



EMODnet



European Marine
Observation and
Data Network

EMODnet Thematic Lot n°3 – Seabed Habitats

EASME/EMFF/2020/3.1.11/Lot3/SI2.843624

Start date of the project: 25/09/2021 (24 months)

Centralisation Phase

Interim Progress Report

Reporting Period: 25/09/2021 – 24/09/2022



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1. Introduction

[Provide a short (max 2 pages) introduction to set the stage (start date, main goals, background, consortium, key components and characteristics of the lot). Max 2 pages.]

This most recent phase of EMODnet Seabed Habitats began on 25 September 2021 and is led by JNCC (UK). JNCC is joined by nine partners from around Europe: GeoEcoMar (RO), IO-BAS (BG), HCMR (GR), ISPRA (IT), MI (IE), CCMAR (PT), Ifremer (FR), GEUS (DK) and SYKE (FI). A subcontractor, Stockholm University (SE), further bolsters the consortium. This consortium assembles a complimentary set of specialists in benthic ecology, spatial habitat modelling, data collation and management, web delivery, geology, oceanography and marine policy.

The general objective of this phase of EMODnet is to further develop an operational service whereby marine data and data products built with common standards can be found, viewed and downloaded in a way that is free of charge and free of restrictions of use.

The geographical scope of this phase has been expanded to include complete coverage of the Caspian Sea and jurisdictional waters of EU Member States in the Caribbean Sea. The thematic scope has also been expanded to include coastal wetlands and essential fish habitats (EFH), so that the Lot would now be more appropriately be named, simply, ‘Habitats’. Specific requirements related to Lot 3 Seabed Habitats are listed below, with some background and a description of our practical interpretation of the requirements:

- *Data and metadata to be made available:*
 - **benthic surveys**
 - **essential fish habitats** in three regional seas, and
 - **coastal wetlands** classified by type

The collation, standardisation and publication of ground-truthing data and metadata from **benthic surveys** began in the 2019-2021 phase of EMODnet SH. The consortium designed a data schema that was compatible with the Darwin Core Archive format that was used for species observation by EMODnet Biology, with the long-term goal of integrated the databases. We deem this to be necessary considering that a point observation of a habitat is likely to be coupled with observations of species from that same record.

Essential fish habitats (EFH) was a new sub-theme introduced in this phase. The three priority regions we selected are the Mediterranean, Baltic and Northeast Atlantic because in these regions EFH data have a history of use by decision-makers. Because it was a new sub-theme, the first requirement was to develop standard vocabularies, data schemas and protocols.

With the role of **coastal wetlands** in reducing flood damage and storing carbon we welcomed the introduction of this new sub-theme. It should be noted that the term ‘coastal wetland’ is not in fact distinct from ‘seabed habitat’ because ‘wetlands’, particularly in the context of the Ramsar Convention, also includes categories related to shallow marine waters. ‘Coastal’, on the other hand, is distinct from ‘seabed’ – the geographical scope of ‘seabed’ is typically from the high-water mark downwards, encompassing everything from the intertidal (AKA littoral) to the abyssal zone. ‘Coastal’ tends to refer to the areas adjacent to the sea, starting from the high-water mark. Consequently, we interpret the term ‘coastal wetland’ to include both coastal habitats and coastal physiographic features such as estuaries and lagoons. As a result of the lack of a clear distinction between the meaning of seabed habitats vs coastal wetlands, we decided to adopt the same protocols and data schemas as used for seabed habitat data and maps for coastal wetlands.

The *Data and metadata* requirements are being fulfilled within WP2 Data Collation and involves all partners.

- *Data products to be made available:*
 - **a base layer of modelled habitats** at a scale of 1:100,000 or better for all sea basins using common EUNIS classification, taking into account the latest revisions
 - **access to the data products** (energy, opacity, etc.) **used to construct these modelled habitats**
 - **a library of digital habitat maps** from national and regional collections as well as from completed EU projects. Where feasible, **collections shall be combined and harmonised into single layers**

The **base layer of modelled habitats** is what we called the EMODnet broadscale seabed habitat map for Europe, or EUSeaMap. This activity began in the first phase of EMODnet and the map has grown and improved in every phase. The biggest task in this phase is to expand EUSeaMap to include the new geographic regions: the Caspian Sea and territories of the Caribbean Sea. The biggest challenges here include identifying the best sources of data and data products to use as inputs to these models, producing new models of the environmental variables, understanding the ecology of the regions, and devising a new classification system that is compatible with EUNIS and the EUSeaMap method. This requirement is being fulfilled in WP1 EUSeaMap.

Access to the data products used to construct the model (and, in fact, access to all data and products produced in the project) is fulfilled through the activities of WP4 Portal. But the production and gathering of input data products is covered in WP1 EUSeaMap.

The **library of digital habitat maps** has been an ongoing activity since phase 2 of EMODnet. It began with maps classified to the EUNIS classification system. In the following phase we began accepting Habitats Directive Annex I maps. Subsequently we began to accept regional classification systems such as HELCOM Underwater Biotopes (Baltic). In this new phase, we will also include maps of EFH and coastal wetlands as part of this activity, which will be fulfilled in WP2 Data Collation.

The requirement for **collections to be combined and harmonised into single layers** has featured since phase 3 of EMODnet. This is being fulfilled in WP3 Composite Data Products, which is the term we use to refer to these types of products. The specific data products we produce are driven by the requirements of stakeholders such as regional sea conventions and EU Member States fulfilling MSFD reporting requirements, which are gathered as part of WP5 Communication and Outreach.

- *For the first six months of the project, a **thematic portal***

The thematic portal, www.emodnet-seabedhabitats.eu, was operational from day 1 of this phase, continuing from the previous phase. Now at the end of year 1 it continues to operate and will do until we are asked to close it down. This work is part of WP4 Portal.

- *Information for central portal*
 - **Metadata, data and data products through web services**
 - *Content for space on central portal including summaries of meetings, quarterly progress reports, uses cases, list of partners*

The publication of **metadata, data and data products via web services** has been a core component of EMODnet SH since phase 1. The difference in this phase is that from some point in year 2, we will no longer be required to directly maintain and update the functionality and content of the theme-specific map viewer. Once the transition to the central portal map viewer is complete, we will no longer be responsible for the controlling the functionality but envisage that we will continue to maintain some responsibility over how the seabed habitat layers are presented, and which functionality improvements are prioritised.

2. Update on the Tasks

[List progress for each of the tasks specified in Section 1.4.1 of the Tender Specifications since the start of the project phase; provide an explanation for any tasks in which progress has not been noted. Provide in the table the complete list of all Milestones and Deliverables from the technical workplan in numerical order, the date due, status and date delivered. Max 2 pages]

Task 1: Maintain and improve a common method of access to data held in repositories

- Data submission protocols and guidance developed and updated for WP2, including:
 - tutorial videos for every step in the process, an instructional webinar for partners and an internal guidance document providing more detail than the public online guidance, including within-project deadlines, roles and responsibilities (D2.04).
 - a new data collation tracker, which allows us to track data acquisition status, data preparation status and data upload status. The data acquisition status can also be summarised efficiently to report against indicator 3.
- For the new sub-theme of Essential Fish Habitats (EFH) we developed and published:
 - a new data exchange format for EFH maps, based on the one for seabed habitat maps but customised for EFH maps (D2.11)
 - a confidence assessment method for EFH maps, based on the MESH confidence assessment for seabed habitat maps but customised for EFH maps (D2.11)
 - a guidance document for EFH maps, which includes a simple classification scheme for types of EFH (D2.11).
- For the new sub-theme of coastal wetlands, we:
 - developed and published an updated data exchange format for seabed habitats that can accept coastal wetland maps and is generally more flexible about which classification systems are accepted (D2.03, D2.08).
 - produced an internal guidance document that clarifies what is within the scope of ‘coastal wetlands’ for the purposes of this contract, including which classification schemes (D2.08).
 - submitted the global Ramsar Classification System for Wetland Type to the NERC Vocabulary Server (D2.09).
 - produced the first known translation table between the Ramsar Classification System for Wetland Type and Annex I of the Habitats Directive (D2.07).
- We requested that VLIZ set up all ESH partners with accounts on the ‘Integrated Publishing Toolkit’ for EurOBIS data providers (D4.08).

Task 2: Construct products from one or more data sources that provide users with information about the distribution and quality of parameters in time and space

- For the next update to EUSeaMap (WP1), year 1 has focused on preparing the base layers and defining the habitat classification schemes for the two new areas:
 - For the Caspian Sea, we prepared environmental data layers from existing data archives on KdPAR (light attenuation in the water column), wave wavelength, seabed temperature and salinity (D1.07), and progress was made in the definition of broad seabed habitat types (D1.05).
 - For the Caribbean Sea, we prepared environmental data layers from existing data archives on KdPAR (light attenuation in the water column) and, along French islands, wave wavelength

- and wave-induced kinetic energy at the seabed (D1.08). The broad seabed habitat types have been defined based on existing EUNIS-like classifications (D1.06).
- In the Baltic Sea, we have created a point dataset describing for each year the probability of a certain seabed location being below the deep halocline (D1.09).
 - We have produced Python scripts that will allow users to prepare raster data products on the hydrodynamic conditions at the seabed, using hydrodynamic models from CMEMS and the digital elevation model from EMODnet Bathymetry as the inputs, for an area and time period of interest (D1.14).
 - For composite data products (WP3), we have:
 - Produced a new product for OSPAR, which covers the northeast Atlantic and includes individual habitat maps from surveys where they exist, and EUSeaMap elsewhere, is currently being used by OSPAR to assess the extent of physical damage to the seabed as part of its 2023 Quality Status Report.
 - Produced an update to the Biogenic substrate in Europe composite data product, which was originally published at the end of Phase 3. This update did not change the extent of the original product but provided more information about the provenance of each polygon.
 - Created a log to track issues and potential improvements to existing composite data products.
 - Drafted a summary of the composite data products that we plan to produce, and/or have the capacity to produce, which we intend to share with RSCs and other stakeholders (D3.01). The intention is to gather their feedback about requirements (WP5).

Task 3: Develop procedures for machine-to-machine connections to data and data products

- Using machine-to-machine connections, the EMODnet Central Portal is able to harvest and display all the layers provided by the EMODnet Seabed Habitats web service (D4.10).
- Where standardisation is not required, such as for externally created composite data products, we use machine-to-machine connections (when available) to harvest layers directly from the source, such as the HELCOM Marine and Data Service (D4.16).

Task 4: Contribute data, data products and content to a central portal that allows users to find, view and download data and data products

- We carry out a bulk upload of seabed habitat data and products on the EMODnet portal in April in September each year (D4.13). In September, for the first time, this has included maps of EFH (20 classified maps and four models) and new models of nine environmental variables for the Caspian Sea. Additionally we have added 26 new and 2 updated individual habitat maps from surveys and 3,580 survey sample points.
- As a portal with a significantly large number of products on offer, both through its catalogue but also through its current thematic web mapper, we worked with the central portal team to produce a list of layers to prioritise for transfer to the central portal, highlighting 81 urgent/key datasets which MUST be transferred to the central portal before decommissioning of the thematic site, and 258 remaining layers which could be added in a future migration phase. In addition to this, we have worked to successfully provide merged options for some of its layers that appear in the current interactive map, again working with the Central team to identify merging opportunities and suitable technical solutions. This reduced the 81 top priority layers to 50.

Task 5: Contribute content to dedicated spaces in the Central Portal

- We have worked in close collaboration with the EMODnet Secretariat to ensure that the static content of the Seabed Habitats portal is appropriately incorporated into the central portal. This has involved meetings as well as interactions via the JIRA system.

Task 6: Ensure the involvement of regional sea conventions (RSC)

- Many members of our consortium have active, ongoing relationships with regional sea conventions and continue to take part of various working groups and expert groups.
- We devised a structured approach to RSC outreach, which is in progress. The outcomes of this will be summarised in a public report and will influence the development of Composite data products and EUSeaMap.
- We presented EUSeaMap at the Scientific Conference On Climate Change in the Caspian Sea Region which was organised by CASPCOM and the Tehran Convention, hosted by UN Environment Programme.
- We provided the OSPAR ICG-COBAM with a vital data product for their assessment of the extent of physical damage to the seabed. We remain in constant communication with them to answer any questions and provide advice on how to use the data product.
- Through discussion with OSPAR, we embedded EMODnet Seabed Habitats into the 2022 data call for data on threatened and/or declining habitats in the northeast Atlantic by expliciting offering our services to gather and format data for compilation in the database. Furthermore, we encouraged the use of an existing EMODnet product (Macroalgal canopy cover) to form the baseline dataset for a new habitat that has been added to the threatened and/or declining list: Kelp Forests.

Task 7: Contribute to the implementation of EU legislation and broader initiatives for open data

- Four project members are represented the European Marine Board Working Group on Marine Habitat Mapping, which will produce a Future Science Brief in 2023, outlining recommendations on the future of habitat mapping in Europe.
- We have participated actively in the MSFD Technical Group on Seabed Integrity (TG Seabed).
- On request from the OSPAR Intersessional Correspondence Group dealing with marine assessments, we have produced a translated version of the combined EUNIS habitat map for the northeast Atlantic that shows MSFD Benthic Broad Habitats. This was requested for use by Member States in their upcoming MSFD assessments.
- In May, we sent a formal letter to the four most relevant ICES Working Groups (Marine Habitat Mapping, Deep-water Ecology, Benthos Ecology and Biodiversity Science) to promote our products and services, and to show willingness to engage with them and their requirements. They all acknowledged receipt and committed to review (D5.03).

Task 8: Monitor quality/performance and deal with user feedback

- For monitoring and reporting web performance, we have been proactive in providing suggestions regarding reporting regions, categories and units for summarising seabed habitat data in a streamlined, logical and useful way. Once the new reporting templates and categories were finalised we developed a new protocol to allow a more automated, repeatable approach to summarising this information for the reports.

Task 9: Maintain the existing thematic web portal for a maximum of 6 months from the start of the project

- We have continued to maintain the existing thematic web portal for even longer than 6 months and will continue to do so until requested to close it down.

Status of the Milestones and Deliverables listed in the workplan					
Milestone/Deliverable in numerical order	W P	Date due	Status (To do/ Delivered/ Delayed)	Date delivered	If Delayed: reason for delay and expected delivery date
D1.01: Modified substrate data product including biogenic substrate and data not possible to include in EMODnet Geology product, but which would improve the broad-scale seabed habitat map for Europe (EUSeaMap) [dependent on new product from Geology]	1	25/05/2023	To do		
D1.02: Confidence layer for modified substrate data product published	1	25/05/2023	To do		
D1.03: A ready-to-use DTM for EUSeaMap	1	25/05/2023	To do		
D1.04: Confidence layer for the DTM product published	1	25/05/2023	To do		
					A first workshop between GeoEcoMar and Ifremer was organised in Constanta in May 2022. Good progress was made, but more work was required. A second workshop will be held in early November 2022 in Bucharest with the objective of finalising the definition of the broad habitat types by the end of the workshop. We do not envisage any onward delays as we have made enough progress to allow us to make decisions about the data requirements, and the final classification of the map will be at the end of the project. Expected due date: 2022 Q4.
D1.05: EUNIS-style habitat classification in the Caspian Sea for broad-scale habitat mapping	1	25/09/2022	Delayed		
D1.06: EUNIS-style habitat classification in the Caribbean Sea for broad-scale habitat mapping	1	25/12/2022	To do		
D1.07: Environmental layers for the Caspian Sea ready for EUSeaMap	1	25/12/2022	To do		
D1.08: Environmental layers for the Caribbean Sea ready for EUSeaMap	1	25/12/2022	To do		
D1.09: Halocline layer for the Baltic Sea ready for EUSeaMap	1	25/05/2022	Delivered	25/08/2022	Delivered

D1.10: Thresholds for Caspian, Caribbean, Baltic, and Mediterranean Seas	1	25/05/2023	To do	
D1.11: Broad-scale seabed habitat map for Europe, Caribbean Sea, and Caspian, in EUNIS 2019 and MSFD broad habitat classifications, including a column that describes the habitat descriptor classes	1	25/09/2023	To do	
D1.12: Confidence assessment for updated broad-scale seabed habitat map in all considered classifications	1	25/09/2023	To do	
D1.13: Confidence associated to all environmental layers published	1	25/09/2023	To do	
D1.14: A R script automating the calculation of environmental layers at the seabed from a CMEMS product archives	1	25/09/2022	Delivered	24/10/2022
D1.15: Technical report published	1	25/09/2023	To do	
D1.16: Well-documented R code and ArcGIS models used to construct the broad-scale seabed habitat map	1	25/09/2023	To do	
D1.17: For Swedish waters, a modelled habitat map based on Geology's novel type of seabed substrate map for habitat modelling [dependent on applicability if this new type of map to habitat modelling]	1	25/12/2022	Cancelled	NA Cancellation of this deliverable accepted by CINEA and DG MARE on 14 September 2022.
D2.01: An expanded library of maps of communities, biocenoses, biotopes and habitats for all of Europe, Caribbean Sea and Caspian Sea ingested and converted to a standard format, with metadata for every map	2	25/2/22- 25/8/23	To do	
D2.02: An expanded collation of point records of communities, biocenoses, biotopes and habitats for all of Europe, Caribbean Sea and Caspian Sea ingested and converted to a standard format, with metadata for every dataset	2	25/2/22- 25/8/23	To do	

D2.03: Updated and integrated templates for habitat map data exchange formats	2	25/11/2021	Delivered	30/06/2022	Delivered
D2.04: Webinars, tutorials or other forms of training material on the EMODnet Seabed Habitats data submission process	2	25/12/2021	Delivered	31/03/2022	Delivered
D2.05: An expanded library of modelled maps of specific habitats for all of Europe ingested and converted to a standard format, with metadata for every dataset	2	25/2/22-25/8/23	To do		
D2.06: Evidence of use of the EMODnet Ingestion and safe-keeping of marine data facility for ingesting data points, maps and models from third parties	2	25/09/2023	To do		
D2.07: Translation tables for coastal wetland types into one or more standard classifications	2	25/01/2022	Delivered	30/09/2022	Delivered
D2.08: A data submission process and protocol for coastal wetlands types maps and points	2	25/01/2022	Delivered	30/06/2022	Delivered
D2.09: Controlled vocabulary lists for classification systems published on NERC Vocabulary Server, as required	2	25/12/21-25/08/23	To do		
D2.10: A library of maps of Essential Fish habitats maps for major fish species in the Mediterranean, North East Atlantic and Baltic Sea ingested and converted to a standard format, with metadata for every map	2	25/2/22-25/8/23	To do		
D2.11: A data submission process and protocol for Essential Fish Habitats maps	2	25/01/2022	Delivered	30/06/2022	Delivered
D2.12: Formal protocol for data sharing and identification of relevant benthic data between EMODnet Biology and EMODnet Seabed Habitats	2	25/09/2022	Delivered	03/10/2022	Delivered
D2.13: Updated data model and guidance for benthic point data	2	25/09/2023	To do		
D2.14: A standard transformation between OSPAR T&D data schema and OBIS Schema to enable import into	2	25/09/2022	Delayed		2022 OSPAR T&D database won't be published until 2023 Q2. In addition, there are plans to overhaul the schema of the OSPAR T&D database to better

<p>OBIS, including a test pilot run using the 2022 OSPAR T&D database</p>				<p>align it with other schemas, which is not due to be completed before the end of this project. Therefore it may not be possible or, at least, sensible, to complete this internal deliverable. If not, then it would also impact D2.15. However, these two deliverables were additional 'bonus' activities proposed by the consortium and are therefore not considered to be essential for the delivery of the tasks dictated by the technical specification.</p>
<p>D2.15: Agree a protocol with the OSPAR commission for the continued archiving of the public database within the OBIS network, pending success of D2.14</p>	2	25/09/2023	To do	
<p>D2.16: List of point datasets, maps and models available via machine-to-machine connections</p>	2	25/11/21-25/8/23	To do	
<p>D2.17: Progress log for the ingestion of point data, maps and models</p>	2	25/10/21-25/09/23	Delivered	31/10/2022 Delivered
<p>D3.01: A list of products to be created or updated and product specifications</p>	3	25/03/2022	Delayed	<p>Most of the data products to be created or updated were defined in the project proposal; however, we also explained that we could produce additional products if required by stakeholders such as Regional Sea Comissions. The review of stakeholder requirements is ongoing (part of WP5) and so the final list that includes additional products has not yet been finalised. The work to produce such products was always going to take place in year 2, so this should not cause any onward delays. Expected due date: 2023 Q4.</p>
<p>D3.02: A combined, harmonized data product showing the best evidence for extent and distribution of the Essential Ocean Variable "Live hard coral cover" in Europe, with metadata (updated)</p>	3	25/08/2023	To do	

D3.03: A combined, harmonized data product showing the best evidence for extent and distribution of the Essential Ocean Variable "Seagrass cover" in Europe, with metadata (updated)	3	25/08/2023	To do
D3.04: A combined, harmonized data product showing the best evidence for extent and distribution of the Essential Ocean Variable "Macroalgal canopy coral cover" in Europe, with metadata (updated)	3	25/08/2023	To do
D3.05: A combined, harmonized data product showing the best evidence for the extent of wetland type in Europe, Caspian Sea and the Caribbean, with metadata (new)	3	25/04/2023	To do
D3.06: Data contributed to a harmonized data product showing the best evidence for extent and distribution of the Essential Ocean Variable "Mangrove cover and composition", with metadata (new, if required)	3	25/08/2023	To do
D3.07: Evaluation of EFH approaches to determine map suitability to combine into products useful for fisheries management and biodiversity conservation	3	25/05/2023	To do
D3.08: Combined, harmonized data products showing the best evidence for extent and distribution of habitats defined in other classifications in all regions, with metadata, depending on stakeholder needs (new)	3	25/08/2023	To do
D3.09: An updated combined, harmonized data product showing the best evidence for the extent of biogenic substrate in all regions, with metadata (updated)	3	25/01/2023	To do
D3.10: Report detailing the construction of the biogenic habitat data product (updated)	3	25/05/2023	To do

D3.11: Report(s) detailing the construction of the data products defined by stakeholder needs (new)	3	25/09/2023	To do		
D3.12: Report detailing the construction of the Essential Ocean Variable data products (updated)	3	25/09/2023	To do		
D4.01: A web portal including a digital map, facilities for downloading data, metadata search and technical information	4	25/09/2021	Delivered	25/09/2021	Delivered
D4.02: Contribute to EMODnet Technical Working Group as necessary	4		As necessary		To do
D4.03: Minutes & actions from Technical Working Group within 1 month of meeting	4		Within 1 month of each meeting		To do
D4.04: Ad hoc changes to website and visual identity, as requested by Secretariat	4	25/10/21-25/03/22	Delivered	30/09/2022	Delivered
D4.05: A set of data schema standards for the provision of habitat data, built upon international standard.	4	25/09/2021	Delivered	25/09/2021	Delivered
D4.06: Method for indirect cascading of problematic external services prior to onward publication	4	25/12/2022	To do		
D4.07: Habitat ground-truthing data from EurOBIS extracted via web services	4	25/12/2021	Delayed		As explained in the previous quarter; progress is pending some changes to the EurOBIS toolsets, but we are on track for the revised delivery date of 2023 Q3.
D4.08: IPT (or alternative) infrastructure for the publication of habitat data into EurOBIS	4	25/08/2023	Delivered	30/09/2022	
D4.09: Internal database of unpublishable habitat data for use in WP1 and to aid public discoverability	4	25/09/2021	Delivered	25/09/2021	Delivered
D4.10: A GeoServer web-server for the provision of OGC spatial web-services (WMS, WFS, WCS)	4	25/09/2021	Delivered	25/09/2021	Delivered
D4.11: A plan of action for the provision of key habitat datasets as attributed raster data	4	25/08/2022	Delivered	26/09/2022	Delivered

D4.12: A GeoNetwork INSPIRE-compliant metadata instance with OGC CSW capabilities	4	25/09/2021	Delivered	25/09/2021	Delivered
D4.13: Publication to the central portal of relevant data and products collected and created under WP1 and WP2	4	25/03/22	with updates at least every 6 months	To do	
D4.14: Website liaison and training node between lot partners/content creators and central portal team.	4	25/09/2021	Delivered	25/09/2021	Delivered
D4.15: Transfer of key habitat mapping resources from the thematic portal to the central portal	4	25/09/2022	Delivered	25/09/2022	Delivered
D4.16: Direct link to the HELCOM Mapping and Data Service, and similar services from other Regional Sea Conventions where feasible	4	25/03/2022	Delivered	30/06/2022	Delivered
D4.17: A direct data link to the ICES VME database, providing access to vulnerable marine ecosystem data	4	25/03/2022	Delivered	31/03/2022	Delivered
D4.18: Tracked issues and suggestions regarding the portal and services, and improvements made as a result.	4	25/09/2021	Delivered	25/09/2021	Delivered
D4.19: Abstracts submitted for annual INSPIRE conference and participation in community forum where relevant.	4		depends on conference dates	To do	
D4.20: Publication of relevant products, datasets and services through EOSC and EUODP	4	25/12/2022	To do		
D4.21: Live operation of help desk 9-5, Mon-Fri	4	25/10/2021	Delivered	25/09/2021	Delivered
D4.23: Provision of Matomo (or similar as steered by secretariat) web analytics information to secretariat for reporting	4	25/09/2021	Delivered	25/09/2021	Delivered
D4.24: Statistics from OGC webservice usage - to be guided by secretariat.	4	25/12/2021	Delivered	31/09/2021	Delivered
D5.01: Evidence of efforts to ensure maximum coherence with data delivery to and from regional sea conventions	5	25/09/2023	To do		

D5.02: Updated review of RSC needs	5	25/01/2022	Delayed	Limited feedback to date from RSCs following outreach from ESH consortium representatives. More work needed to produce a new report that contains enough new information to build on the existing report on RSC needs. This has contributed to the delay in D3.01 but should not delay any onward work. Expected due date: 2022 Q4.	
D5.03: Liaise with ICES in advance of annual WG meetings to ascertain products they require for reporting on ToRs	5	25/05/2022, 25/05/2023	Delivered	31/08/ 2022	Delivered
D5.04: Tutorials for creating new maps from existing data	5	25/03/2023	To do		
D5.05: Promotion of simple procedural guidelines for creating alternative data formats from existing data formats	5	25/03/2023	To do		
D5.06: Tutorial on how to format habitat maps using templates and to simplify the data submission process.	5	25/03/2023	To do		
D5.07: Evidence of engagement with relevant working groups and expert groups to gather feedback and needs of habitat data requirements and products that will help Member States to fulfil reporting obligations	5	25/01/22- 25/09/23	Delivered	30/09/ 2022	Delivered
D5.08: Minutes of meeting(s) with EMODnet biology	5	25/03/2022	Delivered	31/03/ 2022	Delivered
D5.09: Communications plan	5	25/01/2022	Delivered	31/03/ 2022	Delivered
D5.10: New use cases on the EMODnet central portal	5	25/10/21- 25/09/23	To do		
D5.11: A prominent summary of the data and data products available from EMODnet seabed Habitats web services	5	25/09/2022	Delayed	Whilst we have already published a summary of our data products, the plan from our proposal was to expand on this to better highlight some of our products. With the portal centralisation we decided to put this on hold in case a more coordinated approach was developed that would highlight prominent data and products across all lots. Expected due date: 2023 Q3.	

D5.12: Co-ordinated and sustained online presence: news stories, blogs, tweets, etc.	5	25/10/21-25/09/23	To do		
D5.13: Presentations and posters at conferences and cross-cutting meetings	5	25/10/21-25/09/23	To do		
D5.14: ESRI story maps / Infographics	5	25/03/2022	Delivered	31/12/2021	Delivered
D5.15: Record of all promotion and outreach activities	5	25/10/21-25/09/23	To do		
D6.01: Project management plan and project initiation document	6	25/10/2021	Delivered	30/11/2021	Delivered
D6.02: Project quality management plan and project audit document	6	25/10/2021	Delivered	30/06/2022	Delivered
D6.03: Consortium Agreement	6	25/10/2021	Delivered	31/03/2022	Delivered
D6.04: Participation in EMODnet SC meetings as necessary	6	As necessary	To do		
D6.05: Minutes & actions from Steering Committee meetings within 1 month of meeting	6	Within 1 month of each meeting	To do		
D6.06: Progress meeting 1 - WP leads	6	25/03/2022	Delivered	31/03/2022	Delivered
D6.07: Minutes & actions from progress meeting 1	6	Within 1 month of meeting	Delivered	31/03/2022	Delivered
D6.08: Progress meeting 2 - whole consortium	6	25/03/2023	To do		
D6.09: Minutes & actions from progress meeting 2	6	Within 1 month of meeting	To do		
D6.10: Quarterly progress report to EASME, DG-MARE and EMODnet Secretariat	6	15 Jan, 15 Apr, 15 Jul & 15 Oct each year	To do		
D6.11: Interim report	6	25/09/2022	Delivered		Delivered
D6.12: Submission of the invoice for the interim payment	6	25/09/2022	Delivered		Delivered
D6.13: Final report	6	25/09/2023	To do		
D6.14: Submission of the invoice for the final payment	6	25/09/2023	To do		

3. Work Package updates

[Using the Work Package as a header, list the activities that occurred since the start of the project phase. When describing each Work Package, please also refer to the corresponding Tender task(s) (specified in the relevant Tender Specifications). Max 2 pages per work package.]

WP1 – Improving and expanding the base layer of modelled habitats (EUSeaMap)

Corresponding Tender task(s)	Corresponding Tender requirement(s)
2 – Construct products from one or more data sources that provide users with information about the distribution and quality of parameters in time and space	Data products to be made available: <ul style="list-style-type: none"> • a base layer of modelled habitats at a scale of 1:100,000 or better for all sea basins using common EUNIS classification, taking into account the latest revisions • data products (energy, opacity, etc.) used to construct these modelled habitats

This work package relates to the product that has been the flagship of EMODnet Seabed habitats since its creation in 2010: EUSeaMap. A new version will be delivered at the end of the contract (D1.11). The product will be improved in the areas already covered and 2 new areas will be covered, namely the Caspian Sea and the Caribbean Sea. The first year of the phase focused on building the foundations of this new version: preparing the base layers and working on the habitat classification for the 2 new areas.

For the Caspian Sea, environmental data layers have been prepared from existing data archives on KdPAR (light attenuation in the water column), wave wavelength, seabed temperature and salinity (D1.07). The GEBCO Digital Terrain Model (DTM) and the seabed substrate data product developed as part of EMODnet Geology will be used as inputs. Benthic species data were identified from literature and a statistical cluster analysis carried out to identify communities. Ifremer and GeoEcoMar met in May 2022 in Constanta (Romania) for a two-day workshop to make progress in the definition of broad seabed habitat types in the Caspian Sea. A second workshop will take place in Bucharest (2-3 November 2022), with the objective of finalising by the end of the workshop the definition of the broad habitat types (D1.05), input data to use and thresholds for classifying the input data (D1.10).

For the Caribbean Sea, environmental data layers have been prepared from existing data archives on KdPAR (light attenuation in the water column) and, along French islands, wave wavelength and wave-induced kinetic energy at the seabed (D1.08). A literature review provided an understanding of the environmental conditions of the area and revealed the existence of EUNIS-style classifications (i.e., they describe broad habitat types as a combination of a biological zone and a seabed substrate type), including a recent, detailed one for la Martinique¹. The classification that will be used for the broad-scale seabed habitat map (D1.06) is not yet final but based on the existing classifications it is likely that biological zones will be ‘infralittoral’, ‘circalittoral’,

¹ [Andres S., Ferry R., Gaudillat V., Dirberg G. 2022. Typologie des habitats benthiques de la Martinique. Patrinat \(OFB-CNRS MNHN\). 207 pp.](#)

‘bathyal’ and ‘abyssal’, and seabed substrate types will be ‘rock’, ‘biogenic substrate’, ‘mud’, ‘sand’, and ‘coarse and mixed sediment’. The EMODnet DTM developed as part of EMODnet Bathymetry will be used jointly with KdPAR for modelling the biological zones. The seabed substrate data product developed as part of EMODnet Geology will be used for seabed substrate types together with our data product “biogenic substrate” (see D3.09), that will comprise all polygons of biogenic habitat types (typically coral reefs in the region) from the library of habitat types we will have amassed.

For the Baltic Sea, based on DHI operational Hydrodynamic 3D Model DKBS2hd model run results, a point dataset describing for each year the probability of a certain seabed location being located below the deep halocline has been created (D1.09). The spatial resolution is 5km. The temporal coverage is 20 years (2001-2020). This new dataset will be used in modelling the spatial distribution of the biological zones ‘circalittoral’ and ‘offshore circalittoral’, the circalittoral being, according to the EUNIS habitat classification, above the halocline, while the offshore circalittoral is below.

In phase 3 of EMODnet (2017-2019), in order to feed EUSeaMap the ESH consortium put substantial work into using CMEMS archives on ocean variables to derive continuous raster layers with values at the seabed integrated over a time period (a percentile nth, average, minimum or maximum). CMEMS makes variables available at different level of the water column, but at fixed depths. As a result, it is not straightforward to extract a layer with values at the seabed. The consortium developed a workflow to automate the calculation of environmental variables, including time integration and shifting values at the seabed using the EMODnet Bathymetry DTM. In this phase we have transformed these workflows into user-friendly Python scripts that will allow any Python user to do the same, for an area and time period of interest (D1.14). The scripts are available on the [EMODnet Seabed Habitats GitHub page](#).

WP2 – Data collation

Corresponding Tender task(s)	Corresponding Tender requirement(s)
<p>1 – Maintain and improve a common method of access to data held in repositories</p> <p>2 – Construct products from one or more data sources that provide users with information about the distribution and quality of parameters in time and space</p> <p>3 – Develop procedures for machine-to-machine connections to data and data products</p> <p>7 – Contribute to the implementation of EU legislation and broader initiatives for open data</p>	<p>Data and metadata to be made available:</p> <ul style="list-style-type: none"> • benthic surveys • essential fish habitats in three regional seas • coastal wetlands classified by type <p>Data products to be made available:</p> <ul style="list-style-type: none"> • a library of digital habitat maps from national and regional collections as well as from completed EU projects

The overall aim of this WP, which involves all consortium members, is to ingest, standardise and publish each habitat map and dataset that we listed in Appendix 3 of the tender proposal.

Early in year 1, our priority was to develop and update protocols, trackers, templates and guidance. To support partners and help track and report progress we:

- Created tutorial videos for every step in the process, including formatting habitat maps, formatting point datasets, carrying out confidence assessments and creating INSPIRE-compliant metadata (part of D2.04).
- Held an instructional webinar for partners on these topics and produced an internal guidance document that brought together all the steps and provided additional detail than is available in the public online guidance, such as within-project deadlines, roles and responsibilities (part of D2.04).
- Designed a new data collation tracker, which allows us to track data acquisition status, data preparation status and data upload status for each of the habitat maps and datasets that we listed in Appendix 3 of the tender proposal (D2.17). The tracker was formatted in such a way as to may it straightforward and efficient to report against indicator 3 (data providers) in the quarterly reports.

Before this phase of EMODnet SH there was no standard approach or common format for sharing EFH maps. Therefore, we developed and published:

- a new data exchange format for EFH maps, based on the one for seabed habitat maps but customised for EFH maps (part of D2.11)
- a confidence assessment method for EFH maps, based on the MESH confidence assessment for seabed habitat maps but customised for EFH maps (part of D2.11)
- a guidance document for EFH maps, which includes a simple classification scheme for types of EFH (part of D2.11).

Also before this phase there was no standard approach or common format for sharing coastal wetlands maps. Therefore, we:

- developed and published an updated data exchange format for seabed habitats that can accept coastal wetland maps and is generally more flexible about which classification systems are accepted. It also consolidates three separate data exchange formats that previously existing into a single format that will be easier to understand (D2.03, D2.08).
- produced an internal guidance document that clarifies what is within the scope of ‘coastal wetlands’ for the purposes of this contract, including which classification schemes. This will ensure that consortium members can more easily recognise whether a dataset is within the scope of EMODnet Seabed Habitats or not (D2.08).
- submitted the global Ramsar Classification System for Wetland Type to the NERC Vocabulary Server, which has now been published as collection [M28](#) and [M29](#) (D2.09). Before now, the Ramsar classification was only available to view online in Word and PDF documents but is now available in both human- and machine-readable formats.
- produced the first known translation table between the Ramsar Classification System for Wetland Type and Annex I of the Habitats Directive (D2.07), which will ensure that data classified according to one scheme may be reused for other purposes.

A vital part of providing access to data is discovering what habitat maps and datasets exist and logging their existence in data collation tracker. This is an ongoing process carried out by all partners. At the simplest level, we keep track of our own institutions’ activities and use existing relationships with other institutions to find out this information. Although in this phase of EMODnet, our spatial scope has expanded to include the Caspian Sea and European territories of the Caribbean Sea, where we have less familiarly and existing partnerships. Therefore, we have spent substantial amounts of time on desk studies and speaking with contacts to discover sources of data on both seabed habitats and environmental layers that may be useful inputs for EUSeaMap.

For the Caspian Sea, in particular, we have discovered a significant lack of classified habitat data and maps of any kind. This is causing us to consider reallocating some money that been allocated for data provider contracts in the Caspian Sea region to providers of European data, which is more numerous. This is to be discussed and agreed at the next Project Steering Committee meeting in December.

Data prepared and published so far, complete with metadata in the catalogue:

- Individual habitat maps from surveys (essential fish habitats): 20 classified maps and four models (part of D2.10)
- Individual habitat maps from surveys (seabed habitats and coastal wetland): 26 new and two updated (part of D2.01)
- Survey sample points: 21 new and three updated datasets – 3,580 points (part of D2.02)
- Modelled maps of specific habitats: three models (part of D2.05)

WP3 – Building composite data products (points and polygons)

Corresponding Tender task(s)	Corresponding Tender requirement(s)
2 – Construct products from one or more data sources that provide users with information about the distribution and quality of parameters in time and space 6 – Ensure the involvement of regional sea conventions	Data products to be made available: <ul style="list-style-type: none"> • ... Where feasible, collections shall be combined and harmonised into single layers

The purpose of this WP is to add value to the library of digital habitat maps and survey sample points by combining and harmonising them into single layers showing the best available evidence on the extent and distribution of specific habitats of interest.

To make the best use of the data collation activities of WP2 in year 1, we plan to produce the majority of these in year 2 of the project. The project proposal included a list of planned products plus a deliverable for additional products to be defined by stakeholder needs (D3.08). In year 1 we reviewed the list of planned products to be created or updated and their specifications (D3.01). Within this task we have also rescheduled the deadline for the conclusion of each deliverable aiming at a smoother project development.

The final list of products and their specifications is being harmonized with the stakeholder needs, primarily the RSCs (part of WP5). Other criteria were used to set up this list of products such as the ability to contribute to the implementation of EU legislation, helping Member States fulfil reporting obligations, or supporting other policy advisor institutions such as ICES.

As part of D3.08, we have already delivered two additional products:

1. Updated a combined, harmonized data product showing the best evidence for extent of habitats EUNIS level 3 in the OSPAR area, to support OSPAR ICG-COBAM in carrying out an up-to-date assessment of the OSPAR common indicator ‘Extent of Physical Damage to Predominant and Special Habitats’ for the 2023 Quality Status Report.
2. New translation tables to allow the aforementioned map to be classified to MSFD benthic broad habitat types, so that EU Member States may use it for MSFD assessments and reporting.

As part of D3.09, we produced an interim update to the **Biogenic substrate in Europe** composite data product, which was originally published at the end of Phase 3. This update did not change the extent of the original product but provided more information about the provenance of each polygon.

WP4 – Web services and FAIR data access

Corresponding Tender task(s)	Corresponding Tender requirement(s)
<p>1 – Maintain and improve a common method of access to data held in repositories</p> <p>3 – Develop procedures for machine-to-machine connections to data and data products</p> <p>4 – Contribute data, data products and content to a central portal that allows users to find, view and download data and data products</p> <p>5 – Contribute content to dedicated spaces in the Central Portal</p> <p>7 – Contribute to the implementation of EU legislation and broader initiatives for open data</p> <p>8 – Monitor quality/performance and deal with user feedback</p> <p>9 – Maintain the existing thematic web portal for a maximum of six months from the start of the projects</p>	<p>Data and metadata to be made available: all</p> <p>Data products to be made available: all</p> <p>For the first six months of the project, a thematic portal</p> <p>Information for central portal</p> <ul style="list-style-type: none"> • Metadata, data and data products through web services • Content for space on central portal including summaries of meetings, quarterly progress reports, uses cases, list of partners

The thematic web portal and all associated functionality is still being hosted and maintained (D4.01). This is beyond the set 6-month timeline but we will continue to maintain this until requested to close it down to ensure a seamless transition to the central portal. Issues and potential improvements are tracked and discussed within the GitHub platform and solutions implemented when within the scope and constraints of the project (D4.18). This has included updates to:

- static content such as project information and data submission guidance
- functionality, e.g. the data download page to provide additional groupings for: separate regions of EUSeaMap, new categories of habitat maps from surveys i.e. Barcelona Convention and HELCOM underwater biotope maps (these were previously only accessible under the 'Other' heading) and EFH maps and models. Developments to the download page were carried out through a small subcontract with CarbonSix Digital in conjunction with in-house staff.

The content of the portal has been updated at six-monthly intervals to make data and data products from WP1/2 available through the thematic OGC-compliant web-services (D4.10, D4.13) in GeoServer. The second of these uploads included maps of EFH for the first time. A summary of the maps, points and models uploaded to the portal (D4.13) was included in the WP2 section above. In addition, we have published data layers created as part of WP1, namely: environmental variables that influence habitat type: nine new models for the Caspian Sea – two of which have been used to update Europe-wide layers (part of D4.13). All of these datasets were supported by INSPIRE compliant metadata.

Additionally, several new external products are now also provided directly by machine-to-machine connections, including Vulnerable Marine Ecosystems records from ICES (D4.17), biotope maps from the Geological Survey of Norway and Habitats Directive Annex I habitat layers sourced directly from the HELCOM Map and Data Service via WMS (D4.16).

We are active and attentive members of the EMODnet Technical Working Group, having attended all meetings and addressing actions via JIRA tickets in a timely manner (D4.02, D4.03, D4.04).

We offer help to users via our support team who are available Monday to Friday 09:00-17:00 (D4.21) to respond to queries and any feedback received via the Contact Us form on the website, or by direct email. We have received several pieces of feedback through these means and always respond and resolve any issues promptly (see User Feedback table). We also receive instant alerts about web performance problems and resolve them as necessary.

Performance and quality metrics on web-site usage are already automated and accessible to the EMODnet secretariat through Matomo/Europa Analytics (D4.23). For monitoring and reporting, we have been proactive in providing suggestions regarding updates to the data monitoring process including ideas on reporting regions, categories and units for summarising seabed habitat data in a streamlined, logical and useful way. Once the new reporting templates and categories were finalised we developed a new protocol to allow a more automated, repeatable approach to summarising this information for the reports. This includes:

- A system of labelling GeoServer data layers via keywords and vocabularies using the terminology and categories required by the quarterly reports (e.g. themes, sub-themes, data vs data product, sea-basin, etc.)
- Python scripts to read these labels and summarise the information in a consistent manner (D4.24).

Since the beginning of the phase, we have formed a good working relationship with and collaborated closely with the centralisation team at VLIZ, in order to make the centralisation process as frictionless and successful as possible. This collaborative working has so far proven very successful, and led to two key successes in centralisation within the first year.

The first success is in the majority completion of migration of static content from the existing portal to the central website (D4.15). At present, Seabed Habitats considers all priority static content to have been successfully migrated, and through discussions with the centralisation team is happy with the proposed future protocol for content updates. As it stands, cessation of the existing thematic portal will not result in a significant loss of information for the end user.

The second success is in centralisation of the mapping functionalities, datasets and services provided by the existing thematic mapper and GeoServer. Through collaborative review with the centralisation team, functionality of the central mapper was reviewed and commented on where necessary and where there is still additional functionality that could be included, the functionality is not critical, and we will continue to work with the centralisation team to prioritise these requirements.

In the migration of layers to the central portal map viewer, the thematic lot has several nuances that set it apart from the other lots:

- Large number of data products served (>900)
- High complexity of EUSeaMap vector dataset preventing realistic use of existing OGC WFS services
- Existence of composite datasets including confidence sub-layers

As such, we worked closely with the centralisation team to prioritise layers into “must haves” for the initial soft release, and layers to migrate after this time. Layers have also been reconfigured, grouped and regenerated to ease the work of the central portal team, aggregating split layers into groups with additional filters to allow the original intention to remain viewable, redefining cascaded layer sources to use WFS where possible, and improving the display of information when the user clicks on features of the map. We consider all priority 1 layers now successfully moved. Work towards joint confidence layers is underway, after initial trials of early methods proved unfeasible.

WP5 – Communication and outreach

Corresponding Tender task(s)	Corresponding Tender requirement(s)
5 – Contributing content to dedicated spaces in Central Portal	All
6 – Ensure the involvement of regional sea conventions	
7 – Contribute to the implementation of EU legislation and broader initiatives for open data	

This WP is responsible for ensuring communication of Seabed Habitats deliverables and outputs, and engagement with stakeholders in order to ensure that their needs are met by the activities of the project. This is facilitated through delivery, and updating, of a communications plan (D5.09). This includes a schedule for co-ordinated information dissemination, via news items/social media in co-ordination with EMODnet Secretariat Comms (D5.12). A record of all promotion and outreach activities is maintained to reflect this (D5.15). A significant component of this outreach is delivery of presentations and posters at conferences and cross-cutting meetings. All materials published and presented are collated by the project (D5.13).

Communication across the EMODnet thematic lots is essential. Seabed Habitats have engaged regularly with Geology and Biology in this phase in order to identify output alignments and to facilitate more effective deliverables (D5.08).

Task 5: Contribute content to dedicated spaces in the Central Portal

This WP has produced infographics and story maps relating to Seabed Habitats outputs, at a basin level (D5.11) and detailing the products suite available for Seabed Habitats (D5.14). Identification and recording of relevant 'Use Cases' is ongoing (D5.10). Migration to the Central Portal will necessitate a redesign of these outputs to reflect the new architecture.

Task 6: Ensure the involvement of regional sea conventions (RSC)

Through WP5, the project has engaged with all RSCs. A structured approach to RSC outreach and engagement was developed. This comprised tasking dedicated partners with RSC liaison in their regions and production an internal document outlining how to approach the RSCs and what issues to discuss with each of them. The RSC liaison partners are now in discussion with their relevant RSC to gain feedback about existing products and services, and discuss options for new products and ways of working that could benefit the RSCs. The outcomes of this will be summarised in a public report, 'Updated Review Of RSC Needs' (D5.02), and will influence the development of Composite Data Products and EUSeaMap. Some ways in which we have already worked for the benefit of RSCs in year 1 are:

- OSPAR: Through direct engagement with OSPAR, the project has embedded EMODnet Seabed Habitats into the 2022 data call for data on threatened and/or declining habitats in the northeast Atlantic. In addition, a vital data product has been provided to the OSPAR ICG-COBAM for their assessment of the extent of physical damage to the seabed, combining the best available maps into a single layer (see WP3).
- Tehran: The project presented EUSeaMap at the Scientific Conference On Climate Change in the Caspian Sea Region which was organised by CASPCOM and the Tehran Convention, hosted by UN Environment Programme.

This, and the proposed use of ESH products as baseline datasets for RSC activities, is ongoing demonstration of delivery to/from RSCs (D5.01).

Task 7: Contribute to the implementation of EU legislation and broader initiatives for open data

The project pursues engagement with relevant working groups and expert groups to gather feedback and requirements that will be used to inform Seabed Habitat deliverables. Seabed Habitats has participation in European Marine Board Working Group on Marine Habitat Mapping, which will produce a Future Science Brief in 2023, outlining recommendations on the future of habitat mapping in Europe. EUSeaMap and its underlying sediment classification was presented and discussed by the JNCC at a meeting of TG Seabed in order to facilitate an improved transboundary approach for broad scale maps (D5.07).

As a consequence of feedback from members of the OSPAR ICG-COBAM group that are also EU Member States, the project identified a requirement for a translated version of the combined EUNIS habitat map for the northeast Atlantic that shows MSFD Benthic Broad Habitats (delivered as part of WP3).

Though WP5, the project has entered structured engagement with ICES Working Groups (Marine Habitat Mapping, Deep-water Ecology, Benthos Ecology and Biodiversity Science). All have indicated willingness to participate in the review of stakeholders needs (D5.03). EUSeaMap was presented at the ICES Annual Science Conference in order to generate enhanced engagement with ICES groups on proposed developmental pathways for this, and other Seabed Habitats products.

The consortium submitted a pledge to the Make EU Blue campaign to “continue to improve & expand the coverage of the broadscale seabed habitat map for Europe, EUSeaMap, which serves as a base map for national, regional & global assessments”.

WP6 – Coordination and formal reporting

Corresponding Tender task(s)	Corresponding Tender requirement(s)
All	All

Project management

At the start of the project a Project Steering Group was formed, chaired by the Project Coordinator (Helen Lillis, JNCC), and made up of one person from each partner organisation. The Project Steering Group provides *strategic* guidance for the project and ensure the project is managed correctly. The Project Steering Group is responsible for financial decisions, for agreeing remediation actions to resolve any project issues and for taking decisions on priorities. It met virtually in January 2022 and will meet again, in person, in December 2022 in Manchester, UK (D6.08, D6.09). A large focus of the first meeting was WP2 Data Collation. At the next meeting, the progress of all WPs will be discussed, and plans made to ensure the effective delivery of all remaining deliverables in the final nine months of the project.

Separately, the Project Management Team, comprised of the six WP leaders and chaired by the Technical Manager (Mickaël Vasquez, Ifremer), implements the scientific and technical activities necessary to achieve the project objectives. It is responsible for *operational* decision making. The group met virtually in February 2022, in person in Lisbon, Portugal, in May 2022 and again virtually in September 2022 (D6.06, D6.07). It will next meet in December 2022, in person, immediately prior to the Project Steering Group meeting in Manchester.

A Consortium Agreement between the partners was signed by all members of the Project Steering Group in the early months of the project (D6.03). The Consortium Agreement includes details on governance structure, the budget distribution and allocation of effort, and the management of risk.

The Project Coordinator, and usually also the Technical Manager, has attended and participated in all EMODnet Steering Committee meetings and other meetings as requested by the EMODnet Secretariat (D6.04). Relevant information and actions are cascaded to consortium members (D6.05).

In January 2023, the current Project Coordinator, Helen Lillis, will go on maternity for the remainder of this phase of EMODnet. She will be replaced by Helen Woods (JNCC), the current leader of WP4. Helen Woods will attend the November EMODnet Steering Committee alongside Helen Lillis.

Subcontracting

As part of the tender proposal, we named three subcontractors: Stockholm University, Norwegian Institute for Water Research and Anguilla Community College (ACC) (in their capacity as lead organisation in the Mid-Atlantic Environment Research Institute (MAERI) partnership).

The Stockholm University contract was established in the early months, via our partner GEUS. The NIVA contract is very small - €5,000 – and will be established in year 2.

The establishment of the ACC contract has encountered some issues, as described in the following ‘Identified issues: status and actions taken’ section. In summary, the establishment of MAERI as a standalone, operational entity has been delayed and is not as far along as expected at the time of writing the tender proposal. This, in turn, has meant that ACC has not had the expected capacity to fulfil the requirements of the project. As explained in the following section, we have a new plan that should ensure the Caribbean data collation work is fulfilled as planned in year 2 of the project.

Reporting

All quarterly reports have been completed and submitted on time, accepted with only minor queries from CINEA and/or the Secretariat.

For reporting web performance, we have been proactive in providing suggestions regarding reporting regions, categories and units for summarising seabed habitat data in a streamlined, logical and useful way. Once the new reporting templates and categories were finalised we developed a new protocol to allow a more automated, repeatable approach to summarising this information for the reports, as described in WP4.

4. Identified issues: status and actions taken

[Provide an **overview of issues** identified by CINEA (Table A) - new as well as pending ones, the status of those issues, and actions taken to address them and/or roadmap with remaining actions planned to resolve the issues, since the start of the project phase. In Table B, provide information about any issues and challenges identified by yourself.]

A. Priority issue(s) identified and communicated by CINEA/ DG MARE/ SECRETARIAT				
Priority issue	Status (Pending/ Resolved)	Action(s) taken/ remaining actions planned	Date due	Date resolved
EM-88 (Sub-task) Seabed Habitats - Web Services MetadataUrl and DataUrl fields	pending	a few outstanding actions remain, which are being investigated	none	
EM-146 (Sub-task) Seabed Habitats Quality of Service Monitoring: Several of the services did not meet the 99% availability this quarter, and one of the WMS didn't meet the performance requirement of 5 sec.	pending	substantial work has gone into investigating the causes of the performance issues and the development of a solution (the so-called 'self-healing' GeoServer). However, this solution is relatively novel and we have encountered several hurdles. We are now in talks with a company who may be able to provide GeoServer support and hosting on behalf of JNCC. This company has more experience and resources available to devote to solving the problems.	none	
EM-339 (Sub-task) Collect names of Portal editors	resolved		none	29/11/2021
EM-347 (Sub-task) Collect fields/forms used on Seabed Habitats Thematic Portal	resolved		none	26/01/2022
EM-350 (Bug) Missing attribute in eusm2019_full_800 layer of Seabed Habitat WMS service	resolved		none	07/10/2021
EM-363 (Sub-task) Seabed Habitats to report on number and volume of downloaded data and data products by 29th of October 2021	resolved		none	21/01/2022

EM-383 (Task) SBH Grafana dashboard stopped tracking webpage Search Metadata	resolved		none	14/02/2022
EM-384 (Sub-task) SBH to produce an inventory of products	resolved		none	21/06/2022
EM-391 (Sub-task) SBH review of the new CP Map Viewer	pending	tasks complete to date but this issue remains open for future requests for SBH to review the CP	none	
EM-422 (Sub-task) Log4Jshell Update from SBH	pending	ongoing	none	
EM-495 (Sub-task) Seabed Habitats to report on number and volume of downloaded data and data products	resolved		09/02/2022	09/02/2022
EM-531 (Sub-task) SBH - EMODnet Catalogue Tags	resolved	we provided the requested feedback so consider this issue resolved. status according to JIRA: In Review	none	26/04/2022
EM-539 (Task) Seabed Habitats products' centralisation	pending	almost complete	none	
EM-543 (Task) Adding Seabed Habitats' layers to metaGIS	resolved		06/05/2022	29/09/2022
EM-558 (Bug) Seabed Habitats Catalogue no longer has any public records	resolved		none	03/05/2022
EM-570 (Sub-task) Feedback on CP Main Menu	resolved		30/06/2022	27/04/2022
EM-591 (Task) SBH Layers in the Map Viewer Content Management System	pending		04/07/2022	
EM-611 (Task) Centralisation Checklist for review	resolved	JNCC completed this checklist for SH, so consider this to be resolved. status according to JIRA: In Review	none	15/09/2022
EM-639 (Sub-task) Standardise the navigation menu on left hand side of page	resolved	JNCC responded to this on behalf of SH, so consider this to be resolved. status according to JIRA: In Review	none	10/10/2022
EM-644 (Sub-task) Seabed Habitats to provide input to the Tools & Guidelines section	pending		none	
EM-652 (Sub-task) Seabed Habitats to review layer legends and add units where they are missing	resolved		none	11/10/2022

B. Issues / challenges identified by the thematic assembly group itself				
Priority issue / challenge	Status (Pending/ Resolved)	Action(s) taken / remaining actions planned	Date due	Date resolved
Lack of an EMODnet DEM in the Caspian Sea for broad-scale habitat mapping. It is well known that a vital input layer into the broad-scale habitat map (EUSeaMap) is a digital elevation model provided by EMODnet Bathymetry. However, in this phase of the project Seabed Habitats has been asked to produce a broad-scale habitat map for the Caspian Sea, while Bathymetry were not asked to produce a DEM for that sea. As a result, we are forced to use GEBCO, which is of low resolution and quality in the Caspian Sea. We will be able to deliver the deliverable of a broad-scale habitat map for the Caspian Sea, but its quality will not be high.	resolved	raised at the April Steering Committee meeting. It was confirmed with Bathymetry and CINEA that Bathymetry would not be producing a DEM and that ESH should use GEBCO.	none	30/09/2022
EM-515 (New Feature) Ability to filter habitat layers by habitat type or map ID	pending	This is a issue/suggestion that SBH made related to the functionality of the CP	none	
EM-514 (Improvement) Return custom feature/pixel information when user clicks on a feature/pixel in the map	pending	This is a issue/suggestion that SBH made related to the functionality of the CP	none	
EM-513 (New Feature) In the layer catalogue, add the ability toggle entire layer groups on or off	pending	This is a issue/suggestion that SBH made related to the functionality of the CP	none	
EM-412 (New Feature) In the layer catalogue on new central portal, indicate which layer groups contain active layers	pending	This is a issue/suggestion that SBH made related to the functionality of the CP	none	
EM-317 (Improvement) 'Seabed Habitats' missing from list of Topics on Newsroom	resolved		none	
EM-316 (Improvement) reorder EMODnet Themes on Reports page to force the 'active' themes to the top of the list	resolved	This is a issue/suggestion that SBH made related to the functionality of the CP	none	16/09/2021
In the project proposal we proposed that we subcontract the 'Mid Atlantic Environmental Research Institute' (MAERI) to carry out data collation, preparation and outreach in the Caribbean. At the time of bidding MAERI was not an operational entity but a partnership between Anguilla	pending	Pending approval from CINEA, we now plan to subcontract another MAERI partner, SAERI, who are better set up for contracts such as these - both with the financial mechanisms in place and personnel who can be deployed at relatively	31/10/2022	

<p>Community College (ACC), Department of Natural Resources (Anguilla), South Atlantic Environmental Research Institute (SEARI) and JNCC. However, the intention was to establish MAERI as a standalone entity. Developments were hindered by the pandemic and, as such, MAERI still only exists as a partnership between these organisations. In the bid, we proposed that ACC be the partner that is the official subcontractor representing MAERI however it became apparent that administrative obstacles were going to prohibit the establishment of this contract in time to allow the intended level of contribution from MAERI before the end of the contract and so another avenue was required.</p>		<p>short notice. We are currently discussing the finer details but they have confirmed their interest and availability for the contract. Before formalising this arrangement we intend to seek permission from CINEA to change the Caribbean subcontractor from ACC to SEARI. A more comprehensive description of the issue and a business case can be presented to CINEA at this time if required.</p>		
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5. Allocation of project resources

[Provide information about the efforts spent since the start of the project phase (provide the date) on achieving the main objectives and tasks of the project. Provide an overview of resource usage (percentage of project resources) divided into the following categories (if no precise information is available, provide estimate indication instead).]

Information on the allocation of project resources	
Categories	Resource usage ² (%)
Making data and metadata interoperable and available	23%
Preparing data products	8%
Preparing web-pages, viewing or search facilities	2%
Managing user feedback	<1%
Project management	3%
Outreach and communication activities	3%
Others	0%

Resource usage is presented as a proportion of the total budget for both years. We predict that we have spent around 39% of total resources in year 1. Year 2 will see the establishments of some subcontracts that will bring us up to the 100%.

The focus in year 1 has been on ‘Making data and metadata interoperable and available’, which we have attributed to the majority of work under WP2 Data Collation, and around half of the work covered by WP4 Portal. The other half of the WP4 is attributed to ‘Preparing web-pages, viewing or search facilities’.

² Provide the workings of your calculations, *i.e.* percentage allocation of the total amount awarded.

6. User feedback

[Provide a list of all user feedback received since the start of the project phase in chronological order. Indicate the type of the feedback received, a clear description of the query, and the actions undertaken to resolve the issue (e.g. update of metadata, fixing a particular issue with the map viewer). Indicate the status of the query, and if not provide an explanation why. List any feedback you received on the portal that can be used to build EMODnet use cases.]

Overview of user feedback and/or requests received in this project phase							
Date	Organisation	Type of user feedback (e.g. technical, case study, etc.) and short description of the feedback received	Means of contact	Response time	Status of user query (Resolved/ Pending)	Measures taken to resolve the query	Status: if not (yet) resolved/ pending, explain reason why and expected timeline
02/11/2021	French Museum	Technical - Would like to implement a model with substrate data so downloaded C20211108_EUSeaMap_2021_Arctic_Atlantic.gdb but does not know : 1- How to read the data 2- How to extract the data to use them with R Is there a tutorial?	web form	4 hours	resolved	replied via email. Sent a R script to read ArcGIS geodatabase format in R using the rgdal package	resolved
09/11/2021	Cornwall IFCA	Technical - Trying to find/ download biotope distribution data to produce the same maps that marlin have used for each of their biotopes for the seagrass habitat. Is there a layer which contains this information?	web form	4 hours	resolved	replied via email	resolved
23/11/2021	Not disclosed	Technical - Is undertaking a project developing essential fish habitat maps and is relying heavily on our data as information on confidence is available. However, has not been able to download the quality index data for our bathymetry layer (2020). Is it possible to download this? The dtm tiles I	web form	10 minutes	resolved	replied via email EMODnet bathymetry is in charge of the information she's looking for	resolved

		need this for are C2, C3, C4, C5, D2, D3, D4, D5, E2, E3, E4, E5					
01/12/2021	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)	Technical - Current work involves the use of the EMODnet KdPAR and Seabed PAR datasets in Northern Germany. As such, would like to cite this dataset in my manuscript. What is the correct ref?	email	10 minutes	resolved	replied via email	resolved
08/12/2021	JNCC	Technical - I wanted to add the windfarm data (point and polys) from EMODnet Human Activities to the ESH mapper, but when I select Add external layers and try to get layers from HA, I get 'No layers available from this source'. Is this a bug at our end or theirs?	web form	10 minutes	resolved	replied via email to explain that this is an issue at EHA's end (CORS issue) and notified EHA of the issue. EHA has now resolved the issue and it is now working.	resolved
09/12/2021	DG-ENV	Request for analysis - Would you have values for the extent (km2) of each MSFD broad habitat type per country (and per subregion if several for a country)? ... I need to do some calculations in relation to seabed trawling. Calculation made and sent the 11/01/2022. Lots of work, especially to find a shapefile on the marine waters used by the Member States for the MSFD assessment and then to fix the many issues found in the shapefile	email	1 month	resolved	Calculated values for the extent (km2 and percentage) of each MSFD broad habitat type per country and per subregion. Accepted by DG-ENV and plan to publish them online, and keep them updated	resolved
10/12/2021	Not disclosed	Technical - Would need the data for the probability of coralligenous, maerl and posidonia habitats in Greece. Tried to	web form	6 days	resolved	replied via email. There has been a change in the permissions associated with this data and that they are	resolved

		download the three datasets from the map viewer but did not work.				not available for download. Suggested to contact the owner	
02/01/2022	Arcadis	Technical - Attempted to download the probability of coralligenous and maerl habitats in the Mediterranean but the links were broken.	web form	1 hour	resolved	sent correct link with an hour. Then set about correcting the links online	responded with the correct download link. Fixing the links online is in progress
12/01/2022	Not disclosed	Technical - Broken link on bulgarian wave data	email		resolved	modified erroneous data driving underlying webpage	resolved
02/02/2022	DG-ENV	Request for analysis - The 11/01/2022 we sent to the EEA an excel spreadsheet with vaues for the extent (km2) of each MSFD broad habitat type per country (and per subregion if several for a country), a request made by the EEA in December 2021. in the spreadsheet, there were some significant differences between these figures and those they expected, due to projection issues. The calculations were remade using the expected projection (LAEA)	email	10 days	resolved	calculations remade	resolved
03/03/2022	Jersey Marine Conservation	Concern about data ownership - There was concern that the data owner was not given enough recognition in the case of data owned by Jersey Marine Conservation. This relates to the Survey sample points data layer.	web form	1 hour	resolved	a phone conversation helped to identify that the main source of the issue was that the data custodian needs to amend the data owner information before it is submitted to the national UK database, Marine Recorder, which is	resolved

						subsequently aggregated into the EMODnet collection. Furthermore, we will consider a new web page that lists all data providers and what they have contributed.	
04/03/2022	ABPMER	Technical - 'habitat point observations - all' download not working	web form	1 day	pending	Issue investigated, download is over the 2 GB WFS limit. Alternate solutions offered to user to allow access to the data whilst the technical issue is resolved.	pending - awaiting response from user.
14/03/2022	Ifremer	Technical - Would need to know what the habitat is at a specific location. What is the data layer I should look at on the webGIS?	Live Chat	2h	resolved	Live guidance	resolved
23/03/2022	CGR	Technical - Broken links in a metadata record	email	15 minutes	resolved	corrected the metadata record	resolved
01/04/2022	Aqualicence	Technical - The user was enquiring about some missing data in the EMODnet seabed substrate layer, which they were accessing via WMS.	web form	3 hours	resolved	it transpired that they were viewing an old version of the layer, which is still available via WMS but not on the map viewer. I directed her to the latest version, which she was happy to see had the gaps filled. I also promised to rename the WMS layers to make it clear if they were not the most recent version.	resolved

						This has been added to our internal technical issues log	
08/04/2022	SHOM	Technical - The user was confused about the fact that there are EUSeaMap confidence layers on the map viewer, but when they clicked the download link they were taken to a link to download the EUSeaMap map package.	web form	3 hours	resolved	explained that the confidence layer is not available to download on its own via the download page, it is zipped up with the EUSeaMap habitat map.	resolved
16/05/2022	Havochvatten - Swedish Agency for Marine and Water Management	Technical - ICES metadata catalogue was down.	web form	1 hour	resolved	contacted ICES data centre to check status. They confirmed that the service was down temporarily due to system maintenance.	resolved
09/08/2022	Archipelagos Institute of Marine Conservation	Technical - Their organisation has some habitat maps they would like to contribute to EMODnet and were asking a question about unique identifiers.	web form	1 day	resolved	Responded with the required information and reached out to understand more about the data they have to submit.	resolved
03/09/2022	University of Aberdeen	Technical - Is looking to use the Light (PAR) at seabed data layer (accessible from EMODnet Seabed Habitat data portal) however is struggling to find the resolution of the layer and can only find information on the scale in ICES Metadata Catalogue. Ask to confirm the layer's resolution	email	15 minutes	resolved	replied that the resolution of the grid is 0.0010416667 decimal degrees, corresponding to approx. 100m.	resolved

05/09/2022	Natural Power	Technical - They had a question about WMS legend	web form	1 hour	resolved	Responded to explained how to see the legend	resolved
22/09/2022	Red Electrica	Technical - The description of attributes in the EUSeaMap download did not exactly match the attributes present in the attribute table. They requested an updated description of attributes.	web form		resolved	Responded with questions to better understand the problem and offer some potential solutions. They responded to say they have resolved their problem.	resolved
16/06/2022	University of St Andrews	Technical - The user was asking why there was substrate information missing from some coastal areas (e.g. Orkney Islands) in EUSeaMap 2021 when it was present in EUSeaMap 2016.	web form	2 hours	resolved	Responded to explain that this information disappeared from the EMODnet Geology seabed substrate layer and that JNCC were planning to discuss the issue with BGS	resolved
21/06/2022	Intertek	Technical - The user informing us that the OSPAR points layer doesn't have a symbology in the legend for Oceanic Ridges	web form	1 day	resolved	The legend graphic was updated to show the missing habitat	resolved
20/09/2022	National park authority in Schleswig Holstein	Technical - A bit surprised that in German North Sea there are many differences with respect sediment in EUSeaMap 2021 compared to version 2016	email	7 days	resolved	Gave a contact at EMODnet Geology	resolved

7. Meetings/events held/attended & planned

[List organisational meetings/events held/participated (incl. presentations, lectures, trainings, demonstrations, workshops, etc.) since the start of the project phase and planned in the future. Please add a short description on the meeting as well as the nature and volume of the audience.

When listing a meeting, please indicate whether it was an internal (i.e. within your partnership/lot) or external meeting (i.e. outside your partnership/lot).]

A. Meetings/events organised and attended in this project phase					
Date	Location	Type event (internal or external meeting; training/ workshop)	Was a presentation given? (yes/no + short description)	Meeting attended (A) / organised (O)	Short description and main results (# participants, agreements made, etc.)
15/10/2021	Web	Internal Meeting	No	O	WP5 planning, including JNCC handing over responsibility for this WP to MI. 4 participants. MI now prepared to manage WP5.
27/10/2021	Web	External Conference	Yes - on the challenges of delivering EUSeaMap in the Caspian Sea	A	Conference on Climate Change in the Caspian Sea Region (27-28 October). ~200 participants. Promotion of EMODnet Seabed Habitats Phase 4 extension of EUSeaMap into the Caspian Region. Initial identification of primary research contacts for this region. 6 recommendations submitted for inclusion into the Conference Summary Report.
28/10/2021	Web	External Meeting	No	A	EMODnet Central Portal Technical team meeting with Seabed Habitats - meeting 1. ~15 participants. Central Portal team gained a better understanding of steps needed to incorporate the contents and functionality of the Seabed Habitat portal into the Central Portal.
11/11/2021	Web	Internal Meeting	No	O	WP2 planning, including ISPRA handing over responsibility for this WP to JNCC. 5 participants. JNCC now prepared to manage WP2.

23/11/2021	Web	External Workshop	Yes - on data standards and useful EMODnet Seabed Habitats data products (prepared as part of a wider EMODnet presentation delivered by Biology)	A	Workshop: Towards a Coordinated European Observing System for Marine Macroalgae. 53 participants. Awareness of EMODnet Seabed Habitats data standards and existing data products relevant to marine macroalgae.
30/11/2021	Web	Internal Meeting	No	O	Caspian Climate Conference - Presentation Debrief. 4 participants. MI described the 27/10 conference to other partners, with some suggested next steps
30/11/2021	Web	Internal Meeting	No	O	WP1 and WP6 planning. 2 participants. Agreement on division of responsibilities between Project Coordinator (at JNCC) and Technical Project Manager (at Ifremer), who together with the Project Administrator (at JNCC), form the 'Project Office'. Ifremer now prepared to manage WP1.
30/11/2021	Web	Internal Meeting	No	O	WP3 planning and essential fish habitats. 4 participants. CCMAR now prepared to manage WP3.
01/12/2021	Web	External Meeting	No	A	EMODnet Central Portal Technical team meeting with Seabed Habitats - meeting 2. ~15 participants. Central Portal team gained a better understanding of steps needed to incorporate the contents and functionality of the Seabed Habitat portal into the Central Portal.
19/01/2022	Web	Internal Meeting	Yes	O	EMODnet Seabed Habitats kick-off. We expect that all consortium members will gain a greater understanding of what is required in the project.
01/02/2022	Web	External Meeting	No	A	Stakeholder discussion for the "Urbanization and Climate Change Adaptation in the Caspian Sea Region" project. 50 participants. Identified the person who will be collating the spatial data for the Caspian for this UN Habitat project and reached out to her and suggested we liaise on dataset discovery in the region.

02/02/2022	Web	External Meeting	No	A	EMODnet Central Portal Technical team meeting with Seabed Habitats - meeting 3. 15 participants. Central Portal team gained a better understanding of steps needed to incorporate the contents and functionality of the Seabed Habitat portal into the Central Portal.
08/02/2022	Web	External Meeting	No	A	Meeting with EMODnet Biology to discuss future collaboration. 6 participants. A better understanding of outputs from each programme and any commonalities or future collaborations.
10/02/2022	Web	Internal Meeting	No	O	WP2 coastal wetlands. 3 participants. Progress meeting and discuss next steps regarding coastal wetland data and classification
10/02/2022	Web	Internal Meeting	Yes - progress updates	O	Project Management Team meeting. 5 participants. Progress meeting among WP leaders, and to discuss any issues
14/02/2022	Web	External Meeting	Yes - EMODnet Seabed Habitats: collecting habitat maps once, using many times	A	International Ocean Data Conference 2022 - The Data We Need for the Ocean We Want. More awareness of the sorts of products that EMODnet Seabed Habitats has and can produce
15/02/2022	Web	Internal Meeting	No	O	WP1 EUSeaMap in the Caspian Sea. 3 participants. Discuss possible input layers for the Caspian Sea
21/02/2022	Dublin	External Meeting	Yes - EMODNet Seabed Habitats participation & alignments with INFOMAR	O	INFOMAR National Seabed Mapping Conference. 70 participants. Seabed Mapping community in Ireland get an overview of the products and improvements planned in the next phase of EMODnet SH
03/03/2022	Web	External Meeting	Yes - How following the FAIR principles has allowed EMODnet Seabed Habitats to aggregate and combine disparate data into new products for the benefit of many	A	MEDIN Open Meeting. 100 participants. Raise awareness of EMODnet SH among the marine data community in the UK and show its commitment to FAIR data principles.
03/04/2022	Web	External Meeting	No - Live Portal Demo	O	ESH Outputs demonstrated to Ecosystem Accounts Division of Centre Statistics Office Ireland. 2 participants. ESH Outputs demonstrated to Ecosystem Accounts Division of Centre Statistics Office Ireland. ESH Resources / EUSeamap will be used by Ecosystem Accounts Division in the CSO, (Ireland) in compiling Ecosystem Accounts at national level for Ireland.
16/03/2022	Web	External Meeting	No	A	EMODnet Central Portal - static content. 4 participants. Discuss static content transfer to central portal

17/03/2022	Web	External Meeting	No	A	EMODnet Central Portal Technical team meeting with Seabed Habitats - meeting 4. 11 participants. Central Portal team gained a better understanding of steps needed to incorporate the data and functionality of the Seabed Habitat portal into the Central Portal.
23/03/2022	Web	Internal Meeting	No	O	RSC Engagement - Black Sea. 4 participants. Discussed and agreed the approach for engagement of the ESH RSC rep with the RSC for the Black Sea. Template letter drafted and reviewed.
30/03/2022	Web	Internal Meeting	No	O	RSC Engagement - Tehran Convention. 3 participants. Discussed and agreed the approach for engagement of the ESH RSC rep with the RSC for the Caspian Sea.
07/04/2022	Web	External Meeting	No	A	European Marine Board Working Group on Marine Habitat Mapping - kick-off meeting. The EMB WG on Marine Habitat Mapping should aim to highlight the science and policies needed to advance marine habitat mapping to fulfil the objectives of the European Green Deal, the EU Biodiversity Strategy for 2030, and international commitments on biodiversity and climate. The WG should also make links to the societal outcomes of the UN Decade of Ocean Science for Sustainable Development.
14/04/2022	Web	Internal Meeting	No	O	Meeting on "D1.05 EUNIS-style habitat classification in the Caspian Sea for broad-scale habitat mapping". 3 participants. Discussions on Impact of the war on our work. Review of the list of environmental variables collated. Review of sample point data projects.
26/04/2022	Web	External Meeting	Yes - Seabed Habitats portal update	A	EMODnet TWG.
27/04/2022	Web	External Meeting	Yes - Seabed Habitats general update	A	EMODnet Steering Committee.
06/05/2022	Web	External Meeting	No	A	EMODnet Central Portal Technical team meeting with Seabed Habitats - meeting 5. 11 participants. Central Portal team gained a better understanding of steps needed to incorporate the data and functionality of the Seabed Habitat portal into the Central Portal.
09/05/2022	Lisbon, PT	Internal Meeting	Yes - WP updates	O	EMODnet Seabed Habitats Project Management Group Meeting. 9 participants. Updates from each WP on the current

					phase and identification of issues regarding the deliverables. Planning commencement for potential next phase which will include a new project co-ordinator due to JNCC/UK status.
11/05/2022	Web	External Conference	Yes - OSPAR use case	A	EU Marine Data Services All-Atlantic Workshop - satellite event to the Ocean Decade Laboratory on the Outcome "An Accessible Ocean". 150 participants. This 2-hour webinar discussed how a future All-Atlantic Ocean Data Space could be realized by building on existing initiatives such as the two EU operational marine data services, i.e. Copernicus Marine Service and EMODnet.
16/05/2022	Venice, Italy	External Conference	No	A	GeoHab. 150 participants. GEOHAB is an international association of marine scientists studying and mapping geophysical, biophysical, and geomorphic indicators of benthic communities, species diversity, and distribution. Enhancing Visibility of ESH outputs.
23/05/2022	Web	Internal Meeting	No	O	Making progress on setting up the subcontract with Anguilla Community College. 5 participants. Anguilla Community College/Government of Anguilla gaining a better understanding of the requirements so they can recruit a new member of staff to work on the project.
25/05/2022	Web	Internal Meeting	Yes - summary of WP2 progress, guidance, templates	A	WP2 progress meeting (Europe region). 10 participants. To make sure everyone understood what was required for preparing habitat maps and point datasets for submission as part of WP2.
31/05/2022	Constanta, Romania	Internal Meeting	No	O	Workshop on "D1.05 EUNIS-style habitat classification in the Caspian Sea for broad-scale habitat mapping". 3 participants. A draft habitat classification for Caspian Sea
15/06/2022	Web	External Meeting	No	A	European Marine Board Working Group on Marine Habitat Mapping. The EMB WG on Marine Habitat Mapping should aim to highlight the science and policies needed to advance marine habitat mapping to fulfil the objectives of the European Green Deal, the EU Biodiversity Strategy for 2030, and international commitments on biodiversity and climate. The WG should also

					make links to the societal outcomes of the UN Decade of Ocean Science for Sustainable Development.
20/06/2022	Web	Internal Meeting	No	O	Making progress on setting up the subcontract with Anguilla Community College. 5 participants. Anguilla Community College/Government of Anguilla gaining a better understanding of the requirements so they can recruit a new member of staff to work on the project.
22/06/2022	Web	External Meeting	No	A	EMODnet Vision for the future, governance and business model. 15 participants.
29/06/2022	Web	External Meeting	No	A	EMODnet Central Portal Technical team meeting with Seabed Habitats - meeting 6. 11 participants. Central Portal team gained a better understanding of steps needed to incorporate the data and functionality of the Seabed Habitat portal into the Central Portal.
12/07/22	Web	External Meeting	No	A	Ifremer was invited at a meeting organised by people in charge of MSFD assessment in France to provide guidance on the use of EUSeaMap. 6 participants.
13/07/22	Web	External Meeting	No	A	European Marine Board Working Group on Marine Habitat Mapping. Catch-up on the drafting of a Future Science Brief on Marine Habitat Mapping in Europe. 9 participants.
13/07/22	Web	External Meeting	No	A	Meeting with new chair of MSFD EU TG Seabed about EUSeaMap. 5 participants. For TG Seabed to understand why the definition of mud and sand differs between EUNIS and EUSeaMap and for a general introduction
14/07/22	Web	External Meeting	No	O	Meeting with the hosts of the NERC Vocabulary Server, BODC, to discuss to addition of new vocabularies for habitat classification systems. 4 participants.
18/07/22	Web	External Meeting	Yes. Highlights	A	DG/MARE invited thematic coordinators to a meeting directly after the submission of the thematic quarterly reports, to check the state of play of EMODnet's centralisation and the overall progress of our common work. 15 participants.
16/8/22	Aalborg, DK	Conference	Yes. GEUS Mapping Integration	A	Meeting with all marine researcher in Denmark, presenting the results of the habitat mapping in the North Sea including the EUNIS / Broad habitat map using the model developed by ESH Lot in 2019. In Danish/English.

29/08/22	Web	External Meeting	No	A	ICES Working Group on Marine Habitat Mapping. 15 participants. To investigate the applicable uses of Habitat maps in policy / MSFD.
05/09/22	Web	Internal Meeting	Yes. WP Updates	O	EMODnet Seabed Habitats Project Management Group Meeting. 6 participants. Updates from each WP on the current phase and identification of issues regarding the deliverables.
13/09/22	Cork, IE	External Meeting	No	A	IE OSPAR delegation meeting . 30 participants. To promote EUSeaMap and enhance engagement of ICES WGS/ EGS with ESH
14/09/22	Web	External Meeting	Yes. EUSeaMap and EUNIS	A	Technical Group on seabed habitats and sea-floor integrity (TG SEABED). ~30 participants. To present and answer questions on EUSeaMap and EUNIS so that Member States understand how to use EMODnet seabed habitat maps for MSFD reporting and assessment.
15/09/22	Web	External Meeting	No	A	How best to use EUSeaMap for MSFD reporting. 3 participants. Combine best available data from ESH library of maps and models (with EUSeaMap as a base) to create a new map covering the extent of the Marine Reporting Unit used in Irish MSFD assessments.
19/09/22	Genova, IT	External Conference	No	A	Marine Key Habitats and Non-indigenous Species Symposia. The main objective of Symposia is to gather available knowledge on Marine Key Habitats at Mediterranean level.
19/09/22	Dublin, IE	External Conference	Yes. EUSeaMap	A	ICES Annual Science Conference. 500 participants. To promote EUSeaMap and enhance engagement of ICES WGS/ EGS with ESH
21/09/22	Web	External Meeting	Yes. ESH Portal Update	A	EMODnet Technical Working Group.
26/09/22	Web	External Meeting	No	A	European Marine Board Working Group on Marine Habitat Mapping .
26/09/22	Web	Internal Meeting	Yes. EMODnet overview	O	Making progress on setting up the subcontract with the South Atlantic Environmental Research Institute. 4 participants.
SUM				O	Total # of meetings organised = 21
SUM				A	Total # of meetings attended = 34

B. Meetings/events planned in the future				
Date	Location	Type event (meeting, training (workshop), etc.)	Meeting to be attended (A) / organised (O)	Short description and main expected outcomes
03/10/2022	Brussels, BE	External Meeting	O	Seabed Habitats-Biology common topics. 2 participants. Discuss progress on common work areas between the two projects
03/10/2022	Brussels, BE	External Workshop	A	EU-Canada Ocean Partnership Forum. 30 participants. Supporting a Healthy and Sustainable Ocean through International Collaboration to Enhance Knowledge and Data Sharing
06/10/2022	Dingle, IE	External Vessel Launch	A	Commissioning of RV Tom Crean. 2000 participants. EMODNet Seabed Habitat MSFD Maps displayed / Explained to minister & delegation
11/10/2022	Web	External Workshop	O	Copernicus Biodiversity and coastal ecosystems workshop. Promote EMODnet (SH+Biology) data and products of use for coastal biodiversity protection. Overall goals of the workshop: Describe the landscape in terms of biodiversity at stake, European and international policy development in a context of climate change as well sustainable development goals, practices and needs at Member State level. Showcase examples of research, development and best practices to develop blue economy or support territorial development, implement EU policies (CFP, MSPD, MSFD, etc.) along coasts while protecting and fostering biodiversity, based on the use of space technologies combined with science and digital intelligence.
20/10/2022	Web	External Workshop	A	EMODnet for Business workshop: offshore renewable energy sector (Med & Black Sea).
20/10/2022	Web	External Meeting	A	European Marine Board Working Group on Marine Habitat Mapping . The group is tasked with writing a Future Science Brief to highlight the science and policies needed to advance marine habitat mapping to fulfil the objectives of the European Green Deal, the EU Biodiversity Strategy for 2030, and international commitments

				on biodiversity and climate. The WG also make links to the societal outcomes of the UN Decade of Ocean Science for Sustainable Development.
2-3/11/2022	Bucharest, RO	Internal Meeting	O	Workshop on "D1.05 EUNIS-style habitat classification in the Caspian Sea for broad-scale habitat mapping". 3 participants. Workshop on "D1.05 EUNIS-style habitat classification in the Caspian Sea for broad-scale habitat mapping". 3 participants. A classification of seabed broad habitat types for Caspian Sea, a list of environmental variables that explain their occurrence and thresholds values that allow to the classify environmental variables in habitat descriptor classes
12/12/2022	Manchester, UK	Internal Meeting	O	EMODnet Seabed Habitats Project Management Group Meeting. Updates from each WP on the current phase and identification of issues regarding the deliverables.
13/12/2022	Manchester, UK	Internal Meeting	O	EMODnet Seabed Habitats Whole Consortium Meeting. Relationship-building, better understanding of procedures and purposes, ideas for next phase
15/12/2022	Manchester, UK	Internal Meeting	O	EMODnet Seabed Habitats WP3 planning and knowledge exchange. A more concrete plan for delivering composite data products under WP3, and transfer of knowledge/processes/scripts from JNCC to CCMAR

8. Communication assets

[List all the relevant communication and dissemination products and assets you have developed since the start of the project phase (e.g. brochures, videos, press releases, newsletters, blogs) and are planning to do. At the bottom of the table, provide a summary from the actions on Twitter from (e.g. Twitter Analytics: number of Tweets and followers of Twitter account).]

A. Communication products developed				
Date	Communication material	Short description (of the material, title, ...) of the asset	Main results	Name of event at which material was disseminated (if applicable)
29/10/2021	News article	EMODnet Central news article entitled "EUSeaMap 2021: EMODnet broad-scale seabed habitat map for Europe"	Greater awareness of the existence of an updated EUSeaMap so that the latest version of this product is used.	EMODnet Newsletter
11/11/2021	Newsletter item	EMODnet newsletter item entitled "New release of EMODnet broad-scale seabed habitat map for Europe (EUSeaMap)"	Readers see that there is an update to EUSeaMap, and their attention is drawn to the longer news article on this topic.	EMODnet Newsletter
11/11/2021	News article	EMODnet Seabed Habitats news article entitled "Official Release of EUSeaMap 2021"	Greater awareness of the existence of an updated EUSeaMap so that the latest version of this product is used.	EMODnet Newsletter
12/11/2021	News article	EMODnet Seabed Habitats news article entitled "EMODnet Seabed Habitats - Phase 4"	Awareness that the new phase of EMODnet Seabed Habitats has begun, with some new objectives and partners	EMODnet Newsletter
23/11/2021	Online pledge	A pledge: "EMODnet Seabed Habitats will continue to improve & expand the coverage of the broadscale seabed habitat map for Europe, EUSeaMap, which serves as a base map for national, regional & global assessments"	Greater awareness of EMODnet as a contributor to marine environmental protection in Europe.	NA
30/11/2021	News article	EMODnet Central news article entitled "Conference on Climate Change in the Caspian Sea 2021"	Awareness that the geographic scope has expanded to the Caspian Sea	EMODnet Newsletter
30/11/2021	Newsletter item	EMODnet news item entitled "Conference on Climate Change in the Caspian Sea 2021"	Readers see that the geographic scope has expanded to the Caspian Sea and their attention is drawn to the longer news article on this topic.	EMODnet Newsletter
30/11/2021	News article	EMODnet news item entitled "EMODnet Seabed Habitats Phase IV"	Awareness that the new phase of EMODnet Seabed Habitats has begun, with some new objectives and partners	EMODnet Newsletter
30/11/2021	Newsletter item	EMODnet newsletter item entitled "EMODnet Seabed Habitats Phase IV"	Readers see that a new phase has begun, with some new objectives, and their attention is drawn to the longer news article on this topic.	EMODnet Newsletter
31/01/2022	News article	EMODnet newsletter item entitled "Holistic, standards-based access and interoperability for marine biodiversity data"	Awareness that a new use case on the collaboration between EMODnet SH and Biology Lots to produce a standardised approach to Habitat point data submission has been published.	EMODnet Newsletter
31/01/2022	Newsletter item	EMODnet newsletter item entitled "Holistic, standards-based access and	Readers see that the thematic lots are working together and not alone alone.	EMODnet Newsletter

		interoperability for marine biodiversity data"		
31/01/2022	News article	2022: marking the start of a new phase	Awareness on the progress made by EMODnet SH during the last phase.	EMODnet Newsletter
31/01/2022	Newsletter item	2022: marking the start of a new phase	Readers see the outputs and milestones achieved by all of the thematic lots in 2021.	EMODnet Newsletter
15/02/2022	Tweet	Tweet promoting EMODnet SH	Promoting work of EMODnet SH on delivering standardised habitat mapping data products.	@EMODnet and @JNCC_UK
17/02/2022	Newsletter item	EMODnet news item entitled "EMODnet Seabed Habitats Phase IV"	Awareness that the new phase of EMODnet Seabed Habitats has begun, with some new objectives and partners	MEDIN Newsletter
28/02/2022	Newsletter item	EMODnet newsletter item entitled "OSPAR Threatened and/or Declining Habitat Spatial Dataset"	Readers see that there has been a significant update to the number of records hosted in the OSPAR spatial database on Threatened and/or Declining Habitats.	EMODnet Newsletter
29/4/2022	Article in EMODnet Newsletter	Promotion of products currently available from ESH mapper through a story map	Promote EMODnet Seabed Habitats Products	EMODnet Newsletter
17/5/2022	News Article	EMODnet news item entitled "Summarising the extents of MSFD benthic broad habitats per sub-region and country"	Promotion of new EMODnet Seabed Habitats tool to facilitate Member States with MSFD reporting requirements on D6 Seafloor	EMODnet Newsletter
19/5/2022	Tweet	ESH Attendance at Geohab	Promotion of ESH products and relevance of EMODnet to the wider EU research community	@EMODnet, @MarineInst
31/5/2022	Article in EMODnet Newsletter	Summarising the extents of MSFD benthic broad habitats per sub-region and country	Promotion of new EMODnet Seabed Habitats tool to facilitate Member States with MSFD reporting requirements on D6 Seafloor	EMODnet Newsletter
08/6/2022	Tweet	ESH Products Promotion for World Ocean Day	Promotion of ESH products	
30/6/2022	Article in EMODnet Newsletter	ESH Attendance at Geohab	Promotion of ESH products and relevance of EMODnet to the wider EU research community	EMODnet Newsletter
05/07/22	Newsletter Item	EMODnet Seabed Habitats participation in Geohab	Promotion of ESH products and relevance of EMODnet to the wider EU research community	EMODnet Newsletter
20/09/22	Newsletter Article	EMODnet Seabed Habitats Modelled Map Collection	Promotion of ESH Library of Habitat Maps and availability	EMODnet Newsletter
30/09/22	Newsletter Item	EMODnet Seabed Habitats Modelled Map Collection	Promotion of ESH Library of Habitat Maps and availability	EMODnet Newsletter
21/09/22	Tweet	EUSeaMap Evolution Talk promotion	Engagement with EUSeaMap presentation at ICES ASC 2022 and engagement with RSC	ICES ASC 2022 @EMODnet, @MarineInst and @ICESASC

B. Planned communication products

Date	Communication material	Short description (of the material, title, ...) and/or link to the asset	Main results expected
11/2022	Newsletter Item	INFO on Portal Decommissioning	Promote EMODnet Seabed Habitats products access via the Central Portal.

11/2022	EMODnet Central Tweet	ESH website winding down & Publication of all ESH spatial data and data products via Central Portal	Promote and develop engagement with EMODnet Central Portal.
12/2022	EMODnet Central Tweet	Publication to the central portal of relevant data and products collected and created under WP2	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
01/2023	EMODnet Central Protocol for promoting new datasets	Release of coralligenous layer for Med	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
01/2023	News Item on ESH website	Release of coralligenous layer for Med	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
02/2023	EMODnet Central Protocol for promoting new datasets	Release of biogenic substrate layer for Europe	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
02/2023	News Item on ESH website	Release of biogenic substrate layer for Europe	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
04/2023	EMODnet Central Protocol for promoting new datasets	Publication to the Central Portal of data, updated and new products	Develop public engagement with CP and Promote EMODnet Seabed Habitats Products
04/2023	Storymaps (TBC)	Development and delivery of storymaps for the Med / Baltic / Caribbean (TBC)	Promote availability of, and regional engagement with, new EMODnet Seabed Habitats Products
04/2023	News Item on ESH website	Publication of Story maps for Med / Baltic / Caribbean	Promote availability of, and regional engagement with, new EMODnet Seabed Habitats Products
06/2023	EMODnet Central Protocol for promoting new products / datasets	EuSeaMap Update, including coverage for the Caspian and the Caribbean	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
06/2023	EMODnet Central Tweet	EUSeaMap Update, coverage and availability	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
06/2023	News Item on ESH website	Publication of a new expanded version of EUSeaMap	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
06/2023	EMODnet Central Protocol for promoting new products / datasets	Publication of extent of wetland type in Europe, Caspian Sea and the Caribbean	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
09/2023	EMODnet Central Protocol for promoting new datasets	Publication to the Central Portal of data, updated and new products	Develop public engagement with CP and Promote EMODnet Seabed Habitats Products
09/2023	EMODnet Central Tweet	Publication of EOV layers and associated reports	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
09/2023	EMODnet Central Protocol for promoting new products / datasets	Publication of Live Hard Coral Cover EOV in Europe	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
09/2023	EMODnet Central Protocol for promoting new products / datasets	Publication of Seagrass Cover EOV in Europe	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
09/2023	EMODnet Central Protocol for promoting new products / datasets	Publication of Macroalgal Cover EOV in Europe	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products

09/2023	EMODnet Central Protocol for promoting new products / datasets	Publication of Mangrove Cover and Composition EOVS in Europe	Promote availability of, and engagement with, new EMODnet Seabed Habitats Products
09/2023	News Item on ESH website	Publication of new products from ESH	Promote EMODnet Seabed Habitats Products

[In Table A, list peer reviewed publications directly (co-)authored by consortium and project partners since the start of the project phase. In Table B, list all non-peer reviewed publications (co-)authored. In all cases, indicate the type of publication, provide the full reference incl. title, volume and issue etc., and whether the publication is open or closed access.]

A. (Co-)Authored peer-reviewed publications in this project phase					
Date of publication	Type of publication	Full reference	ISBN	DOI	Is it open access? Yes/No
01/2022	Journal	Larkin Kate E., Marsan Andrée-Anne, Tonné Nathalie, Van Isacker Nathalie, Collart Tim, Delaney Conor, Vasquez Mickael, Manca Eleonora, Lillis Helen, Calewaert Jan-Bart (2022). Connecting marine data to society . In Ocean Science Data. Collection, Management, Networking and Services. 2022. Manzella, G, Novellino, A (Eds). ISBN 978-0-12-823427-3. Chap.5, pp.283-317 (Elsevier BV) .	978-0-12-823427-3	https://doi.org/10.1016/B978-0-12-823427-3.00003-7	Yes
12/02/2022	Paper	Manolis Tsapakis, Ioanna Kalantzi, Alexandra Pavlidou, Nomiki Simboura, Konstantinos Tsiaras, Nikolaos Katsiaras & Maria Louiza Petre (2022). The Coastal Environmental Status of Argolikos Gulf. In: The Handbook of Environmental Chemistry. Springer, Berlin, Heidelberg.		https://doi.org/10.1007/698_2021_838	Yes
20/09/2022		Borja, Angel & Pouso, Sarai & Galparsoro Iza, Ibon & Manca, Eleonora & Vasquez, Mickaël & Lu, Wenhai & Yang, Lu & Uriarte, Ainhize. (2022). Applying the China's marine resource-environment carrying capacity and spatial development suitability approach to the Bay of Biscay (North-East Atlantic). 9. 10.3389/fmars.2022.972448.		http://dx.doi.org/10.3389/fmars.2022.972448	Yes
01/09/2022	Journal	Horta e Costa, Barbara & Gonçalves, Jorge & Gonçalves, Emanuel. (2022). UN Ocean Conference needs transparent and science-based leadership on ocean conservation. Marine Policy. 143. 105197. 10.1016/j.marpol.2022.105197.		10.1016/j.marpol.2022.105197	Yes

14/07/2022	Journal	Panayotidis, Panayiotis & Papathanasiou, Vasillis & Gerakaris, Vasilis & Fakiris, Elias & Orfanidis, Sotiris & Papatheodorou, George & Kosmidou, Maria & Georgiou, Nikos & Drakopoulou, Paraskevi & Loukaidi, Valia. (2022). Seagrass meadows in the Greek Seas: presence, abundance and spatial distribution. <i>Botanica Marina</i> . 65. 289-299.		http://dx.doi.org/10.1515/bot-2022-0011	No
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B. Other/non-peer reviewed types of publications (co-)authored in this project phase

Date of publication	Type of publication	Full reference	ISBN	DOI	Is it open access? Yes/No
01/05/2022	Spreadsheet	Vasquez, M. (2022). Summary of extents of MSFD benthic broad habitats per sub-region based on EUSeaMap 2021. Available online at https://www.emodnet-seabedhabitats.eu/resources/documents-and-outreach			Yes
01/09/2022	Conference Paper	Todorova, Valentina & Panayotova, Marina & Doncheva, Valentina & Zlateva, Ivelina. (2022). ASSESSING THE PHYSICAL DISTURBANCE ON THE SEABED FROM FISHERIES IN THE BULGARIAN BLACK SEA AREA WITH REFERENCE TO BENTHIC HABITATS STATUS. 10.5593/sgem2021/3.1/s15.83.		http://dx.doi.org/10.5593/sgem2021/3.1/s15.83	Yes
01/09/2022	Conference Paper	Todorova, Valentina & Doncheva, Valentina. (2022). BENTHIC HABITATS BIODIVERSITY STATUS IN THE BULGARIAN BLACK SEA IN 2019 -CLASSIFICATION AND SPATIAL ASSESSMENT UNDER THE MARINE STRATEGY FRAMEWORK DIRECTIVE. 10.5593/sgem2021/3.1/s15.86.		http://dx.doi.org/10.5593/sgem2021/3.1/s15.86	Yes

For a compressive overview of publications referring to/making use of EMODnet data and/or data products, please consult Google Scholar.

9. Monitoring indicators

[Refer to the standardised monitoring tool, i.e. Matomo/ Europa Analytics, to complete the indicators excel template, and provide a short explanation in the table below on the numbers and trends for each indicator when possible/applicable. **Indicate clearly if monitoring was carried out using tools other than Matomo/Europa Analytics.**]

Comments on the progress indicators in the indicators spreadsheet		
Progress indicator	Means of collecting figures	Comment
1. Current status and coverage of total available thematic data A) Volume and coverage of available data	Other	A good addition of habitat data, especially in underrepresented regions such as the Black Sea. Relatively small percentage increase of 1% is ok considering the initial large volume of point data extant in the database.
What is your opinion on the data coverage within EMODnet for your thematic?		
B) Usage of data since the start of the project phase	Other	Number of downloads and WMS and WFS requests cannot be compared with the previous reporting period because the figures from the last final report covered a two-year period, whereas the current reporting period is one year. However there is a distinct upward trend in map visualisations. Note that WFS request tracking is particularly susceptible to inflated numbers due to either erroneous or intentional repeated requests against type names (e.g. bots, security, feature stats), but this is difficult to discern in the data.
2. Current status and coverage of total number of data products A) Volume and coverage of available data products	Other	Key areas of increase in this reporting period are the addition of 24 essential fish habitats: collection of classified maps/collection of models as well as increase in the number of seabed habitats (including coastal wetlands): collection of classified maps and new environmental variable data products from the Caspian sea.

B) Usage of data products since the start of the project phase	Other	<p>Statistics marked with an asterisk * or dagger † symbol were grouped together in the previous reporting period, therefore the trend is presented here as total of each group against the previous period.</p> <p>Number of downloads and WMS and WFS requests cannot be compared with the previous reporting period because the figures from the last final report covered a two-year period, whereas the current reporting period is one year. However there is a distinct upward trend in map visualisations.</p> <p>Also, numbers of map visualisations, WMS requests and WFS requests are not very comparable across reporting periods due to previous aggregation across data/products.</p>
3. Internal and external organisations supplying/approached to supply data and data products since start of the project phase	Other	Receipt of data from a number of different bodies. Predominantly Government/public bodies, followed by academia with low representation from industry and NGOs.
4. Online 'Web' interfaces to access or view data	Other	No major changes to infrastructure.
6. Statistics on information volunteered through download forms	Other	Around 50% of users providing some statistics (the portal does not enforce statistics collection to remain a truly open data portal), Of the users that reported a country or region, as expected a large proportion are European, which the largest country share the United Kingdom, followed by Italy, France, Spain, Belgium, Ireland and Portugal. This ties closely with partners, suggesting that promotion of the site within partner countries is very effective.

7. Published use cases		
9. Technical monitoring	Matomo	Acceptable response time
10. Visibility & Analytics for web pages	Matomo	Fairly consistent use across the reporting period
11. Visibility & Analytics for web sections	Matomo	Fairly consistent use across the reporting period
12. Average visit duration for web pages	Matomo	Fairly consistent use across the reporting period

The monitoring numbers reported as part of the progress monitoring of EMODnet performance are collected through Matomo and/or Europa Analytics, unless reported otherwise.

10. Recommendations for follow-up actions by the EU

[Give a list of recommendations and suggestions for the EU to consider and take action. Max 1 page.]

Standard definitions in EUNIS and MSFD benthic broad habitat types

The transformation of the EUNIS classification in 2019 led to standardised naming across basins of broad habitat types (i.e. those described at hierarchical levels 1-3 of the classification scheme), which was widely welcomed and seen as a significant improvement. However, the classification scheme still has major issues.

A recent user feedback from the MSFD TG Seabed illustrates one of the main issues, which is the lack of specific, quantitative definitions of the broad seabed habitat types. As part of their MSFD assessments, some users noticed significant discrepancies in the German North Sea between EUSeaMap and German local habitat maps with respect to sediment characterisation. In many places EUSeaMap exhibited muddy habitats while the local maps exhibited sandy habitats. Both maps however used the same sediment maps as source, which were all originally classified in the same sediment classification scheme, namely Folk (1954), which uses metrics of sand:mud ratio and proportion of gravels to classify into the various sediment types, including 'mud', 'sandy mud', 'muddy sand', 'sand', etc. In reality, this region contains high proportions of what the Folk classification calls 'sandy mud', which is a class that has been variously interpreted by habitat mappers over the years when deriving a habitat type from sediment information.

In this example, the German local maps placed the boundary between EUNIS mud and sand categories at the sand:mud ratio of 4:1 (i.e. 80% sand) while EUSeaMap 2021 uses a ratio of 9:1 (i.e. 90% sand). This adds to other examples of inconsistent sediment categorisations in the habitat mapping initiatives over the past 20 years. For example, the boundary between EUNIS sand and mud categories was placed by Connor et al (2006) (UKSeaMap) and Cameron and Askew (2011) (EUSeaMap 2010) at ratio 4:1, while James et al (2010) and Tappin et al (2011) (local UK-based studies) placed it at 6:1 (approx. 85% sand). For the version 2016 of EUSeaMap (Populus et al, 2017), a further analysis in northwest Europe concluded that there is no clear evidence for a hard, ecologically-relevant boundary between sand and mud, whether it be at ratio 7:1 (i.e. 87.5% sand) or 9:1. From a practical point of view, it was decided to place it at 9:1 for EUSeaMap, seeing as though it aligned with an existing Folk boundary - the classification in the sediment map used as a source for EUSeaMap and used universally in sediment mapping. However, none of these boundaries correspond with that used in the Mediterranean or Black Sea, which is at a ratio of 1:1 (i.e. 50% sand, 50% mud).

The last published manual for the EUNIS classification was released in 2004 (Davies et al, 2004). We have been informed that the manual to accompany the latest version of EUNIS is still not close to publication. As a result, the new version of EUNIS is little more than a set of terms, each with a brief description, without any quantitative definition. The 2004 guidance itself is also not helpful in resolving the matter as it refers to a ratio of 30% mud, 70% sand – a boundary that predates all the European scale broad-scale mapping studies and that it not used at all.

Commission Decision (EU) 2017/848 (laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment) lists the habitat types that Member States must refer to for the purposes of the MSFD – the Benthic Broad Habitat Types. This list does not include definitions but appears to assume that the (new version

of) EUNIS classification scheme would include standard consistent definitions that reflect the standard, consistent terminology.

Further discrepancies between maps are likely to occur until EUNIS sediment types are clearly defined in terms of Folk classification metrics. But this is just an example. There are other compartments of the EUNIS classification that are not defined, or their definition is so unspecific that it may lead to confusion or misinterpretation. Considering how fundamental it is to MSFD implementation, precise definitions of broad habitat types are imperative for all Europe.

Therefore, we would recommend that the EU considers the creation of EUNIS regional working groups, the terms of reference of which would be to 1) define precisely the broad habitat types in all marine regions, and 2) review and update the EUNIS classification at biotope levels, i.e. levels 4-6. This would be needed in all regions, but more particularly in the Black Sea, where there is no consensus. There are also substantial gaps in the Arctic section, which currently only comprises these biotopes from the Atlantic section that are acknowledged to occur in the Arctic. This could lead to consistency within regions at least, if not between regions. These should be accompanied by a timely update mechanism for all changes to be published by the European Environment Agency.

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