EMODnet

European Marine Observation and Data Network

EMODnet Thematic Lot n° 2 - Seabed Habitats

Start date of the project: 05/05/2017 - (24 months)

EMODnet Phase III – Interim Report

Reporting Period: 05/05/2017 – 04/05/2018

The European Marine Observation and Data Network (EMODnet) is financed by the European Union under Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund.

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Executive summary

A consortium of partners representing the full geographic scope of the tender specification joined together to deliver the requirements for EMODnet Thematic Lot 2 – Seabed Habitats (EASME/EMFF/2016/1.3.1.2/Lot2/SI2. 751208). The EMODnet Seabed Habitats partnership comprises government agencies, research institutes and private companies with proven national and international expertise in marine seabed mapping and modelling, who have been collaborating effectively together since 2009. The first project, urEMODnet (2009-2012), delivered prototype seabed habitat maps in four trial basins (Greater North Sea, Celtic Seas, Baltic, Western Mediterranean). An extended consortium was formed for EMODnet Seabed Habitats Phase 2, which extended coverage to all basins and refined models. EMODnet Seabed Habitats Phase 3 is building on these strong foundations to add detail, strengthen evidence and refine existing products as well as collating new types of data about ground truthing surveys. This Interim Report summarises the progress to date.

Data preparation is well underway to improve input layers that will be required for the update of EUSeaMap in Year 2. This includes both the creation of new layers by this project (such as kinetic energy at the seabed), and the liaison with other EMODnet Lots (Geology, Bathymetry, Physics, Chemistry and Biology) regarding layers which they are creating that will feed into our model. Work is also underway to revise the thresholds that underpin the model, create a final list of habitats to be included within the broad-scale map and move the model to run on open source software.

The project partners have designed a schema for the collation of ground truthing habitat data points that is compatible with the schema used by EMODnet Biology and developed guidance around how to complete it. Ground truthing data points have now been collated from almost all partners for onwards submission to EurOBIS following quality assurance procedures. The new schema will allow the information to be uploaded to the same infrastructure used by Biology, namely the Ocean Biological Information System (OBIS). An additional 257 habitat maps have been collated by the 12 partners and made available via the web mapping portal. A review of marine habitat modelling has been completed which identified over 200 seabed habitat modelling studies in Europe.

The EMODnet web portal has been relaunched to conform with the updated EMODnet Style Guide and a new back end system for the interactive map has been implemented in the form of GeoServer which will improve functionality for machine-to-machine web services. We have initiated contact with the Regional Seas Conventions over their use of and requirements for the EMODnet Seabed Habitats portal building upon already good relationships with HELCOM and OSPAR. Further work is required to establish and maintain better links with the Barcelona and Black Sea conventions. Contact with other external projects, both within Europe and beyond, has been initiated and will continue in earnest in Year 2.

The next phase of the project will re-run the model to create the updated EUSeaMap and associated confidence maps at three scales: 1:1,000,000, 1:250,000, and 1:100,000. These will be delivered to external parties via the web portal. Data collation work will progress to contacting external parties across Europe for submission of their habitat mapping data to the portal. Additional updates will be made to the web portal to improve functionality. Much of the focus for Year 2 will move to reaching out to the stakeholder community, promoting the web portal and improving connections and interaction with external websites.

1 Introduction

EMODnet Seabed Habitats 3 is initially a two-year project, running from 5th May 2017 to 4th May 2019, with the possibility of a further two-year extension. The general objective of the EMODnet Seabed Habitats project is to create a homogeneous seabed habitat map covering all European seas. The project brings together a consortium of 12 partners which cover the full geographic scope of the project area:

- The Black Sea is represented by GeoEcoMar and IO-BAS.
- The Eastern Mediterranean is represented by ISPRA and HCMR.
- The Western Mediterranean is represented by Ifremer and ISPRA.
- The Atlantic basins are represented by the Marine Institute, JNCC, CCMAR and Ifremer.
- The Arctic basins, Greater North Sea and Norwegian Sea are represented by NIVA, JNCC, GEUS and Bioconsult.
- The Baltic is represented by GEUS, SYKE and Bioconsult.

Members of the Partnership have been collaborating effectively since urEMODnet (2009-2012) to deliver prototype seabed habitat maps in four trial basins (Greater North Sea, Celtic Seas, Baltic, Western Mediterranean). An extended consortium was formed for EMODnet Seabed Habitats Phase 2, which successfully extended coverage to all basins and refined models. EMODnet Seabed Habitats Phase 3 aims to add detail, strengthen evidence and refine existing products, in addition to collating new types of data from ground truthing surveys.

The first consistent broad-scale seabed habitat maps for European waters were developed under the Preparatory action for EMODnet (EC contract no. MARE/2008/07) supporting the European Commission's vision for *"a seamless multi-resolution digital seabed map of European waters by 2020"*. Phase 2 of the EMODnet Seabed Habitats project (EC contract no. MARE/2012/10) extended these prototype maps so that they now cover all European basins, building on the methodology with enhanced validation. This broad-scale product has been complemented with a collation of habitat maps from surveys that are freely disseminated online through the same portal. Phase 3 of EMODnet Seabed Habitats will fulfil the desire to deliver products to the highest resolution possible, by changing our modelling methods to take account of the best-resolution data coming from other Lots (for example, Lot 1 Geology), accessing ground truthing data currently held in separate repositories with machine-to-machine connections, and boosting the existing library of digital habitat maps. To provide our data and data products to users in the most efficient and helpful way, we are making improvements to our portal so that the user experience is the best it can be, maximising interoperability and ensuring data are freely available.

The tender specification called for eight tasks to be undertaken by the consortium:

Task 1: Develop a common method of access to data held in repositories

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

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

Task 4: Develop a web portal allowing users to find, visualise and download data

Task 5: Ensure the involvement of regional sea conventions

Task 6: Facilitate interoperability with data distributed by non-EU organisations

Task 7: Install a process to monitor performance and deal with user feedback

Task 8: Operate a help desk offering support to users

These are being delivered through seven work packages:

WP1: Data preparation

For "a base layer of modelled habitat at a scale of 1:100,000 or better" we need input data representing the most important abiotic variables for predicting these habitats. These input data need to be at a resolution that is sufficient to describe the resolution at which these abiotic variables vary in nature. This work package aims to ensure that we have the best possible input data layers to feed into WP2 – Thresholds, modelling and confidence.

WP2: Thresholds, modelling and confidence for broad-scale physical habitat map

This work package aims to construct an updated broad-scale habitat map for all European sea basins (known as EUSeaMap).

WP3: Individual habitat modelling

The main objective of this work package is to explore how modelling of single habitats can be integrated with the results of broad-scale modelling, and therefore contribute to our 'map of the sea'. Additional objectives are to carry out a review of individual seabed habitat modelling, to collate and disseminate existing modelled maps of seabed habitats through our portal and to use modelling to fill identified gaps.

WP4: Ground truthing data

This work package aims to collate and provide access to information on the spatial distribution of habitats or communities in European marine waters.

WP5: Library of habitat maps

This work package aims to build a comprehensive "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". This library will be available to download from the EMODnet Seabed Habitats portal.

WP6: Portal and EUNIS application

The objective of this work package is to provide an attractive, intuitive means for the public to discover, view and download data and data products used, created and collated by the Project. The work package will build and improve on the existing EMODnet Seabed Habitats portal framework to provide both front-facing user-interfaces and OGC/INSPIRE compliant machine-to-machine web services for integration into other platforms and websites.

WP7: Co-ordination and communication

The objective of this work package is to co-ordinate the scientific and technical achievements of the Partnership, to manage the Project in terms of deliverables, deadlines, budget and financial matters and to organise communication and dissemination.

2 Highlights in this reporting period

- **New web portal and mapping services** – in May 2018 EMODnet Seabed Habitats published our new mapping portal and pushed out our updated mapping services. The new portal is delivered via the Umbraco content management system and has been redesigned in line with the revised EMODnet style guide to include additional functionality such as an online helpdesk feature for people wanting to contact the project team. At the end of Year 1 our mapping portal has been transferred over to GeoServer which allows for improved machine-to-machine connections through INSPIRE and OGC compliant Web Mapping Services (WMS) and Web Feature Services (WFS) and additionally include Web Coverage Services (WCS) as standard.

- **EUSeaMap publication** - the EMODnet Broad-Scale Seabed Habitat Map for Europe (EUSeaMap) was updated in June to include the new MSFD benthic broad habitat types (which are defined in in Part II of the Annex to Commission Decision (EU) 2017/848). A comprehensive report detailing the method behind EUSeaMap was published in June – see http://www.emodnet-seabedhabitats.eu/resources/documents#2017_link.

- **Preparatory work for Year 2 EUSeaMap update** – in preparation for the Year 2 update of EUSeaMap we have been collating and creating the necessary environmental data layers. We have been making progress modelling kinetic energy at the seabed in the Black Sea. Discussions have begun with EMODnet Physics and Mediterranean benthic ecologists about making a mask for the Rhône plume area and a decision has been taken to extend the thresholds prevailing in Norway into the Barents Sea. A list of boundaries to review and reanalyse (for example, the boundary between the infralittoral and circalittoral zones in polyhaline regions of the Baltic Sea) has been compiled. The review and reanalysis work will commence early in Year 2 as planned. Furthermore, options for translating the model from proprietary software, ArcGIS, to open source software, R, have been compared as well as altering one of the steps of the process to allow a multi-resolution output.

- **A new schema for ground-truthing data** – up to now there has been no European infrastructure for the sharing of ground-truthing data on seabed habitats. Therefore, the first task to making this kind of data available has been to produce a data schema that will allow disparate data sets to be combined and published in a standard way. In the creation of this data schema we recognised that it will be essential to be able to retain the links with any species information also recorded from the same ground-truthing samples – i.e. the data that is collated and published by EMODnet Biology. Therefore, we have designed a schema that is compatible with the schema used by EMODnet Biology. This will allow the information to be uploaded to the same infrastructure used by Biology, namely the Ocean Biological Information System (OBIS). These data are compliant with Darwin Core facilitating interoperability with non-EU data.

- **External data collated and published** - an additional 257 habitat maps have been collated by the 12 partners of EMODnet Seabed Habitats and made available via the web mapping portal (representing an almost 60% increase in the number of maps available). Habitat ground-truthing data points have been collated from almost all partners for onwards submission to EurOBIS. Once the data has been submitted to EurOBIS it will also be made available via the EMODnet Seabed Habitats portal. All partners have contributed to the production of a list of over 200 seabed habitat modelling studies in Europe which has identified sources of external data products to try to acquire and publish via the portal in Year 2. Initial contact has been made with over 40 potential third-party data providers in at least 10 countries to explore what data exists and what can be shared with the project. This work will continue in earnest in Year 2.

- **Links made with external projects** – we have attended a series of external events to publicise the EMODnet Seabed Habitats project and establish initial links with potential collaborators both within Europe and further afield. This work will continue in earnest in Year 2. Links established to date include:
    - presenting the requirements of the Seabed Habitat project to Mercator Ocean (the operators of the Copernicus Marine Service) and stating our willingness to collaborate.
    - attending a seabed mapping workshop of the Atlantic Ocean Research Alliance (AORA) to present the EMODnet Seabed Habitats portal and make proposals for interoperability with their data and their North Atlantic Data Viewer.
    - attending the launch workshop of the Ecological Coastal Units (ECUs) project where we presented EUSeaMap and the EUNIS habitat classification and contributed to the definition of the objectives and methods. The work will be carried out by ESRI and USGS primarily, and we will act as advisors to the project.
    - agreeing with UNEP-WCMC to share data from the data calls for their project on compiling habitat datasets and making them available online via their Ocean Data Viewer and developing a joint statement to include in those data calls to explain the join-up to data providers. We also discussed the possibility of EMODnet Seabed Habitats acting as a European node for the production of the datasets on the extent of seagrass beds, cold-water coral reefs and saltmarshes.
    - agreeing with the European Topic Centre on Inland, Coastal and Marine waters lead, to issue coordinated data calls and share data wherever possible.
    - initiating discussions with the European Environment Agency (EEA) about the inclusion of distribution maps on the marine EUNIS habitat web pages, hosted by EEA. We plan to work with EEA to feed these maps via machine-to-machine connections directly from the EMODnet Seabed Habitats portals. This work will begin in Year 2.

- **Work with the Regional Sea Conventions** – EMODnet Seabed Habitats partners are already well-integrated into the work of the RSCs. We have identified partners within the consortium with specific responsibilities for liaison with each RSC secretariat. These are:
    - Baltic: SYKE
    - Black Sea: IO-BAS
    - Mediterranean: ISPRA
    - North-east Atlantic: JNCC

  We have good relationships with HELCOM and OSPAR and will continue to deliver products to meet their reporting requirements. We attended an OSPAR Intersessional Correspondence Group on the Co-ordination of Biodiversity Assessment and Monitoring (ICG-COBAM) workshop on the process of data flow for feeding into assessments in December to promote the services that EMODnet could offer in streamlining data flow into these assessments. We have identified that the Barcelona RSC use the EMODnet portal and will make contact in the next quarter to ensure our existing products meet their needs. We will endeavour to find the relevant contact in the Black Sea, however engagement with this RSC has proved difficult

- **Liaison with other EMODnet Lots** – links have been established and maintained with other lots, in particular EMODnet Geology and EMODnet Biology:
    - **EMODnet Geology:** in May 2017, we attended the EMODnet Geology kick-off highlighting the Seabed Habitat plans of relevance to Geology. Acknowledging the heavy reliance of EMODnet Seabed Habitats on the seabed substrate product of EMODnet Geology, JNCC and GTK (Geology coordinator) held a face-to-face meeting in October 2017. Here, we discussed various points of common interest, including, *inter alia*, (a) how best to communicate about specific issues with the substrate data product, (b) what to do about organogenic sediments and other seabed features that are not included in the substrate data product and (c) confidence assessment.
    - **EMODnet Biology:** in April 2017, we introduced the Seabed Habitat plans and discussed potential ways to work together at the EMODnet Biology kick-off meeting. We have proposed to EMODnet Biology to share information about, and access to, the same datasets so that they

may benefit from our efforts and to ensure some consistency between the use of environmental data layers in the modelling activities of both projects. In October 2017 we sat on the organising committee of the EMODnet Biology Essential Data Products Workshop and presented the EMODnet Seabed Habitats project at the workshop, highlighting its links with EMODnet Biology and its ambitions/possibility regarding the development of data products. In May 2018, we attended their partner meeting to help ensure appropriate join up between EMODnet Biology and our WP 4.

3 Summary of the work done

An overview of wider progress against the work packages can be found in Section 6. A summary of progress in relation to the eight tasks specified in Section 1.4.1 of the Tender Specification is highlighted below:

Task 1: Develop a common method of access to data held in repositories

EMODnet Seabed Habitats has continued to collate and make available habitat maps from across European Seas. In Year 1 of the project an additional 257 habitat maps have been collated by the 12 partners and made available via the web mapping portal (representing an almost 60% increase in the number of maps available). Ground-truthing habitat data points have been collated from almost all partners for onwards submission to EurOBIS early on in Year 2 of the project. Once the data has been submitted to EurOBIS it will also be made available via the EMODnet Seabed Habitats portal. All partners have contributed to the production of a list of over 200 seabed habitat modelling studies in Europe. This has identified sources of external data products to try to acquire and publish via the portal. Collation of these models, where available, and publication on the portal will occur in Year 2.

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

The EMODnet Broad-Scale Seabed Habitat Map for Europe (EUSeaMap) was updated in June to include the new MSFD benthic broad habitat types (which are defined in in Part II of the Annex to Commission Decision (EU) 2017/848) and a comprehensive report detailing the method behind EUSeaMap was published in June – see www.emodnet-seabedhabitats.eu/outputs. Much preparatory work has been completed in Year 1 in advance of a re-run of the EUSeaMap model in Year 2 of the project (see progress updates for Work Packages 1 and 2 below for more detail).

This new version of EUSeaMap, to be completed in Year 2, will encompass the latest updates brought by EMODnet Bathymetry, EMODnet Geology and work undertaken in Year 1 of EMODnet Seabed Habitats. The new broad-scale map will be produced at three scales: 1:1,000,000, 1:250,000, and 1:100,000.

In Year 1 a literature review of best practice in habitat modelling has been completed. We will use this review in Year 2 to help us to establish best practice, identify gaps and seek models that we could use to help us improve our own products.

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

JNCC have transferred the EMODnet Seabed Habitats mapping portal over to GeoServer. This new platform allows for improved machine-to-machine connections through INSPIRE and OGC compliant Web Mapping Services (WMS) and Web Feature Services (WFS) and additionally includes Web Coverage Services (WCS) as standard.

Task 4: Develop a web portal allowing users to find, visualise and download data

The EMODnet Seabed Habitats web portal has been relaunched and now operates on the Umbraco Content Management System. It has been brought up-to-date and is now in line with the recently launched EMODnet Style Guide. The mapper has been updated with the additional 257 habitat maps and now holds 737 datasets.

In Year 2 of the project additional data layers will be collated and made available for download via the portal.

Task 5: Ensure the involvement of regional sea conventions

We have good relationships with HELCOM and OSPAR and will continue to deliver products to meet their reporting requirements. We have identified that the Barcelona Convention use the EMODnet portal and will make contact in Year 2 to ensure our existing products meet their needs. We will endeavour to find the relevant contact in the Black Sea, however engagement with this regional sea convention has proved difficult.

Task 6: Facilitate interoperability with data distributed by non-EU organisations

In Year 1 of the project we have initiated contact with a number of non-EU initiatives seeking collaboration:

- In November we attended the Atlantic Seabed Mapping International Working Group (ASMIWG) meeting and presented the EMODnet Seabed Habitats portal and made proposals for interoperability with their data and their North Atlantic Data Viewer. The portal developers (NOAA) were not present but the attending members of the working group agreed on the need for interoperability between the portals and promised to take the message to NOAA.
- We have also identified another source of potential collaboration – with the Horizon 2020-funded SponGES project, who we spoke to at the Atlantic Seabed Mapping International Working Group meeting and were very keen on data exchange and interoperability between portals.
- In October we attended the launch workshop of the Ecological Coastal Units (ECU) project (led by the United States Geological Survey (USGS) and ESRI). We presented EUSeaMap and the EUNIS habitat classification and contributed to the definition of the objectives and methods for defining these ECUs based on our experiences and knowledge of marine classification approaches, potential issues and data availability. The work will be carried out by USGS and ESRI primarily, and we will act as advisors to the project.
- UNEP-WCMC "is seeking to convene an international network of intergovernmental and governmental focal points, including the Secretariat of the Convention on Biological Diversity (CBD), the Ramsar Secretariat, and the International Coral Reef Initiative Secretariat, to transform our understanding of where important habitats—such as seagrasses, warm- and cold-water corals, saltmarshes, and mangroves—can be found, and our ability to track and ground-truth their extent and condition systematically over time. The resulting ocean habitat datasets will be made available online via their Ocean Data Viewer, and will be packaged into an online *Ocean Atlas* showcase. We have agreed to share data from the data calls of this project and EMODnet Seabed Habitats and developed a joint statement to include in those data calls to explain the join-up to data providers. We also discussed the possibility of EMODnet Seabed Habitats acting as a European node to produce the datasets on the extent of seagrass beds, cold-water coral reefs and saltmarshes.

In Year 2 a greater focus of effort will be on communications and outreach and we plan to follow up on some of these opportunities which have been created.

In addition to the above, the habitat points ground-truthing data that have been collated through WP 4 for submission to EurOBIS are compliant with Darwin Core, facilitating interoperability with non-EU data.

Task 7: Install a process to monitor performance and deal with user feedback

In line with all other EMODnet portals Europa Analytics has been installed on the EMODnet Seabed Habitats portal to enable enhanced monitoring of the web portal. To date user feedback (primarily via email) has been responded to, logged and reported on to the EMODnet Secretariat and DG MARE within the quarterly reporting of the project. At the end of Year 1 EMODnet Seabed Habitats has launched a new helpdesk feature alongside other communications channels and so, moving into Year 2 of the project there should be an enhanced user experience in relation to providing feedback on the portal.

Task 8: Operate a help desk offering support to users

A helpdesk has been launched on the EMODnet Seabed Habitats portal as part of the new website. The EMODnet Seabed Habitats team are now available to answer external queries from 0900-1700 (Brussels time), Monday to Friday via the online helpdesk, contact form, phone number or email address.

4 Challenges encountered during the reporting period

Main challenge	Measures taken
None of the individuals from our consortium are involved in the EMODnet Data Ingestion project, which makes engaging with that project more difficult than for all the other lots.	We have recommended the use of the Ingestion portal in a guidance document for Seabed Habitats partners who are seeking third-party data. All Seabed Habitats partners have registered as 'data centres' with the EMODnet Ingestion portal, which will allow them to process any data submission related to seabed habitats in their country or a neighbouring country.
Several partners have begun to approach third parties about acquiring their data and many of them have received some resistance.	The response varies by country as some have a more open data sharing culture than others. Some promising feedback that has been received, however, is that with some perseverance the data owners sometimes change their minds. As such, we have not yet listed any organisations that have been approached to supply data with no result (indicator 3), because we prefer to view these difficulties as a 'work in progress'.
Finding the best way to engage with the RSCs has been a challenge – while it is important to involve the secretariats, it is often the working groups/expert groups who can really define the requirements. In addition, it seems like with all the effort made to date, more work is needed to promote the offerings of EMODnet. EMODnet portals are not yet considered the default source of data for RSC groups.	We have identified partners within the consortium with specific responsibilities for liaison with each RSC secretariat. These are: ○ Baltic: SYKE ○ Black Sea: IO-BAS ○ Mediterranean: ISPRA ○ North-east Atlantic: JNCC In Year 2 we plan to do further work to assess how we can better promote EMODnet Seabed Habitats to the RSCs and get our products and portal better integrated within their processes.
In developing the templates and guidance for publishing habitat point data we found that most habitat classification systems were not represented online as standard controlled vocabularies.	We are now in contact with the British Oceanographic Data Centre about generated controlled vocabularies for the most common classification. In the meantime, we are having to refer to other web pages and PDF reports when providing a unique resource identifier (URI) for a habitat type or classification system. We will then have to edit the URIs once the controlled vocabularies are published. A related issue is that biotopes or communities are sometimes attributed to points based on ad hoc statistical analyses, and therefore they do not correspond to any particular classification system.
There is limited full-coverage environmental data available to use in the extension of EUSeaMap to the full Barents Sea.	We may have to produce a relatively simple model for this area that is more reliant on using depth proxies for defining the boundaries of biological zones, and excludes any distinction between high, moderate and low energy areas.

Achieving the requested resolution for EUSeaMap will be difficult in many areas due to the resolution of the available environmental datasets. For example, EMODnet Geology expect to achieve the 1:100,000 scale for less than 10 % of European seas for its seabed substrate data product (a key input to EUSeaMap).	We will produce the new broad-scale map at three scales: 1:1,000,000, 1:250,000, and 1:100,000 depending on the resolution of the underlying data in any given area.
Preparation of habitat maps for publishing on the portal	Many partners have had problems with the generation of INSPIRE-compliant metadata for the map collation process and this has had to be manually repeated by the workstream lead for almost all of the maps collated. This process could be avoided in the future if the INSPIRE Editor online was upgraded and maintained so the resulting metadata it creates passed the online validation test.
Compliance with the General Data Protection Regulations	The General Data Protection Regulations come into force in May and there has been little central discussion about how we are going to comply going forward. We will add a privacy notice to the download facility of the seabed habitats portal but still have personal information included in quarterly reports and are not clear how to deal with these, apart from deleting the relevant content. We are awaiting a further steer from the EMODnet Secretariat, but will have to develop a lot based solution in the interim and will report our actions in the next period.

5 Allocation of project resources

Categories	Resource usage (Estimated %)
Making data and metadata interoperable and available	50%
Preparing data products	19%
Preparing web-pages, viewing or search facilities	15%
Managing user feedback	1%[1]
Project management	10%
Outreach and communication activities	5%
Others	

[1] Time spent by the project team dealing with user feedback figure low due to limited user feedback being received in comparison to the time taken to complete other tasks. All user feedback has been actioned swiftly (see Section 7).

6 Work package updates

Work Package 1 – Data preparation (WP lead: Ifremer)

Obtain predictions of kinetic energy at the seabed

In the Black Sea, IO-BAS developed a long-term wave hindcast in the western part at 3 km resolution and two small areas at resolution around 400m. As part of WP1 ISPRA post-processed 11 years of data to evaluate the 90th percentile of wave energy at the bottom of the 3km resolution area. These three areas do not cover the entire Black Sea and, moreover, the resolution of the most extensive one is not sufficiently fine to substantially improve the previous results obtained in Phase 2. As a result, ISPRA decided to provide a new evaluation of the sea bottom wave energy at high resolution using EMODnet Bathymetry and the available high resolution winds. The resolution of the total new domain of Black Sea is 1/64, and two nested areas have also been processed, the resolution of which is 1/128 (i.e. around 1km) and the union of which covers all the Black Sea. The available data covers the period 2016-2018.

For Macaronesia and Iberia layers will be produced from archives relative to two Copernicus CMEMS products: "atlantic-iberian biscay irish- ocean physics analysis and forecast" for T, S, currents, resolution 1/36 x1/36 "atlantic-iberian biscay irish- ocean wave analysis and forecast" for waves, resolution 1/10 x1/10.

Improve the mapping of the oxygen regime in the Black Sea

In the Black Sea Copernicus CMEMS provides a product named "Black Sea biochemistry hindcast" which is a hindcast for various biochemical variables among which is "dissolved oxygen". Simulated values of oxygen are annually averaged at the spatial resolution of 5km, for 30 vertical levels in the water column over an 11-year time period. Another variable comprises oxygen values at the seafloor. Unfortunately, its spatial coverage is the north-western shelf only. We are in contact with Copernicus to try to find a solution to this.

Identify and compile new environmental data layers for the Baltic Sea

GEUS have been in touch with SGU about new secchi depth data. GEUS and SYKE are working on identifying and compiling the best possible Baltic data layers. SYKE has provided depth-attenuated wave exposure at the seabed. This will be assessed during the next progress meeting.

Identify and compile environmental data layers for the Barents Sea

SYKE made a bid for a project with Russian colleagues around data in the Barents Sea, which unfortunately was unsuccessful. A decision was then taken to extend the thresholds prevailing in Norway into the Barents Sea using EMODnet base layers such as depth and substrate. However, regarding water transparency (defining the infralittoral zone), Ifremer is planning to contract ACRI-ST (who have previously modelled the whole EU waters) to extend their model into the Barents Sea.

Liaise with EMODnet Geology, Bathymetry, Physics & Chemistry, Biology

Geology

EMODnet Geology have now completed their 1:100,000 layer. The coverage is drastically reduced in comparison with the 1:250,000 but there is quite a lot of coverage in the coastal zone. This delivery is the primary condition

for our habitat map to be developed at a similar scale. JNCC, ISPRA, HCMR, Ifremer and Bioconsult met with Geology leads in Oct 2017 to discuss substrate issues. We discussed two topics:

a) how to deal with bioclastic fraction of surface sediments;
b) what is needed in terms of seabed geomorphology and what Geology can do. HCMR have created a log file and shared it with partners.

Bathymetry

We are waiting for the 100m DTM to be delivered in summer 2018. This new version will enable us to improve all secondary layers based on bathymetry (e.g. thresholds of biozones).

Physics and Chemistry

Ifremer have been in touch with Mediterranean benthic ecologists about the justification for a Rhône plume area mask and with EMODnet physics regarding river flow data. Discussions did not lead to significant enough benthic drivers to make such a mask, so the idea was ruled out. JNCC have agreed with EMODnet Physics that they will also show the physical layers we have produced to give them more publicity.

Biology

Biology produced a wish list in a Google document which was commented on by Ifremer and partners were invited to also add their contributions. JNCC have made all layers available via WMS so that Biology can access them directly from R scripts for their modelling.

Work Package 2 – Modelling, thresholds and confidence (WP lead: Ifremer)

Adapt the GIS model to allow multi-resolution and to use open-source software

So far EMODnet Seabed Habitats has produced the broad-scale map in raster mode, leading to the loss of some of the detail contained by the seabed substrate polygon layers provided by EMODnet Geology. Therefore, in Phase 3 an objective of the project was to test a new polygon-based approach. We were also wanting to move towards open source solutions.

A stress-test study was carried out to compare the performance of four software packages, namely ArcGISTM, GRASS, QGIS and R for the union of three polygon layers.

R packages were rapidly removed from the test because they were not successful with simple input datasets. The main difference between ArcGIS, QGIS and GRASS was for the time performance. ArcGIS was surprisingly fast, QGIS was surprisingly slow, and GRASS was substantially slower than ArcGIS but the performance was still acceptable.

As a conclusion, from the five tested options, ArcGIS and GRASS were the two only serious ones for the union of heavy layers. Although ArcGIS is substantially better than GRASS when it comes to time performance, the project has decided to use GRASS. This is because GRASS can be run from R software and we are planning to implement in R the GIS process workflows that produce the broad-scale habitat map.

Run the GIS models to produce an updated broad-scale habitat for all Europe

The above-mentioned GIS models will be run to produce a new version of the broad-scale seabed habitat map for the whole of Europe, including the Barents Sea in Year 2 of the project.

This new version will encompass the latest updates brought by EMODnet Bathymetry, EMODnet Geology, and the project WP1.

It has been decided that the broad-scale map will be produced at three scales: 1:1,000,000, 1:250,000, and 1:100,000. Obviously, the spatial coverage will be the same as that of the seabed substrate layer provided by EMODnet Geology at these scales.

Revise the list of habitats to be included in the broad-scale physical habitat map

Correlating MSFD Broad Habitat types and EMODnet seabed habitat Broad Habitat types

A table that correlates MSFD Benthic Broad Habitat types[2] and the Broad Habitat types used in EMODnet broad-scale seabed habitat maps (not limited to EUNIS types) was published[3] in June 2017.

Black Sea habitats

A meeting took place in April 2018 at IO-BAS (Varna, Bulgaria), the objective of which was to assess the broad-scale habitat map which was produced in 2016 as part of EMODnet Phase 2 and brainstorm on solutions to the

2 Marine Strategy Framework Directive Benthic Broad Habitat Types (V. 2017) as defined in: COMMISSION DECISION (EU) 2017/848 of 17 May 2017

3 Manca E., Lillis H., Annunziatellis A., Agnesi S., Mo G., Tunesi L., Parry M., Doncheva V., Al-Hamdani Z., 2017. The MSFD Benthic Broad Habitat Types Tables. Annex to Populus J. et al., 2017

identified issues. A key output of the meeting is a revised version of the broad-scale habitat classification for the Black Sea. The updated list of these habitats is provided in Annex I along with their definition in terms of seabed substrate and abiotic variables, and the acknowledged benthic assemblages hosted by these habitats. A revised version of the above-mentioned correlation table between benthic broad MSFD habitats and the broad habitat types used in EMODnet broad-scale seabed habitat maps is provided in Annex II.

As a result, a revised map of the Black Sea broad-scale seabed habitat map has been created and will be published soon (Figure. 1). This map will be updated to include the latest seabed substrate map provided by EMODnet Geology at the scale 1:100,000.

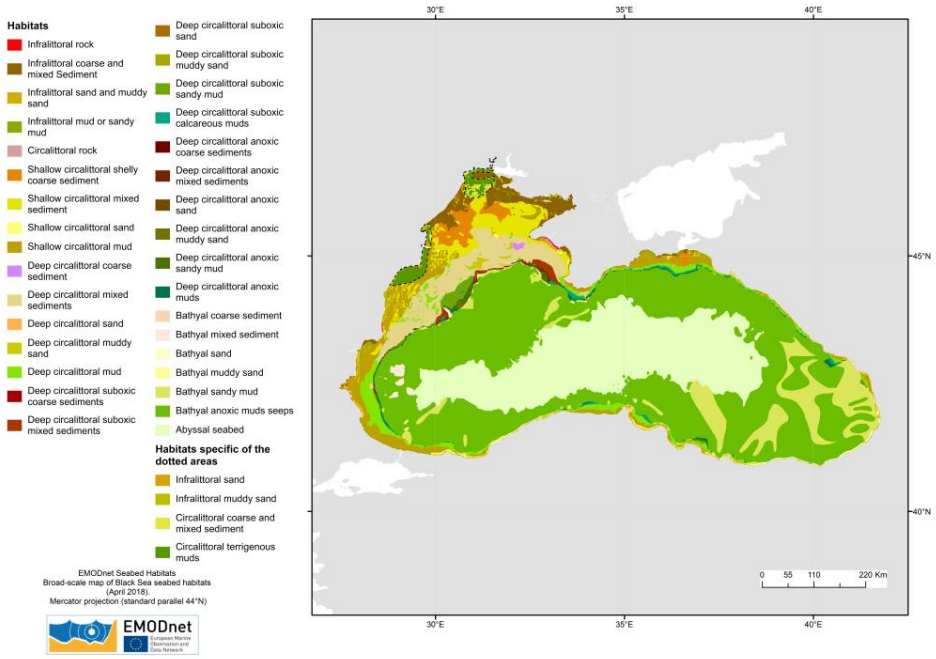

Figure 1. Update of the Black Sea broad-scale seabed habitat map

Biogenic substrate

The WP is compiling a layer of "biogenic substrate" (e.g. "*Lophelia pertusa* reefs", "Pacific oyster beds", etc.) from WP5 data layers, where "biogenic substrate" strictly refers to beds or reefs of a species that meet similar criteria to Mediterranean *Posidonia oceanica* meadows in that they:

- Cover and replace the underlying substrate as a structuring factor, so that the underlying substrate cannot be detected;
- Occur on different substrate types, so that the underlying substrate cannot be presumed;
- Are detectable using acoustic survey techniques, so that they are mapped in the same way as other substrate types.

After this data layer has been compiled, the project will decide if it is relevant to insert the polygons into the broad-scale seabed habitat map as has been done in the Mediterranean basin for the *Posidonia oceanica* meadows.

Carry out analyses to identify biologically-relevant thresholds

A list of the thresholds that require revision has been produced. The main efforts are for the Barents Sea. Depending on WP1 outcomes with respect to wave and oxygen, there will also be investigation into improvements in the Black Sea infralittoral/shallow circalittoral, shallow circalittoral/ offshore circalittoral and oxic/suboxic/anoxic categories. Due to new data on light, a new threshold will also be worked out in the Baltic for infralittoral/circalittoral.

Work Package 3 – Individual habitat modelling (WP lead: SYKE)

In Year 1 of the project a review of European seabed habitat modelling efforts has been completed and is currently out with project partners for review.

Web of Science (accessed 15.1.2018) was used to identify 4,364 articles citing marine habitat mapping and modelling (years 2007–2017). Using the search terms "habitat" & "marine" & "model" resulted in 3,377 articles. These articles were reviewed, resulting in 237 articles that dealt with marine habitat modelling in the European marine area. We conducted qualitative data analysis using the Nvivo programme and produced figures and tables based on the resulting work. An outline of these activities has now been written up into the habitat modelling review.

Work Package 4 – Ground truthing data (WP lead: ISPRA)

During the first year of the project WP4 has largely delivered what was required with just a slight delay occurring with internal data collection.

The first part of the year was dedicated to the identification of the best database schema. Feasible structures were shared among the project partners and we evaluated the possibility of constructing a schema that would be interoperable with the main existing biological database (i.e. those used by EMODnet Biology and the structure used by OBIS, with particular reference to the new extension OBIS-ENV).

A specific meeting with EMODnet Biology, attended by JNCC, ISPRA and VLIZ, was held in Ostend in July 2017. During this meeting the WP4 database schema was shared with VLIZ colleagues in order to evaluate the compatibility between our structure and the OBIS archive. During the following months VLIZ and the WP4 leaders continued discussions in order to improve the interoperability between the respective systems.

Based on the result of this meeting and feedback provided by WP4 partners, the final structure of the WP4 database was released immediately after the first EMODnet Seabed Habitats progress meeting in Athens (October 2017).

This version of the schema is comprised of three different sheets (metadata, sampling event and EMOF compliant information) and was released with some vocabularies already defined and linked to the allowed database entries (i.e. the authors can feed the database with the sampling point and related habitat information and the relative vocabulary entries are auto-completed). Furthermore, a guidance document for the compilation of the three sheets was created. Finally, if habitat ground truthing data is already present in EMODnet Biology only the EMOF sheet data is completed and for this reason a separate file with only the explanation of the EMOF compliant sheet and the relative vocabularies was also prepared.

Then, in order to support the compilation of the database, two teleconferences were held in November 2017 and January 2018.

In order to confirm the interoperability between the WP4 schema and the OBIS structure and to discuss in detail some issue concerning the vocabularies used in the database, a new teleconference was carried out in February 2018 with VLIZ colleagues. During this conference we agreed to share some test datasets that were sent to VLIZ.

It was agreed that some new vocabularies entries will be managed by JNCC via BODC vocabulary (http://vocab.nerc.ac.uk/collection/).

Each partner provided most of the internal datasets according to the map tracker file present in the project's SharePoint by the end of April. Collected data are now under QA/QC check and will be ready submission to OBIS and subsequent upload to the EMODnet Seabed habitat web portal after the mid-term meeting in Faro (May 2018).

Work Package 5 – Library of habitat maps (WP lead: Marine Institute)

In Year 1 a total of 257 maps were collated by the 12 partners for the Habitat Map collation work package. This number exceeds the number of maps listed at the proposal stage of the project. The maps have undergone the JNCC data submission process and have all been checked for format and metadata compliance before being forwarded to JNCC for upload onto the EMODnet Seabed Habitat maps portal. The collated maps mostly comprise EUNIS habitat maps from surveys and Annex I habitat maps from Natura 2000 surveys.

All partners provided good quality spatial data in terms of its topological correctness and there weren't any issues regarding the data exchange formats specified by JNCC for each GIS shapefile submitted. Some issues arose on how composite maps could be collated. In some cases, they were divided by survey and confidence score, but some maps (e.g. maps provided by SYKE) were unable to be split in this way so it was decided to keep them as composite maps displaying one habitat (e.g. Annex 1 habitat).

The first progress meeting highlighted concerns surrounding the usefulness of the confidence assessment scoresheet when it comes to assessing habitat maps derived from point data only. The present scoresheet gives these maps a very low score despite the high density of ground truthing data and expert interpretation input into the generation of the map. It will be a topic for discussion again at the next progress meeting where the issue will be resolved with possibly the generation of a new scoresheet for subsequent phases of EMODnet mapping projects. The comprehension of these map scores is reliant on the visibility of the criteria on which the map is scored being made available to persons viewing or downloading the map.

Finally, the main reasons for maps listed in the proposal but not collated were due to these maps being more suitable to other data collation work packages (e.g. WP3, WP4 or OSPAR), or on account of the fact that the maps were incomplete or only available as a WMS. In most instances, partners collated alternative maps to those listed in the proposal to ensure the number they proposed were submitted.

The figures for maps proposed and those submitted along with reasons for not submitting maps proposed is summarised in the following table.

Partner Country & Organisation	Number of maps proposed	Number of maps submitted	Number of maps not submitted	Reasons for maps listed in proposal not being submitted
Bulgaria (IOBAS)	6	6	0	N/A
Denmark (GEUS)	5 sets of maps	77	0	N/A
Finland (SYKE)	2 sets of maps	9	5	some of the product outputs from models were not suitable for inclusion in WP5
France (IFREMER)	12	12	4	4 alternative maps were submitted instead of the 4 maps listed in the proposal
Germany (BioConsult)	3	6	0	N/A
Greece (HCMR)	2	2	0	Additional data were listed in the proposal but these were more suited to WP3 & WP4
Ireland (MI)	3 sets and 9 maps	87	5	Some of the maps have been submitted elsewhere on the portal (e.g.Annex I grids and OSPAR)
Italy (ISPRA)	9	8	1	This map has been replaced by the data in map IT003006
Norway (NIVA)	1 set of maps	5	10	These maps were more suited to OSPAR and some were only available as WMS layers
Portugal (CCMAR)	8	1	0	All maps proposed were consolidated into one map (this was agreed at the Progress Meeting in Athens)
Romania (GeoEcoMar)	3	2	1	3rd map proposed is no longer in existence.
UK (JNCC)	10 sets and 4 maps	42	32	There are several reasons why some maps have not been submitted in Year 1: 1. JNCC staff resource has been focussed on portal updates and ingestion of large number of partner maps as lead of WP6 (so some UK maps will be uploaded in Year 2 instead); 2. Some maps are awaiting updates and will be uploaded once updated (e.g. Annex I composite maps); 3. Difficulty in extracting individual surveys from composite products (e.g. the CNCB Annex I maps), though these maps will be extracted to upload.

Work Package 6 – Portal and EUNIS application (WP lead: JNCC)

In the first year of the project JNCC have overseen a contract to move the EMODnet Seabed Habitats web portal over onto the Umbraco Content Management System. The new website was launched in May 2018 and the website design has been refreshed to conform with the updated EMODnet Style Guide. Additional functionality now included on the website includes:

- A dedicated EMODnet Seabed Habitats helpdesk including online chat powered by tawk.to and an online contact form in addition to email address and phone number;
- An up-to-date RSS news feed.

The mapping platform has also been migrated to GeoServer and the portal now:

- has INSPIRE compliant OGC web services;
- provides full WFS, WMS and WCS web services for key data products as standard;
- has the ability to monitor the web services for tracking and direct use of machine-to-machine services.

In terms of data and data products made available from the portal this year we have added:

- An updated version of the EMODnet Broad-Scale Seabed Habitat Map for Europe (EUSeaMap) which includes the new MSFD benthic broad habitat types (updated in June 2017);
- 257 additional habitat maps from survey collated through WP5 primarily from partner organisations.

This year we have also started to make contact with external organisations to improve the visibility of the portal and links with other projects as detailed below:

- Although none of our consortium are partners in the EMODnet Ingestion portal we have made links with the Ingestion portal and recommended it's use in a guidance document for Seabed Habitats partners who are seeking third-party data. All Seabed Habitats partners have registered as 'data centres' with the EMODnet Ingestion portal, which will allow them to process any data submission related to seabed habitats in their country or a neighbouring country.
- We have attended three EMODnet Biology meetings and proposed to them that we share information about, and access to, the same datasets so that they may benefit from our efforts and to ensure some consistency between the use of environmental data layers in the modelling activities of both projects.
- We have had initial discussions with the European Environment Agency (EEA) about the inclusion of distribution maps dynamically generated by EMODnet Seabed Habitats portal on the marine EUNIS habitat web pages, hosted by EEA. We plan to work with EEA to feed these maps via machine-to-machine connections directly from the EMODnet Seabed Habitats portals. This work will begin in Year 2.
- In November 2017, we attended a seabed mapping workshop of the Atlantic Ocean Research Alliance (AORA) to present the EMODnet Seabed Habitats portal and make proposals for interoperability with their data and their North Atlantic Data Viewer.

Work Package 7 – Co-ordination and communication (WP lead: JNCC)

Co-ordination

In the first year of the project the work of the Partnership has been effectively co-ordinated and all quarterly reports and the interim report delivered to EASME and the EMODnet Secretariat. A memorandum of agreement between the partners was drawn up and signed by all project partners shortly after the contract was signed in May 2017.

JNCC have represented the EMODnet Seabed Habitats project at EMODnet Steering Committee and Technical Working Group meetings and attended other meetings organised by the Secretariat throughout the year as required.

To date two partner meetings have been held – an inception meeting was held in Cambridge, UK in April 2017 and the first progress meeting took place in Athens, Greece in October 2017. A third progress meeting has been organised to review progress of the first year and plan in more detail the work to be completed in Year 2 in Faro, Portugal in May 2018.

A face-to-face meeting was organised with EMODnet Geology (in conjunction with the progress meeting in Athens) to facilitate detailed discussions over areas of common interest and ensure appropriate co-ordination between the Lots and we have attended three EMODnet Biology meetings within the first year to ensure appropriate join up across these Lots as well.

Communications

A communications plan has been developed but will be further refined early on in Year 2 as the focus of the project shifts towards publicising the EMODnet Seabed Habitats portal. In the first year of the project we have:

- Produced an updated EMODnet Seabed Habitats booklet outlining work completed to date and introducing the goals of the current phase of the project which we will use when we attend meetings and events in Year 2 to publicise the portal;
- Initiated contact with the various Regional Seas Conventions and identified a lead contact point for each convention who will be responsible for maintaining and developing links and identifying how EMODnet products could be further integrated into their work;
- Attended many other meetings and events to promote the work of the project as outlined in Sections 8 and 9 of this report;
- Contributed to a peer reviewed paper on the use of EUSeaMap in supporting Ecosystem Based Management.

7 User Feedback

Date	Organization	Type of user feedback (e.g. technical, case study etc.)	Response time
2016	OSPAR	Case study – They combined the products (EUSeaMap and EUNIS habitat maps from surveys) into a single layer, attached sensitivity information to it and overlaid with human activity data to assess the "Extent of Physical Damage to Predominant and Special Habitats", which is an OSPAR common indicator which is being used to inform against the MSFD criteria D1.6 - Habitat condition and D6.1 - Physical damage, having regard to substrate characteristics	NA
2017	SimCelt habitat	Case study - They presented EUSeaMap as the best source of data on Marine Habitats for the Celtic Seas region for the purposes of Maritime Spatial Planning.	NA
2017	Adriplan project	Case study - EUSeaMap used in a cumulative impact assessement for the Adriatic Sea – presented through a data portal and peer review publications	NA
2017/01	NA	General portal feedback: we signed our website up to http://peek.usertesting.com/ which uses members of the public to provide feedback on a website via a 5-minute screencast.	NA
2017/05/12	burdGIS	General portal feedback (unsolicited): "A fantastic seabed habitat datasource courtesy of EMOD"	NA
2017/06/01	SGU	Future product suggestion: add a feature to the portal that would allow anyone to produce their own 'EUSeaMap' using their own data. (in discussion at ICES WGMHM)	NA
2017/06/01	AWI	Future product suggestion: add tools to the portal to allow people to analyse the data in different ways, e.g. some basic spatial statistics. (in discussion at ICES WGMHM)	NA
2017/09	EMODnet Check-points	Case studies: We have reviewed all the EMODnet Checkpoint Data Adequacy Reports and compiled a list	NA

		of relevant points. For each point, we have identified an action.	
2017/09/28	ISMAR-CNR	Technical: this user had previously enquired about the adoption of CC-BY 4.0 license on EMODnet products. They were informed that EMODnet Seabed Habitats had moved to the license for all portal-made products. They provided positive feedback on the license adoption and suggested it be used in wider EMODnet.	NA
2017/09/06	SYKE	Technical: one partner suggested the ability to drag layers on the map's table of contents to determine drawing order. Suggestion added to development options, but is currently not feasible.	NA
08/01/2018	University of East Anglia	Data request: request for full coverage NW EU continental shelf maps of several coastal/littoral habitats (saltmarsh, seagrass, kelp beds, intertidal mudflats, intertidal sandflats, maerl beds) to create carbon budget for the area.	2 hours
19/02/2018	EMODnet Secretariat	Technical: zoom function not working properly for one of the ESH interactive map layer.	3 hours
25/02/2018	European Atlas of the Seas Steering Committee/EMODnet Secretariat	Technical: encoding of the characters.	21 hours
26/02/2018	European Atlas of the Seas Steering Committee/EMODnet Secretariat	Technical: issue with display of one of the layers and suggestion to use an url instead of an IP address and to hide the mapserver map file (directory path and folders, subfolders…) with help of a php wrapper.	22 hours
02/03/2018	Ghent University	Data request: request for wave data in the Belgian continental shelf.	3 hours
07/03/2018	European Atlas of the Seas Steering Committee/EMODnet Secretariat	Technical: suggestion for improving the speed and accessibility of the WMS/WFS services, to allow series monitoring and implement csw entry point.	NA
28/03/2018	European Environment Agency	Technical: suggestion for improving interoperability with WISE marine data service.	NA

8 Meetings held/attended since last report

Date	Location	Title	Internal/External + Short Description
18-20/04/2017	Cambridge, UK	EMODnet Seabed Habitats Partner Meeting	Internal – Kick off meeting with partners for EMODnet Seabed Habitats Phase 3
25-26/04/2017	Ostend, Belgium	EMODnet Biology Kick Off Meeting	Internal – Attended meeting to establish links and introduce the Seabed Habitats project
30/05/2017	Copenhagen, Denmark	ICES Habitat Mapping Working Group	External – Presented on EMODnet Seabed Habitats (previous achievements and plans for this phase), asked for feedback on the portal and started discussions on how to better align EMODnet SH with the ICES WGMHM
30-31/05/2017	Espoo, Finland	EMODnet Geology Kick Off Meeting	Internal – Attended meeting to establish links and introduce the Seabed Habitats project
07/06/2017	Copenhagen, Denmark	ETC-ICM, Technical Group – Data (TGDATA)	External – Provided EMODnet Seabed Habitat slides for a presentation giving an overview of all EMODnet data and metadata standards in relation to MSFD reporting.
06/07/2017	Teleconference	WP2 meeting	Internal – To debate the integration in the broad-scale map existing survey data polygons on biogenic habitats
13-15/09/2017	Rome, Italy	EMODnet Steering Committee	Internal – JNCC represented EMODnet Seabed Habitats at the meeting
18/09/2017	Toulouse, France	Meeting with Mercator Ocean	External – presented the requirements of the Seabed Habitats project for Copernicus products and stated our willingness to collaborate
02/10/2017	Athens, Greece	Meeting with EMODnet Geology	Internal - JNCC and GTK (EMODnet Geology coordinator) discussed various points of common interest between the projects.
03-06/10/2017	Athens, Greece	EMODnet Seabed Habitats Partner Meeting	Internal – Second EMODnet Seabed Habitats Partner Meeting
10/10/2017	London, UK	EMODnet Biology Essential Data Products Workshop	Internal - presented the EMODnet Seabed Habitats project, its links with EMODnet Biology and its ambitions/possibility regarding the development of data products.
30-31/10/2017	Redlands, California, USA	Ecological Coastal Units Project Workshop	External - presented EUSeaMap and the EUNIS habitat classification and contributed to the definition of the objectives and methods for defining these ECUs based on our experiences and knowledge of marine classification approaches, potential issues and data availability.
08-09/11/2017	Bergen, Norway	Atlantic Seabed Mapping International Working Group	External - presented the EMODnet Seabed Habitats portal and make proposals for interoperability with their data and their North Atlantic Data Viewer.

		Seabed Mapping Workshop	
14-17/11/2017	Antwerp, Belgium	EMODnet Open Sea Lab	Internal – represented EMODnet Seabed Habitats at the meeting
05/12/2017	Gothenburg, Sweden	OSPAR ICG-COBAM Data Flows Workshop	External - promoted the services that the project can offer in streamlining data flow into these indicator assessments.
20/02/2018	London, UK	Seabed Mapping Working Group	External – UK habitat mapping group of various organisations with a seabed habitat mapping remit throughout the UK. JNCC attended and highlighted EMODnet work as relevant.
26/02/2018	Edinburgh, UK	MAREMAP	External – UK meeting on co-ordinated effort to map seafloor geology. JNCC attended workshop and highlighted EMODnet work as relevant.
26/02/2018	Teleconference	WP2 Progress Meeting	Internal – Updates on thresholds, milestones and actions
20-21/02/2018	Mallorca, Spain	EMODnet Technical Working Group	Internal – JNCC represented EMODnet Seabed Habitats at the meeting
21-23/02/2018	Mallorca, Spain	EMODnet Steering Committee	Internal – JNCC represented EMODnet Seabed Habitats at the meeting
14/03/2018	Marine Institute, Ireland	COMPASS Project Modelling Workshop	External EU Project meeting. Presentation 'Irelands Seabed Mapping Programme' with EMODnet participation slides.
11-12/04/2018	Varna, Bulgaria	WP2 Meeting	Internal – To assess the Black Sea broad-scale seabed habitat map and brainstorm on solutions to issues
24/04/2018	London, UK	MEDIN 10 Year Meeting	External – Discussions with other meeting attendees about progress with EMODnet Seabed Habitats
03-04/05/2018	Trieste, Italy	EMODnet Biology Meeting	Internal – To maintain links and co-ordination between EMODnet Biology and Seabed Habitats, particularly in relation to WP4 ground truthing.

9 Outreach and communication activities

Date	Media	Title	Short description and/or link to the activity
01-05/05/2017	Leaflet distributed at Geohab	The EMODnet Seabed Habitats Portal: Your one-stop shop for seabed habitat data	Leaflet distributed at Geohab conference in Halifax, Canada - http://geohab2017.wixsite.com/geohab2017
15/06/2017	Presentation at RDA-Europe BlueBRIDGE Datathon on Fisheries and Aquaculture	EMODnet Seabed Habitats	Invited to present an overview of the datasets and tools available that could be useful during the datathon. Presentation given remotely via GoToMeeting - http://www.bluebridge-vres.eu/events/rda-europe-bluebridge-datathon-fisheries-and-aquaculture-june-15-16-heraklion-crete-greece
11/07/2017	Poster presentation at M2D - Models to Decisions annual conference	Confidence in the EMODnet Broad-Scale Seabed Habitat Map for Europe	Poster presentation on confidence assessment in EMODnet SH broad-scale map at a conference on communicating uncertaities in modelling to decision makers. Conference organised by the M2D network - http://blogs.exeter.ac.uk/models2decisions/events/m2d-2017-annual-conference/
15-16/11/2017	Presentation at INFOMAR National Seabed Mapping conference	EMODnet regional data products	Presentation at INFOMAR National Seabed Mapping conference in Ireland on EMODnet regional data products - http://www.infomar.ie/documents/INFOMAR_2017_Seminar_Agenda.pdf
10-12/01/2018	Presentation at Nordic Geological Winter Meeting	EMODnet seabed habitats. The Danish contribution.	Presentation by GEUS on EMODnet Seabed Habitats at the Nordic Geological Winter Meeting - http://2dgf.dk/foreningen/33rd-nordic-geological-winter-meeting/
10/02/2018	Peer reviewed paper published in Open Journal of Ecology	European Broad-Scale Seabed Habitat Maps Support Implementation of Ecosystem-Based Management	Project members contributed to the publication of a paper on the use of EUSeaMap in supporting Ecosystem Based Management. The paper is available online at: http://file.scirp.org/Html/2-1380880_82460.htm
20-22/03/2018	Presentation at Merigeo	EMODnet: tour d'horizon	Presentation by Ifremer on EMODnet at Merigeo - http://www.merigeo.fr/
27/03/2018	Presentation at MAREANO INFORMAR and MAREMAP (MIM)	Automated Marine Habitat Classification Techniques	Presentation by the Marine Institute at the MIM working group on seabed substrate mapping including information on EMODnet

	working group		
05/2018	Leaflet updated for use in Year 2	The EMODnet Seabed Habitats Portal: Your one-stop shop for seabed habitat data	EMODnet Seabed Habitats leaflet has been updated to include work completed and plans for Phase 3 for use to publicise the portal at events in Year 2 of the project.

10 Updates on Progress Indicators

Indicator 1 - Volume of data made available through the portal

The following data product has been updated made available to view and download through the portal:

- ***"EUSeaMap" 2016** – updated to align with the published Marine Strategy Framework Directive Benthic Broad Habitat types*

The following data products created by EMODnet Seabed Habitats Phase 2 have been made available to view and download through the portal – note that these three products are visible as a single layer on the interactive map [4]:

- *Kinetic energy at the seabed due to currents in the Black Sea - derived from the Copernicus CMEMS project archives, (resolution 10km; years 1971-1984 and 1990-2001).*
- *Kinetic energy at the seabed due to currents in the Mediterranean Sea - derived from the Copernicus CMEMS project (resolution 7 km; years 1999-2011).*
- *Kinetic energy at the seabed due to currents in the Adriatic Sea - derived from the Tessa project archives (resolution 2.2 km; years 2011-2014).*

The following external data products have been made available to view through the portal, with direct links to download them from their original source [5]:

- *Habitats Directive – Official 2013 reported distribution: 1110 Sandbanks which are slightly covered by sea water all the time*
- *Habitats Directive – Official 2013 reported distribution: 1120 Posidonia beds*
- *Habitats Directive – Official 2013 reported distribution: 1130 Estuaries*
- *Habitats Directive – Official 2013 reported distribution: 1140 Mudflats and sandflats not covered by seawater at low tide*
- *Habitats Directive – Official 2013 reported distribution: 1150 Coastal Lagoons*
- *Habitats Directive – Official 2013 reported distribution: 1160 Large shallow inlets and bays*
- *Habitats Directive – Official 2013 reported distribution: 1170 Reefs*
- *Habitats Directive – Official 2013 reported distribution: 1180 Submarine structures made by leaking gases*

The following list comprises the "GUIs" (Globally Unique Identifiers) of the newly submitted maps by the end of the first year. These can be searched for in the Metadata search page on EMODnet Seabed Habitat:

- **6** new maps submitted by IO-BAS (Bulgaria): BG003000, BG003001, BG003002, BG003003, BG003004, BG003005

- **77** new maps submitted by GEUS (Denmark): DK003001, DK003002, DK003003, DK003004, DK003005, DK003006, DK003007, DK003008, DK003009, DK003010, DK003011, DK003012, DK003013, DK003014, DK003015, DK003016, DK003017, DK003018, DK003019, DK003020,

[4] Environmental variables that influence habitat type > Currents > Kinetic energy at the seabed due to currents (Mediterranean, Black Sea): http://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/?LAYERS=EUSMCURR_medBS&zoom=3&Y=40&X=-11

[5] Composite data products > Habitats Directive – Official 2013 reported distribution: http://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/?LAYERS=ANXI_1110,ANXI_1120,ANXI_1130,ANXI_1140,ANXI_1150,ANXI_1160,ANXI_1170,ANXI_1180&zoom=3&Y=40&X=-11

DK003021, DK003022, DK003023, DK003024, DK003025, DK003026, DK003027, DK003028, DK003029, DK003030, DK003031, DK003032, DK003033, DK003034, DK003035, DK003036, DK003037, DK003038, DK003039, DK003040, DK003041, DK003042, DK003043, DK003044, DK003045, DK003046, DK003047, DK003048, DK003049, DK003050, DK003051, DK003052, DK003053, DK003054, DK003055, DK003056, DK003057, DK003058, DK003059, DK003060, DK003061, DK003062, DK003063, DK003064, DK003065, DK003066, DK003067, DK003068, DK003069, DK003070, DK003071, DK003072, DK003073, DK003074, DK003075, DK003076, DK003077

- **9** new maps submitted by SYKE (Finland): FI003002, FI003003, FI003004, FI003005, FI003006, FI003007, FI003008, FI003009, FI003010
- **12** new maps submitted by IFREMER (France): FR003001, FR003002, FR003003, FR003004, FR003005, FR003006, FR003007, FR003008, FR003009, FR003010, FR003011, FR003012
- **6** new maps submitted by BioConsult (Germany): DE003000, DE003001, DE003002, DE003004, DE003005, DE003006
- **2** new maps submitted by HCMR (Greece): GR003001, GR000016
- **87** new maps submitted by Marine Institute (Ireland): IE003001, IE003002, IE003003, IE003004, IE003005, IE003006, IE003007, IE003008, IE003009, IE003010, IE003011, IE003012, IE003013, IE003014, IE003015, IE003016, IE003017, IE003018, IE003019, IE003020, IE003021, IE003022, IE003023, IE003024, IE003025, IE003026, IE003027, IE003028, IE003029, IE003030, IE003031, IE003032, IE003033, IE003034, IE003035, IE003036, IE003037, IE003038, IE003039, IE003040, IE003041, IE003042, IE003043, IE003044, IE003045, IE003046, IE003047, IE003048, IE003049, IE003050, IE003051, IE003052, IE003053, IE003054, IE003055, IE003056, IE003057, IE003058, IE003059, IE003060, IE003061, IE003062, IE003063, IE003064, IE003065, IE003066, IE003067, IE003068, IE003069, IE003070, IE003071, IE003072, IE003073, IE003074, IE003075, IE003076, IE003077, IE003078, IE003079, IE003080, IE003081, IE003083, IE003084, IE003085, IE003086, IE003087, IE003088
- **8** new maps submitted by ISPRA (Italy): IT003000, IT003001, IT003002, IT003003, IT003004, IT003005, IT003006, IT003007
- **5** new maps submitted by NIVA (Norway): NO003003, NO003004, NO003005, NO003011, NO003012
- **1** new map submitted by CCMAR (Portugal): PT003015
- **2** new maps submitted by GeoEcoMar (Romania): RO003003, RO003004
- **42** new maps submitted by JNCC (UK): GB001055, GB001089, GB001090, GB001120, GB001218, GB001232, GB001260, GB001261, GB001300, GB001312, GB001314, GB001327, GB001333, GB001336, GB001494, GB001499, GB001505, GB001507, GB001512, GB001514, GB001518, GB001520, GB001522, GB001524, GB001528, GB001530, GB001536, GB001544, GB001546, GB001552, GB003019, GB003020, GB003021, GB003026, GB100381, GB200053, GB300026, GB400003, GB400006, GB400007, GB400008, GB400009

Indicator 2 - Organisations supplying each type of data broken down into country and organisation type (e.g. government, industry, science)

	Country	Organisation Type
Agence des aires marines protégées	France	Government Agency
Agri-Food and Biosciences Institute (AFBI)	Ireland	Government Agency
Alfred Wegener Institute	Germany	Research
ArcticNet Inc	Canada	Research
Associated British Ports (ABP)	UK	Industry
AZTI-Tecnalia	Spain	Research
BioConsult Schuchardt & Scholle GbR	Germany	Industry
Bord Iascaigh Mhara (BIM) Fisheries	Ireland	Government Agency
British Geological Survey	UK	Government Agency
Cemex UK Marine Ltd	UK	Industry
Centre for Environment, Fisheries and Aquaculture Science (Cefas)	UK	Government Agency
Chichester Harbour Conservancy	UK	Industry
ConocoPhillips	International	Industry
Cornwall Wildlife Trust	UK	NGO/Charity
Department of Environment, Farming and Rural Affairs (Defra)	UK	Government Agency
Devon Biodiversity Records Centre	UK	NGO/Charity
DOP/IMAR University of the Azores	Portugal	Academia
Dorset Wildlife Trust	UK	NGO/Charity
Ecological Consultancy Services Ltd.	UK	Industry
Environment Agency (EA)	UK	Government Agency
Environment and Heritage Service (EHS)	UK	Government Agency
Envision Mapping Ltd	UK	Industry
Geological Survey of Finland	Finland	Government Agency
Geological Survey of Denmark & Greenland (GEUS)	Denmark	Government Agency
Ghent University	Gelgium	Academia
Hellenic Centre for Marine Research	Greece	Government Agency
Hellenic National Oceanographic Data Centre	Greece	Government Agency
Helsinki Commission	International	Government Agency
ICES	Denmark	Government Agency
Ifremer	France	Research
Institut des Milieux Aquatiques (IMA)	France	Research
Instituto Português do Mar e da Atmosfera (IPMA)	Portugal	Academia
IO-BAS	Bulgaria	Government Agency
Isle of Wight County Council	UK	Government Agency
ISPRA	Italy	Government Agency
Joint Nature Conservation Committee (JNCC)	UK	Government Agency

Leibniz Institute for Baltic Sea Research, Warnemünde IOW	*Germany*	*Research*
Marine Institute	*Ireland*	*Government Agency*
Marine Institute and Geological Survey of Ireland	*Ireland*	*Government Agency*
Marine Scotland Science	*UK*	*Government Agency*
Metsähallitus	*Finland*	*Government Agency*
Ministero dell'Ambiente e della Tutela del Territorio e del Mare	*Italy*	*Government Agency*
National Museums and Galleries of Wales	*UK*	*Government Agency*
National Parks and Wildlife Service	*Ireland*	*Government Agency*
Natural England	*UK*	*Government Agency*
NIMR Geoecomar	*Romania*	*Government Agency*
Norwegian Institute for Water Research (NIVA)	*Norway*	*Government Agency*
Npower	*UK*	*Industry*
Plymouth Marine Lab	*UK*	*Research*
RIKZ (Rijksinstituut voor Kust en Zee)	*Netherlands*	*Government Agency*
RIZA (Institute for Inland Water Management and Waste Water Treatment)	*Netherlands*	*Government Agency*
Salcombe Harbour Authority	*UK*	*Government Agency*
Scottish Environment Protection Agency (SEPA)	*UK*	*Government Agency*
Scottish Natural Heritage	*UK*	*Government Agency*
Spanish Institute of Oceanography	*Spain*	*Government Agency*
Thames Estuary Partnership	*UK*	*Industry*
The Finnish Environment Institute SYKE	*Finland*	*Government Agency*
Marine Biological Association	*UK*	*Research*
Torbay Coast and Countryside Trust (TCCT)	*UK*	*NGO/Charity*
UNEP World Conservation Monitoring Centre	*UK*	*Research*
University College Cork	*Ireland*	*Academia*
University of Algarve (UAlg-FCT)- Centre of Marine Science (CCMAR)	*Portugal*	*Academia*
University of Aveiro	*Portugal*	*Academia*

Indicator 3 - Organisations that have been approached to supply data with no result

Nothing to report

Indicator 4 - Volume of each type of data and of each data product downloaded from the portal

Layer	***Number of downloads 05/05/2017 – 30/04/2018***
Individual EUNIS maps from survey	*27412 over 239 download sessions* [6]
Individual non-EUNIS maps from survey	*853 over 60 download sessions* [6]
OSPAR threatened and/or declining habitats	*221*
Energy - North Sea and Celtic Sea	110
Energy/Wave Exposure - Baltic Sea	57
Halocline - Baltic Sea	32
Salinity - Baltic Sea	41
EU Sea Map 2016 - Fraction of light reaching the seabed	86
EU Sea Map 2016 - Photosynthetically Active Radiation at the seabed	87
EU Sea Map 2016 - Photosynthetically Active Radiation at the surface	74
EU Sea Map 2016 - Coefficient of light attenuation in water (KDPAR)	65
EU Sea Map 2016 - Number of satellite images for each pixel of KDPAR	38
Broad-scale habitat map (EUSeaMap)	739
EUSeaMap 2016 higher resolution case study for east of Angus and Aberdeenshire	32

[6] Habitat maps from surveys are available as individual downloads, with the option for the user to "Download All". The number presented in the table is the number of individual habitat maps.

Indicator 5 - Organisations that have downloaded each data type

Period: 05/05/2017 – 30/04/2018		
AA School Architecture	HR Wallingford	Second Institute of Oceanograph, SOA
Aarhus University	IAMC – CNR	Senckenberg Research Institute Frankfurt
Aberystwyth University	ICES	SEPA
Åbo Akademi University	ICM-CISC	Sharklab-Malta
ABPmer	IDRA Bio & Littoral	Shell UK Ltd
ACRI-HE	Ifremer	Smartcom Software
AECOM	IHCantabria	SOACSY
AFBI	ILVO	SOCIB
Agence française pour la biodiversité	IMAR	Spanish Institute of Oceanography (IEO)
Alderney Wildlife Trust	Imperial College London	SPF Economie Belgium
Alfred Wegener Institute	Institute for Coastal Marine Environment - Italian National Research Council	Sun Yat-sen University
Amec Foster Wheeler	Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences	Swansea University
ANAC	Institute of Marine Sciences (ISMAR-CNR)	Swedish Agency for Marine and Water Management
AquaBiota Water Research	Institute of Oceanology - Bulgarian Academy of Sciences	Swedish University of Agricultural Sciences
Aquafact Environmental Consultants	Instituto Español de Oceanografía	Technical University of Denmark - DTU
Arcadis	Instituto Hidrográfico de la Marina	Technische Universität Berlin
Artdatabanken	Instituto Português do Mar e da Atmosfera	The Environment Partnership (TEP)
AWI	Intertek	The Hebrew University of Jerusalem
AZTI-Technalia	InTouch GIS Services Ltd	The M Horizon (UK) Ltd
Bangor University	ISPRA	The Renewables Consulting Group
Bioconsult SH	IU-ECOAQUA	Thomson Ecology
Biopol	JBA Consulting	Thomson Unicomarine
Black and Veatch	JRC	Thünen-Institut
Bloomberg	Kiel University	UC
BMT Cordah	King's College London	Ulster University
BODC	Klaipeda University	UNEP-WCMC
Bournemouth University	Lancaster University	Universidad de Avila (Spain)
BRGM	Leegis	Universidad de La Laguna

Brockmann Consult	Leibniz Institute for Baltic Sea Research Warnemünde - IOW	Universidad de las Azores
burdGIS	Leidos	Universidad Nacional Agraria La Molina
Cardiff University	Lincolnshire County Council	Universidade de Aveiro
CEDAR, National Museums Northern Ireland	Lund University	Universidade de Lisboa
Cefas	MacArthur Green	Universidade do Algarve - CCMAR
CEH	Maplango	Universidade Lisboa
Cerema	MARBEC	Università degli Studi di Palermo
Channel Coastal Observatory	MARE	Universitá di Bologna
CNRS	MariLim Aquatic Research GmbH	Università Iuav di Venezia
COISPA	Marine and Freshwater Institute, Iceland	Universitat Autònoma de Barcelona
Conwy Valley Consortium Limited	Marine Biological Association	Universitat de Barcelona
Cooke aquaculture	Marine EcoSol	Universitat de Vic
Cornwall College	Marine Institute	Université de Bretagne Occidentale
COWI AS	Marine Scotland Science	University College Cork
Cranfield University	MarineSpace Ltd	University College Dublin
CSIC	Maritime and Coastguard Agency	University College London
CVC Ltd	Medins	University of Aberdeen
DAERA	MEDSEA Foundation	University of Alicante
Delft University of Technology (TU Delft)	Metria	University of Azores
Deltares	Ministry of Agriculture and Fisheries, Food and Environment (Spain)	University of Bristol
DEME	Ministry of Infrastructure and Water Management (Netherlands)	University of Bucharest
Democritus University of Thrace	MMT	University of California, Davis
Devon County Council	Mott MacDonald	University of East Anglia
DGRM	Muséum National d'Histoire Naturelle	University of Exeter
DHI	National Institute for Marine Research and Development (Romania)	University of Glasgow
Dirección General de Sostenibilidad de la Costa y del Mar	National Institute of Biology (Slovenia)	University of Gothenburg
Dokuz Eylül University	National Oceanography Center Southampton	University of Granada
Dorset Wildlife Trust	National University of Ireland Galway	University of Hamburg
Dutch Ministery of Infrastructure and Environment	Natural England	University of Hull
EBD-CSIC	Natural Power	University of Leeds

Ecopath International Initiative	Newcastle University	University of Liverpool
Ecospan Environmental Ltd	Nexen Petroleum UK Ltd	University of Minho
EDF Energies	NHTV Breda University of Applied Sciences	University of Oldenburg
Edinburgh Napier University	NIOZ	University of Piraeus
EDPR UK	Niras	University of Pisa
EEA	NL Hydrography	University of Plymouth
EID Mediterranee	NLWKN	University of Porto
EMODnet Secretariat	Norwegian Institute for Water Research	University of Porto - CIIMAR
ENGIE	Norwegian Institute of Marine Research	University of Queensland
Eni	Norwegian University of Science and Technology	University of Salento
EnQuest plc	Observatoire Pelagis	University of Sheffield
Environment Agency	Ocean Ecology	University of South Carolina
EPFL	Ocean Tracking Network	University of South Wales
ERM	Oceanomare Delphis Onlus	University of Southampton
European Commission DG Environment	OCEANSNELL	University of Southern California
European Enviromental bureau	OpenSeas	University of Southern Denmark
European Institute for Energy Research	Orbis Energy Ltd	University of St Andrews
Federal University of Rio Grande (FURG)	Orkney Fisheries Association	University of Stuttgart
FGBML	OSPAR Commission	University of Technology in Wroclaw
Finnish Environment Institute	Parks & Wildlife Finland	University of the Aegean
Finnish Natural Resource Institute	Parthenope University of Naples	University of the Highlands and Islands
Flanders Marine Institute	Politecnico di Milano	UNiversity of the Salento
Forschungszentrum Jülich	Politecnico di Torino	University Of Thessaly
FPS Economy of Belgium	Port of London Authority	University of Torvergata
French Agency for Biodiversity	Project Seagrass	University of Venice
Fugro	Ramboll	University of Waikato
Genesis Oil and Gas Ltd	Regional Council of Satakunta	US Geological Survey
GeoEcoMar	Regional Directorate of Fisheries in Madeira	UVIGO
Geological Survey of Norway	Regione del Veneto	Vattenfall Wind Power Limited
GEUS	Rijkswaterstaat	VLIZ
Ghent University	RINA Consulting	Wageningen University
GMIT	RNLI	Water Innovate Limited
GoBe Consultants Ltd	Romanian National Meteorological Administration	Water Insight
Greek Ministry of Environment & Energy	Royal Belgian Institute of Natural Sciences	Western Ecology
GRID-Arendal	Royal HaskoningDHV	Wildlife Trusts
Hafok AB	RPS Group Plc	WSP

Hampshire County Council	RSPB	WWF-Canada
Harokopio University of Athens	Sapienza University of Rome	Xodus Group
Hellenic Centre for Marine Research	Scottish Association for Marine Science	Yorkshire Wildlife Trust
Heriot-Watt University	Scottish Sea Farms	Zoological Society of London
Heritage Oil	Sea Going Green	
Holkham Hall & Estate	Sea Mammal Research Unit	

Indicator 6 - User statistics to determine the main pages utilised and identify user navigation routes

As the monitoring for the web portal changed midway through the reporting year annual statistics cannot be collated. Below are presented the statistics for the four quarters of the year separately, as reported in the previous four quarterly reports:

Quarter 1 (April-June 2017)

This information is gathered by Google Analytics describing the user statistics for key web pages in the period 01/04/2017 to 30/06/2017.

page description	page address	Number of unique visitors	How many users end their visit on this page	Average residence time on page (mm:ss)
Home page	www.emodnet-seabedhabitats.eu	15	3	00:53
View data	http://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/	713	611	03:47
Download data	http://www.emodnet-seabedhabitats.eu/access-data/download-data/	382	316	01:49
Build custom map	Page no longer available	137	15	00:57
Search metadata	http://www.emodnet-seabedhabitats.eu/access-data/search-metadata/	72	26	00:45

Quarter 2 (July-September 2017)

This information is gathered by Google Analytics describing the user statistics for key web pages in the period 01/07/2017 to 30/09/2017.

page description	page address	Number of unique visitors	How many users end their visit on this page	Average residence time on page (mm:ss)
Home page	www.emodnet-seabedhabitats.eu	9	1	00:45
View data	http://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/	606	516	03:25
Download data	http://www.emodnet-seabedhabitats.eu/access-data/download-data/	357	280	01:49
Build custom map	Page no longer available	106	56	00:57

Search metadata	http://www.emodnet-seabedhabitats.eu/access-data/search-metadata/	70	18	00:36

Quarter 3 (October-December 2017)

This information is gathered by Google Analytics describing the user statistics for key web pages in the period 01/10/2017 to 31/12/2017.

page description	page address	Number of unique visitors	How many users end their visit on this page	Average residence time on page (mm:ss)
Home page	www.emodnet-seabedhabitats.eu	19	5	00:20
View data	http://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/	769	637	03:57
Download data	http://www.emodnet-seabedhabitats.eu/access-data/download-data/	467	377	02:12
Build custom map	Page no longer available	156	26	00:54
Search metadata	http://www.emodnet-seabedhabitats.eu/access-data/search-metadata/	92	37	00:33

Quarter 4 (January-March 2018)

Visibility & Analytics	*Date*[7]	*Portal*[8]	*Analytics tool*[9]				
	01/01/2018 23/03/2018	*Seabed Habitats*	*Matomo*				
Pages[10]	Page views		Trend	Unique page views		Trend	Exit Rate
	Last Report	Actual Report	%	Last Report	Actual Report	%	%
Interactive map	n.a.	2597	n.a.	n.a.	1789	n.a.	74%
Data download	n.a.	2364	n.a.	n.a.	932	n.a.	73%
Web map service	n.a.	359	n.a.	n.a.	255	n.a.	35%
Metadata search	n.a.	290	n.a.	n.a.	129	n.a.	29%

[7] Date is the date of measurement, preferably on the 1st of each month

[8] Portal is the portal's name

[9] Matomo (ex Piwik) or Logs

[10] For each portal, the most relevant webpages that need to be monitored have to be identified. The Support Guidelines document provides an initial list.

Data submission process	n.a.	71	n.a.	n.a.	60	n.a.	48%
Data exchange format	n.a.	76	n.a.	n.a.	64	n.a.	42%
MESH archive	n.a.	44	n.a.	n.a.	15	n.a.	34%
Documents	n.a.	288	n.a.	n.a.	220	n.a.	50%
Map query page	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Landing pages[11]	Number of visits		Trend	Number of unique visitors		Trend	Bounce Rate
	Last Report	Actual Report	%	Last Report	Actual Report	%	%
Home Page	n.a.	2778	n.a.	n.a.	2144	n.a.	51%

[11] By landing page we mean pages that mainly redirect users to other pages.

Indicator 7 - List of what the downloaded data has been used for

This information is collected from the form that users fill out when downloading data from the download page (http://www.emodnet-seabedhabitats.eu/access-data/download-data/) in the period 05/05/2017 to 30/04/2018.

Reason	Proportion of total (%)
Commercial/Industry	9%
Education	21%
Exploration/Exploitation surveys	1%
Fisheries	0%
Government	10%
NGO/Charity	0%
Personal use	5%
Research	50%
Other	3%

Indicator 8 - List of web-services made available and organisations connected through these

Organisations who built on top of EMODnet web-services	***Date***	***Portal***		
	31/03/2018	*Seabed Habitats*		
	Type	**Country**	**Web-service type**	**Link to product or short description of usage**
OSPAR	Regional Sea Convention	International	WMS/WFS	Use of EMODnet Web Services to hold and display OSPAR database of threatened and/or declining habitats within OSPAR data system. https://odims.ospar.org/maps/298
ICES WGDEC	Intergovernmental organisation	International	WMS	Display of OSPAR habitats (from EMODnet WMS) alongside ICES VME data. http://vme.ices.dk/map.aspx
JNCC	Government/ Public Administration	United Kingdom	WMS	EMODnet web services used to display map of relevant habitat points and polygons within JNCC classification webpages. http://jncc.defra.gov.uk/marine/biotopes/hierarchy.aspx example page with map: http://jncc.defra.gov.uk/marine/biotopes/biotope.aspx?biotope=JNCCMNCR00000009

Metadata is available through a Catalogue Service for the Web via the ICES GeoNetwork. Mapping data are available through an OGC-compliant Web Mapping Service:

http://www.emodnet-seabedhabitats.eu/access-data/web-services/

11 Recommendations for follow-up actions by the EU

Updates to the INSPIRE geoportal editor

Many partners have had difficulty producing INSPIRE-compliant metadata for the map collation process. We have found that metadata created on the INSPIRE geoportal editor does not pass its own validation test. Therefore the creation of metadata has had to be manually repeated by the workstream lead for almost all of the maps collated. This process could be avoided in the future if the INSPIRE Editor online was upgraded and maintained so the resulting metadata it creates passed the online validation test.

Addition of habitats of interest to the Regional Sea Conventions to the INSPIRE data specification

We would like to see habitats of interest to the Regional Sea Conventions added to the INSPIRE data specification (e.g. OSPAR Threatened and Declining Habitats).

More money and focus on INSPIRE to improve user-friendliness

We would like to see more money and focus on INSPIRE to drive its usability for ordinary scientists. This would include simpler documentation and tools which enable users to best use INSPIRE data. We believe this would promote its use amongst the EU scientific community.

12 Annex: Other documentation attached

Annex I – **List of expected modelled Black Sea broad scale habitats, respective environmental variables necessary for their modelling and included assemblages – Version 04/2018**

Broad scale habitat name	Biological Zone	Substrate	Temperature	Bathymetry	Density (sigma-theta)	Contains indicator association
Infralittoral sand (Plume)	INFRA	SAND	Biological zones are defined based on the type of substrate IF SAND or MUDDY SAND -> INFRA ELSE -> CIRCA			Fine sand with *Lentidium mediterraneum*
Infralittoral muddy sand (Plume)	INFRA	MUDDY SAND				*Cerastoderma glaucum, Mya arenaria, Anadara kagoshimensis*
Circalittoral coarse and mixed sediment (Plume)	CIRCA	MIXED/COARSE				Diverse faunal assamblages due to hetergenous substrate dominated by bivalves *Mytilus galloprovincialis, Spisula subtruncata, Acanthocardia paucicostata* and polichaetes *Nephtys hombergii*
Circalittoral terrigenous muds (Plume)	CIRCA	MUD/ SANDY MUD				Danube and Dnieper plume areas (Mud with *Melinna palmata, Mya arenaria, Alitta succinea, Nephtys hombergii)*

The European Marine Observation and Data Network (EMODnet) is financed by the European Union under Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund.

Infralittoral rock	INFRA	ROCK		<14m To be revised		Upper-infralittoral rock dominated by *Cystoseira bosphorica* Upper-infralittoral rock dominated by *Cystoseira barbata* Upper infralittoral rock with variable annual green and red macroalgae *Ceramium virgatum*, *Gelidium spinosum*, *G. crinale*, *Corallina mediterranea*, *Ulva rigida*, *Ulva linza*, *U. intestinalis*, *Cladophora sericea*, *C. albida*, *Bryopsis plumosa* Lower infralittoral rock with dominant perennial sciaphylic red and brown macroalgae (*Phyllophora crispa*, *Zanardinia typus*, *Apoglossum ruscifolium*) and/or widely adaptive green (*Cladophora albida*, *Cladophora coelothrix*) and red macroalgae (*Polysiphonia elongata*, *Gelidium spinosum*, *Gelidium crinale*, *Anithamniom cruciatum*) Infralittoral rock overgown by *Mytilaster lineatus* and *Mytilus galloprovincialis* Infralittoral soft rock with piddocks (*Pholas dactylus*, *Barnea candida*) Infralittoral rock with faunal turf (bryozoans, sponges) Biogenic reefs of *Ostrea edulis* Upper infralittorlal rock with photophilic macroalgae (*Ceramium virgatum*, *Corallina officinalis*, *Ulva rigida*, *Ulva linza*, *U. intestinalis*, *Cladophora vagabunda*, *Cladophora sericea*, *C. albida*, *Bryopsis plumosa* and *Cystoseira barbata*) Infralittoral rock with *Mytilaster lineatus* and *Mytilus galloprovincialis*

						Infralittoral soft rock with Pholadidae Lower infralittoral rock with faunal turf (sponges)
Circalittoral rock	CIRCA	ROCK		>14m To be revised		Mussel beds of *Mytilus galloprovincialis* on varied circalittoral sediment Circalittoral rock overgrown by *Mytilus galloprovincialis*, hydrozoans and sponges
Infralittoral Coarse and Mixed Sediment	INFRA	COARSE; MIXED		<19m		Infralittoral shelly gravel and sand with *Chamelea gallina* and *Mytilus galloprovincialis*
Infralittoral sand and muddy sand	INFRA	SAND; MUDDY SAND		<19m		Pontic *Zostera noltii* meadows Pontic mixed *Zostera noltii- Zannichellia palustris-Zostera marina* meadows Pontic *Zostera marina* meadows Pontic *Potamogeton petcinatus - Zannichellia palustris* meadows in man-made sheltered areas Upper-infralittoral medium and fine sand dominated by *Donax trunculus* Infralittoral shelly coarse sand and shellbed with varied infauna Infralittoral fine and medium sand, dominated by *Chamelea gallina* (*Lentidium mediterraneum*, *Tellina tenuis*) Lower infralittoral coarse and medium sand, dominated by *Upogebia pusilla*

						Infralittoral fine sand dominated by *Lentidium mediterraneum* (*Cerastoderma glaucum*) Lower infralittoral muddy sand with *Upogebia pusilla*
Shallow circalittoral shelly coarse sediment	CIRCA	COARSE (shelly with no mud)	>9.7°C	>19m		*Coccotylus truncatus* & *Phyllophora crispaon* shelly organogenic sand Shallow circalittoral shelly coarse sediment with varied infauna (*Modiolus adriaticus*, *Gouldia minima*) Shallow circalittoral shelly coarse sediment with varied infauna (*Nereididae*, *Diogenes pugilator*, *Polititapes aureus*, *Pitar rudis, Mytilus beds*)
Shallow circalittoral mud	CIRCA	MUD; SANDY MUD; MUDDY SAND	>9.7°C	>19m		Shallow circalittoral muddy sand and sandy mud with *Upogebia pusilla*, *Heteromastus filiformis*, *Nephtys hombergii*, *Aricidea claudiae*, *Chamelea gallina* Shallow circalittoral mud dominated by *Melinna palmata* Shallow circalittoral sandy mud and mud with *Pitar rudis*, *Spisula subtruncata*, *Paphia aurea*, *Mytilus galloprovincialis*, *Abra spp., Cardiidae, Nephthys hombergii*, *Heteromastus filiformis* Shallow circalittoral mud and sandy mud with *Upogebia pusilla* (up to 30m depth) Shallow circalittoral mud with *Abra nitida*, *Pitar rudis*, *Spisula subtruncata, Acanthocardia paucicostata*, *Nephthys hombergii* and *Mytilus galloprovinciali*

Shallow circalittoral mixed sediment	CIRCA	MIXED	>9.7°C	>19m		Shallow circalittoral with *Dipolydora quadrilobata* meadows and *Mytilus*
Deep circalittoral muddy sand	DEEP CIRCA	MUDDY SAND	<9.7°C	>19m	<15.4kg/m^3	Deep circalittoral muddy sand with tunicates
Deep circalittoral mixed sediments	DEEP CIRCA	MIXED	<9.7°C	>19m	<15.4kg/m^3	Deep circalittoral shelly mud with *Modiolula phaseolina*
Deep circalittoral mud	DEEP CIRCA	MUD; SANDY MUD	<9.7°C	>19m	<15.4 kg/m^3	Deep circalittoral mud with *Terebellides stroemi*, *Amphiura stepanovi*, *Pachycerianthus solitarius*
Deep circalittoral suboxic calcareous muds	DEEP CIRCA	MUD	<9.7°C	>19m	>15.4 kg/m^3 <16.2 kg/m^3	Deep circalittoral suboxic muds with *Bougainvillia muscus*
Deep circalittoral anoxic muds	DEEP CIRCA	MUD	<9.7°C	>19m	>16.2 kg/m^3	Deep circalittoral anoxic muds
Bathyal anoxic muds	BATHYAL	MUD	The upper boundary is a break of slope manually defined			Bathyal anoxic muds
Abyssal seabed	ABYSSAL	ANY	The upper boundary is a break of slope manually defined			

Annex II – **Updated crosswalk table for the Black Sea between Benthic Broad MSFD habitats and the Broad Habitat types used in EMODnet Broad-scale seabed habitat maps**

Biozone	Inside river plume	Substrate	Oxygen regime	Broad-scale habitat 2018	MSFD Habitat
Infralittoral	no	Mud	Oxic	Infralittoral mud and sandy mud	Infralittoral mud
Infralittoral	no	Sand	Oxic	Infralittoral sand	Infralittoral sand
Infralittoral	no	Coarse sediment	Oxic	Infralittoral coarse and mixed Sediment	Infralittoral coarse sediment
Infralittoral	no	Mixed sediment	Oxic	Infralittoral coarse and mixed Sediment	Infralittoral mixed sediment
Infralittoral	no	Sandy Mud	Oxic	Infralittoral mud and sandy mud	Infralittoral mud
Infralittoral	no	Muddy Sand	Oxic	Infralittoral muddy sand	Infralittoral sand
Infralittoral	no	Rock	Oxic	Infralittoral rock	Infralittoral rock and biogenic reef
Soft bottom shallow circalittoral	no	Mud	Oxic	Shallow circalittoral mud	Circalittoral mud
Soft bottom shallow circalittoral	no	Sand	Oxic	Shallow circalittoral sand	Circalittoral sand
Soft bottom shallow circalittoral	no	Coarse sediment	Oxic	Shallow circalittoral shelly coarse sediment	Circalittoral coarse sediment
Soft bottom shallow circalittoral	no	Mixed sediment	Oxic	Shallow circalittoral mixed sediment	Circalittoral mixed sediment
Soft bottom shallow circalittoral	no	Sandy Mud	Oxic	Shallow circalittoral mud	Circalittoral mud
Soft bottom shallow circalittoral	no	Muddy Sand	Oxic	Shallow circalittoral mud	Circalittoral mud
Rocky circalittoral	no	Rock	Oxic	Circalittoral rock	Circalittoral rock and biogenic reef
Soft bottom deep circalittoral	no	Mud	Oxic	Deep circalittoral mud	Offshore circalittoral mud
Soft bottom deep circalittoral	no	Mud	Suboxic	Deep circalittoral suboxic calcareous muds	Offshore circalittoral mud
Soft bottom deep circalittoral	no	Mud	Anoxic	Deep circalittoral anoxic muds	Offshore circalittoral mud
Soft bottom deep circalittoral	no	Sand	Oxic	Deep circalittoral sand	Offshore circalittoral sand
Soft bottom deep circalittoral	no	Sand	Suboxic	Deep circalittoral suboxic sand	Offshore circalittoral sand
Soft bottom deep circalittoral	no	Sand	Anoxic	Deep circalittoral anoxic sand	Offshore circalittoral sand
Soft bottom deep circalittoral	no	Coarse sediment	Oxic	Deep circalittoral suboxic coarse sediment	Offshore circalittoral coarse sediment

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Soft bottom deep circalittoral	no	Coarse sediment	Suboxic	Deep circalittoral coarse sediment	Offshore circalittoral coarse sediment
Soft bottom deep circalittoral	no	Coarse sediment	Anoxic	Deep circalittoral anoxic coarse sediment	Offshore circalittoral coarse sediment
Soft bottom deep circalittoral	no	Mixed sediment	Oxic	Deep circalittoral mixed sediment	Offshore circalittoral mixed sediment
Soft bottom deep circalittoral	no	Mixed sediment	Suboxic	Deep circalittoral suboxic mixed sediment	Offshore circalittoral mixed sediment
Soft bottom deep circalittoral	no	Mixed sediment	Anoxic	Deep circalittoral anoxic mixed sediment	Offshore circalittoral mixed sediment
Soft bottom deep circalittoral	no	Sandy Mud	Oxic	Deep circalittoral mud	Offshore circalittoral mud
Soft bottom deep circalittoral	no	Sandy Mud	Suboxic	Deep circalittoral suboxic sandy mud	Offshore circalittoral mud
Soft bottom deep circalittoral	no	Sandy Mud	Anoxic	Deep circalittoral anoxic sandy mud	Offshore circalittoral mud
Soft bottom deep circalittoral	no	Muddy Sand	Oxic	Deep circalittoral muddy sand	Offshore circalittoral sand
Soft bottom deep circalittoral	no	Muddy Sand	Suboxic	Deep circalittoral suboxic muddy sand	Offshore circalittoral sand
Soft bottom deep circalittoral	no	Muddy Sand	Anoxic	Deep circalittoral anoxic muddy sand	Offshore circalittoral sand
Bathyal	no	Mud	Anoxic	Bathyal anoxic muds	Upper bathyal sediment or Lower bathyal sediment
Bathyal	no	Sand	Anoxic	Bathyal sand	Upper bathyal sediment or Lower bathyal sediment
Bathyal	no	Coarse sediment	Anoxic	Bathyal coarse sediment	Upper bathyal sediment or Lower bathyal sediment
Bathyal	no	Mixed sediment	Anoxic	Bathyal mixed sediment	Upper bathyal sediment or Lower bathyal sediment
Bathyal	no	Sandy Mud	Anoxic	Bathyal sandy mud	Upper bathyal sediment or Lower bathyal sediment
Bathyal	no	Muddy Sand	Anoxic	Bathyal muddy sand	Upper bathyal sediment or Lower bathyal sediment
Abyssal	no	Mud	Anoxic	Abyssal seabed	Abyssal
Abyssal	no	Sand	Anoxic	Abyssal seabed	Abyssal
Abyssal	no	Mixed sediment	Anoxic	Abyssal seabed	Abyssal
Abyssal	no	Sandy Mud	Anoxic	Abyssal seabed	Abyssal
Infralittoral	yes	Sand	Oxic	Infralittoral sand	Infralittoral sand
Infralittoral	yes	Muddy Sand	Oxic	Infralittoral muddy sand	Infralittoral sand
Infralittoral	yes	Rock	Oxic	Infralittoral rock	Infralittoral rock and biogenic reef
Soft bottom shallow circalittoral	yes	Mud	Oxic	Circalittoral terrigenous muds	Circalittoral mud
Soft bottom shallow circalittoral	yes	Coarse sediment	Oxic	Circalittoral coarse and mixed sediment	Circalittoral coarse sediment

Soft bottom shallow circalittoral	yes	Mixed sediment	Oxic	Circalittoral coarse and mixed sediment	Circalittoral mixed sediment
Soft bottom shallow circalittoral	yes	Sandy Mud	Oxic	Circalittoral terrigenous muds	Circalittoral mud
Rocky circalittoral	yes	Rock	Oxic	Circalittoral rock	Circalittoral rock and biogenic reef

13 List of abbreviations and acronyms

ABP – Associated British Ports

AECOM – Architecture Engineering Consulting Operations and Maintenance

AFBI – Agri-Food and Biosciences Institute

ANAC – Administración Nacional de Aviación Civil (National Civil Aviation Agency)

AORA – Atlantic Ocean Research Alliance

AWI – Alfred-Wegener Institute

BODC – British Oceanographic Data Centre

BIM – Bord Iascaigh Mhara

BRGM – Bureau de Recherches Géologiques et Minières (The French Geological Survey)

CBD – Convention on Biological Diversity

CCMAR – Centre of Marine Sciences

CEFAS – Centre for Environment, Fisheries and Aquaculture Science

CEH – Centre for Ecology and Hydrology

CMEMS – Copernicus Marine Environmental Monitoring Service

CNRS – Centre national de la recherche scientifique (National Centre for Scientific Research, France)

CSIC – Consejo Superior de Investigaciones Científicas (Spanish National Research Council)

CSW – Catalogue Service for the Web

DAERA – Department of Agriculture Environment and Rural Affairs

DEFRA – Department for Environment Food and Rural Affairs

DEME – Dredging Environmental and Marine Engineering

DGRM – Direcção - Geral de Recursos Naturais, Segurança e Serviços Marítimos (Directorate - General for Natural Resources, Safety and Services Seafarers)

DHI – International consulting and research organisation, formerly Danish Hydraulic Institute

DTU – Denmarks Tekniske Universitet (Technical University of Denmark)

EA – Envioronment Agency

EASME – Executive Agency for Small and Medium-sized Enterprises

EBD-CSIC – Estación Biológica de Doñana (Doñana Biological Station)

ECU – Ecological Coastal Units

EDPR UK – Energias de Portugal Renováveis (Energies of Portugal - Renewables)

EEA – European Environment Agency

EHS – Environment and Heritage Service

EMODnet – European Marine Observation and Data Network

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EPFL – École polytechnique fédérale de Lausanne (Federal Institute of Technology in Lausanne)

ERM – Environmental Resources Management

ESH – EMODnet Seabed Habitat

ESRI – Environmental Systems Research Institute

ETC-ICM – The European Topic Centre on Inland, Coastal and Marine Waters

EU – European Union

EUNIS – European Nature Information System

EurOBIS – European Ocean Biogeographic Information System

FURG – Federal University of Rio Grande

GEUS – Geological survey of Denmark and Greenland

GMIT – Galway-Mayo Institute of Technology

GUI – Globally Unique Identifier

HCMR – Hellenic Centre for Marine Research

HELCOM – Helsinki Commission (The Baltic Marine Environment Protection Commission)

IAMC-CNR – L'Istituto per l'Ambiente Marino Costiero del Consiglio Nazionale delle Ricerche (The Institute for the Coastal Marine Environment of the National Research Council, Italy)

ICES – International Council for the Exploration of the Sea

ICES WGMHM – ICES – Working Group on Marine Habitat Mapping

ICG-COBAM – Intersessional Correspondence Group on the Co-ordination of Biodiversity Assessment and Monitoring

ILVO – Instituut voor Landbouw-, Visserij- en Voedingsonderzoek (Flanders Researcg Institute for Agriculture, Fisheries and Food)

IMA – Institut des Milieux Aquatiques (Institute of Aquatic Environments)

IO-BAS – Institute of Oceanology, Bulgarian Academy of Sciences

INSPIRE – Infrastructure for Spatial Information in the European Community

IP – Internet Protocol

IPMA – Instituto Português do Mar e da Atmosfera (Portuguese Institute of the Sea and the Atmosphere)

ISMAR-CNR – Instituto di Scienze Marine - Consiglio Nazionale delle Ricerche - Institute of Marine Sciences - National Research Council

ISPRA – Italian institute for environment protection and research

JNCC – Joint Nature Conservation Committee

JRC – Joint Research Centre

KDPAR – Diffuse attenuation coefficient of the photosynthetically available radiation

MARBEC – Marine Biodiversity Exploitation and Conservation

MARE – Directoraat-generaal Maritieme zaken en Visserij (Directorate-General for Maritime Affairs and Fisheries)

MAREMAP – Marine Environmental Mapping Programme

MEDIN – Marine Environmental Data and Information Network

MSFD – Marine Strategy Framework Directive

NA – Not Applicable

NIOZ – Nederlands Instituut voor Onderzoek op Zee (Royal Netherlands Institute for Sea Research)

NIVA – Norsk instututt for vannforskning (Norwegian Institute for Water Research)

NLWKN – Niedersächsischer Landesbetrieb für Wasserwirtschaft Küsten- und Naturschutz (The Lower Saxon Department for Water, Coastal and Nature Conservation)

OBIS – Ocean Biological Information System

OGC – Open Geospatial Consortium

OSPAR – Oslo/Paris Convention (for the Protection of the Marine Environment of the North-East Atlantic)

RIKZ – Rijksinstituut voor Kust en Zee (National Institute for Coast and Sea)

RNLI – Royal National Lifeboat Institution

RSC – Regional Sea Convention

RSPB – Royal Society for the Protection of Birds

SEPA – Scottish Environmental Protection Agency

SGU – Sveriges geologiska undersökning (Geological Survey of Sweden)

SOCIB – Balearic Islands Coastal Observing and Forecasting System

SYKE – Finnish environmental institute

TCCT – Torbay Coast and Countryside Trust

TEP – The Environmental Partnership

UNEP – United Nations Environment Programme

UNEP-WCMC – UNEP – World Conservation Monitoring Centre

USGS – United States Geological Survey

UVIGO – Universidade de Vigo (Vigo University)

VLIZ – Vlaams Instituut voor de Zee (Flanders Marine Instutute)

WCS – Web Coverage Service

WFS – Web Feature Service

WISE – Water Information System for Europe

WMS – Web Mapping Service

WP – Work Package

WWF – World Wide Fund for Nature