SEANSE

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# Analysis of Data Needs and Existing Gaps

December, 2018

Strategic Environmental Assessment North Sea Energy

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# Work Package 2: Knowledge Transfer and Information Exchange

# Deliverable 1: Analysis of Data Needs and Existing Gaps Specifically Relating to Transboundary Working

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# Acronyms

**AAMP:** Agence des Aires Marines Protégées
**AFB:** Agence Française de la Biodiversité (previously AAMP)
**BfN:** Bundesamt für Naturschutz
**BSH:** Bundesamt für Seeschifffahrt und Hydrographie
**CONTIS:** Continental Shelf Information System
**CSW:** Catalogue Service for the Web
**DGEC:** Direction Générale de l'Energie et du Climat
**DREAL:** Direction Régionale de l'Environnement, de l'Aménagement et du Logement
**EEZ:** Exclusive Economic Zone
**EMODnet:** European Marine Observation and Data Network
**ENC:** Electronic Navigational Chart
**EPCI:** Etablissement Public pour la Coopération Intercommunale
**GIS:** Geographic Information System
**GML:** Geography Markup Language
**IGN:** Institut National de l'Information Géographique et Forestière
**ISO:** International Organisation for Standardisation
**MEEM:** Ministère de l'Environnement, de l'Energie et de la Mer
**MIG:** Mission de l'Information Géographique
**MMO:** Marine Management Organisation
**MS:** Member State
**MSDI:** Marine Spatial Data Infrastructure
**MSP:** Maritime Spatial Planning
**NMPi:** National Marine Plan interactive
**OGC:** Open geospatial Consortium
**ONS:** Office for National Statistics
**OSPAR:** Oslo-Paris Convention (for protection and conservation of North-East Atlantic)
**RCAHMS:** Royal Commission on the Ancient and Historical Monuments of Scotland
**SDI:** Spatial Data Infrastructure
**SEA:** Strategic Environmental Assessment
**SEANSE:** Strategic Environmental Assessment North Sea Energy
**Shom:** French public establishment in charge of description and forecasting of ocean, from littoral to offshore
**SLD:** Style Layer Descriptor
**SOAP:** Simple Object Access Protocol
**UKHO:** United Kingdom Hydrographic Office
**VLIZ:** Vlaams Instituut voor de Zee
**WCS:** Web Coverage Service
**WFS:** Web Feature Service
**WMS:** Web Map Service
**WMTS:** Web Map Tile Service

# Introduction

### *About SEANSE*

The general objective of SEANSE project is to develop a coherent (logical and well-organised) approach to Strategic Environmental Assessments (SEAs) with a focus on renewable energy in support of the development and effective implementation of Maritime Spatial Planning in the Channel and North Sea.

### *SEANSE Work Package 2 – Knowledge Transfer and Information Exchange*

According to the Maritime Spatial Directive, the use of the best available data has to be organised by the Member States (article 10) to establish the plans. In addition, the Member States have to cooperate in order that the issues of a transnational nature are taken into account and in order that the marine spatial plans are coherent at the basin scale (article 11).

Considering that the organisation and sharing of the spatial data related to MSP implementation can support these cooperation requirements, and considering that the INSPIRE Directive provides the standards and protocols to be used to share spatial data between European countries, the work package 2 of SEANSE project investigates in what measure the MSP spatial data accessible in the Channel and North Sea can be shared at a cross-border level by the use of Maritime Spatial Data Infrastructures. It then identifies the barriers to interoperability which is in fact the capacity of the data to be used to create meaningful maps at a transboundary level. This work also aims to propose and initiate solutions to improve it.

### *SEANSE Work Package 2 – Knowledge Transfer and Information Exchange Deliverable 1: Analysis of Data Needs and Existing Gaps – Specifically Relating to Transboundary Working*

This report aims to give a description of the state of current data needs and gaps and to identify the challenges and opportunities associated to data and information in support of taking into account MSP issues of a transnational nature in the North Sea and Channel. The first part explains the methodology used to perform this analysis, the second part is an analysis of marine data production for each country of the North Sea, and finally the third part provides an analysis of available data and existing gaps by category.

# Part 1: Methodology

The objective of the analysis of data needs and gaps is to provide an overview of the current available spatial data related to MSP in the North Sea and Channel, and to highlight their strengths and weaknesses when used to share MSP knowledge at a transboundary level. Part 1 on Methodology describes the criteria chosen to establish an inventory of spatial datasets in SEANSE project.

## 1. Data requirements

High quality maritime spatial data and information is a key element for implementing Maritime Spatial Planning (MSP). Data and information sharing is allowed by Marine Spatial Data Infrastructures which therefore support transboundary cooperation as well as national efforts linked to MSP. The associated tools are also critical to enable access to data and information as a basis for dialogue with the public and all interested parties, as well as providing support for decision making.

The Inspire Directive was published in 2007 by the European Commission in order to create a European Spatial Data Infrastructure to ensure interoperability between databases and to facilitate geographic data dissemination, availability and use. On the technical side, the directive relies on OGC standards for metadata elaboration (ISO19115 – ISO19139) as well as diffusion protocols (CSW, WMS, WFS, WCS). They allow to use and display data and metadata directly from the source. This ensures that the most up-to-date datasets are being used, following a core principle of Information Management: *"Collect once, use many times"*.

The Inspire Directive implementation includes a timeline. For example, maritime delimitations, like the other data categories of the Annex I of the Directive had to be Inspire-compliant before 23rd November, 2017[1]. In that context, an increasing amount of data has been made available during the last few years, and the dynamic is still on-going.

MSP is also taking advantage of this evolving situation, as a considerable amount of datasets has been published, either with European projects (e.g. EMODnet) or national MSDI (e.g. Marine Scotland NMPi).

The INSPIRE Directive thus provides a framework, good practices and technical tools for exchanging interoperable data in Europe, and MSP benefits of this favourable situation.

In this context, the data analysis presented in this report focuses on spatial datasets which meet the below criteria:

- Data is accompanied by a INSPIRE metadata record
- Metadata are essential to ensure a rightful use of data. Indeed they provide the baseline information about for example the producer, lineage or licence. INSPIRE metadata must be provided in ISO19139 standard, and made available through CSW protocol.
- Data is accessible through OGC – INSPIRE compliant web services.

[1] http://inspire.ec.europa.eu/inspire-roadmap/61

Getting access to data through WMS / WFS / WCS brings several benefits. It first avoids multiple storage of the same dataset (following the principle of "collect once, use many times"). It then ensures being able to always use the last published version of a dataset.

Other criteria are not linked to INSPIRE directive, but are necessary to take into account:

- Data produced at European and national levels is prioritary taken into account in this work compared to local data. Existing and accessible local data can nevertheless fulfil the technical requirements but it is not possible to analyse all the available local datasets. It would be necessary to restrict the analysis on local data to some data identified as fundamental to deal with MSP issues of a transnational nature. This kind of identification is done in the SEANSE case studies work for example. Nevertheless, at the time of the establishment of the inventory of this report, the detailed data list to be used in the case studies is not established. The analysis of datasets is focusing on data with a licence policy allowing use for SEANSE project activities.

## 2. Classification

The data inventory produced in SEANSE project is based on a classification issued from a study led on behalf of European Commission: Assistance Mechanism for the Implementation of MSP – Technical Study 1: MSP Data Study.

Following this classification, data is categorised in five main themes:

- Administrative Boundaries ( maritime and terrestrial boundaries)
- Physical, Chemical and Biological Characteristics (Physical characteristics, Type of habitat, Biological characteristics, Pressures and impacts)
- Human Activities (Aquaculture, Fishing, Renewable energies, Installations and Infrastructure, Marine transport routes and traffic flows, Ports, Nature and species conservation sites, and protected areas, Military, Raw material extraction areas, Scientific research, Submarine cables and pipeline routes, Tourism and recreation, Underwater cultural heritage, Coastal defence)
- Spatial Policy
- Socio-economic data (Human population, Economic indicator, Social indicator)

## 3. Information gathered

When adding a dataset to the inventory, some information is collected, relating to:

- Name
- Producer
- Provider
- Area
- Metadata type and URL
- Access protocol and URL
- Data type
- Date of data
- Licence type
- Usage Restrictions

## 4. Already existing Inventories

The analysis of data needs and gaps conducted in SEANSE project relies on the knowledge shared by the Partners of SEANSE at the beginning of the project, including several existing data inventories on North Sea and Channel.

BEAGINS (Baseline Environmental Assessment for the Grid in the Irish and North Seas) project aimed at producing a baseline environmental assessment study focused on renewable energy in the North and Irish Seas. During this project, a data catalogue has been constituted. It could directly benefit to SEANSE project as it covers several countries involved: UK, Belgium, Netherlands, Germany and Denmark. However, it uses a different classification than the one used in SEANSE project, and it is not generally MSP oriented.

In the framework of the "North Sea Perspective on Shipping, Energy and Environmental Aspects in Maritime Spatial Planning" (NorthSEE) project, a review of North Sea data portals has been realised. Based on this inventory, actions have been undertaken to harmonize dataset. Moreover, "infoquarium" has been developed: This is an innovative data and information platform for MSP.

The other inventory used is SIMCelt Analysis of data needs and existing gaps. SIMCelt (Supporting Implementation of Maritime spatial planning in the CELTic seas) project was dedicated to supporting cooperation between Member States on the implementation of the Maritime Spatial Planning Directive in the Celtic Seas. SIMCelt Analysis of data needs and existing gaps includes a data inventory on the Celtic Seas. It is based on the same data classification, and covers United Kingdom and France.

# Part 2: Data for MSP in the Channel and North Sea

Data is organised at several levels, the most significant are the European and national.

Results presented are based on a survey circulated among partners, and on previous reports from European projects (SIMCelt, SIMNORAT, SIMWESTMED).

## 1. Europe

### a. EMODnet

EMODnet (European Marine Observation and Data Network) is a network of organisations supported by the EU's integrated maritime policy. This networks intends to provide freely available marine data for all the potential users, including policy makers, scientists, or industrials. EMODnet makes this marine information accessible through thematic portals:

- Chemistry
- Biology
- Physics
- Human activities
- Bathymetry
- Seabed habitats

On top of that, a central portal allows finding data from either of these thematic portals.

When working in a transboundary context, EMODnet data becomes indispensable for several reasons:

- Data is compliant with INSPIRE and OGC standards, which enhances interoperability. That means it is usually associated with INSPIRE metadata, and can be harvested through CSW, WMS or WFS protocols
- EMODnet data is opened, and can be freely used without constraints
- Data usually covers entirely European seas.
- Data is already harmonised, including symbology and attributes. This element makes information more easily understandable

If many advantages are identified when using EMODnet data, some barriers still remain:

- The available web services can be unstable, making harvesting difficult
- Lack of data on some areas or data themes have been identified
- Each thematic portal is built on a different technical architecture. This fact complicates the access to information
- There is a need to better inform on the harmonisation process for the user to be aware of information loss and limitation of uses
- Some outdated information in EMODnet datasets could be identified (e.g. Offshore Wind Farms, Germany)

### b. European Environment Agency

The European Environment Agency (EEA) is an agency of the European Union, whose task is to provide sound, independent information on the environment. The EEA aims to support sustainable development by helping to achieve significant and measurable improvement in Europe's environment, through the provision of timely, targeted, relevant and reliable information to policymaking agents and the public.

- Data Portal: Discomap

Discomap is the access point for environmental data delivered by the EEA. Technically speaking, it uses an ArcGIS Server to emit different kind of data web services (REST, JSON, SOAP, WMS).

**Barriers:** metadata are only available in ESRI format, not in ISO 1939 standard.

#### c. Oslo-Paris Convention Commission

OSPAR is the mechanism by which 15 Governments & the EU cooperate to protect the marine environment of the North-East Atlantic.

- Data portal: OSPAR Data and Information Management System (ODIMS)

ODIMS gives access to more than 200 layers of information. Many of them are related to pressures on the environment and to human activities like fishing or marine renewable energies. ODIMS portal is based on Geonode software, and provides access to INSPIRE metadata as well as data web services.

## 2. Belgium

#### d. National MSP Portal: Marine Atlas

MarineAtlas.be is a joint initiative of several Belgian federal administrations that generate, collect and maintain geo–referenced information related to the sea. It is the entry point for all the spatial data related to the activities areas defined in the national MSP plan. This portal is built with a Geonetwork to handle metadata, and a Geoserver which publishes INSPIRE data web services.

**Assets**: Metadata are all available in four languages: French, Flemish, German and English.

**Barriers**: Marine Atlas seems to experience regular technical issues, as it often becomes unavailable (several days between September and December 2018).

#### e. VLIZ: Flanders Marine Institute

The Flanders Marine Institute (VLIZ) promotes accumulation of marine knowledge and excellence in marine research in Flanders. The marine research areas are the ocean and seas, the coast and the tidal systems. The target groups for knowledge accumulation are the marine research community as well as educational institutions, the general public, policymakers and the industry (within the scope of the blue economy).

- VLIZ data infrastructure

VLIZ manages a spatial data infrastructure to organise its data diffusion. This SDI includes a metadata catalogue (GeoNetwork) and a geospatial data server (GeoServer). These two components are connected to several viewers set up for specific projects and topics. Here are some of them:

  - Marine regions provides indicative information on marine boundaries all around the world. It also gives access to data on toponyms.
  - The Coastal Atlas is an online atlas about the Belgian coast.

#### f. RBINS – OD Nature: Royal Belgian Institute of Natural Sciences - Operational Directorate Natural Environment

The Royal Belgian Institute of Natural Sciences is one of the ten federal scientific establishments that are governed by the Belgian Science Policy Office (Belspo). It is involved in important scientific research activities and carries out public service missions. It is open to everyone through the Museum of Natural Sciences.

- Portal: Marine Atlas (see above)

## 3. Denmark

Denmark is currently in the process of adopting a national MSP plan. There is no dedicated MSP data portal yet. Several stakeholders are involved in marine data production.

### g. Ministry of foreign affairs

The Danish ministry of foreign affairs is responsible for producing data about maritime delimitations. Unfortunately those datasets are not publicly available.

### h. Danish Geodata Agency

Danish Geodata Agency (Geodatastyrelsen) is in charge of recording real estate in Denmark and nautical charts in Denmark, Greenland and the Faroe Islands. It is divided in two parts:

- The Danish cadastre is the basis for all land registration in Denmark.
- Danish Hydrographic Office produces nautical charts and publications that meet international conventions and specifications for safety at sea.

### i. Ministry of Environment and Food of Denmark

The Ministry of Environment and Food of Denmark is responsible for administrative and research tasks in the areas of environmental protection, farming and food production.

#### i. Environmental Protection Agency

The Danish Environmental Protection Agency is part of the Ministry of the Environment and it administers the legislation on environmental protection to ensure clean air, water and soil and good living conditions for humans, animals and nature.

#### ii. The Danish Coastal Authority

The Danish Coastal Authority (Kystdirektoratet) is the official coastal government agency - a division of The Danish Ministry of the Environment and part of The Danish Nature Agency.

## 4. France

France is currently in the process of adopting a national MSP plan, and has no national MSP data portal. However, the organisation and sharing of data and information in support to MSP implementation is on-going, in particular through the design of an information system dedicated to marine environment (SIMM: Système d'Information Milieu Marin). The first version of the associated web platform should be implemented in 2019.

### j. Shom

Shom is the French national hydrographic and oceanographic office. It describes and models the physical maritime environment to fulfil its core missions: national hydrographic service, support to defence activities and support to government maritime and coastal policies.

- Portal: data.shom.fr

Data produced by Shom is available in its spatial data infrastructure, data.shom.fr. This portal groups around 90 data products including physical parameters like bathymetry or currents, and official maritime delimitations. Data.shom.fr SDI provides access to INSPIRE-compatible metadata and data web services.

### k. **Cerema:** Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement

Cerema is the Centre for Studies and Expertise on Risks, the Environment, Mobility and Development. It is a public body dedicated to supporting of public policies. Cerema depends on the Ministry of ecology and the Ministry of Territorial Cohesion.

- Portal: Geolittoral

Geolittoral is the access point for data provided by the Cerema. Data available on this portal concern several categories like coastal hazard, land use, maritime uses or maritime traffic. ArcGIS Server is the tool used for data diffusion.

### l. French Agency for Biodiversity

The French Agency for Biodiversity (AFB), funded by the Ministry of Ecology, supports public policies linked to knowledge, protection and management of biodiversity.

- Portal: Cartomer

Cartomer is a portal dedicated to Marine protected areas. It also provides access to ecological data and marine habitats.

### m. Ifremer

IFREMER is a French institute that undertakes research and expert assessments to advance knowledge on the oceans and their resources, monitor the marine environment and foster the sustainable development of maritime activities.

- Portal: Sextant

Sextant is the spatial data infrastructure supported by Ifremer. More than being the platform to spread data produced by Ifremer, it provides all the tools for other organisations and projects to share their datasets. It currently hosts 48 thematic data catalogues and over 7000 datasets.

### n. IGN: National geographic Institute

IGN (Institut National de l'Information Géographique et Forestière) is the national agency for geographic and forestry reference information.

- Portal: Geoportail

Geoportail is the French official INSPIRE data portal. It harvests data from all the public organisations and regroups them in one single entry point. It is associated to a national metadata catalogue called geocatalogue.

### o. Regional Spatial Data Infrastructures

In France, the implementation of the INSPIRE Directive led to the creation of regional data hubs. With this organisation, local producers put their data on these regional platforms, which are harvested by the national geoportal. In SEANSE project area, two regional infrastructures are concerned:

- Geonormandie, for Normandy region,
- Géopicardie and PPIGE, for Hauts-de-France Region

## 5. Germany

### p. GeoSeaPortal

GeoSeaPortal is the German national MSP portal, managed by the Federal Maritime and Hydrographic Agency (BSH). It gives access to data on the sectoral plan, but also to baseline data about physical and biological parameters, maritime delimitations, some human activities like maritime transport. Dataset can be displayed on the data portal and can be harvested.

Metadata are provided by service and not by data set. In some cases, the same metadata record covers a wide range of datasets and does not provide enough information on each element.

### q. BSH: Federal Maritime and Hydrographic Agency

The Bundesamt für Seeschifffahrt und Hydrographie (BSH) is the federal maritime and hydrographic agency for Germany. The BSH is a higher federal authority within the portfolio of the Federal Ministry of Transport and Digital Infrastructure (BMVI). It is the national reference producer for bathymetry, as well as maritime delimitations.

- Portal: GeoSeaPortal (see above)

CONTIS - Continental Shelf Information System: CONTIS is developed by the Federal Maritime and Hydrographic Agency (BSH). It gathers a wide range of data used for the marine environment on the German continental shelf and the EEZ. It provides data produced by BSH and other authorities from the fields of marine sectoral and marine spatial planning.

### r. Marine Dateninfrastruktur Deutschland MDI-DE Geoportal

The Marine Data Infrastructure provides data and information from coastal engineering, coastal water protection, marine environmental protection and marine nature conservation via a joint geoportal. Metadata and web services support the search for and use of data. Federal and state authorities bring together existing information infrastructures on marine data and ensure continuous operation and further development of the infrastructure. The Marine Data Infrastructure provides data and information from coastal engineering, coastal water protection, marine environmental protection and marine nature conservation via a joint geoportal. Metadata and web services support the search for and use of data “on coastal waters and the EEZ”. Federal and state authorities bring together existing information infrastructures on marine data and ensure continuous operation and further development of the infrastructure. The database helps German administration to fulfill reporting for EU directives like MSFD and INSPIRE.

- Portal: MDI-DE.org

### s. BfN: Federal Agency for Nature Conservation

The German Federal Agency for Nature Conservation (Bundesamt für Naturschutz – BfN) is the German government’s scientific authority with responsibility for national and international nature conservation.

- Portal: Geodienste.bfn.de

The Federal Agency for Nature Conservation provides several interactive maps, based on the same tools as the GeoSeaPortal managed by BSH. One is dedicated to protected areas, another is focused on monitoring data and recordings of harbour porpoise sightings.

## 6. Netherlands

There is no official national MSP portal in the Netherlands, but it is possible to find several marine-related data portals.

### t. Marine related data portals

#### i. Noordzeeloket

Nordzeeloket is an online atlas focused on Dutch North Sea. It gives access to datasets related to:

- water systems: physical, chemical and biological properties of the North Sea
- marine uses: fishing, the extraction of minerals and the generation of (wind) energy, but also functions as a network of shipping routes and accommodates various cables and pipelines
- Policy and management: The rules for human use, the international agreements on this and more or less well-defined plans for the future

#### ii. PDOK

Publieke Dienstverlening Op de Kaart (PDOK – Public Services On the Map) is a platform for the opening up of geodata sets by Dutch authorities. These are current and reliable data for both the public and private sectors. PDOK provides digital geo-information as data services and files. The PDOK services are based on open data and therefore freely available to everyone.

### u. Rijkswaterstaat

Rijkswaterstaat is responsible for the design, construction, management and maintenance of the main infrastructure facilities in the Netherlands. This includes the main road network, the main waterway network and watersystems.

- Portal: Dataportaal RWS

RWS provides a metadata catalogue and INSPIRE web services to give access to the data it produces. The software used for the metadata catalogue is a Geonetwork. RWS gives access through this infrastructure to around 170 datasets.

### v. Marine Information and Data Centre

The Marine Information and Data Centre (IHM) is a collaborative venture between the Ministry of Infrastructure and the Environment and the Ministry of Economic Affairs. The IHM serves as a platform for finding and sharing data about the North Sea.

- Portal : Marine Information and Data Centre Portal

The Marine Information and Data Centre handles a portal giving access to open datasets related to marine and coastal monitoring.

### w. Statistics Netherlands

Statistics Netherlands (CBS) provides reliable statistical information and data to produce insight into social issues, thus supporting the public debate, policy development and decision-making while contributing to prosperity, well-being and democracy.

### x. Deltares

Deltares is an independent institute for applied research in the field of water and subsurface with five areas of expertise: Flood risk, adaptive delta planning, infrastructure, water and subsurface resources and environment.

#### y. Wageningen University

Wageningen University & Research is collaboration between Wageningen University and the Wageningen Research foundation.

#### z. Royal Netherlands Institute for Sea Research

NWO-NIOZ Royal Netherlands Institute for Sea Research is the national oceanographic institute and principally performs academically excellent multidisciplinary fundamental and frontier applied marine research addressing important scientific and societal questions pertinent to the functioning of oceans and seas.

## 7. United Kingdom

MSP is organised at the constituent nation level. However, some major marine data producers are UK wide.

#### aa. National producers

##### i. UKHO

The UK Hydrographic Office (UKHO) collects and supplies hydrographic and geospatial data for the Royal Navy and merchant shipping.

- Portal: UKHO portal and Bathymetry DAC

The UKHO data portal provides official data about UK maritime delimitations. It also gives access to bathymetric data. On a technical side, it is built on CARIS software solution.

**Barriers:** some datasets, like straight baselines, are not published. Moreover, some metadata do not bring much information as many field are left empty.

#### bb. Scotland

##### i. National MSP Portal: Marine Scotland NMPi

The Marine Scotland MAPS NMPi (National Marine Plan interactive) interactive tool, part of the Marine Scotland Open Data Network, has been designed to assist in the development of national and regional marine planning. Marine Scotland MAPS NMPi allows viewing different types of information and, where appropriate, links have been provided to the related parts of Scotland's Marine Atlas, the National Marine Plan as well as links to data sources to facilitate data download.

**Barriers**: Some datasets have no INSPIRE metadata. Additional information about them is provided by standard web pages.

##### ii. Marine Scotland

Marine Scotland is part of the Scottish Government, and is responsible for the integrated management of Scotland's seas.

- Portal: Marine Scotland NMPi: see above

#### cc. England

##### i. National MSP Portal: Marine Planning Evidence

Marine Planning Evidence is a portal supported by the Marine Management Organisation. It is meant to publish the official marine plans areas as well as the evidence datasets used to build them. It thus comprises data relative to the main themes of MSP. Marine Planning Evidence portal is based on ArcGIS Server.

**Barriers:** Many datasets present on the portal are only provided in REST Services. This inducts compatibility troubles with other infrastructures based on INSPIRE and OGC standards.

#### ii. Marine Management Organisation

The Marine Management Organisation (MMO) is an executive non-departmental public body, sponsored by the Department for Environment, Food & Rural Affairs. Its missions are to license, regulate and plan marine activities in the seas around England so that they're carried out in a sustainable way.

- Portal: Marine Planning Evidence: See above

#### iii. British Oceanographic Data Centre

The **British Oceanographic Data Centre (BODC)** is a national facility for looking after and distributing data concerning the marine environment. It is a major producer for all oceanographic physical parameters. It has no data portal, but a data search engine.

## Conclusion

In each country of the North Sea and Channel there are completely different organisations for MSP-related data management and dissemination. This may depend on the state of progress in the adoption of a marine spatial plan, the number of actors involved, etc. It is useful to access a wide range of data sets from few entry points such as in Germany and in Scotland, but information is often scattered in countries such as France and the Netherlands. In Denmark, the information useful for MSP is less accessible in web services. Finally, some of the needed data sets are available at European scale, thanks to projects like EMODnet or European agencies. However, if they give access to harmonised data covering an entire subject area, they can sometimes provide outdated or less accurate information.

# Part 3: Analysis of data needs and gaps

## Boundaries – Terrestrial boundaries

Number of identified datasets: 13

While the SEANSE project area comprises six member states, in total it includes ten countries, each with different structures of their administrative organisations. When there is one major administrative subdivision level in Scotland (Council areas), we can identify 4 levels in France.

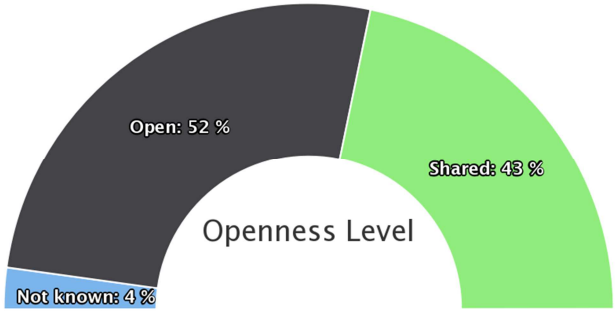



Figure 1 - Terrestrial boundaries openness level

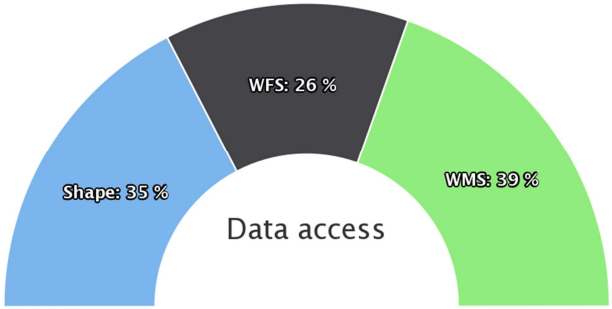



Figure 2 - Terrestrial boundaries data access

**Data scale**

| | |
|---|---|
| **European** | ✔ |
| **National** | ✔ |
| **Regional** | |
| **Local** | |

**Coverage**

Complete coverage of terrestrial boundaries in North Sea and Channel area is reached.

**Assets**

- Most data sources are available in WFS or WMS
- Data usually comes from authoritative sources
- Half of the identified datasets are available in an open licence

**Barriers**

- Many different data sources, reflecting a great heterogeneity in terrestrial administrative organisations between jurisdictions

**Potential Improvements**

- Portrayal harmonisation: unique style for boundaries at the same hierarchical level

## Boundaries – Maritime Boundaries

Number of identified datasets: 6

Maritime boundaries are key data when dealing with Maritime Spatial Planning, as it identifies which Member State has authority on which area.

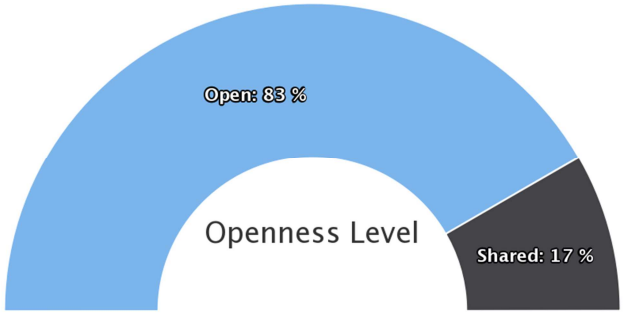



Figure 3 - Maritime Boundaries openness level

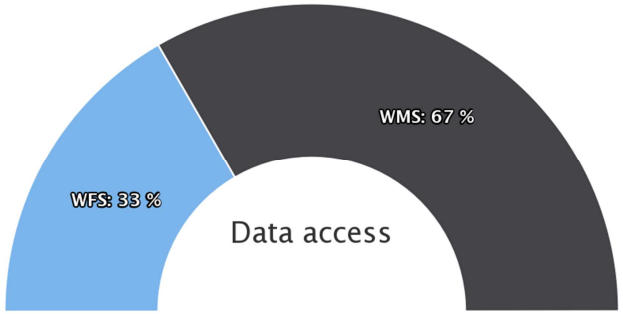



Figure 4 - Maritime boundaries data access

**Data scale**

| | |
|---|---|
| **European** | |
| **National** | ✔ |
| **Regional** | |
| **Local** | |

**Coverage**

Data is not published or has not been found for Belgium and Denmark. For some other countries, data is only partially available (e.g. United Kingdom).

**Assets**

- All identified datasets are available through INSPIRE web services (WMS or WFS)
- Data partly comes from partners, which will make it easier to provide updates to datasets.
- Data for maritime delimitations comes from official sources

**Barriers**

- Most data sources are available in WMS, which could make working with them more difficult
- Data models are based on different standards (S-57, Inspire)

**Potential Improvements**

- Portrayal harmonisation: unique style for boundaries at the same hierarchical level
- Providing clear conditions of use in metadata

## Physical, biological and chemical information – Physical characteristics

Number of identified datasets: 27

Physical characteristics include information about seabed like bathymetry and geology, but also data concerning the water column and surface: temperature, salinity, currents, etc. For the most part of these parameters, it is possible to identify sources of information covering the whole project area and available by web service.

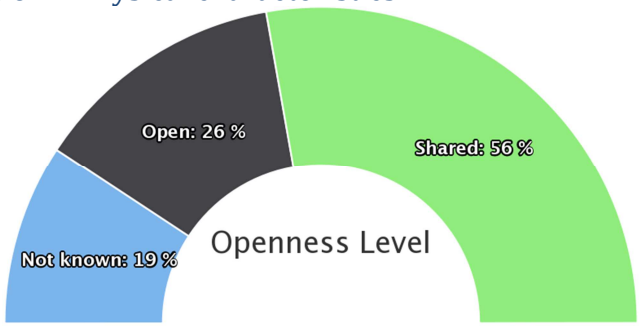



Figure 5 - Physical characteristics openness level

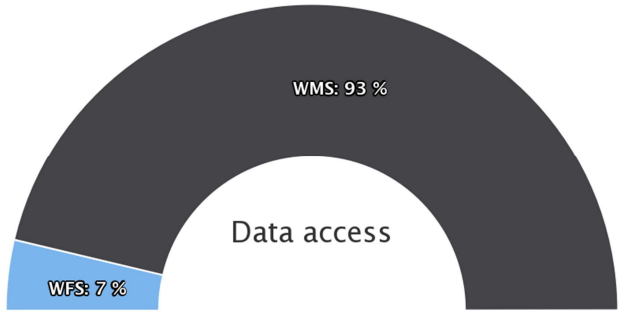



Figure 6 - Physical characteristics data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

For many physical parameters, it is possible to identify sources of information covering the whole project area and available by web service. Shom and BSH (SEANSE partners) cans also provide information on some parameters

**Assets**

- All the identified datasets are published through INSPIRE compatible web services.

**Barriers**

- Some data from Dutch sources are not available in INSPIRE web services
- The major part of datasets is not available in an open licence (nearly 75%).
- Most data sources are available in WMS, which could make working with them more difficult

**Potential Improvements**

- Portrayal harmonisation: unique style for boundaries at the same hierarchical level

## Physical, biological and chemical information – Biological characteristics

Number of identified datasets: 30

Marine SDI dedicated to maritime spatial planning provides a wide range of datasets focused on species distribution. The EMODnet Biology project also releases datasets on taxa distribution, but provided information appears to be less accurate compared to datasets available on other marine portals.

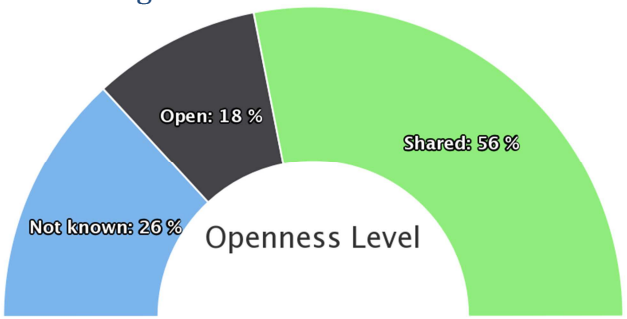



Figure 7 - Biological characteristics openness level

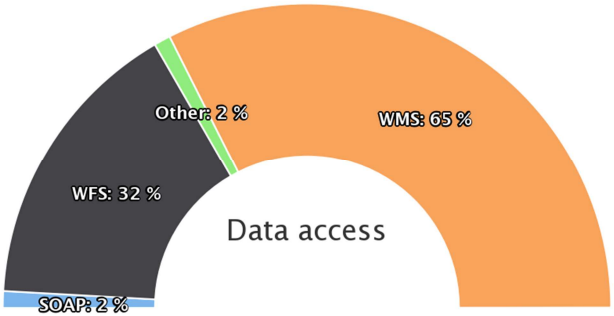



Figure 8 - Biological characteristics data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | ✓ |
| **Local** | |

**Coverage**

Datasets about biological characteristics are lacking for Denmark and Belgium. It is also difficult to find information matching the criteria on some species in specific countries (e.g. Cetaceans in French waters).

**Assets**

- Nearly all data sources are available in INSPIRE compatible web services

**Barriers**

- Only 18% of the identified datasets can be qualified of "Open Data", and 32% have no clear conditions of use associated.

**Potential Improvements**

- Future integration of the datasets needed for the models used in case studies

## Physical, biological and chemical information – Types of habitats

Number of identified datasets: 5

We can identify two types of data when dealing with marine habitats: data collected from surveys, and predictive maps based on models. When surveys bring accurate data on focused areas of interest, models try to extrapolate in order to provide regional maps.

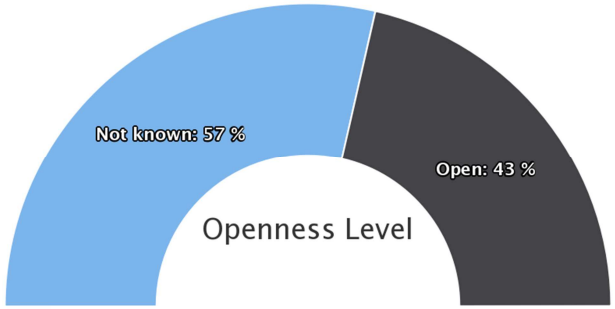



Figure 9 - Types of Habitats openness level

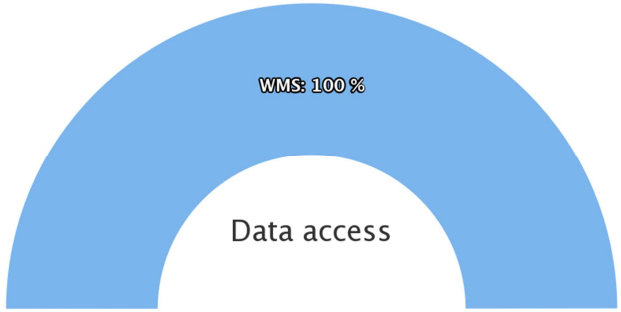



Figure 10 - Types of habitats data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | |
| **Regional** | |
| **Local** | |

**Coverage**

A complete map of marine habitats in Europe, therefore covering the North Sea and Channel, is made available through EMODnet Seabed Habitats project.

**Assets**

- By having one dataset covering the whole project area, we can benefit of harmonised data.
- EMODnet provides also data about confidence in the predictive model, which can give precious indications about accuracy according to location.

**Barriers**

- Many different data sources, reflecting a great heterogeneity in terrestrial administrative organisations between jurisdictions

**Potential Improvements**

- No improvement identified

## Physical, biological and chemical information – Pressures and Impacts

Number of identified datasets: 10

It is possible to find many data sources for pressures on the North sea area. In the case of a portal demonstrator for maritime spatial planning, getting already harmonised sources for some example of pressures appears to the most relevant, so the choice was made to select datasets provided by OSPAR Commission.

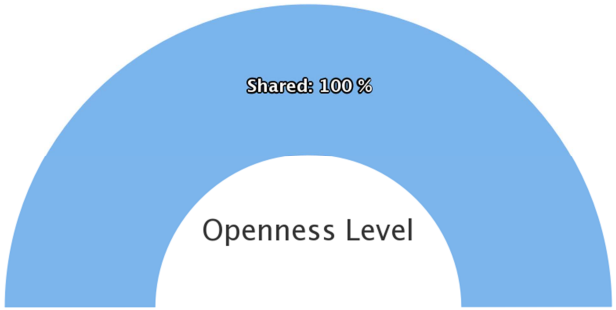



Figure 11 - Pressures and impacts openness level

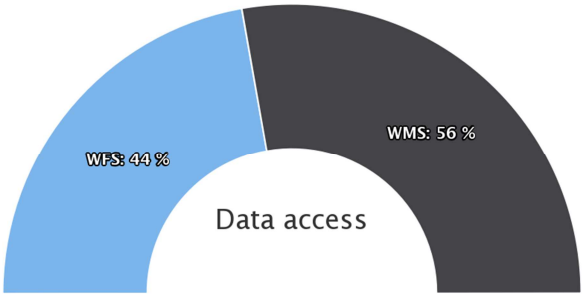



Figure 12 - Pressures and impacts data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | ✓ |
| **Local** | |

**Coverage**

OSPAR datasets cover SEANSE project area in totality. They provide therefore a good representation of some pressures existing in this maritime zone.

**Assets**

- Most data sources are available in WFS and with an open licence
- OSPAR datasets provide a complete harmonised coverage of North Sea and Channel.
-

**Barriers**

- None of the identified datasets are provided under an open licence.
-

## Human activities - Aquaculture

Number of identified datasets: 10

With respect to aquaculture, EMODnet Human Activities provides layers of information about finfish and shellfish production areas. These datasets are the result of harmonisation work at a European scale, partly based on previous projects, like EUROSHELL[2] regarding shellfish production sites.

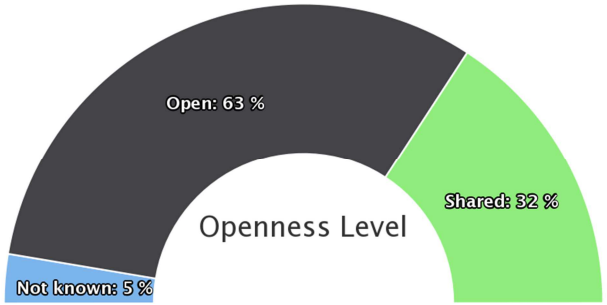



Figure 13 - Aquaculture openness level

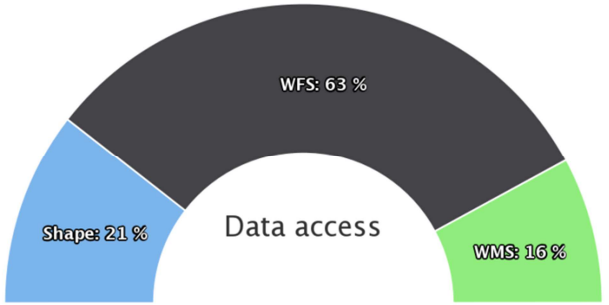



Figure 14 - Aquaculture data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

EMODnet datasets for finfish, shellfish and algae production areas provide a complete and harmonised coverage for North Sea and Channel.

**Assets**

- Datasets harmonisation work initiated through EMODnet and EUROSHELL[1] project

**Barriers**

- Many different data sources, reflecting a great heterogeneity in terrestrial administrative organisations between jurisdictions
- Some of the metadata provided by EMODnet Human activities portal are not harvestable. They must be downloaded. This prevents from having automatically access to the last up-to-date version.

[2] http://www.euroshell-net.eu/Project

## Human activities – Fishing

Number of identified datasets: 8

Fishing activity can be characterized by two kinds of information. The first one corresponds to regulation data, i.e. areas where fishing activity is restricted. The second one is the observed activity. Data relative to activity can be collected with Vessel Monitoring System (VMS), which is mandatory equipment for fishing vessels above 15 meters.

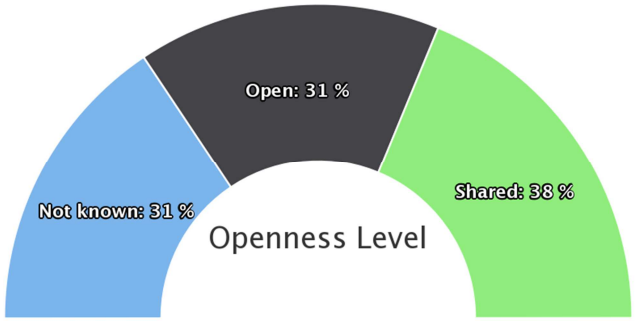



Figure 15 - Fishing openness level

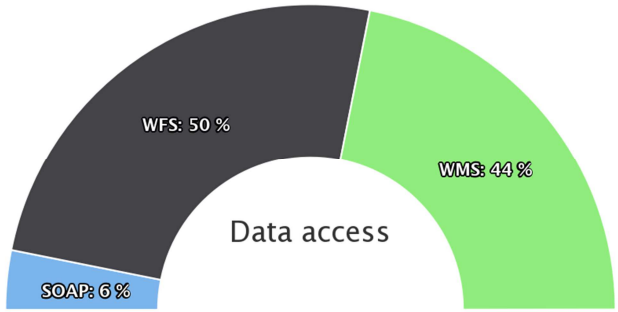



Figure 16 - Fishing data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

Access to VMS data is complicated in several countries. This kind of data was easily harvested only in Scotland and England.

**Assets**

- Nearly all data sources are available in INSPIRE- compatible web services

**Barriers**

- Access to datasets relative to fishing sector sometimes very difficult (ex: VMS data in France)
- Several metadata records are not based on INSPIRE and OGC standards. Some are in REST format, other are simply web pages.
- Several datasets (31%) have no clear conditions of use associated.

## Human activities – Marine Renewable Energies

Number of identified datasets: 19

Marine renewable energies concern offshore facilities dedicated to electricity production from wind, tides, waves and current.

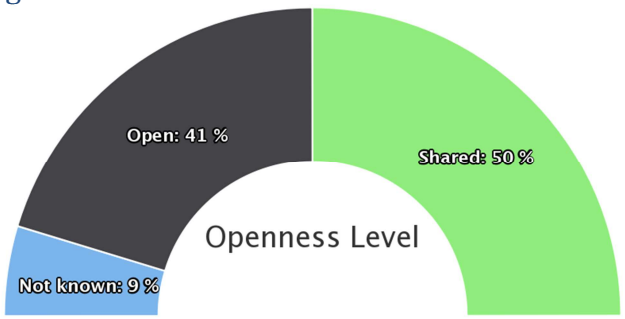



Figure 17 - Marine renewable energies openness level

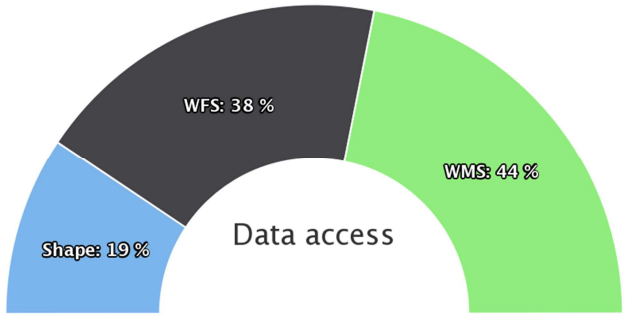



Figure 18 - Marine renewable energies data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

Rijkswaterstaat provided shapefiles containing all the offshore wind farms in the North Sea. The North SEE project collects data for marine renewable energy from North Sea countries. These data can be completed with other data sources, at European or National levels, including other kinds of marine renewable energies.

**Assets**

- Most data sources are available in INSPIRE compatible web services

**Barriers**

- Data from EMODnet Human Activities project may contain some outdated information. It was identified for German wind farms.
- Some datasets and associated metadata are only available in a country's official language. It is the case for French and Dutch datasets. This may be an obstacle for transboundary cooperation.
- Some datasets are not available in web services, only in shapefile.
- Many datasets have no harvestable metadata

## Human activities - Marine transport and traffic routes

Number of identified datasets: 34

Maritime transport data are grouped into many different themes. Some can be retrieved on nautical charts, like navigational assistance data, or traffic separation schemes, but others concern traffic, either theoretical (e.g. indicative ferry routes) or collected by Automatic Identification System (AIS).

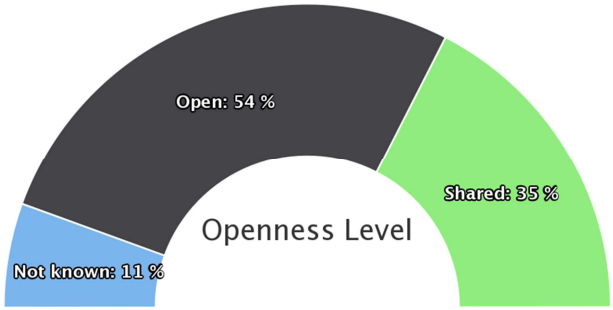



Figure 19 - Maritime transport openness level

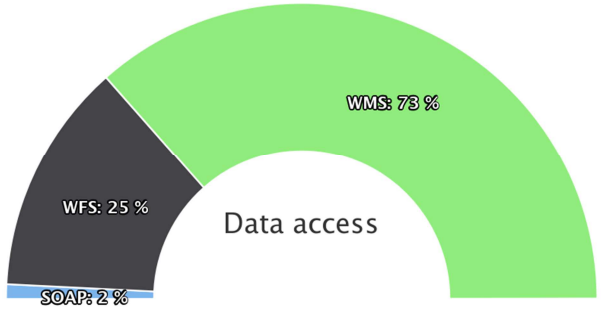



Figure 20 - Maritime transport data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

There is a lot of datasets available for Maritime transport and traffic flow in the North Sea and Channel, including information based on AIS data. There is only a lack of available information in Denmark.

**Assets**

- AIS data is available for most countries
- Nearly all the identified datasets are available in INSPIRE compatible web services.

**Barriers**

- Some important datasets, like French Traffic Separation schemes, are not published.
- Some datasets do not have a harvestable INSPIRE metadata record. For example the datasets from Marine Scotland often only have a description in a web page.
- Some datasets and associated metadata are only available in country's official language. This was encountered especially for French, Dutch and German datasets.

## Human activities – Ports

Number of identified datasets: 4

Several sources provide information layers on ports in the North Sea and Channel, with heterogeneity in data models: some sources indicate only the name and coordinates, when others include functional information, frequentation, etc.

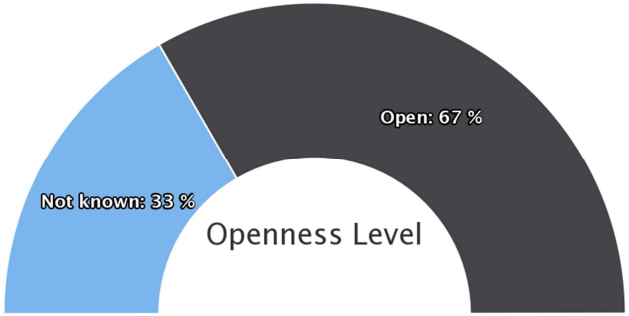



Figure 21 - Ports openness level

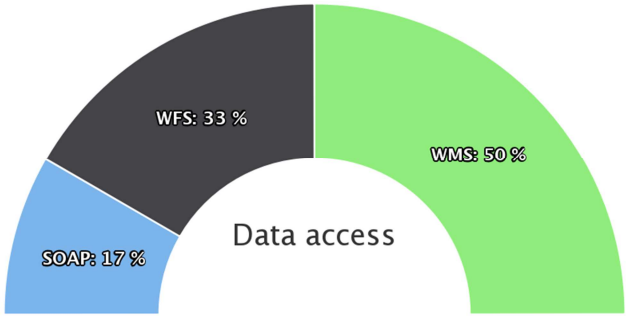



Figure 22 - Ports data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

EMODnet provides a layer of main ports covering the whole North Sea and Channel. It can be completed with some national datasets.

**Assets**

- With The EMODnet dataset are associated many information related to traffic, including goods, passengers, etc.

**Barriers**

- Some datasets have no conditions of use associated.
- English dataset on ports is not provided in an INSPIRE compliant web service.
- Differences in the definition of a port can be observed in the datasets considered, making difficult to work with several data sources.

## Human activities – Nature and species conservation sites and protected areas

Number of identified datasets: 23

Nature and species conservation sites and protected areas comprise a wide range of zones typologies. Some are defined from European directives, like Natura 2000, when others are based on national regulation.

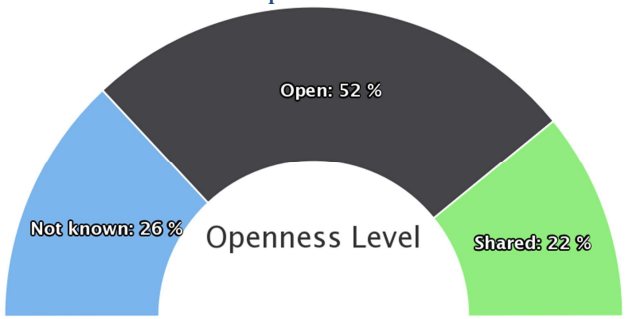



Figure 23 - Conservation sites openness level

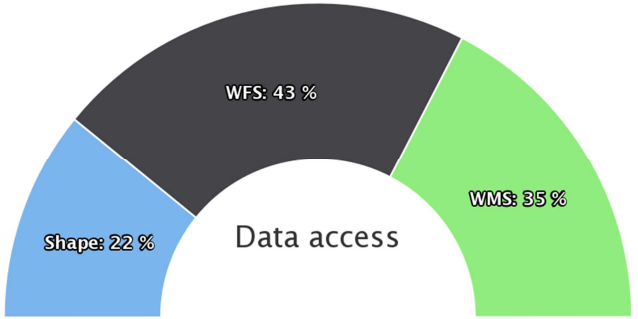



Figure 24 - Conservation sites data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

Many datasets are available for identifying Marine protected areas and other conservation sites. They come either from European sources like EMODnet, or from national conservation agencies.

**Assets**

- Most part of the identified datasets are published under an open licence
- EMODnet datasets provide already harmonised information at a project area wide scale.

**Barriers**

- Some datasets are only published in Shapefile format, and thus are not harvestable.
- Some datasets and associated metadata are only available in country's official language. This was encountered especially for French, Dutch and German datasets.

## Human activities – Military

Number of identified datasets: 13

As far as military data is concerned, some harmonisation work has been done by EMODnet Human Activities and the OSPAR commission on the theme of munition dumping sites. When dealing with zones restricted to military usage, less information can be found on the various official SDI, and datasets that are available come with specific usage restrictions.

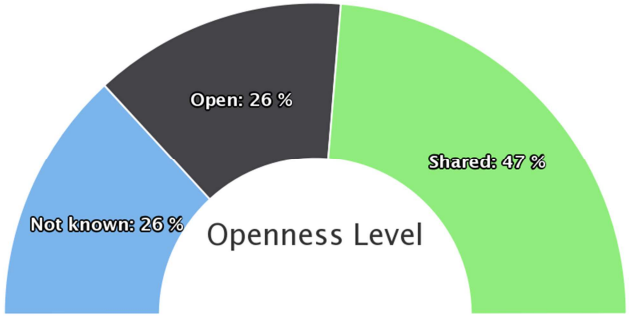



Figure 25 - Military openness level

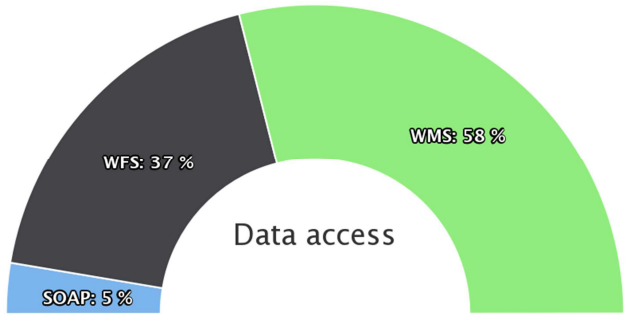



Figure 26 - Military data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

There is available information for all the countries of the North Sea and Channel except for Denmark. In most cases, they concern military practice areas and munition dumping grounds.

**Assets**

- Nearly all datasets are available in INSPIRE compatible web services.

**Barriers**

- Few datasets can be accessed without usage restrictions (26% in an open source licence). No conditions of use can be found for more than 40% of them.
- Some datasets and associated metadata are only available in country's official language. This was encountered especially for French, Dutch and German datasets.
- Some datasets are not associated with an INSPIRE metadata record.

## Human activities – Raw material extraction areas

Number of identified datasets: 18

This raw material extraction theme covers marine aggregates and exploitation, but also hydrocarbon extraction. The EMODnet Human Activities project provides harmonised information for both subthemes.

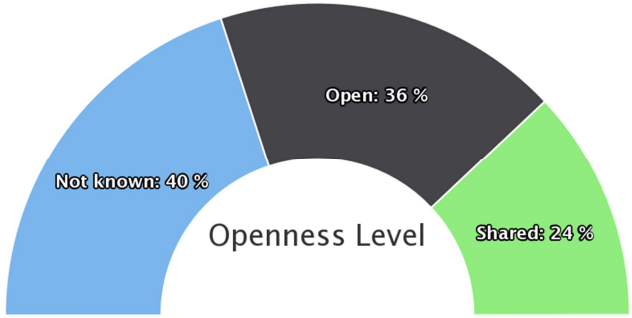



Figure 27 - Raw material extraction openness level

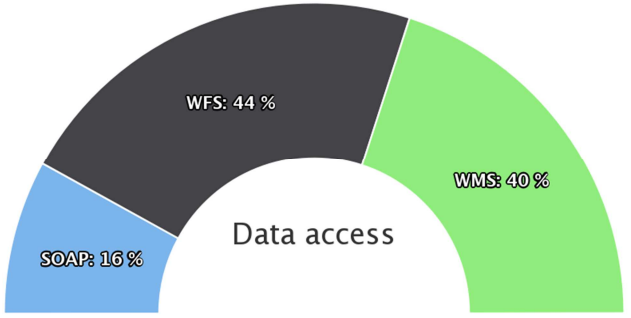



Figure 28 - Raw material extraction data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

Regarding Hydrocarbon extraction, EMODnet layers seem complete enough as they match well with national datasets. Complementary datasets are needed to get a better coverage of aggregate extraction subtheme.

**Assets**

- EMODnet provides a quite exhaustive dataset covering the whole project area, with already harmonised information.

**Barriers**

- More than half of the identified data sources have no conditions of use associated.
- Some datasets are not associated with an INSPIRE metadata record.
- Some datasets and associated metadata are only available in country's official language. This was encountered especially for French and Dutch datasets.

## Human activities – Submarine cables and pipeline routes

Number of identified datasets: 13

Two types of sources can be identified for submarine cables and pipelines. On one hand, some European sources provide harmonised information on the whole project area, but this information is incomplete. On the other hand, national datasets appear to be more exhaustive, but can be conflicting with each other.

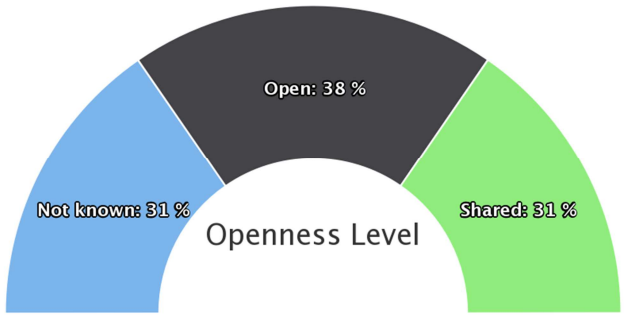



Figure 29 - Submarine cables openness level

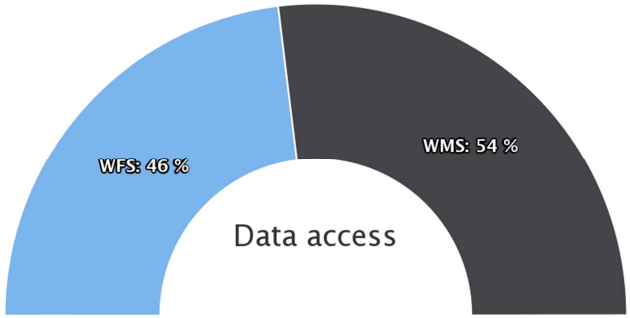



Figure 30 - Submarine cables data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

Associating European and national datasets seems to provide a quite complete coverage of North Sea and Channel. However, no available dataset was identified for Belgium and Denmark.

**Assets**

- All the identified datasets are available in INSPIRE compatible web services

**Barriers**

- Data sources from different countries may be conflicting with each other: different geometries, attribute information, etc. It is not possible in this study to assess the accuracy of each dataset.
- Some datasets (35%) do not have associated licence policy.

## Human activities – Tourism and recreation

Number of identified datasets: 17

Access to information about tourism and recreation is far from easy. A large range of activities need to be considered, involving countless potential sources of information, each one providing data with different structure and representation. This category is also not covered by EMODnet Human Activities.

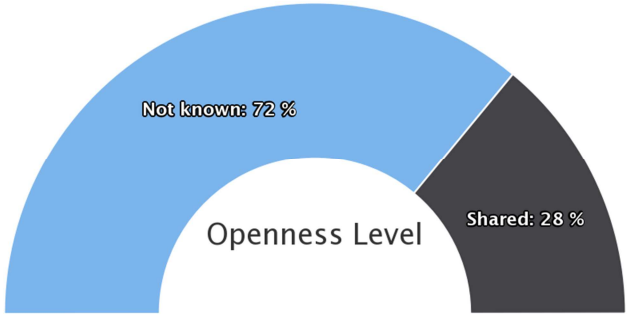



Figure 31 - Tourism openness level

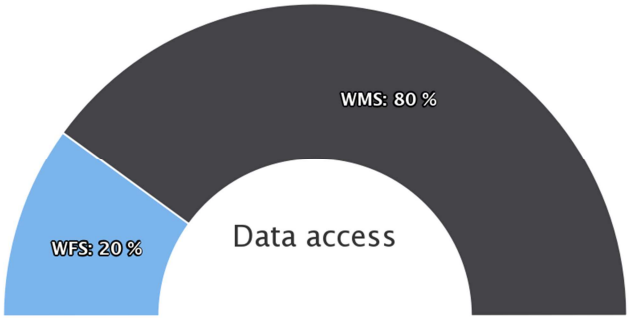



Figure 32 - Tourism data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

Major MSP data portal usually do not provide much information on tourism and recreational activities. Nevertheless, some very interesting information on touristic activities is provided by Marine Scotland's National Marine Plan interactive.

**Assets**

- All the identified datasets are available in INSPIRE compatible web services

**Barriers**

- For nearly 70% of the identified datasets, no conditions of use were found.
- Identified datasets have no INSPIRE metadata record associated. For some of them, there is a description web page or a rest page giving some information.

## Human activities - Underwater Cultural Heritage

Number of identified datasets: 9

Underwater cultural heritage mainly relates to shipwrecks, but also integrates specific sites of interest, like historic marine protected areas or World Heritage sites.

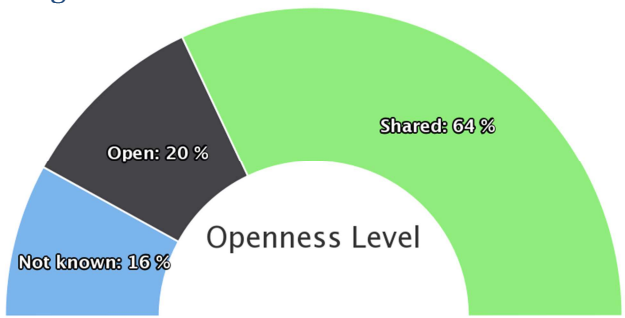



Figure 33 - Underwater cultural heritage openness level

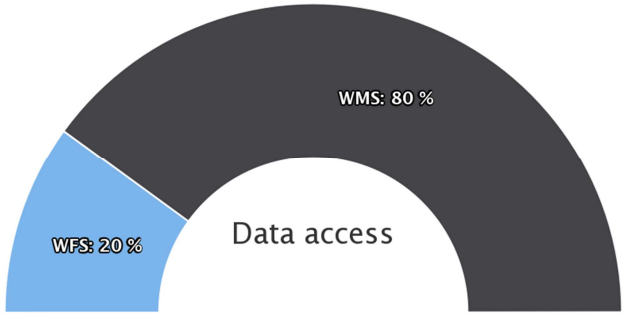



Figure 34 - Underwater cultural heritage data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

For several countries, data on shipwrecks is not publicly available. This was encountered for Denmark and Belgium. In the Netherlands, wrecks exact position is not made available.

**Assets**

- All the identified datasets are available in INSPIRE compatible web services.
- Part of the identified datasets is provided by SEANSE partners.

**Barriers**

- Few datasets are published under an open source licence.
- Only five datasets on the thirteen identified are accompanied with an INSPIRE metadata record
- The EMODnet Human Activities wrecks layer only provides data for the Netherlands

## Human activities – Coastal Defence

Number of identified datasets: 20

The coastal defence theme covers data about shoreline management and protection against coastal risks. Information types required for MSP include coastline position, shoreline management plans, dredging, and coastal hazard characterisation.

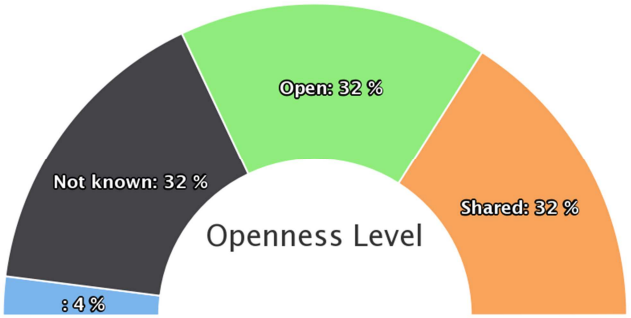



Figure 35 - Coastal defence openness level

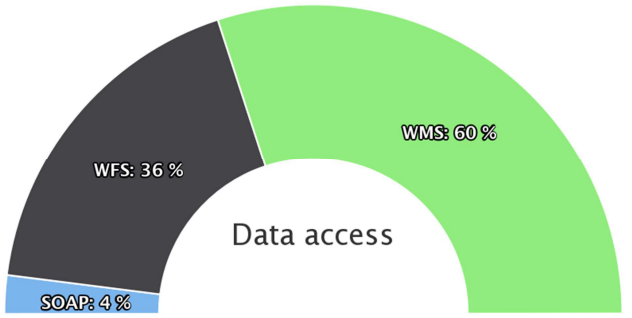



Figure 36 - Coastal defence data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

The EMODnet Human Activities project provides a layer with a good coverage of SEANSE project area, and containing already harmonised data. Other kinds of data, like hazard characterisation, show important coverage variations on data availability by web services.

**Assets**

- Nearly all the identified datasets are available in INSPIRE compatible web services.
-

**Barriers**

- More than a quarter of the identified data are not provided with proper conditions of use. Furthermore, only 6 datasets out of 20 are published under an open licence.
- Only one dataset, regarding dredging, has a complete coverage of North Sea and Channel.
- Some datasets are not associated with an INSPIRE metadata record.

## Spatial Policy

Number of identified datasets: 22

Spatial policy data include marine planning zoning information. This kind of delimitation can be created at different scales, from transboundary zoning like OSPAR regions to local partnerships.

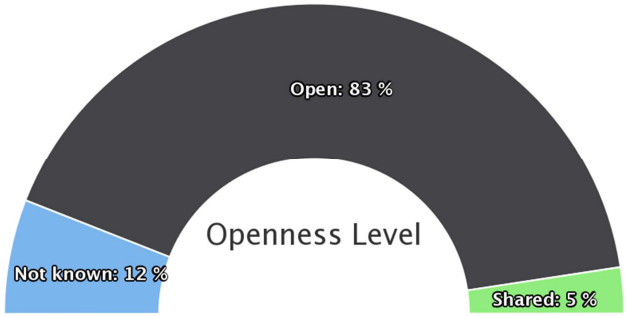



Figure 37 - Spatial policy openness level

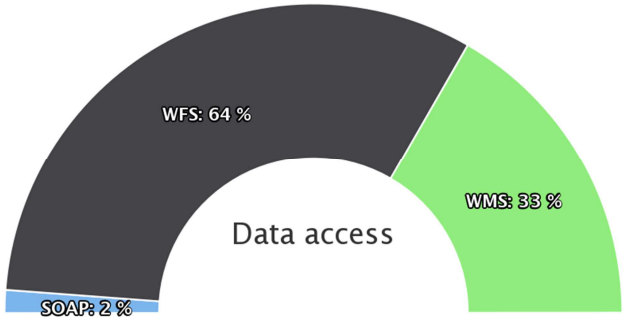



Figure 38 - Spatial policy data access

**Data scale**

| | |
|---|---|
| **European** | ✓ |
| **National** | ✓ |
| **Regional** | |
| **Local** | |

**Coverage**

Spatial data from maritime spatial plans are available through dedicated portals in Germany, Belgium and England. France and Denmark are currently in the process of adopting their own national planning documents.

**Assets**

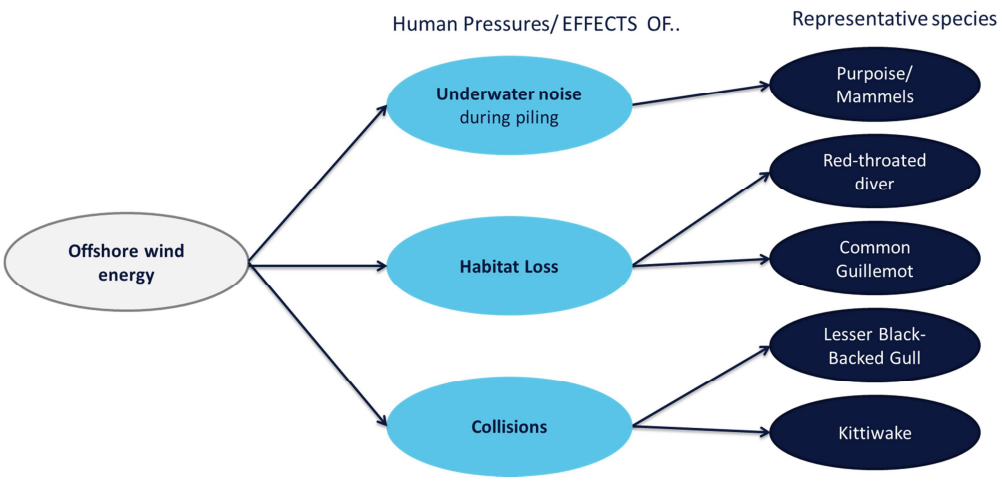
- All data sources are available through web services, and the biggest part of them can be harvested in WFS.
- 83% of the datasets have an open licence.
- Metadata from the Belgian national MSP portal are all available in four languages

**Barriers**

- Provided information is heterogeneous between countries. In England, the available information is the boundaries of the different regional plans, when in Germany or in Belgium, access is given to a more accurate zoning for each activity.
- Some datasets are not associated with an INSPIRE metadata record.

# Focus on SEANSE case study data needs and gaps

For the case studies carried out in the SEANSE project, some specific data needs and gaps have been identified related to cumulative impact assessments of marine renewable energy on species populations. The chart below describes the pressures and effects on representative species:




According to the representative species and the pressures taken into account in the case studies, the following datasets are needed:

- Biological
  - Species abundance and distribution
  - Estimation of population size (status, demography)
  - Habitats
  - Migration patterns
- Pressures
  - Underwater noise
  - Collision
  - Displacement/ habitat loss
- Human Activities
  - Spatial and temporal extent

# Conclusion

The analysis of data needs and gaps allowed highlighting many issues linked to marine data for Maritime Spatial Planning. Some were already identified in previous MSP transboundary projects (SIMCelt, SIMNORAT, SIMWESTMED), and others are specific or stronger on SEANSE project area:

- There are many relevant layers for transboundary MSP. Some countries have established national inventories identifying reference data producers or sources for data collection. Considering transboundary issues, it is useful for Members States and planners to have access to knowledge on the waters of neighbouring states. The minimum useful information is data availability and coverage. Web services are an easy way to access data, as they allow reading data and information without having to collect or download them. These useful data formats are not widely available. If some relevant data for MSP in a transboundary context are not listed in the inventory of this report, it does not mean that the data do not exist, but it highlights that they are not easily available in these useful formats. Data publication progress: several important data sets for maritime spatial planning are not available in an Inspire-compliant format (nor is the metadata). However the situation is evolving gradually. Licencing is an essential issue in a cross-border context, and in an exchange of harmonised information. Some data sets have a restrictive use, even for non-commercial purposes. For many others, no terms of use or licencing policy could be identified. However, there has been positive progress as more data sets are published under an open source licence.
- Symbology: Although WMS dataset is easier to manage compare to vector like dataset / Web Service, there is a symbology issue when dealing with multiple layers in WMS version treating the same topic. Consequently, map understanding can be weakened. Working on standardised symbology is a way to better compare acticities and aid cross_border discussions.
- Language: most MSDIs provide data and metadata only in their own language. This makes it difficult to exchange information in a transboundary context, especially in a marine area like the North Sea, where it is possible to find information in at least five different languages. However, some spatial data infrastructures, such as the Belgian Marine Atlas, overcome this difficulty by providing metadata records in four languages, including English.
- Finally several technical challenges are identified, like issues when trying to visualize data brought by different protocols. The problem is mainly solved when trying to connect to SOAP protocol emitted by ArcGIS server. One possible answer could be to ask the responsible administrations to activate WMS services. Another technical issue is linked to http / https. Multiple SDI are now using http protocol secured by a certificate when others have not made the conversion yet, and hence are not secured. Compatibility issues have been observed when trying to connect an http web service to an https infrastructure and vice versa. However, this difficulty should be resolved gradually as all the web is converging towards https protocol.

# Annex Data inventory

This annex provides the inventory of MSP related spatial data available in web services and fulfilling technical requirements as presented in Part 1 of this report. It is established in SEANSE project on the date of 31st of December 2018. It relies on the knowledge shared by the Partners and further investigations.