Biodiversity Indicators for policy goals: Reaching across policy, science and management

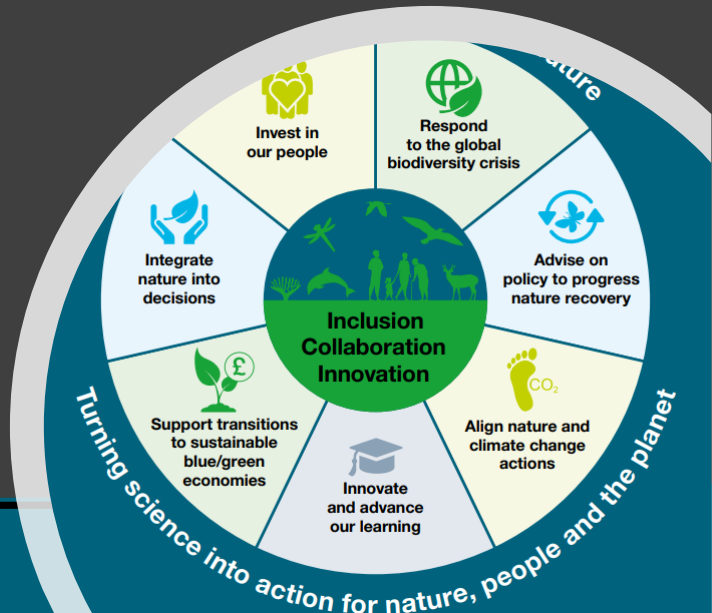
Dr Cristina Vina-Herbon, Head of Marine Ecosystems Team – International
& Kirsty Woodcock, Marine Ecosystems Scientist

Cristina.herbon@jncc.gov.uk

Together for Nature

Joint Nature Conservation Committee

- Advice and research for UK Government, devolved administrations and UK Overseas Territories on national and international nature conservation.
- Work areas we cover:
  - Monitoring, Mapping, Earth Observation
  - Conservation, Fisheries and other management advice
  - Biodiversity indicator development, cooperation and engagement
  - International areas: Global Biodiversity Framework, ICES, OSPAR, Convention Migratory Species, CITES, Global Coral Reef Monitoring Network (GCRMN)



Together fo

OSPAR Regional Sea Convention Indicators

OSPAR VISION

- "*Our vision is a clean, healthy and biologically diverse North-East Atlantic Ocean, which is productive, used sustainably and resilient to climate change and ocean acidification*"

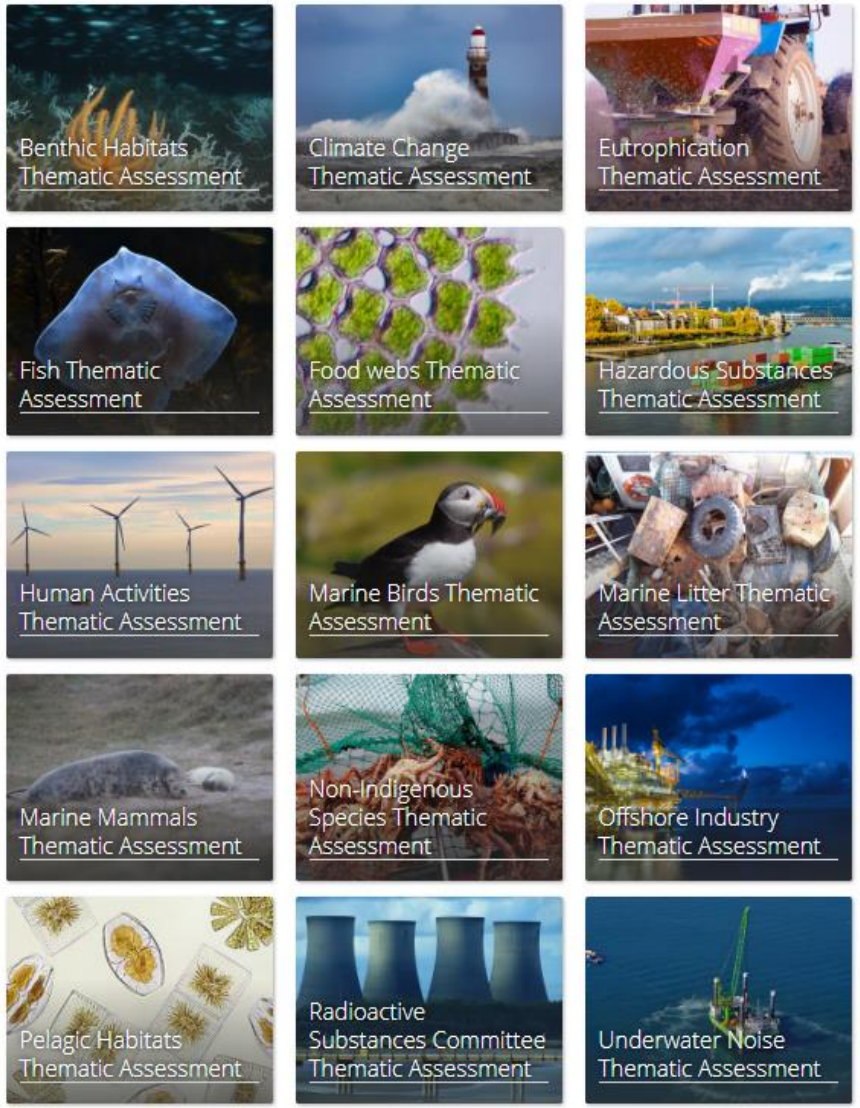
- **Indicators:** Scientific tools or methods to quantify environmental changes, trends and impacts on the health and condition from pressures or human activities on biodiversity and ecosystems

- **Strong collaboration between scientists and policy makers**

- Indicators on Biodiversity, Activities and Pressures developed under OSPAR

- Quality Status Report 2023: understanding of the state of the North-East Atlantic and the extent to which management measures contributed to its current state.

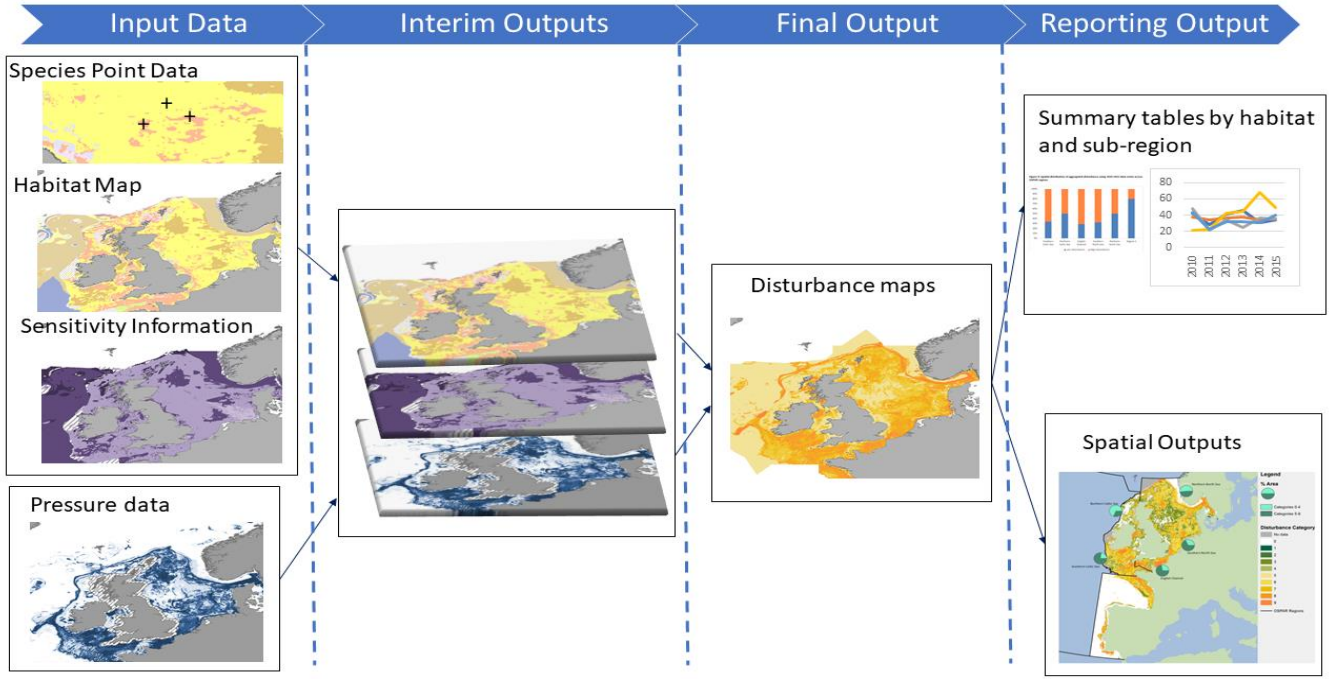
➢ **Operationalisation of indicators to support policy and management**

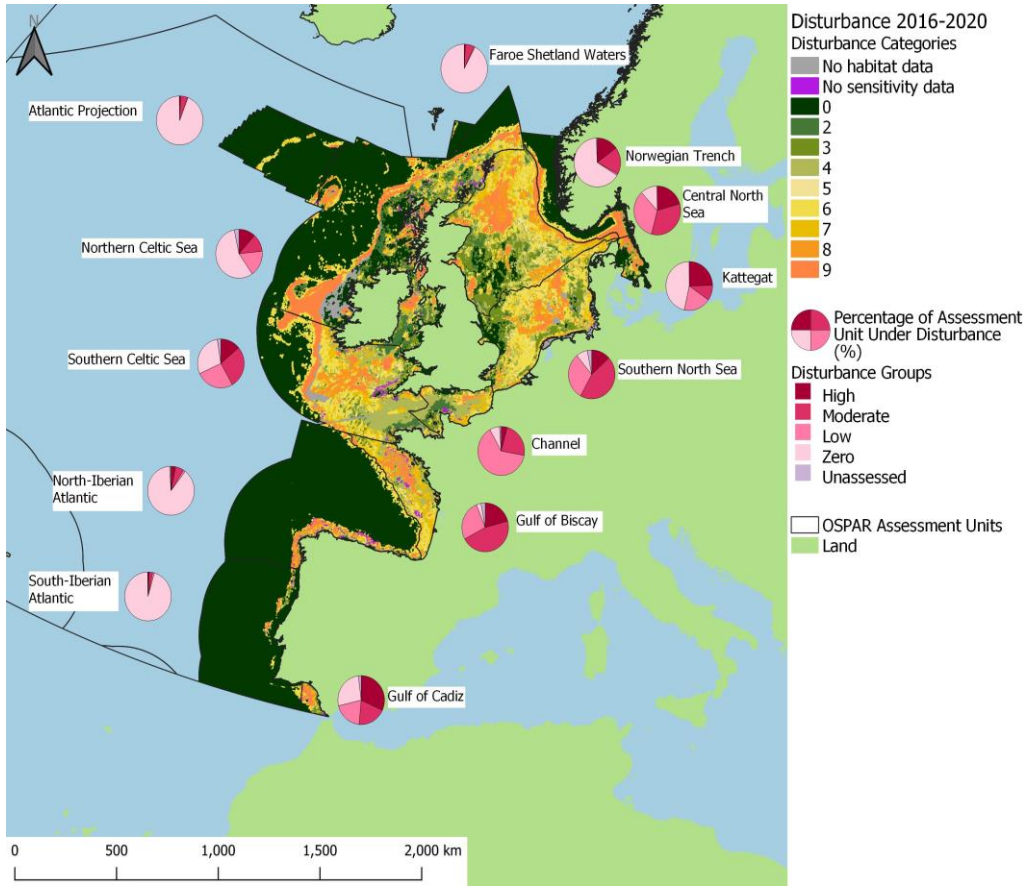


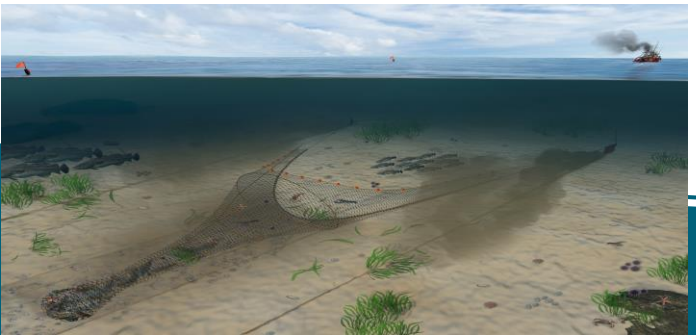
OSPAR Indicators – Regional scale

https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/indicator-assessments/phys-dist-habs-fisheries/

Extent of physical disturbance – Fisheries (BH3a) & Commercial aggregate extraction (BH3b)



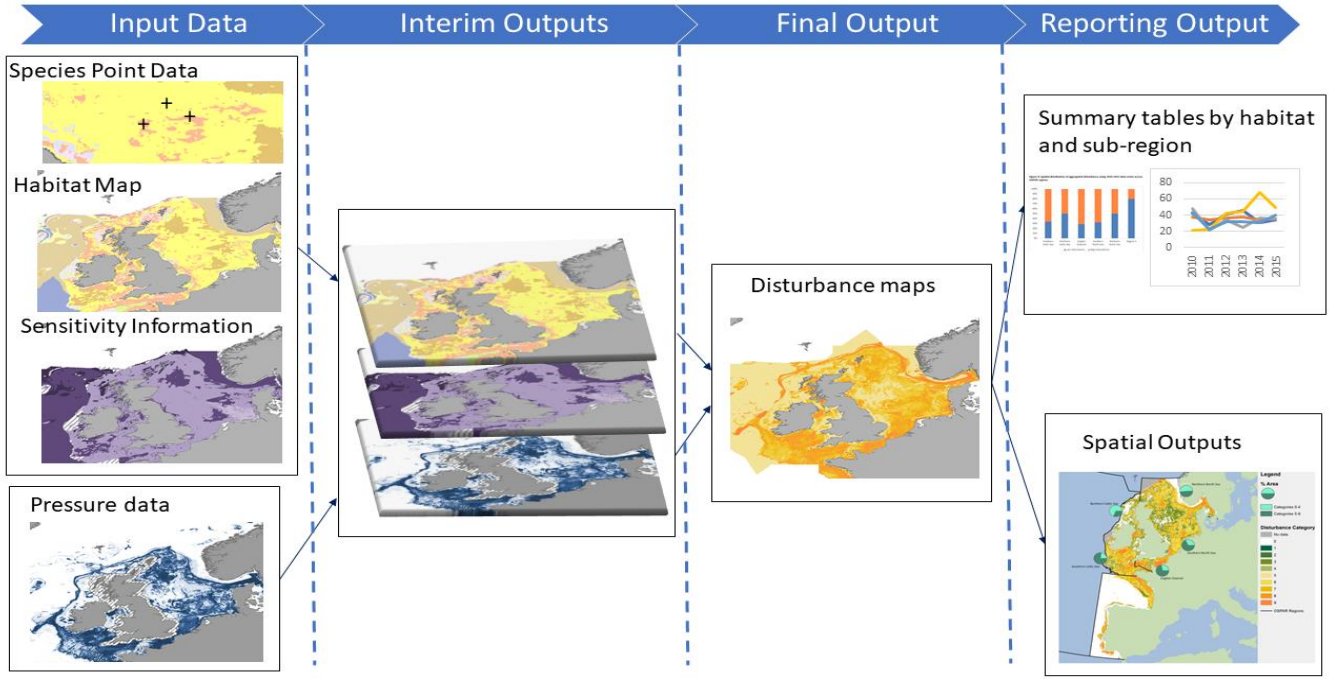


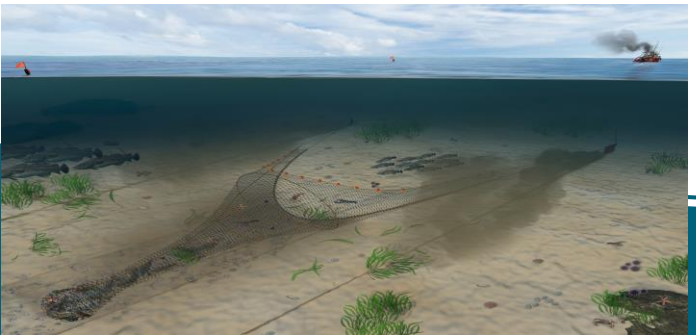


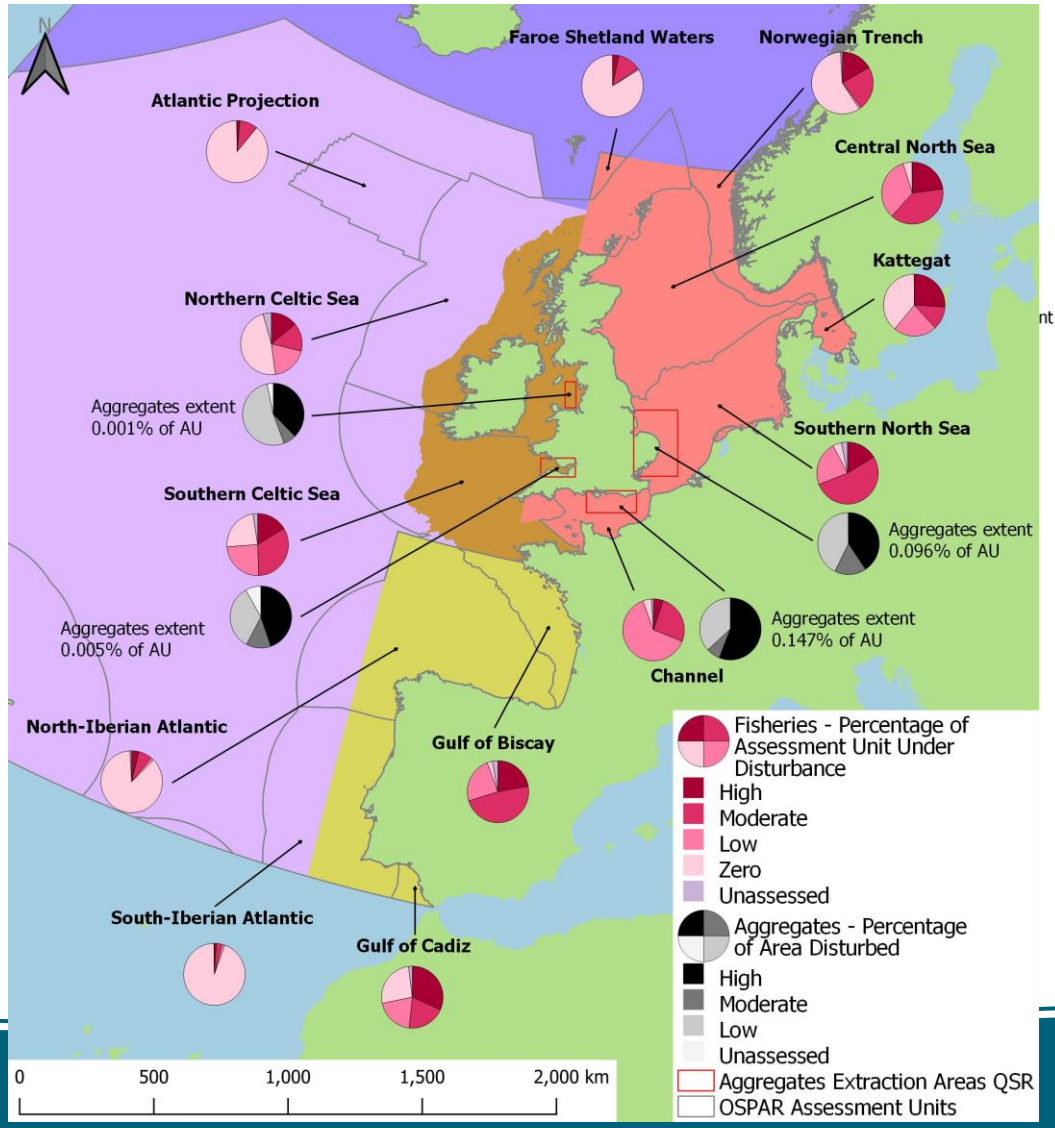
OSPAR Indicators – Regional scale

https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/indicator-assessments/phys-dist-habs-fisheries/

Extent of physical disturbance – Fisheries (BH3a) & Commercial aggregate extraction (BH3b)

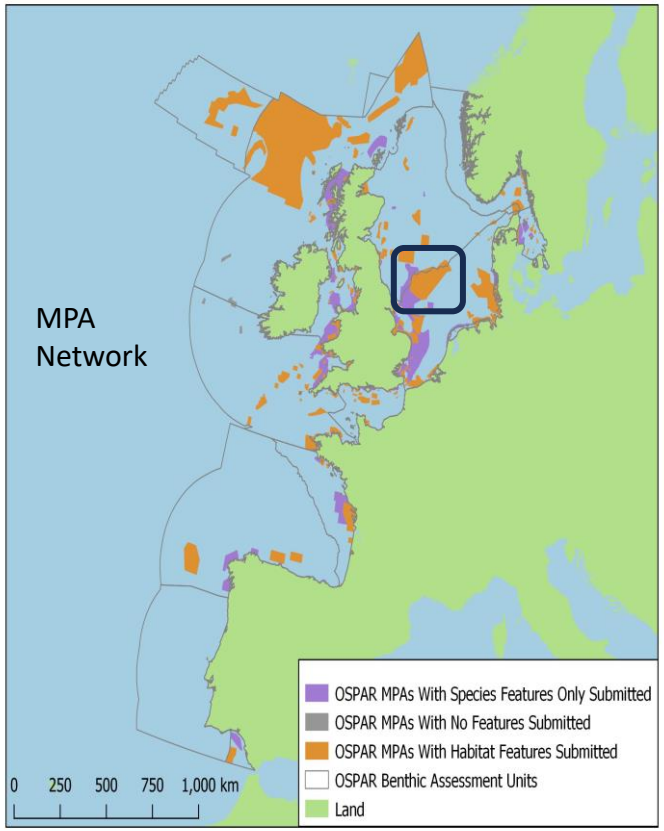


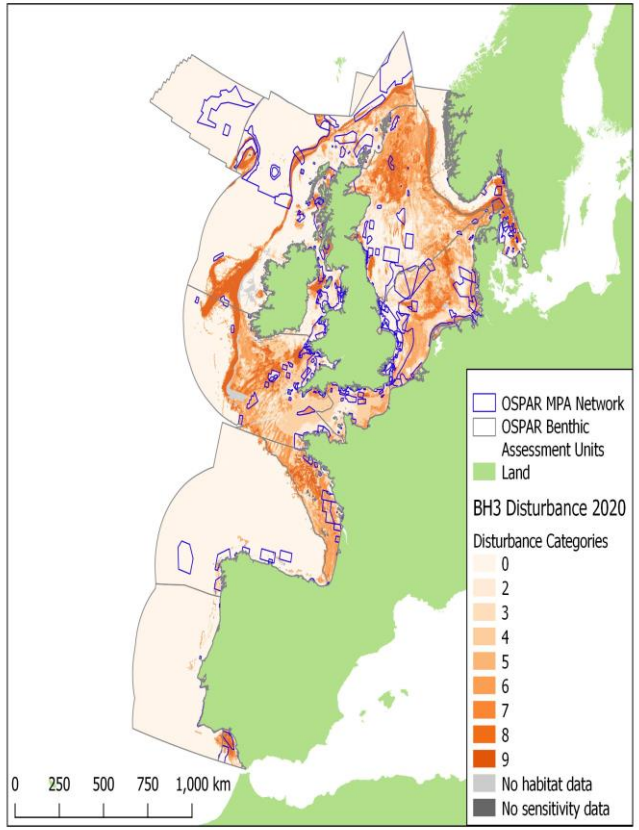


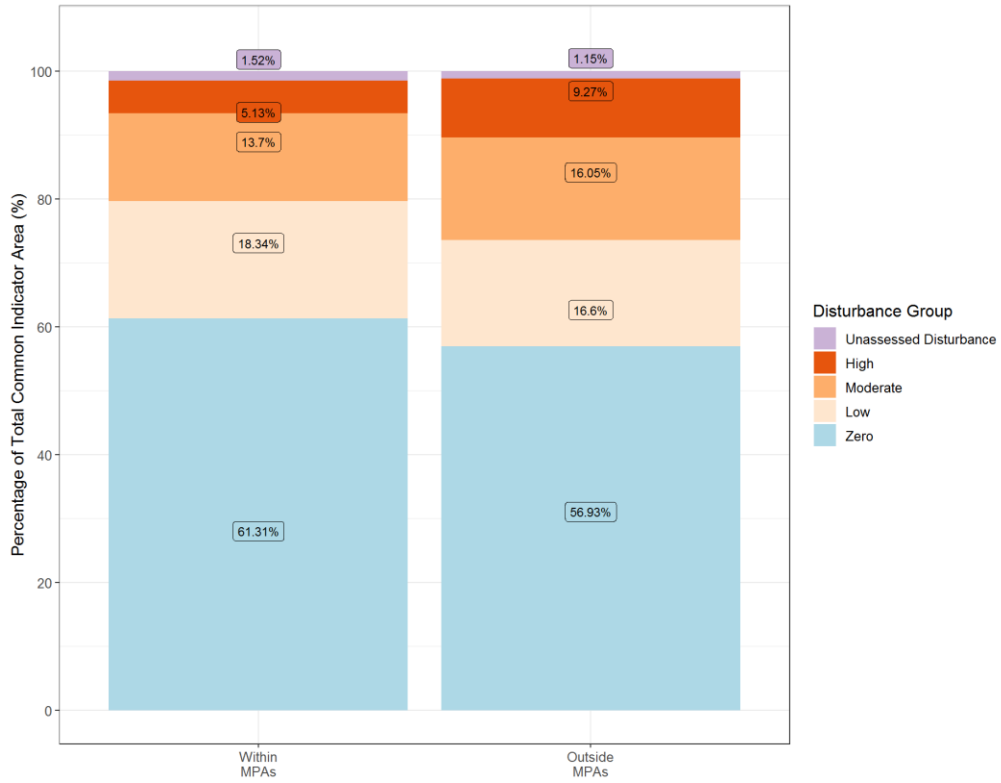


Assessment of effectiveness of management measures (North-East Atlantic Project on biodiversity and eutrophication assessment integration and creation of effective measures)

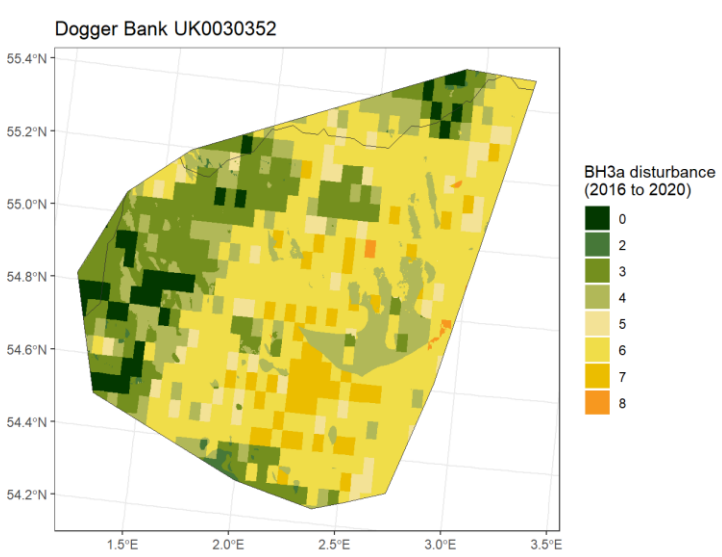
https://www.ospar.org/about/projects/nea-panacea

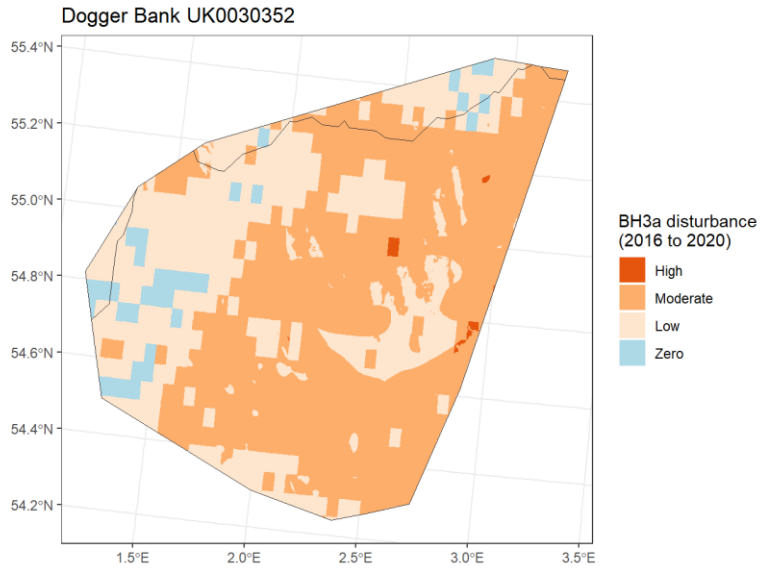


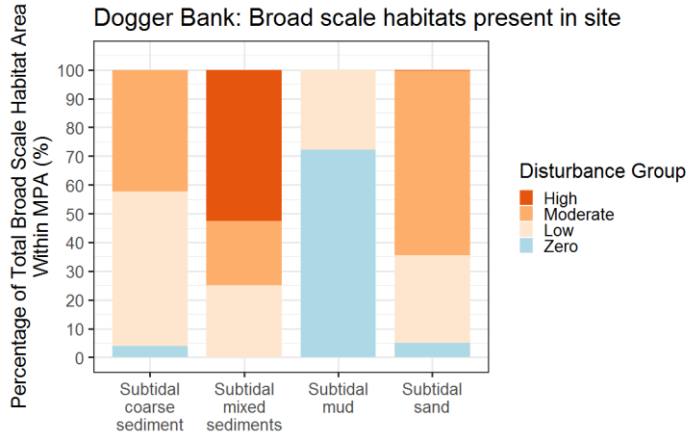


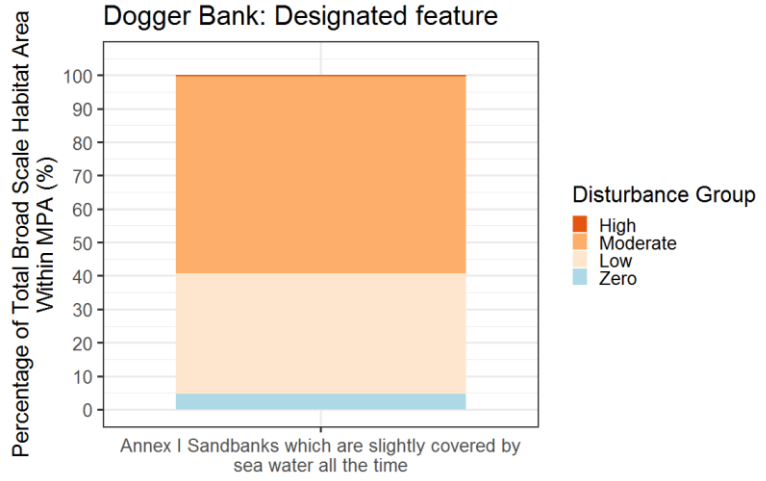


Estimating Disturbance within Specific MPAs









Indicators and Marine Ecosystems Services (Natural Capital)

https://www.gov.uk/government/publications/natural-capital-and-ecosystem-assessment-programme/natural-capital-and-ecosystem-assessment-programme#marine-projects

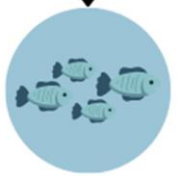
JNCC

Asset

Habitats or species (e.g., mussel beds)

Link

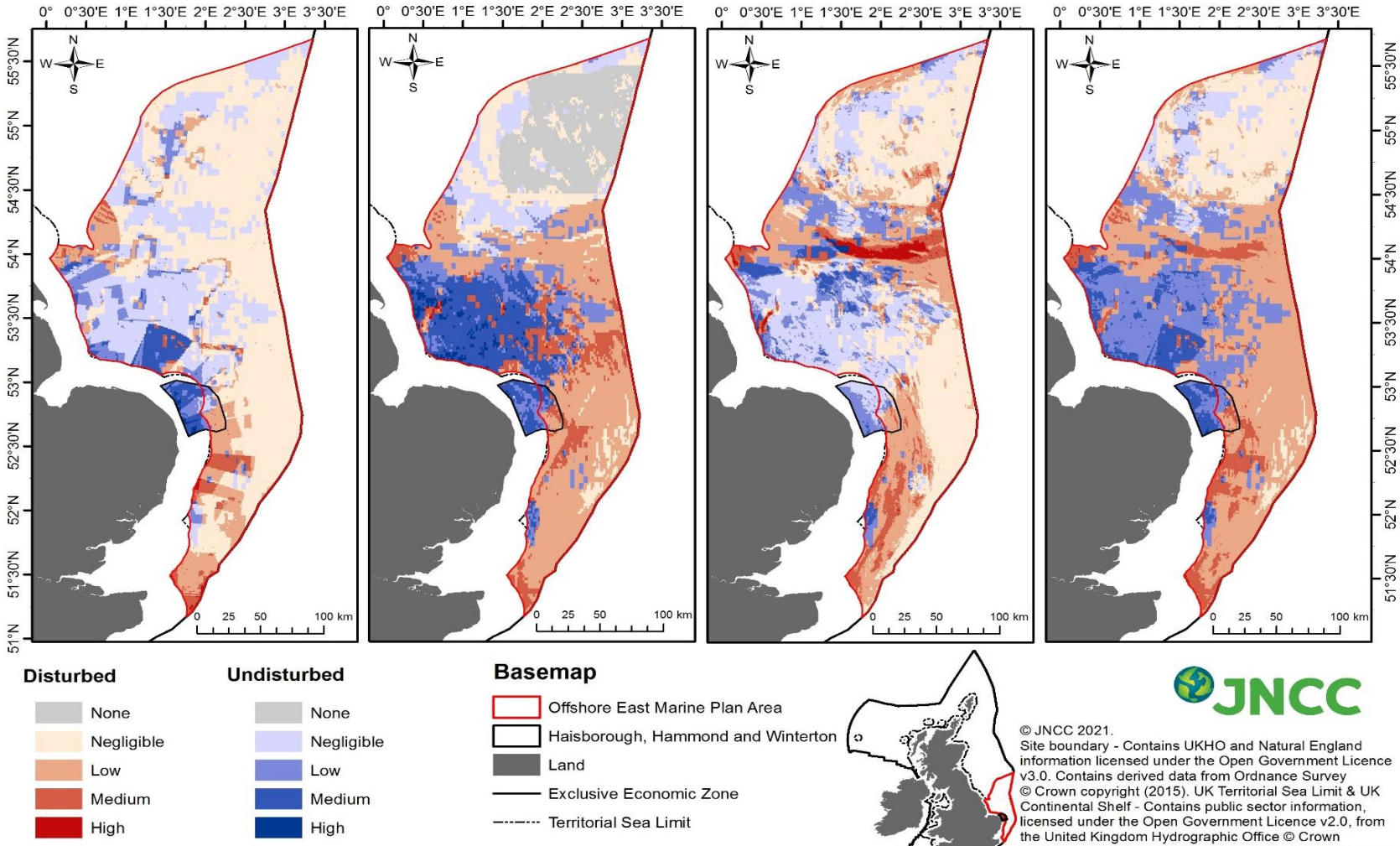
Evidence in literature, including other ASMs and published papers (e.g., Potts et al. 2014, high confidence, peer-reviewed).



Service

Ecosystem Service provided by the asset (e.g., habitat provision for other species).

NCEA

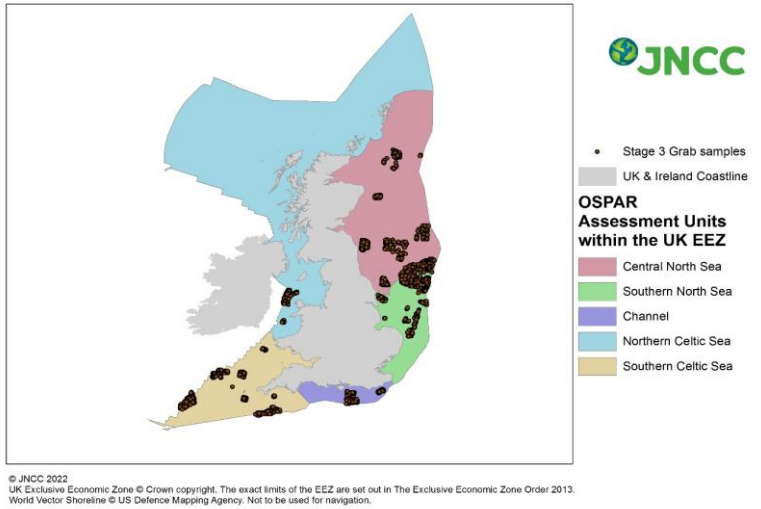


JNCC

Level of service provision in Disturbed and Undisturbed areas for (A) combined recreation adapted from MMO (MMO, 2014), (B) demersal fish nurseries adapted from Katara et al. (2021), (C) carbon density adapted from Diesing et al. (2021) and (D) cumulative provision of all three services in the offshore East Marine Plan Area and HHW SAC

Comparison of Indicators: management, monitoring and integration

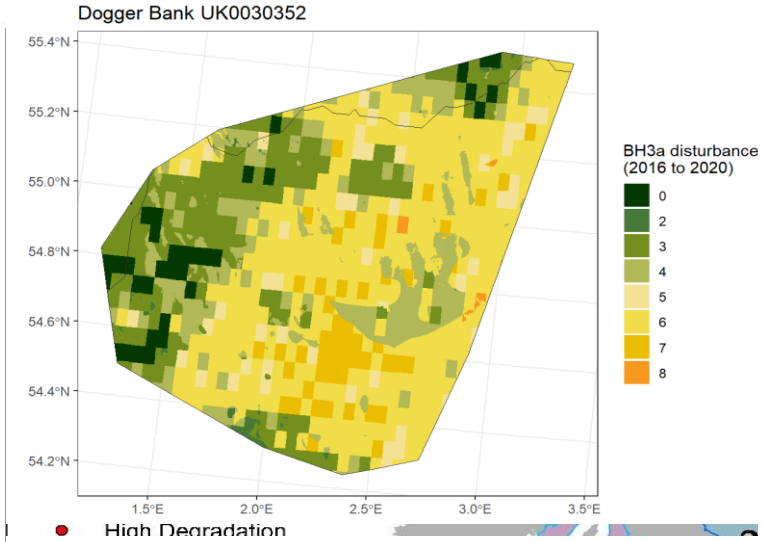
- Testing and comparison of an indicator set: evaluating results, strengths, weaknesses and data requirements
- Increases confidence in assessments
- Explore potential integration
- Establish when indicators should be used independently
- Inform and guide monitoring

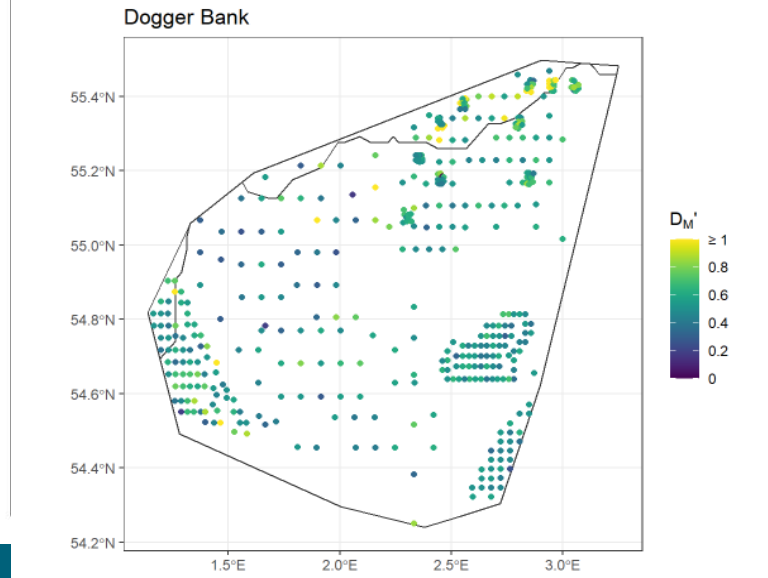


Indicator	Title	Operational within the UK	Relevant legislation/ International commitments/ international group	Operational in OSPAR region (if relevant)	Measurement Unit	Trait based, modelling based, or index?†
BH1	Sentinels of the Seabed (previously named "Typical Species Composition (BH1)"	No	UK Marine Strategy/ OSPAR	IV	proportion of sentinel species in the benthic community	Trait based index
BISI	Benthic indicator species index	No	OSPAR	NA	0 (low quality) to 1 (high quality).	Trait based index
BH2b	Condition of benthic habitat communities	Yes	UK Marine Strategy, OSPAR	II	Ecological quality ratio (EQR) (will be replaced by Relative Margalef Index for OSPAR QSR 2023)	Index calculation
IQI	Infaunal Quality Index	Yes	UK Marine Strategy, Water Environment Regulations (WER)	NA	Scale 0 (impacted) to 1 (reference).	Index calculation
PD2	Population Dynamic 2 (fishing)	No	ICES	NA	Scale of 0 (high impact) to 1 (low impact)	Trait based index based on longevity only and predictive modelling
BH3	Extent of Physical Disturbance to Benthic Habitats	Yes	UK Marine Strategy/ OSPAR	II, III, IV	km^2 and % habitat disturbed.	Modelling based

†

Comparison of Indicators: management, monitoring and integration





Indicator	Result summary: condition of benthic community	
	Sublittoral coarse sediment (A5.1)	**Sublittoral sand (A5.2)**
BH1	**Moderate** The indicator detected a slightly negative correlation between abrasion intensity and proportion of sentinel species	**Moderate** The indicator did not detect significant correlation between abrasion intensity and proportion of sentinel species.
BISI	**Poor** BISI values were very low (ranging from 0.013 to 0.026) with very little variation between them, BISI values of 1 indicate that the community is in good condition. The computed t also indicated the observed value was significantly different to the reference value.	
BH2b	**Good** The mean EQR value for Margalef D was close to 1 indicating a high/good status of the benthic community. It must be noted that precision of the model is poor.	**Good/Moderate** The mean EQR value for Margalef D was close to 0.5 indicating a good/moderate status. It must be noted that precision of the model is poor.
IQI	**Good** The EQR value for was 0.70, classed as "good" Ecological Status.	**Good** The EQR value was 0.69, classed as "good" Ecological Status.
PD2	**Original methodology - Moderate** State predicted by the PD2 was calculated at 0.92 and depletion at 0.06.	**Original methodology - Moderate** State predicted by the PD2 was calculated at 0.94 and depletion at 0.07.
	Alternative methodology – Poor Total biomass per sample was observed to be lower than predicted by the PD2 tool, with no correlation between the two.	**Alternative methodology – Poor** Total biomass per sample was observed to be lower than predicted by the PD2 tool, with no correlation between the two.
BH3	**Moderate** The BH3 disturbance map shows that the habitats selected are generally exposed to low-medium disturbance levels, although areas highly disturbed can be found in all the MPAs. The proportion of area highly disturbed is approximately 25% in total, with approximately 43% of A5.1 disturbed.	**Moderate** The BH3 disturbance map shows that the habitats selected are generally exposed to low-medium disturbance levels, although areas highly disturbed can be found in all the MPAs. The proportion of area highly disturbed is approximately 25% in total, with approximately 19% of A5.2 disturbed.

Things to remember

- Biodiversity indicators data products could be used for multiple purposes:
  - Domestic and international assessments & reporting
  - Policy & management decisions
- Design, testing and operationalisation of indicators takes time
- Working in close relationship with policy and managers is essential
- Translating the results into natural capital and ecosystem services
- Targeting resources & prioritising action
- Understanding data availability and quality (monitoring, modelling etc) is key
- Indicator assessments can be integrated in some cases or nested to support wider assessments

Acknowledgements:

Liam Matear, Stefano Marra, Stephen Duncombe-Smith, Adam Smith, Marco Fusi, Megan Parry, Laura Pettit (All JNCC)

BH3 Indicator co-leads: Axel Kreutle (BfN), Petra Schmitt (BioConsult)

OSPAR Benthic Habitats Expert Group

UK Benthic Habitats Expert Subgroup

Cristina.herbon@jncc.gov.uk

Together for Nature