Species richness, species evenness, trait richness and trait evenness (TEve) → directly comparable with MSFD
Naturalness	This is accounted for in the site **condition assessment**, where sites in good condition (less degraded) are preferentially selected over sites in fair or poor condition where the option exists.	1 / usage. Usage e.g. from AIS, or vessel monitoring data. OR 1/marine activity index

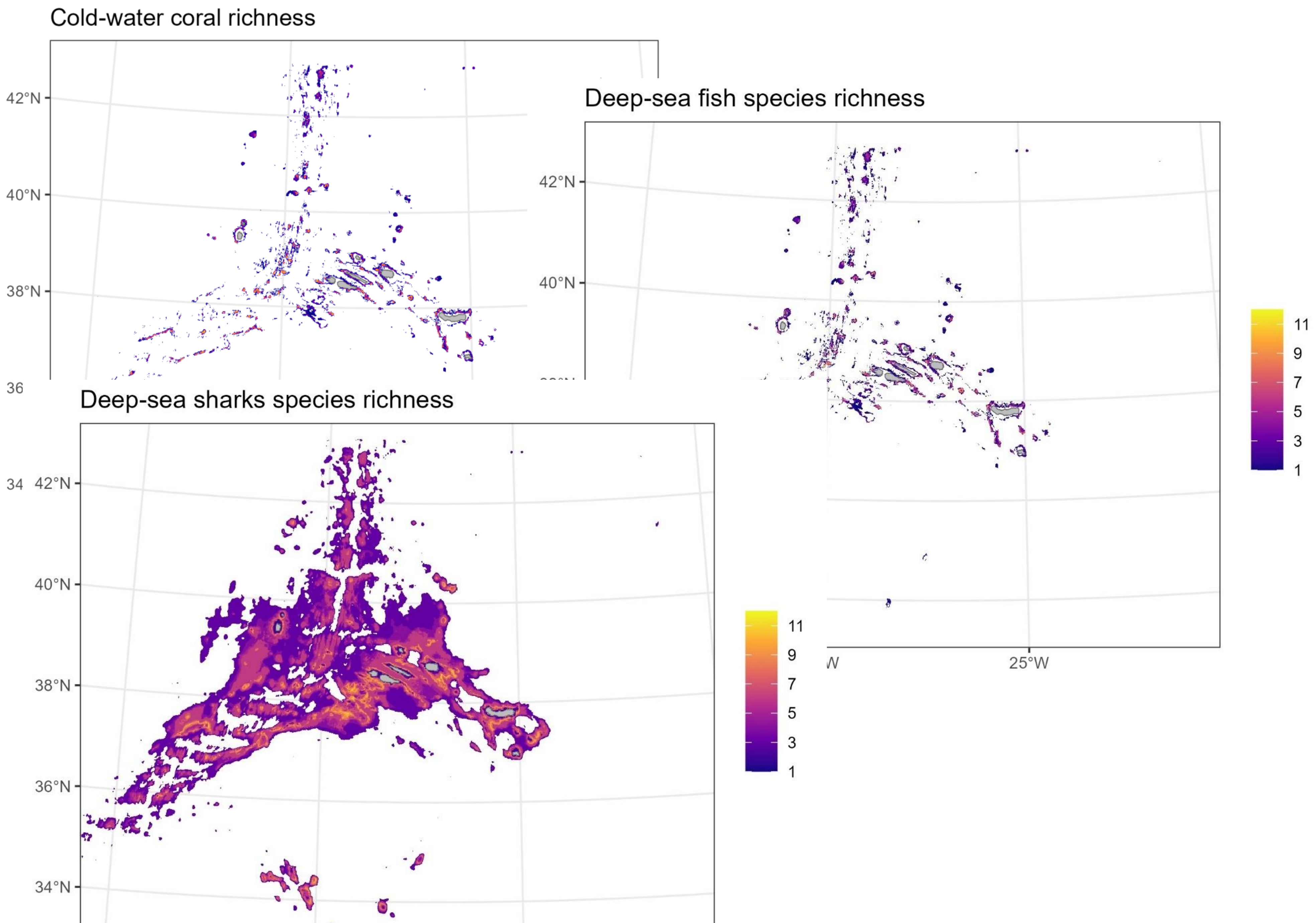
Biodiversity

Shannon Wiener diversity Celtic Sea



Plant and animal species count Greek Seas

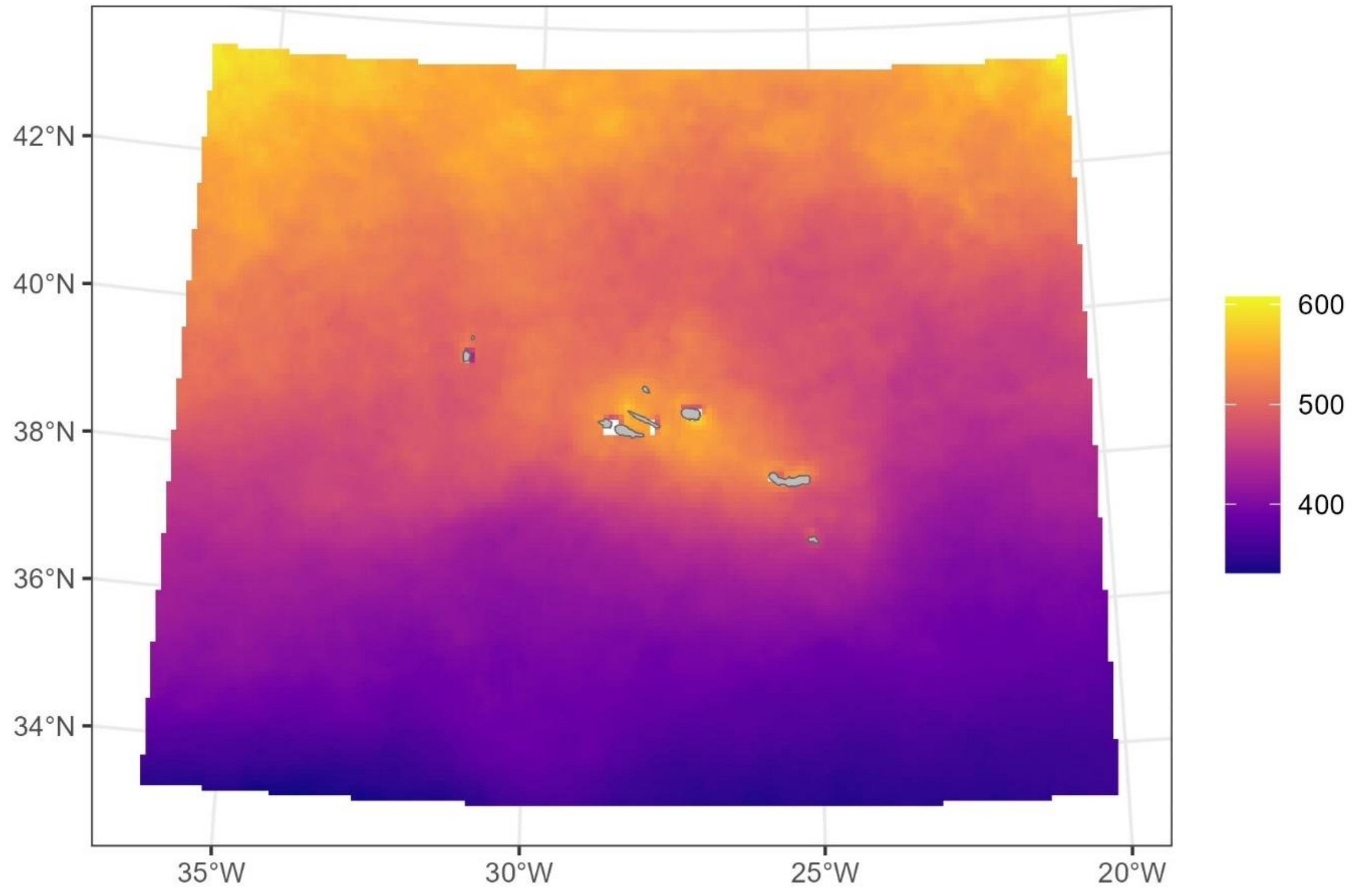


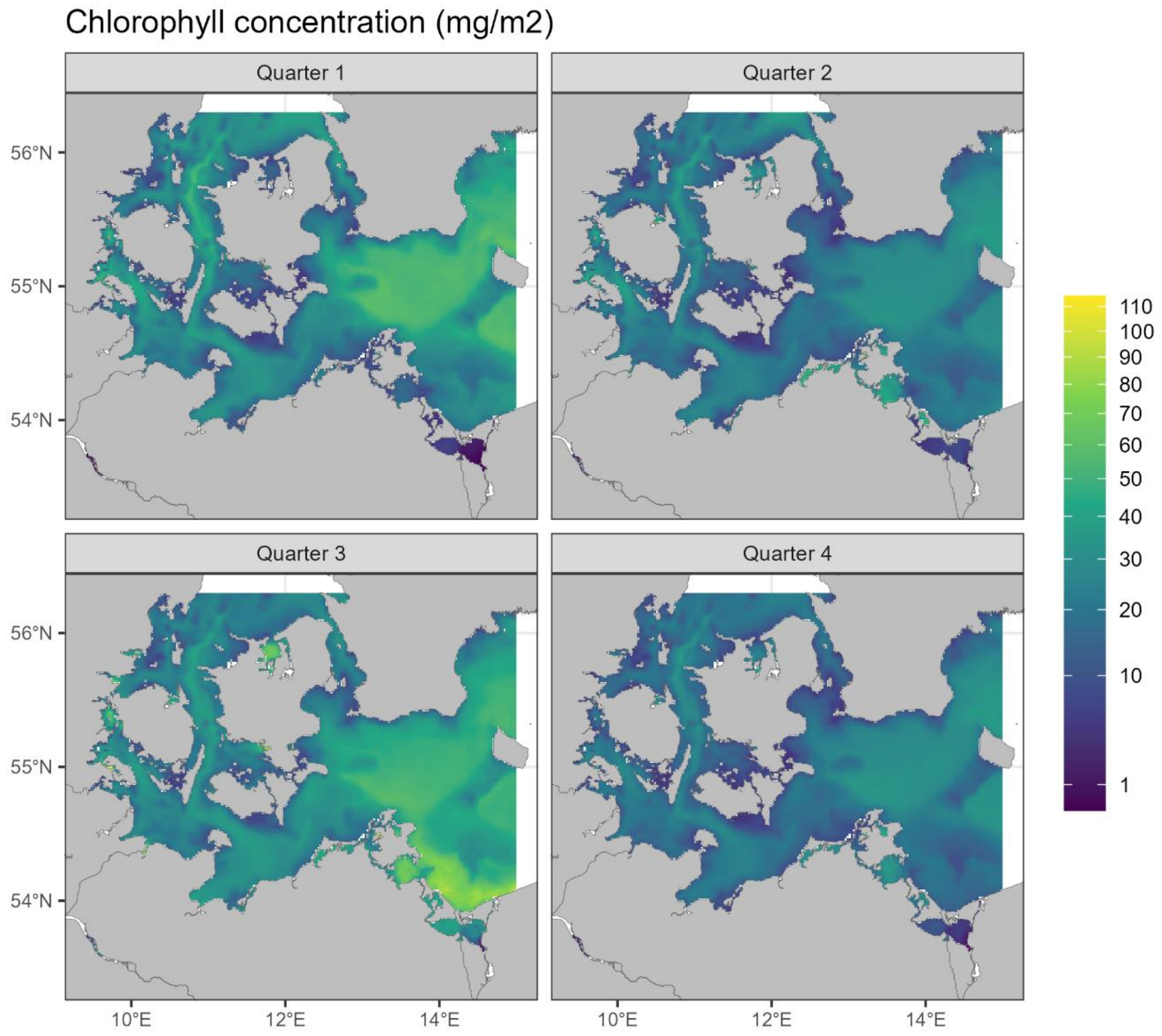

Cold-water coral richness
42°N
40°N
38°N
36
34
Deep-sea fish species richness
42°N
40°N
W
25°W
11
9
7
5
3
1
Deep-sea sharks species richness
42°N
40°N
38°N
36°N
34°N
11
9
7
5
3
1

MarinePlan

Productivity

Net primary productivity (mg C/m2/day) Azores

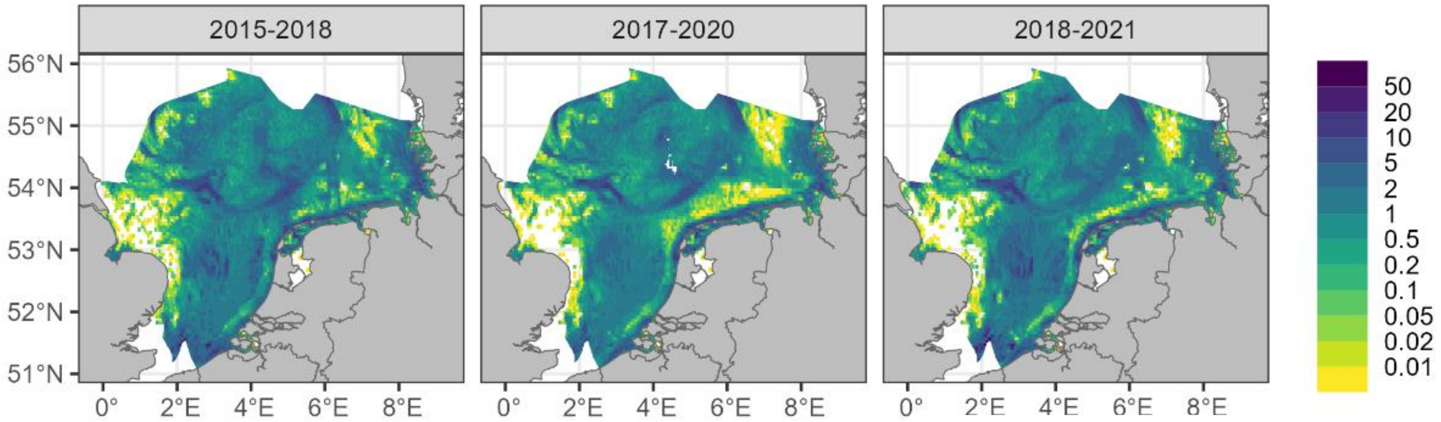




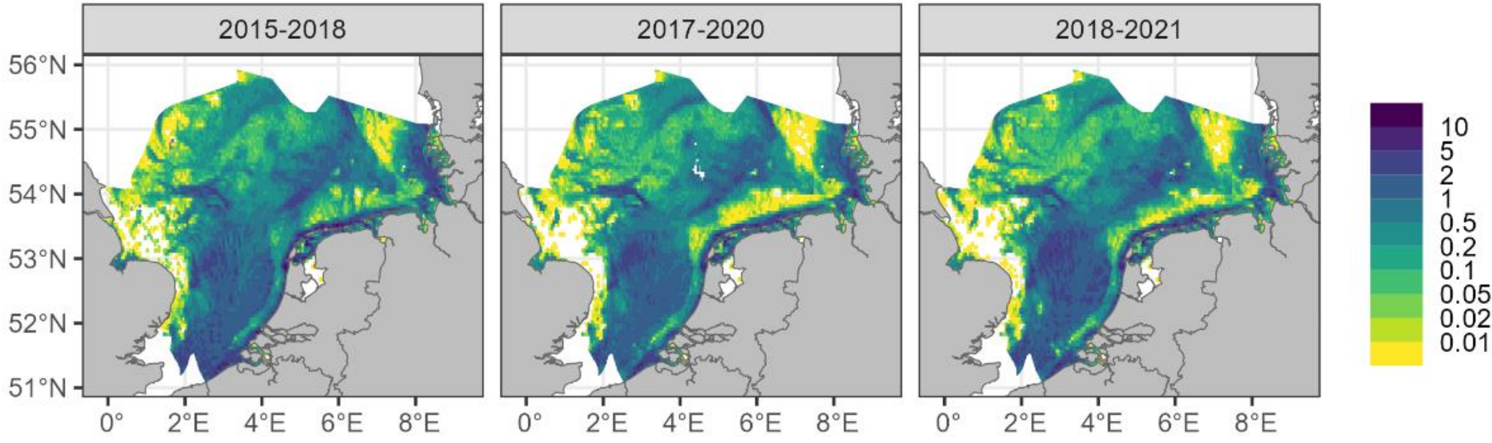
Quarterly chlorophyll-a concentration (mg/m^2), aggregated across years (2001-2021). Colours are on a squareroot-scale.

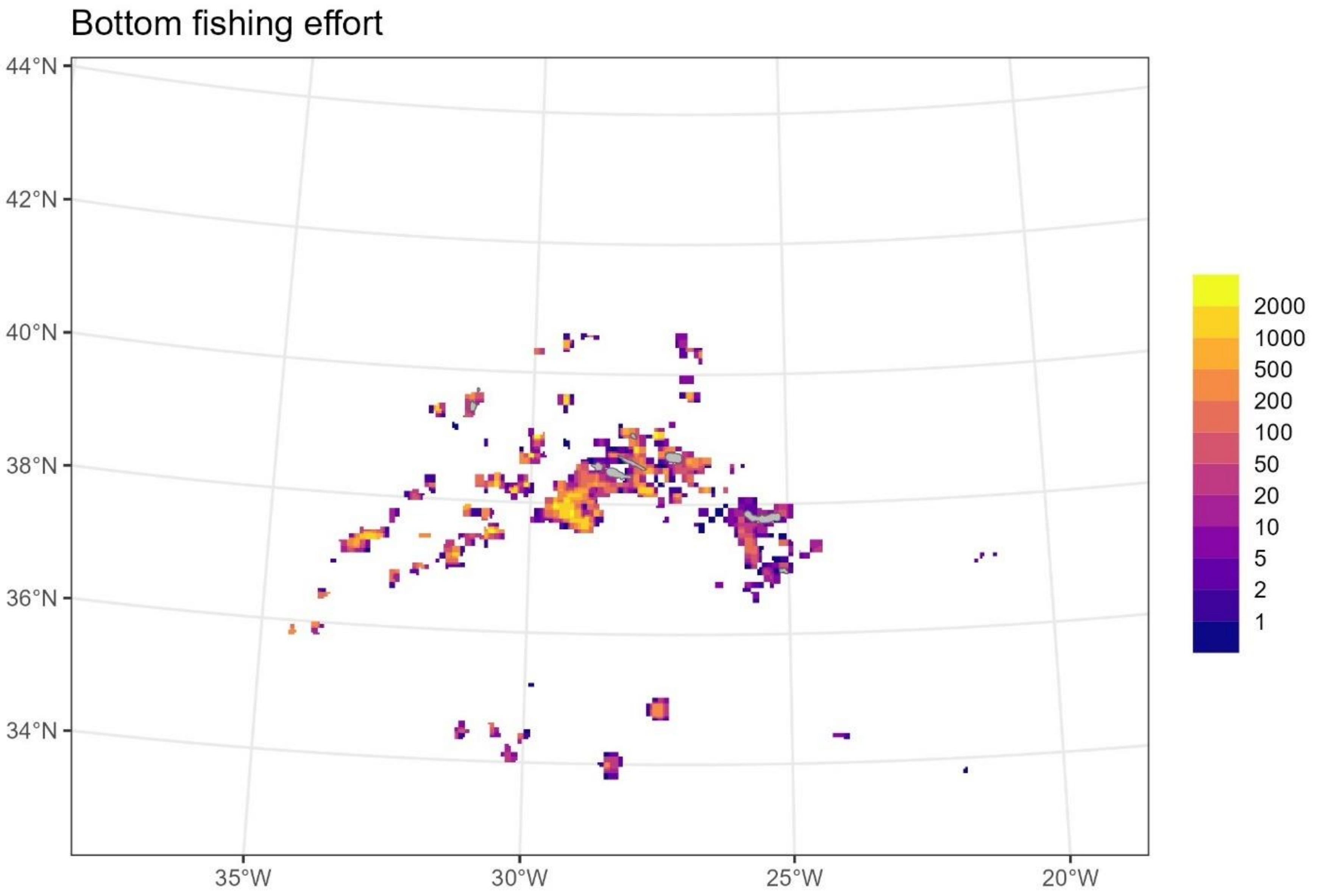
Naturalness

Surface Swept Area Ratio



Subsurface Swept Area Ratio

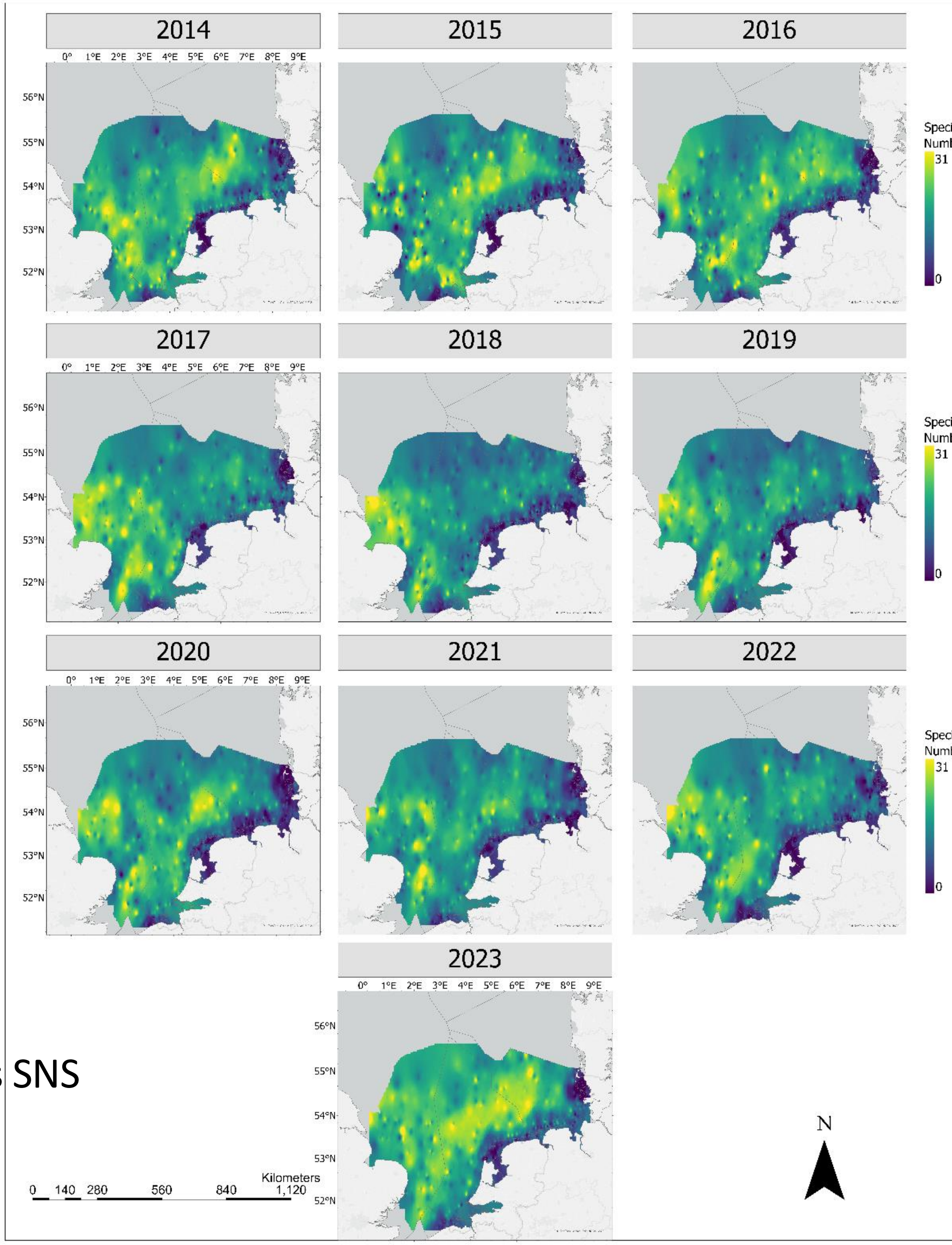




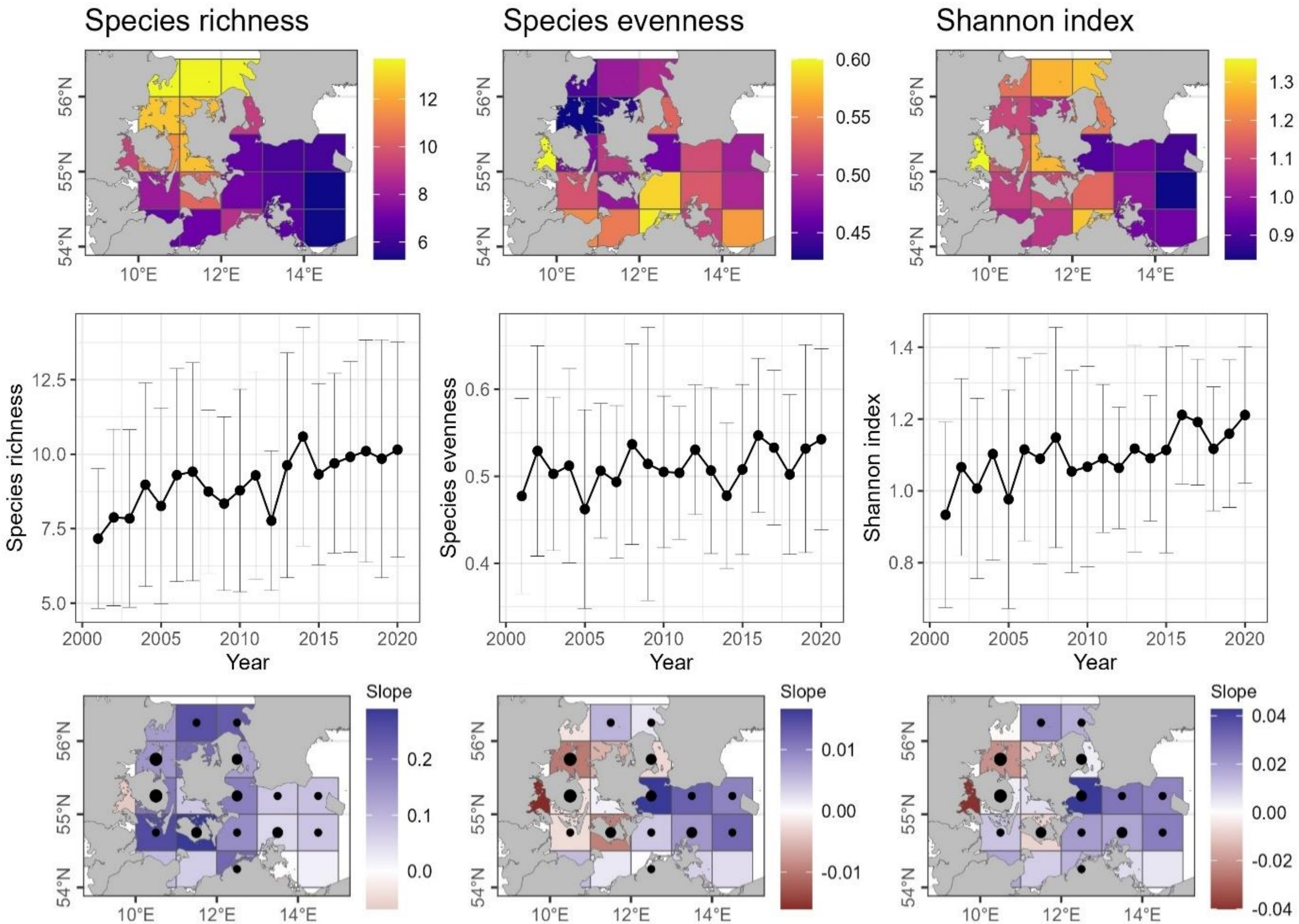
Azores. Bottom-fishing effort layer computed from an analysis of the Vessel Monitoring System (VMS) for vessels licensed for bottom longline or handline fishing gears. Colours are on a log-scale.

Next step:

Add Stability & Variability

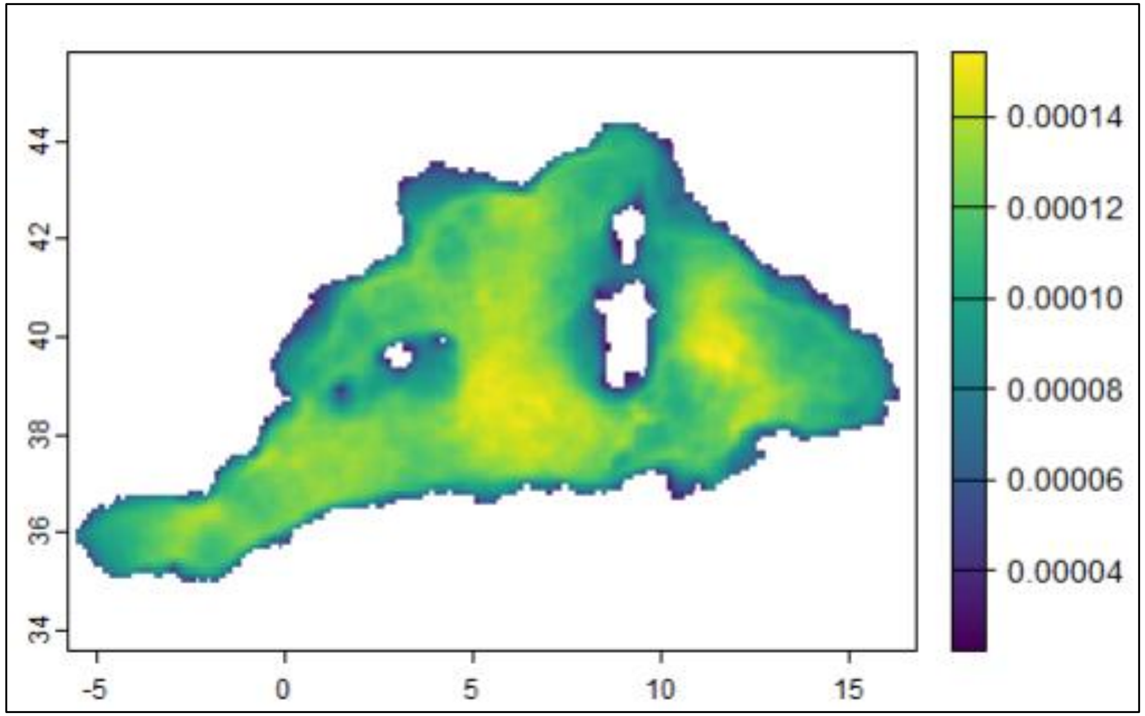


Species Richness SNS

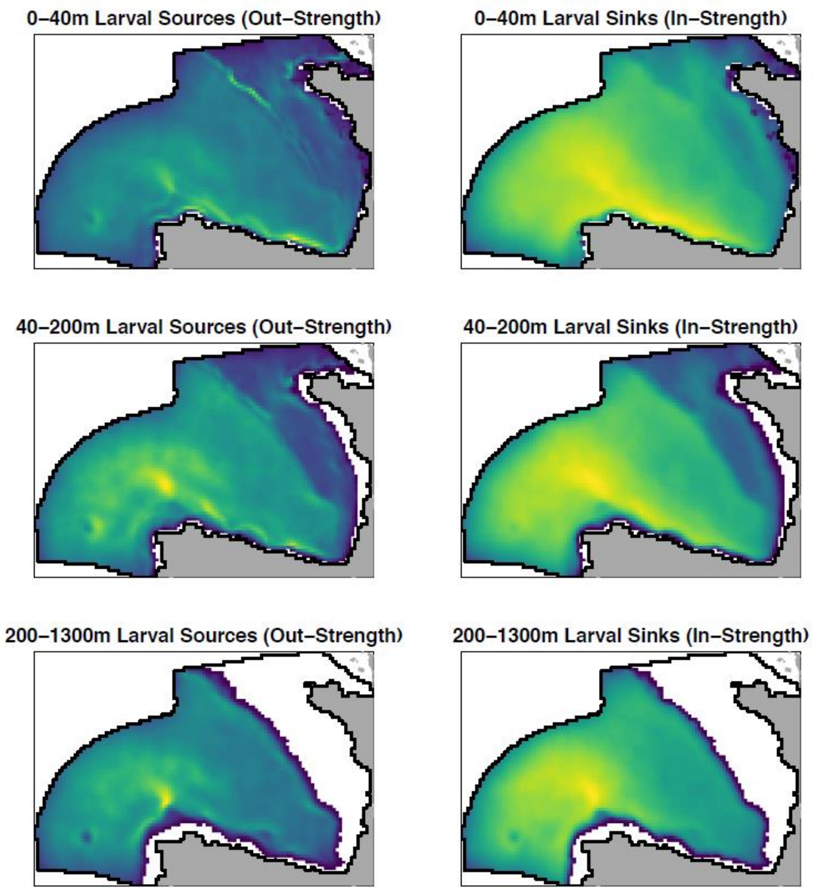


Spatial (1st row), temporal (2nd row) and spatio-temporal (3rd row) patterns of species richness (1st column), species evenness (2nd column) and Shannon index (3rd column). Biodiversity indices were estimated from species abundances from 2001-2020. Error bars in the time series plots indicate spatial variation of index values within years. Spatio-temporal patterns represent the rate of change of each biodiversity index calculated as the slope of a linear regression of index values by year. Points indicate significance of trend: small = p<0.05, medium = p<0.01, large = p<0.001, no point = not significant.

Next step: Add connectivity



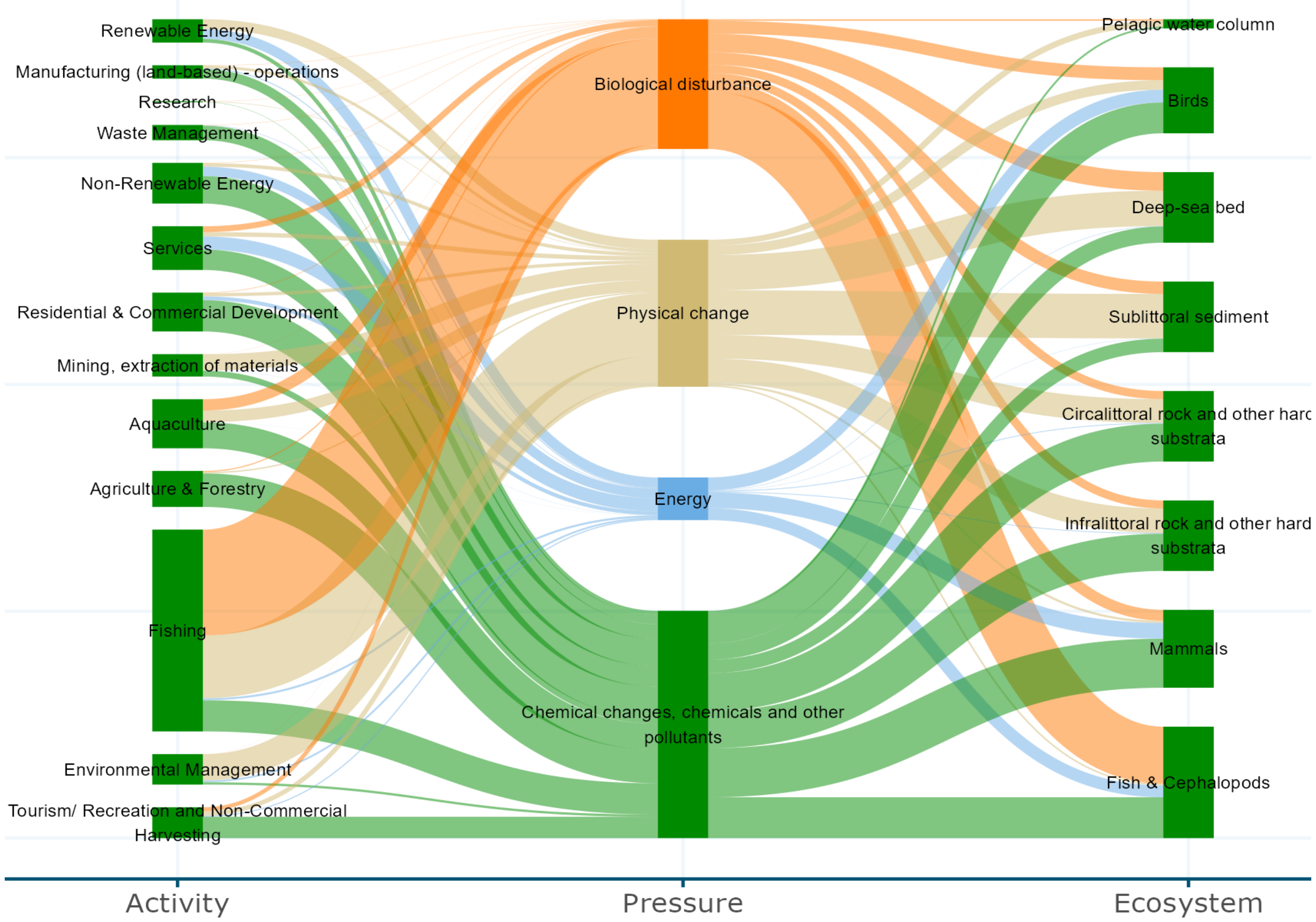
Western Med: PageRank Index (importance of the planning unit) calculated for the 25-day connectivity output.



Spatial patterns of simulated larval connectivity in the water column in the Bay of Biscay, showing the relative importance of regions as sources (left, outgoing connectivity) and sinks (right, incoming connectivity),

Impact Assessment for Naturalness and Vulnerability

- **S**patial **C**umulative **A**ssessment of **I**mpact **R**isk for **M**anagement



Piet G, Grundlehner A, Jongbloed R, Tamis J, de Vries P. 2023. SCAIRM: A spatial cumulative assessment of impact risk for management. Ecological Indicators 2023; 157: 111157.

Potential for **active restoration** →

Potential for **passive restoration** ↓

Fraction biodiversity		Effect Potential		
		0	Low	High
Absent	0	Not eligible for conservation	**AR** can be considered	Eligible for **AR** if environmental conditions allow
-	Low	May benefit from **PR** directed at other ecosystem components	**AR** can be considered and may benefit from **PR** directed at other ecosystem components	Eligible for **AR** but may benefit from **PR** directed at other ecosystem components
Present	High	Eligible for **PR**	Eligible for **PR and AR can be considered**	Areas most suitable for **strict conservation, possibly further enhanced through AR**

Suitability as MPA →

Key words of EBSA lessons:

Assure measurability

Assess stability in space and time domains

Integrate Connectivity

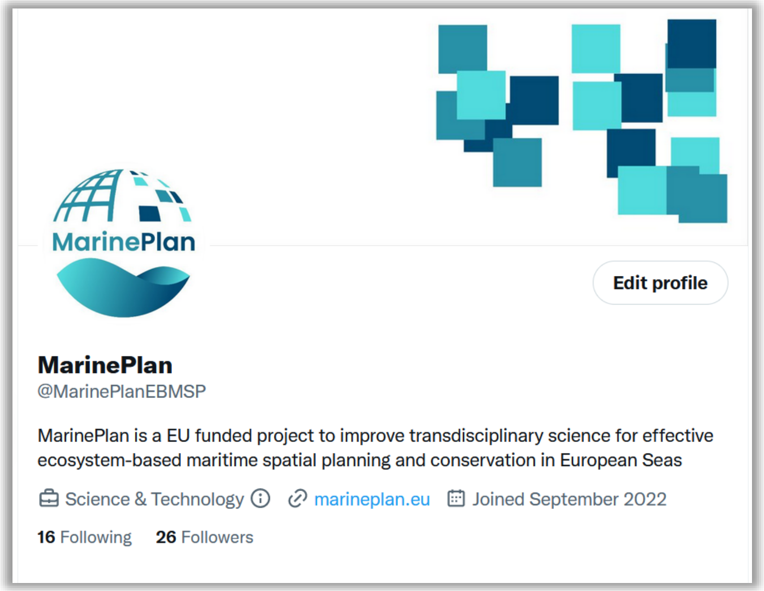
→ Use as layers in Spatial Optimisation

→ Apply in Spatial Cummulative Impact Assessments

Thank you!

www.marineplan.eu

@MarinePlanEBMSP



Funded by the European Union

This project has received funding from the European Union's Horizon Europe research and innovation programmes HORIZON-CL6-2021-BIODIV-01-12 under grant agreement No 101059407 and by UK Research and Innovation (UKRI) under the UK government's Horizon Europe funding guarantee grant numbers 10038951 & 10050537. Views and opinions expressed are however those of the authors only and do not necessarily reflect those of the European Union or UK Research and Innovation. Neither the European Union nor the granting authority can be held responsible for them.

MarinePlan