



Methods protocol
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Eclipse Expert Working Group on Impacts of Offshore Wind Farms Expansions.

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INDEX

Background	1
Objectives	2
Policy relevance and geographical scope of the request	2
Relevance for biodiversity	3
Methods	3
Methodological framework	3
Stage 1: Scoping review for SSS	4
Question components	4
Search strategy	5
Eligibility criteria	5
Screening strategy	5
Data collection and analysis	6
Stage 2: Participatory workshop using External experts	7
Timeline	7
Recruitment	7
Workshop	8
Limitations	9
Ethical Considerations for Methods Protocol	9
Timeline	13
Acknowledgements	13
References	14
Annexe 1: Keywords for SR based on descriptors of GES as stated in Article 8 of the European Commission Decision on GES 2017/848 document (linked here)	15



BACKGROUND

The aim of the request is to highlight the impacts - including cumulative impacts - of the planned expansion of offshore wind energy production on marine biodiversity and ecosystems with regard to the achievement of good environmental status (GES). Such analysis is critically needed considering the increase in challenging targets for renewable energy sources that need to be achieved by Member States in the coming years, a large percentage of which are likely to be offshore. Existing studies on cohabitation between offshore wind energy production and nature tend to focus, in particular, on marine protected areas (MPAs) or the protection of species (e.g., birds). Existing knowledge misses an analysis relevant to all the dimensions (descriptors) of good environmental status as per the Marine Strategy Framework Directive (MSFD). Such analysis, which includes literature reviews and scenarios modelling, should look at how offshore wind energy expansion might affect the achievement of GES, considering the GES threshold values set by Member States for several GES criteria (such as seabed loss, impulsive noise, contaminant levels, species abundance, etc.) and the subsequent cumulative impacts. The study should empower the Commission to propose solutions, including in the context of the Member States' MSFD Programmes of Measures and the MSFD review, to make sure that offshore wind energy expansion does not impede the achievement of GES under the MSFD, considering the entire lifecycle of offshore wind power plants (including their decommissioning), whatever the type of turbine (monopiles, floating, tripods, etc.). These solutions could, for example, relate to marine spatial planning (e.g., current developments in the context of the Greater North Sea Initiative), considering the cumulative impacts of other human activities on the marine environment. Identification of different solutions (for instance, technological) would be relevant.

The planned developments of offshore wind production in order to achieve the targets set by EU policy and by member state's national legislation are likely to be at such a large scale that they will have impacts on marine ecosystems and marine ecosystem functioning, including seabed habitat loss, disruption of migratory routes of mobile species, including birds and cetaceans, deadly collisions with birds, disruption of feeding and breeding grounds of a number of species, underwater noise during development and maintenance, input of contaminants and litter and changes to hydrographic conditions. Almost all the descriptors of good environmental status are likely to be impacted by these developments.

With this in mind, the European Commission's Directorate-General for Environment (EC – DG ENV) put forward the following request to Eklipse:

“What are the cumulative impacts of offshore wind farms and their consequences for the achievement of the good environmental status of marine ecosystems?”

To answer this primary question, an Expert Working Group (EWG) specialised in offshore wind farms request has been established. The group has been meeting remotely every week since



27.06.2024. It first received an introduction to the Eclipse call, a presentation of the request and the needs of the requester. The initial stages undertaken by Eclipse were also presented in the accompanying [“Document of Work”](#) and a summary of the recommended methods prepared by the Methods Expert Group (MEG). The EWG then selected three co-chairs to lead the subsequent meetings. After several discussions with the MEG, the EWG agreed on the following research objectives and methods.

OBJECTIVES

The main goal of the request put forward by the Directorate General for Environment (DG ENV) is to enhance the understanding of the potential impacts of Offshore Wind Farms (OWFs) expansion on achieving Good Environmental Status (GES), as defined by the Marine Strategy Framework Directive (MSFD).

Specifically, the work aims to:

- a. Investigate the impacts of fixed-foundation wind turbines and grid connection infrastructure expansion on each of the 11 descriptors of GES under the MSFD.
- b. Assess the consequences of cumulative impacts on marine ecosystems, i.e. to what extent do individual stressors overlap in time and/or space.
- c. Identify and analyse knowledge gaps and mitigation strategies through literature review, expert consultation, and participatory workshops.

POLICY RELEVANCE AND GEOGRAPHICAL SCOPE OF THE REQUEST

The final framing of the request seeks to contribute primarily to the MSFD (and its ongoing review). It will also inform other EU legal instruments/policies such as the Maritime Spatial Planning Directive, the Renewable Energy Directive, the Biodiversity Strategy, the Zero Pollution Action Plan, the Marine Action Plan, the Wind Power Action Plan, the Nature Restoration Law, as well as regional and/or international agreements or processes, notably the Regional Sea Conventions Action Plans/activities, and other initiatives planned/taking place at a regional level through:

- a. the negotiation or implementation of a legal act (e.g., Directive, Regulation, Decision),
- b. the negotiation or implementation of a non-binding instrument (e.g., Strategies, Communications),
- c. the drafting of EU action plans or legislative proposals (either at the development, negotiation, or adoption phase).

The geographical scope of the request is the EU's marine regions and subregions as defined under the MSFD: the Baltic Sea, the Black Sea, the North East Atlantic (including the Greater



OFFSHORE WIND FARMS IMPACTS

North Sea, the Celtic Seas, the Bay of Biscay and the Iberian Coast, and Macaronesia), and the Mediterranean Sea (including the Western Mediterranean Sea, the Adriatic Sea, the Ionian Sea, the Central Mediterranean Sea, and the Aegean-Levantine Sea).

RELEVANCE FOR BIODIVERSITY

The planned developments of offshore wind energy production to achieve the targets set in EU and national legislation and policies are likely to be on such a large scale that they will have impacts on marine ecosystem biodiversity and functioning. Impacts may include habitat loss, disruption of migratory routes, collisions with offshore wind structures, disruption of feeding and breeding grounds, modification of the abundance and distribution of local and invasive species, introduction of pollutants and litter, and changes to hydrographical conditions. All GES descriptors are likely to be impacted by these developments.

METHODS

TIMELINE AND TYPE OF DELIVERABLES

The results of the request will greatly contribute to the discussion on the Great North Sea initiative, which will start in November 2024, and the MSFD review planned for 2025. By November 2024 draft summaries will be delivered for a selected number of descriptors. The remainder will be finalised by March 2025.

The desired deliverable is a single report containing short scientific summaries for each GES descriptor, each containing:

- a qualitative analysis, based on a literature review, of the impacts - including cumulative impacts - of the planned expansion of offshore wind energy production on marine ecosystems, both pelagic and benthic.
- identify and analyse knowledge gaps and mitigation strategies through a literature review.

METHODOLOGICAL FRAMEWORK

This section provides a general description of the proposed methodology: a two-staged methodological process. A Scoping Review (SR) will be applied to produce short science summaries (SSS, stage 1) that will then be leveraged to inform a one-off online expert consultation and participatory workshop (stage 2).



STAGE 1: SCOPING REVIEW FOR SSS

The SR will provide an overview of the distribution and extent of existing evidence relating to the above-mentioned objectives. It will help to identify current knowledge gaps for which further information will be sought from the expert consultation and participatory workshop. The SR will be conducted in close accordance with the guidelines and standards for quick scoping reviews (Collins et al., 2015; Dicks et al., 2017). Thus, the SR will follow a structured methodology - following an *a priori* protocol (current document) - to collate and synthesise the existing research evidence (academic and grey literature) into SSS per GES descriptor. Due to time constraints, a full systematic review is not feasible. Whilst less insightful than a full systematic review, the SR can be applied to understand the impact of ‘pressure’ on a system or a policy-driven intervention and is designed to be transparent and to minimise bias (Collins et al., 2015).

Question components

To conduct the SR, we defined key question components according to the PerSPECtIF framework (Booth et al., 2019) (see Table 1 below).

Table 1. Components of the study question

Perspective	Setting	Phenomenon of interest	Environment	Timing	Findings
Academic literature, scholarly reviews, grey literature	European regional seas	Impacts of offshore wind farms on the achievement of Good Environmental Status (GES)	Marine environment	2006 - present	Permanent and short-lived impacts of offshore wind farms on marine ecosystems linked to the 11 descriptors of GES, i.e., marine biodiversity, non-indigenous species, commercial fish and shellfish, food web, eutrophication, seabed integrity, hydrological conditions, contaminants, contaminants in seafood, marine litter and underwater noise; cumulative nature of impacts



Search strategy

A search for peer-reviewed (scientific/academic) literature and additional grey literature will be conducted in existing topical literature databases. First, two academic databases will be consulted: Web of Science and Scopus. Second, complementary searches in Google Scholar and Tethys will be done to achieve the review objectives within the required timeline.¹

The search will be conducted using keywords in articles' titles and/or abstracts. The keywords are listed in Annex 1 and based on the criteria for the descriptors as stated in Article 8 of the European Commission Decision on GES 2017/848 document. Boolean operators (e.g., AND) will be used to combine keywords in search queries with OWF to have more focused and productive results.

Additional specialist organisations listed below will be searched to retrieve relevant technical reports containing primary data/case studies/reports on the principal question: the European Environment Agency, the EU Joint Research Centre (JRC).

After the search is completed, all references will be exported into Zotero, a citation manager, and duplicates will be archived.

Eligibility criteria

Once the search has been completed, the studies will be filtered using the predefined set of inclusion/exclusion criteria outlined below to collate a relevant evidence base:

- Studies documenting the presence of OWF
- Studies documenting cumulative impacts
- If possible, studies documenting the status before and after OWF development
- Geographical reference: Baltic Sea, Mediterranean Sea, North Sea, Black Sea, Bay of Biscay, Celtic Sea, Iberian Coast
- Date restriction: 2006 – present
- Language restriction: English

Screening strategy

Following the predefined eligibility criteria stated above, the study selection will follow a three-phased screening process. In the first phase, all titles will be screened, and then all retained abstracts will be screened in the second phase, followed by a full-text screening stage in the third phase. Hence, if the qualifying information is not sufficiently detailed to reject or retain with certainty, the publication (i.e., title or abstract) in question will be retained for assessment at the next eligibility step (i.e., abstract or full text).

¹ Each sub-search on Google Scholar will be limited to the first 100 hits in line with recommendations, since it is less effective at capturing academic literature (Haddaway et al., 2015).



Data collection and analysis

Data/information will be extracted to online Google Sheets from the retained scientific/academic and grey literature, which will be used for the synthesis of SSS. A Google sheet will be created for each of the GES descriptors. To ensure data/information is extracted in a structured manner following a review of the screened literature, the study attribute data/information listed below will be extracted:

- Publication source
- Type of publication (e.g., “Research article” (i.e., journal article), “Thesis (PhD)”, “Technical report” (i.e., any technical documentation in report form), “Other” (e.g., poster, presentation, conference objects))
- Publication details (i.e., title, authors, publication year, DOI)
- Geographical location (i.e., Baltic Sea, Mediterranean Sea, North Sea, Bay of Biscay, Celtic Sea, Iberian Coast)
- Characterisation of the pressure-impact relationship(s) for each Good Environmental Status (‘GES’) descriptor
- Evidence of impact measured or observed (i.e., relating to individual GES descriptors)
 - D1: Changes in studied biodiversity group with regards to wind farm expansion (e.g., Birds, Mammals, Fish (Indigenous sp. only for D1), Cephalopods)
 - D2: Changed composition of native marine communities, displacement of native species due to the introduction of non-indigenous species by wind farm expansion
 - D3: Studied commercial fish and/or shellfish and altered conditions concerning wind farm expansion
 - D4: Food webs (e.g., describe impacts on linkages between living organisms caused by wind farm expansion)
 - D5: Eutrophication (e.g., describe impacts on chlorophyll a, phytoplankton biomass, primary production, dissolved oxygen and nutrient dynamics)
 - D6: Seabed integrity (e.g., describe impacts such as physical disturbance and loss of habitat due to wind farm expansion)
 - D7: Hydrological conditions (e.g., describe impacts to physical parameters of seawater: temperature, salinity, depth, currents, waves, and turbidity due to wind farm expansion)
 - D8: Contaminants (e.g., describe impacts of contaminants associated with wind farm expansion that degrade the marine environment)
 - D9: Contaminants in seafood (e.g., describe impacts of contaminants in seafood caused by the expansion of wind farms)
 - D10: Marine litter (e.g., describe impacts related to litter such as mortality entanglement)
 - D11: Underwater noise (e.g., describe impacts associated with electricity systems, noise, electromagnetic radiations, and vibrations, among others related to wind farm expansion)



OFFSHORE WIND FARMS IMPACTS

- Method(s) used to measure cumulative impacts (i.e., DPSIR - Drivers, pressures, state, impact, response model, cause-effect pathways, etc.)

The EWG and MEG will discuss any uncertainties during the data extraction, and joint decisions will be made.

STAGE 2: PARTICIPATORY WORKSHOP USING EXTERNAL EXPERTS

A participatory workshop will be held to support this project and the publication of the draft report. The main focus of this workshop is to seek experts' knowledge and insight to corroborate the outputs of the literature review and experiential evidence, including the management of complex cumulative impacts. This will also identify knowledge gaps and possible actions for each of the 11 descriptors. It will complement identified gaps and discuss them around the main phenomena of interest (i.e. cumulative impacts, physical impacts, chemical impacts, impacts on habitats and biodiversity as well as ecological interactions, etc.), considering potential mitigation strategies.

Timeline

The workshop will take place once the draft report is shaped by the end of January 2025. To allow for orderly planning of the workshop and maximise its value, the experts will be asked to identify other experts in thematic areas from mid-December. They will contribute to the recruitment by identifying potential experts and institutions/repositories of scientific expertise on cumulative impact assessments and/or marine biodiversity protection. The post-workshop activities described above will occur in March 2025 to align with the final deliverable deadlines.

Recruitment

Experts for this workshop will be identified by the EWG following Eklipse's methods on expert consultation (cf. [Eklipse methods](#)). Members of EWG will contribute to recruiting external experts by making initial suggestions based on identifying (recurring) leading authors of reviewed literature. Additionally, experts will be selected by consulting with groups identified at this project stage who work on similar but differently timed reports (e.g., the International Council for the Exploration of the Sea, the European Environmental Agency and Ifremer).

The recruitment of experts needs to be representative of thematic expertise (e.g., aligned with gap areas or specific descriptors used in the analysis) and experience in the field. Due to the number of descriptors being greater than five and those featuring different levels of gap areas, a merging of sub-categories covering key gap areas is proposed as an efficient way to work on the request.



OFFSHORE WIND FARMS IMPACTS

Stakeholders (policymakers and NGOs) will be targeted using the Eklipse network. A stakeholder analysis will be performed to help the EWG identify stakeholders across the criteria areas, including companies involved in OWF projects. This list can include the people within the Eklipse EWG list of experts and seek to selectively recruit from the 15 institutions identified initially as holding relevant expertise. The selection is targeted towards OWF stakeholders but of broad focus, given the virtual nature of the workshop. Stakeholder analysis will be performed at this stage to help the EWG identify additional experts across the key areas. Recruitment will also ensure adequate representation across the EU and gender and race.

A shortlist of people will be collated by December 2024, and invitations will be sent in early January 2025 to align with the February workshop date.

Workshop

The participatory workshop will be held in February 2025 and will gather 30-40 participants who will have received the draft report and a briefing paper in advance. Key presentations will help shape an interactive session. A professional facilitator will help drive the session. A chairperson will facilitate the workshop (within the MEG or the EWG) supported by thematic facilitators and note-takers for each of the thematic areas identified.

The suggested format would involve:

- A summary of the report and results
- Thematic area discussions to identify and discuss knowledge gaps and key results
- Plenary to share results and identify next steps.

The format will be a virtual webinar with contributions from the EWG, requester, and other key policy audiences to help shape the action plan for the draft report. Participants will not be remunerated in order to avoid motivations for participating that may be financially driven. Participants will be given the opportunity to be named in the final report as contributing to the request. This will be optional to allow for voluntary anonymity to be maintained. The workshop will take place online using the Zoom software. Recording will be proposed to enable note-taking and summarising as well as capturing the focus group discussions, and consent will be asked beforehand as part of the recruitment phase. With the support of a Research Assistant (RA), the MEG and the EWG members will provide the guidelines for gathering consent, including online shared consent forms and conflict of interest forms, as an integral part of the recruitment process. Those will cover confidentiality and describe the core requirements for participation (i.e., minimum time commitment and focus of the elicitation workshops, as well as a brief description of the focus group's aims and participation structure).



OFFSHORE WIND FARMS IMPACTS

3-4 participants in each thematic area are required, and ideally, their combined expertise should cover all the identified areas and most of the 'combined' indicators used for the SSS and SR. Individuals will be targeted globally, given the virtual nature of the workshop. The workshop will also enable cross-group exchange through a second stage, during which all invited experts will have the time to listen to the other groups and interact with other experts. Break-out rooms will enable to structure the focus groups, and adequate support from an expert group will be provided for monitoring purposes.

Temporary use of Google Docs online storage space with secured sharing to the EWG and MEG members will be used to work with the collated data. Data from the project is collated and safeguarded by EWG processes for data collection and storage. The EWG and the MEG will have access to identifiable information if they attend the workshop. A subgroup of the main EWG will be tasked with the analysis of the data, and the RA will devote time to this activity under guidance from the MEG.

The summary of notes from the workshops will be shared for initial review by participants. A report of each thematic group and plenary discussion will be prepared and circulated after the workshop for further comments and reflection. This enables any errors to be identified in accordance with good ethical practice. It also allows further elicitation after the workshop, which can help gather additional information. These preliminary reports will help to draft the final report, which will be finalised with copies sent to all participants for cross-checking and any final reflections. Drescher and Edwards (2018) provide further detail on improvements in transparency and reporting in relation to expert knowledge in the context of expert consultation, which is included in the methodology on ethical considerations (for more details, see next section).

LIMITATIONS

Limitations of the results and synthesis produced will be analysed and discussed in the final report.

ETHICAL CONSIDERATIONS FOR METHODS PROTOCOL

1. Provide details of participant population and the number of participants required (Include brief characteristics as well as principal inclusion and exclusion criteria)

Four participants for the participatory workshop in each thematic gap area are required, and ideally, their expertise should cover all the identified gap areas and most of the 'combined' indicators used for the SSS and SR. Individuals will be targeted globally, given the virtual nature of the workshop. Individuals will be asked for conflicts of interest using



Eclipse's approach to mapping and gathering consent, including their involvement in active projects that may be impacted by the outcomes of the report.

2. Describe how and from where participants will be recruited.

See the recruitment section above for details.

·**Identifying invited experts:** Chosen experts would be academics/policy makers/multi-national consultants/teams of experts with deep knowledge or experience on the given topic.

·**Stakeholder analysis:** will be performed as a first stage to help the EWG identify experts across the criteria areas. This list can include the people within the Eclipse EWG list of experts and seek to selectively recruit from the 15 institutions identified initially as holding relevant expertise.

3. Describe where the research activities will occur (for example, online, data collection tools being used, etc.)

The workshop will take place online and will be delivered using Zoom software. Recording will be proposed to enable note-taking and summarising as well as capturing the focus group discussions. Consent will be asked beforehand as part of the recruitment phase. As such, we will have written consent for recording, but crucially, participants will have the choice to remain anonymous in any reporting of their contributions.

4. Describe any incentive participants may receive for participation.

Participants will not be remunerated for their time to avoid motivations for participating that may be financially driven. Participants will be given the opportunity to be named in the final report as contributors to the request, which will be optional to allow for voluntary anonymity to be maintained.

5. How will consent be obtained from or on behalf of participants? When, where and how?

The Eclipse Methods Expert Group (MEG) and the Expert Working Work (EWG) EWG, with the support of the Research Assistant (RA), will provide the guidelines for gathering consent, including online shared consent forms and conflict of interest forms as an integral part of the recruitment process. Those will cover confidentiality and describe the core requirements for participation (i.e., minimum time commitment and focus of the elicitation workshops, as well as a brief description of the focus group's aims and participation structure).

6. How will consent be recorded?



OFFSHORE WIND FARMS IMPACTS

Consent forms will be provided at the recruitment stage and collated by the MEG. Consent for recording on the day will be verbally agreed upon to keep the data internally shared only/for data-capturing purposes.

7. Describe any ethical issues and how these will be mitigated.

External consultants, stakeholders, and other participants may face conflicts of interest due to previous or recent project collaboration or the inability to share unpublished work. EWG members will be asked to declare possible connections to these organisations/individuals (e.g., financial, shareholding, personal relationships, etc.) when suggesting them to the focus groups. Initially, collected declarations can be reviewed by the MEG. Similarly, academics may not be willing to disclose unpublished findings or ongoing research. Hence, individuals will be asked for conflicts of interest using Eclipse's approach to mapping and gathering consent, including their involvement in active projects that may be impacted by the outcomes of the report. The conflict of interest forms will help the recruiting phase for the participatory workshop.

8. How will the results from this study (including feedback to participants) be disseminated?

The summary of notes from the workshops will be shared for initial review by participants. The focus group and workshop input will be integrated into the report and circulated to participants.

9. Describe how the anonymity of participants and the confidentiality of data will be protected and the specific methods to be used for this, both through the research and in the dissemination of findings.

Consent forms will include questions on anonymity and information on the nature of the request. For instance, the publication of findings will be explained in the form to give experts the option to be or not be identified. Code-naming will be used (e.g., reviewer X1) to guarantee anonymity.

10. Who will have access to identifiable information? Describe any potential use of the identifiable data by others.

The EWG and the MEG will have access to identifiable information if they attend the workshop. A sub-group of the EWG will be tasked with the analysis of the data, and the RA will devote key time to this activity under mentorship by the MEG.

11. Are there any conditions under which privacy or confidentiality cannot be guaranteed, or if confidentiality is not an issue in this research, explain why.



OFFSHORE WIND FARMS IMPACTS

See above for consent and anonymity. This research does not focus on private data or confidential information.

12. Describe the methods of data analysis, how data will be stored and how long data will be stored for

Data from the project is collated and safeguarded by EWG processes for data collection and storage. Temporary use of Google Docs online storage space with secured sharing to the EWG and MEG members will be used to work with the collated data. The data generated from the workshop will include recordings from Zoom and notetaking data.

13. Conflict of interest - Does the EWG or any other investigator/collaborator have any direct personal involvement (e.g. financial, share-holding, personal relationship, etc.) with the organisations/individuals involved that may give rise to a potential conflict of interest?

The EWG members will be asked again to declare such possible connections before suggesting experts for the focus groups. Initial declarations have been collected and can be reviewed by the MEG for any changes. The conflict of interest forms will also be used for recruitment to the participatory workshop.

14. Participant information sheet and participant consent form.

Due to the short-term nature of this request, these have not yet been finalised. These will be provided in a timely manner for review based on Eclipse's design of forms for experts and previous enquiries.

TIMELINE

The following key activities with milestones and proposed duration are described in Table 2.

Table 2. Overview of the methods, indicating the different tasks, milestones, and timelines.

	Description	Duration/ T
Task 1	Method protocol	2.5 months
Milestone 1	Method protocol final version	06.9.2024
	Method protocol peer-review finished (3 weeks allocated)	23.09.2024
	Reply comments peer review	15.10.2024
Task 2	Scoping review	4.5 months (16.9.2024-15.2.2025)
Milestone 2	Preliminary results for the requester	Mid-November 2024
Task 3	Scoping review	
Milestone 3	Database with quantitative and/or qualitative results	February 2025
Task 4	Workshop	February 2025
Milestone 4	Analysis of workshop results	End February 2024
Task 5	Report writing	1 month
Milestone 5.1	Draft report ready for peer review	March 2025
Milestone 5.2	Report finished	April 2025

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ANNEXE 1: KEYWORDS FOR SR BASED ON DESCRIPTORS OF GES AS STATED IN ARTICLE 8 OF THE EUROPEAN COMMISSION DECISION ON GES 2017/848 DOCUMENT (LINKED HERE)

Descriptors/Primary Criteria	Keywords
D1 - Marine biodiversity	wading bird species, grazing bird species, surface-feeding bird species, pelagic-feeding bird species, benthic-feeding bird species, abundance, seals, bats, cetaceans (small-toothed, deep-diving), Baleen whales, marine turtle (loggerhead, green, leatherback, Kemp's ridley and hawksbill), shelf (pelagic, demersal) fish species, coastal fish species, deep-sea fish species, phytoplankton, zooplankton, diatom, dinoflagellate, copepods, crustacean
D2 - Non-indigenous species	Invasive species, alien species, non-native species abundance, distribution
D3 - Commercial fish and shellfish	fisheries, stocks, coastal fish, pelagic shelf fish, demersal shelf fish, deep-sea fish, and shellfish. mortality
D4 - Food web	phytoplankton (e.g., diatoms, dinoflagellates), mesozooplankton (e.g., copepods, cladocerans), benthic filter-feeding invertebrates (e.g., mussel, scallops, brittle stars); benthic feeding invertebrates (e.g., nephrops, crabs, shrimps), planktivorous fish and invertebrates (e.g., anchovy, herring, horse mackerel, jellyfish), sub-apex pelagic predators (e.g., mackerel, saithe, tunids, Loligo_), sub-apex demersal predators (e.g., sole, hake, haddock, octopus), apex marine mammal predators (e.g., killer whale), apex fish predators (e.g., large tuna, large cod, large sharks), seabirds, productivity, diversity, abundance
D5 - Eutrophication	nutrients, dissolved inorganic nitrogen (DIN), dissolved inorganic phosphorus (DIP), total phosphorus (TP), total nitrogen (TN), chlorophyll a, phytoplankton biomass, dissolved oxygen, harmful algal bloom (HAB) (e.g., cyanobacteria, dinoflagellates)
D6 - Seabed integrity	benthic habitat loss, physical loss of seabed, physical disturbance to seabed, sedimentation, abrasion
D7 - Hydrographical conditions	temperature, salinity, depth, currents, waves, turbidity, bathymetry, tides
D8 - Contaminants	Metals (e.g., lead, cadmium, mercury, copper), polyaromatic hydrocarbons (PAHs), perfluorooctane sulfonate (PFOS), hexabromocyclododecane (HBCDD), polybrominated diphenyl ethers (PBDEs), polychlorinated biphenyls (PCBs), dioxins, furans, tributyltin (TNT), Cesium-137, PFAS, Organochlorinated pesticides (lindane, aldrin, dieldrin, HCB, DDTs, heptachlor).



OFFSHORE WIND FARMS IMPACTS

D9 - Contaminants in fish and other seafood	lead, cadmium, mercury, dioxins and, PCBs, and PAHs.
D10 - Marine litter	rubber; cloth/textile; paper/cardboard; processed/worked wood; metal; glass/ceramics; chemicals; food waste, fish gear, single-use plastics, microliter, microplastic particles
D11 - Underwater noise	Impulsive underwater noise, continuous underwater noise, sound
Context keywords	"European waters", "Baltic Sea", "Mediterranean Sea", "North Sea", "Bay of Biscay", "Celtic Sea", "Iberian Coast"