



**FPCUP ACTION 2021-2-33:  
COPERNICUS FOR MARINE SPATIAL PLANNING  
AND EU DIRECTIVES**

**1st Reporting Process//SGA#20/WP21  
Country report for France**

- Task 1. Review of the official implementation of EU marine Directives
- Task 2. Data gaps analysis in the implementation of EU Directives
- Task 3. Identification on how to use Copernicus Data in the implementation of EU

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## BACKGROUND

Marine sectors face several challenges regarding management and sustainability. It is becoming evident that these challenges are even more noticeable during the implementation of specific policies and strategies, particularly those related to marine data and information availability in the context of certain European Directives.

The Copernicus program is dedicated to deliver global data in a reliable and sustainable way. Numerous nations encounter difficulties in ensuring sustainable growth in specific industries, and the Framework Partnership Agreement for Copernicus User Uptake (FPCUP) focuses on harnessing Copernicus data for different maritime sectors within the framework of some EU Directives implementation.

The FPCUP aims at a better integration of Copernicus data in the European regulatory framework by increasing the number of users and applications derived from Copernicus through different actions. This report relates to Action 2021-2-33: *Copernicus for Marine Spatial Planning and EU Directives* that pursues "to promote the use of Copernicus data in the implementation of the EU Marine Spatial Planning Directive (Directive 2014/89/EU; MSP) and EU Marine Strategy Framework Directive (Directive 2008/56/EC; MSFD), while contributing to the standardization of methodologies in the implementation process".

This objective will be achieved through 3 specific objectives:

1. To examine the implementation of EU Directives by Member States using as pilot sites Spain, Portugal, Estonia, Cyprus, and France, and to identify data gaps.
2. To analyse how Copernicus satellite data products can improve those data gaps.
3. To use Copernicus data services in the implementation of EU marine Directives.

To address these objectives within Action 2021-2-33, the following duties should be carried out:

- In **Task 1** (*Review of the official implementation of EU marine Directives*) is dedicated to carry out a review of the application of the two EU marine Directives in each country.
- **Task 2** (*Data gaps in the implementation of EU marine Directives*) is dedicated to identify data gaps and needs within the maritime sectors that are actively engaged in the implementation of the EU marine Directives mentioned earlier.

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BACKGROUND

- In **Task 3** (*Identification on how to use Copernicus Data in the implementation of EU marine Directives*) the requirements of the Marine Directives and the data gaps detected in Task 2 will be contrasted with the benefits and opportunities offered by Copernicus data services. As a final result, a jointly standardized set of protocols leading to the implementation of improved methodologies for use in national reporting will be compiled.
- In **Task 4** (*Copernicus data to generate high spatial information for the implementation process*) Copernicus spatial data will be analysed and processed to generate spatial maps related to specific maritime activities and uses required by the national authorities and stakeholders.

## **TASK 1. REVIEW OF THE OFFICIAL IMPLEMENTATION OF EU MARINE DIRECTIVES**

### **1. Marine Spatial Planning: A review**

In the early 2000s, the Intergovernmental Oceanic Commission of UNESCO (IOC-UNESCO) initiated the Maritime Spatial Planning (MSP) initiative to address the challenge of organized utilization of marine spaces. MSP aimed to achieve better sharing and organized usage of these areas, promoting global governance at both the state and interregional levels. The European Union (EU) also engaged in this issue with the Maritime Spatial Planning Directive 2008/56/EC (DCSMM), along with the strategic framework directive for marine environment preservation (DCSMM - 2008). These directives aimed to ensure the functioning of marine ecosystems while accommodating future generations' uses and sustainable development.

MSP, according to UNESCO/IOC, is the public process of analysing and distributing human activities in marine areas to achieve ecological, economic, and social goals defined through political processes. It shifts from single-sector planning to an integrated approach, considering various sectors, societal needs, and values. The outcomes of MSP can range from plans and permits to non-binding visions, strategies, and governance principles.

The EU MSP Directive defines MSP as analysing and organizing human activities in marine areas to achieve ecological, economic, and social objectives. Member States analyse human activities within their jurisdictional marine spaces to foster sustainable growth, development, and resource use. The directive obliges coastal Member States to develop national maritime spatial plans by 2021. MSP covers areas under Member States' jurisdiction, while respecting international law.

Key benefits of MSP include reducing conflicts between sectors, fostering investments, promoting cross-border cooperation, and environmental protection. MSP puts marine issues on the political agenda and enhances stakeholder awareness. Different projects and transnational efforts support MSP across Europe, fostering coherence within sea basins.

MSP steps involve stakeholder involvement, vision development, existing and future condition analysis, conflict resolution, solution formulation, plan drafting, implementation, evaluation, and adaptation.

## 2. Maritime Spatial Planning Directive (Directive 2014/89/EU) in France

### 2.1. Procedures

The 1. Maritime Spatial Planning (MSP) in France is implemented by the National Strategy for the Sea and the Coast (SNML "*Stratégie Nationale pour la Mer et le Littoral*") since 2017. This strategy is developed in consultation with the National Council for the Sea and Coast ("*Conseil national de la mer et des littoraux*") and integrates maritime space planning with a perspective of sustainable growth.

This approach to maritime and coastal planning aligns with environmental challenges, climate change adaptation, and economic growth related to the blue economy. It combines the vision of the Marine Strategy Framework Directive (MSFD) and the Water Framework Directive (WFD) within the SNML, ensuring coherence with national and local development plans. This coordinated approach also encompasses efforts towards integrated coastal zone management and sectoral guidelines. Coordinating with other public policies involves adhering to environmental standards, enhancing coordination among stakeholders, and promoting territorial projects.

The SNML is based on a regulatory framework consisting of:

- The Law No. 2016-816 of June 20, 2016, for the blue economy,
- The Law No. 2016-1087 of August 20, 2016, for the restoration of biodiversity,
- Decree No. 2017-724 of May 3, 2017, integrating maritime planning and the action plan for the marine environment into the strategic document for coastal areas.

### 2.2. Governance

Each of the French maritime fronts has a strategic document defining the application conditions of the national strategy based on local specificities. The boundaries of the fronts are the same as those for the Marine Strategy Framework Directive (MSFD), in coherence with the integrated approach. This document includes maritime space planning, subject to environmental assessment, and is developed in consultation with maritime and coastal stakeholders. It is adopted by the coordinating prefects of each front (Figure 2-1).

Each front encompasses maritime, aerial, and terrestrial areas. The maritime area includes waters under French sovereignty and jurisdiction, zoned in terms of surface, water column, and seabed. The aerial area pertains to the adjacent



airspace. The terrestrial area encompasses coastal activities impacting maritime spaces, with varying depths depending on the activity.

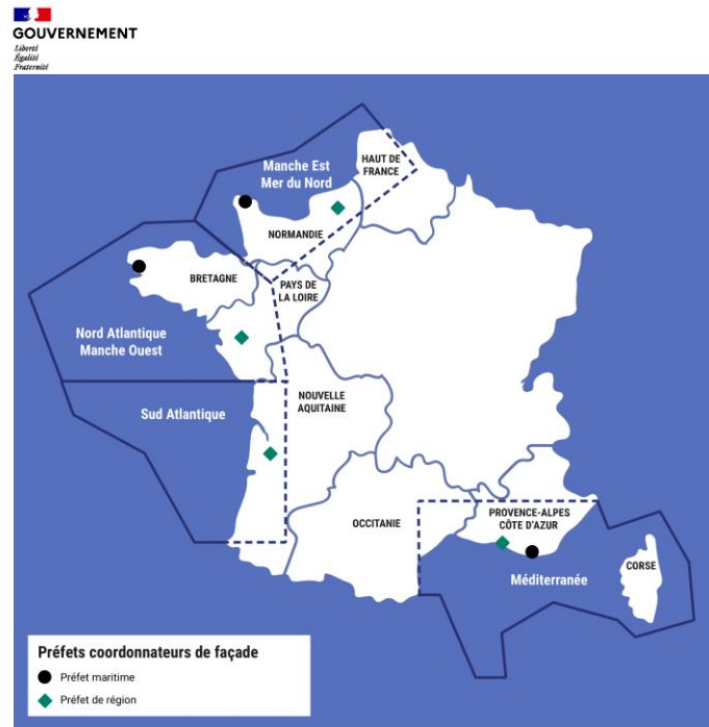


Figure 2-1. French waters limitations for MSP (source: [www.merlittoral2030.gouv.fr](http://www.merlittoral2030.gouv.fr))

The implementation is conducted at the front level over a 6-year cycle and is divided into 4 phases:

- **Existing Situation:** This section provides an overview of the coastal and maritime area for each front. It includes an environmental and socio-economic diagnosis, outlining marine and coastal uses, associated economic activities, and prospects for development. Major issues, including ecological aspects and emerging needs, are identified while considering potential usage conflicts.
- **Priority Strategic Objectives and Indicators:** The second part defines socio-economic and environmental objectives in accordance with the Marine Strategy Framework Directive (MSFD). Environmental objectives aim to reduce human pressures on the marine environment to achieve and maintain good ecological status. These objectives aim to regulate spatial and temporal activities while preserving ecological balance.

These first two phases constitute the **strategic aspect**, which was adopted in 2019. The first step involved public consultation between January and March 2018, under the supervision of the National Commission for Public Debate

(“*Commission nationale du débat public*”), resulting in the identification of local priorities and strategic orientations. These orientations were approved by coordinating prefects in 2019.

- **Monitoring Mechanism:** The third section details the evaluation methods for the implementation. It identifies data collection and monitoring mechanisms used to update the current situation and measure the achievement of strategic objectives. This mechanism operates at the national level and is presented in a document accessible to all stakeholders, offering a comprehensive synthesis of collected data concerning socio-economic activities and the health of the marine environment.
- **Action Plans:** Developed for each front, this fourth part describes the actions necessary to achieve the objectives set in the strategic section. Action plans are presented as thematic sheets detailing specific actions, involved parties, funding amounts, and potential funders. These plans result from close collaboration between government services and local partners, reflecting the commitment of relevant communities and economic sectors.

These last two phases constitute the **operational aspect**, which was adopted in 2022. Stakeholders, including maritime councils and government agencies, incorporated public feedback to develop action plans in alignment with strategic objectives

### 2.3. Operators

The entities in charge operate with varying levels of expertise when it comes to implementing the strategic documents. At the national level, the responsibility lies with the ministers in charge of the sea, environment, and overseas territories. At the level of maritime regions, the coordinating prefects play a central role. These coordinating prefects consist of a duo composed of a regional prefect (Provence-Alpes-Côte d'Azur, Nouvelle-Aquitaine, Pays de la Loire, and Normandy) and a maritime prefect. They have the authority to develop, coordinate, and approve the strategic documents. Throughout the process, they collaborate closely with the interregional maritime departments specific to each region.

The National Council for the Sea and Coastlines (“Conseil national de la mer et des littoraux” - CNML) serves a coordinating role with the Maritime Regional Councils. The CNML is structured into 5 governance colleges (elected officials, public establishments, businesses, worker representative unions, associations and foundations) and guides these councils by ensuring coherence between local

maritime policies and the national policy for the sea and coastlines. It ensures that actions and directives taken at the national level are in harmony with the initiatives and requirements of the relevant regions. Beyond national borders, inter-state cooperation among neighboring states of marine waters is established to ensure coherence and coordination of plans in the respective marine region. Whenever possible, this cooperation also extends to third countries, thereby strengthening the international dimension of maritime planning.

### 2.4. Conclusion

In France the implementation of Maritime Spatial Planning is in progress. "Geoportail" Platform serves as a resource hub for implementing MSP, managed by the Ministries of Environment and maritime affairs (Figure 2-2). The platform facilitates knowledge sharing, supports MSP implementation, and offers valuable resources for understanding and practicing MSP across France.

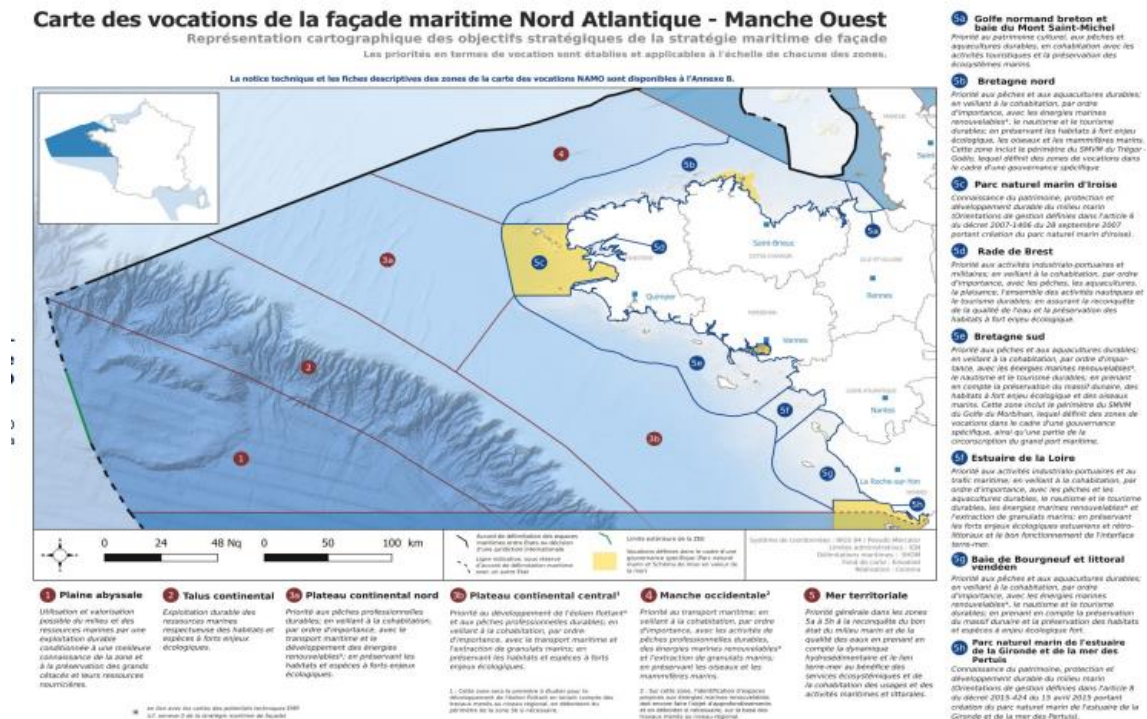


Figure 2-2: Example of a "vocation" maps provides by Geoportal for the North Atlantic - Western English Channel facade. The map summarizing the strategy within coherent areas by applying priority strategic objectives and indicators for tracking the achievement of these objectives.

Within the framework of MSP, leveraging Copernicus data is considered an avenue to structure research efforts and promote cooperation among stakeholders, streamlining the sharing of tools and references. This approach aims to enhance the effectiveness of existing knowledge resources, necessitating inventive approaches across diverse observation tools, such as ships, satellites, airplanes, and buoys, to attain optimal outcomes.

### 3. Marine Strategy Framework Directive: A review

#### 3.1. Objectives

The MSFD is an integrative directive of a set of European regulatory texts that concern the marine environment: Water Framework Directive (WFD), Habitat-Fauna-Flora Directive (HFFD), Birds Directive (BD), Common Fisheries Policy (CFP), etc. The integrated approach to the management of the marine environment is based on a large number of existing actions at the national, European and international levels, which aims to federate and amplify in a coherent manner.

While previous directives (e.g. the Habitats-Fauna-Flora Directive) generally have an approach limited to one ecosystem component (habitats, species or a sector of activity), the MSFD develops an innovative ecosystem approach consisting of taking into account all components of the marine ecosystem in the management of human activities.

Finally, the MSFD requires Member States sharing the same marine region or sub-region to cooperate and strive for a common approach, notably through cooperation within the Regional Seas Conventions (including Ospar, Barcelona). Where relevant, the work carried out in the framework of the Regional Seas Conventions is considered as an integral part of the work to implement the MSFD.

The overall objective of the MSFD is to protect the marine environment across Europe while allowing the continuation of sustainable uses of the sea. It requires EU Member States (MS) to establish national marine strategies to achieve or maintain Good Environmental Status (GES) in their marine waters by 2020.

“Good environmental status (GES) means the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations [...]”.

*(extract from Article 3(5) of the MSFD)*

GES is determined at the level of the marine region or sub-region on the basis of eleven qualitative descriptors. These relate to biological diversity, non-indigenous species, commercially exploited fish and shellfish, food webs, human-induced eutrophication, sea floor integrity, hydrographical conditions, contaminants, contaminants in fish and other seafood, marine litter and introduction of energy (including underwater noise). It is the responsibility of Member States to identify ways of measuring each descriptor and determining a baseline, targets and indicators.

The MSFD mainly applies to marine waters and may influence activities such as navigation dredging and new construction. It is possible that Member States will require consideration of MSFD as part of Environmental Impact Assessments for large projects thereby forming part of the consenting process potentially including mitigating measures and monitoring programmes.

The key requirements of the Directive, which apply on a six yearly cyclical basis, are:

- > An assessment of the current state of Member States seas,
- > A detailed description of what GES means for Member States waters, and associated targets and indicators,
- > The establishment of a monitoring programme (MoP) to measure progress toward GES,
- > The establishment of a programme of measures (PoM) for achieving GES.

The MSFD does not seek to replicate existing legislation rather to build upon it and fill in any gaps that may exist. It will not, for example, seek to replicate the efforts of the Water Framework Directive (WFD) or the Common Fisheries Policy (CFP) or indeed to undermine any regulations put in place by the International Maritime Organization (IMO).

### 3.2. Difference with the Water Framework Directive (WFD)

The EU Water Framework Directive 2000 (WFD) was transposed into law in EU Member States at the end of 2003 establishing a holistic and integrated approach for managing the water environment across Europe. This Directive requires measures to be taken to encourage the sustainable use of water and to protect and improve rivers, lakes, estuaries and coastal waters with the aim of achieving good ecological and chemical status. The WFD can have significant implications for recreational boating, both for ongoing activities such as dredging and disposal, and for new development proposals.

The WFD calls for a management plan to be developed for each river basin district. Following several years of preparatory work, the first WFD river basin management plans were published in most Member States between late 2009 and mid-2010. These plans set out the 'Programme of measures' which are required to achieve good ecological and chemical status in water bodies 'at risk' of failing to meet these targets. The first 'Programme of Measures' to achieve good status (or potential) had to be in place by 2012 with the intention of achieving the objectives by 2015. Progress with WFD implementation is reviewed on a six-yearly basis and there are two further WFD planning cycles – up to 2021 and 2027.

MSFD applies to marine waters i.e., the waters, the seabed and subsoil on the seaward side of the baseline from which the extent of territorial waters is measured. MSFD therefore applies to coastal waters as defined by the WFD and therefore there is overlap, but MSFD only applies for the practical aspects of environmental status that are not addressed through the WFD. The scope of MSFD is broader than that of the WFD, covering a greater range of biodiversity components and indicators such as marine mammals and seabirds. In other words, where both directives apply in coastal waters, the MSFD covers those aspects of good environmental status not covered by the WFD such as litter, noise and marine mammals.

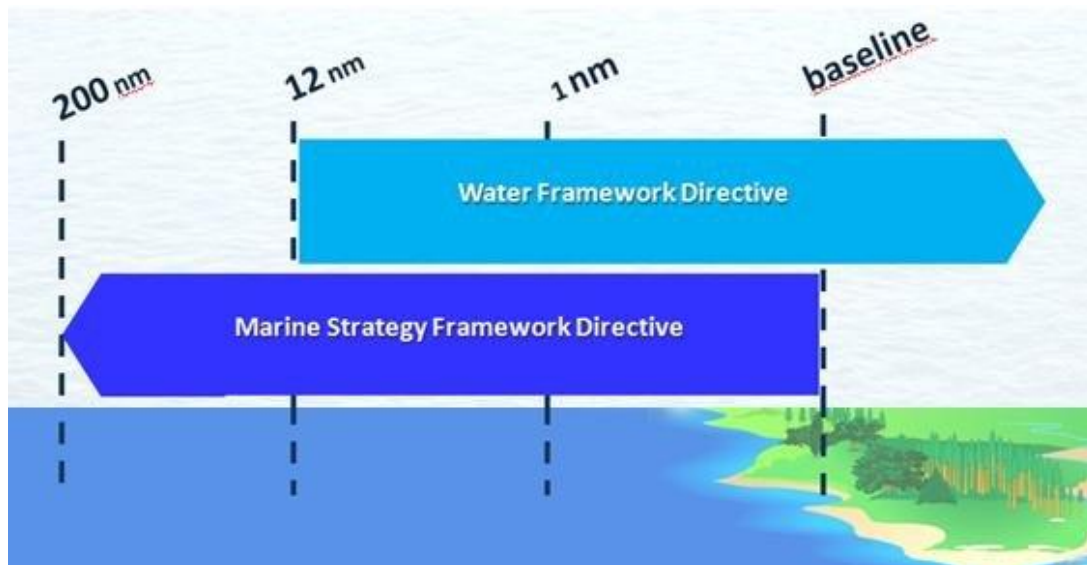


Figure 3-1: MSFD vs WFD covered areas

The MSFD should therefore make as much use as possible of existing measures and agreements within the WFD because many of the measures to meet the

objectives of the WFD will also deliver MSFD targets. This is of particular relevance to the contaminants descriptor where source control in riverine and coastal waters may have significant positive consequences for marine waters. The implications of the extensive geographical overlap with the WFD are also relevant for several other descriptors (e.g. biodiversity, eutrophication, hydrographical conditions).

### 3.3. Implementation

As established in article 17, Member States (MS), must develop and implement a marine strategy for their marine waters, every six years, through a series of 5 steps:



Figure 3-2 : How EU Member States develop marine strategies (Source: European Commission)

More precisely, those steps consist in the actions described in the following figure.

The first three steps of the MSFD comprise an assessment of the environmental status of the waters and the environmental impact of human activities (article 8), the determination of GES (article 9) and the setting of environmental targets (article 10). The fourth step requires MS to develop a monitoring programme to assess the environmental status of marine waters and progress towards the achievement of environmental targets (article 11), and, finally, in the fifth step, MS establish a programme of measures to achieve or maintain GES (article 13).

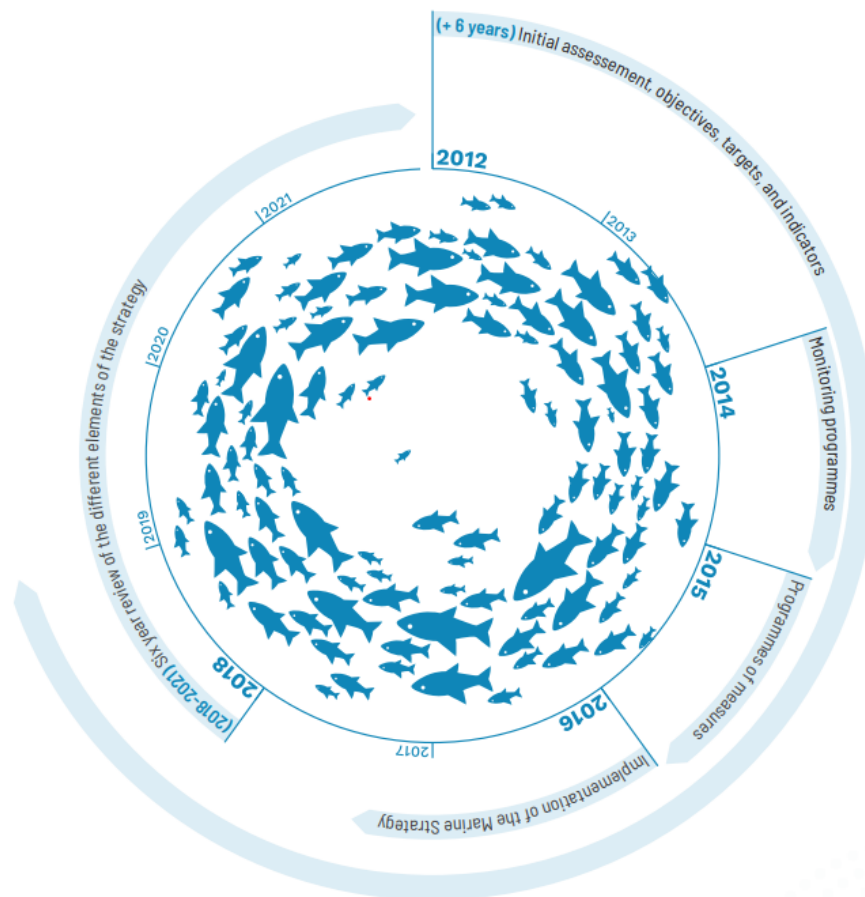


Figure 3-3 : MSFD's six-year implementation cycle (source: RAGES project)

### 3.3.1. Step 1 - Initial assessment

The assessment of the ecological status of marine waters and the environmental impact of human activities on these waters is the first step in the implementation of the MSFD (art. 8). It is prepared at the level of each marine sub-region and reviewed every 6 years.

It is composed of three components:

- > An analysis of the specificities and essential characteristics and the ecological status of these waters,
- > An analysis of the main pressures and impacts, notably due to human activity, on the ecological status of these waters,
- > An economic and social analysis of the use of these waters and the cost of the degradation of the marine environment.



The first two elements constitute the assessment of the ecological status. The GES of the marine environment is defined, within each descriptor, according to methodological standards and criteria harmonized at the European level and specified at the French level in a specific decree.

The economic and social analysis of the use of marine waters is broken down into 23 sectors of activity described in particular according to socio-economic indicators and which interact with the marine environment (*including* transport, fishing, aquaculture, MRE, Etc.) This interaction may result in the direct use of the sea or its resources by the sector, in pressures caused to the environment by the sector or in the dependence of the sector on the good state of the marine environment.

### 3.3.2. Good Environmental Status (GES) definition

Good ecological status corresponds to the proper functioning of ecosystems (at the biological, physical, chemical and health levels) allowing for the sustainable use of the marine environment. Eleven qualitative descriptors (Annex 1 of the MSFD), common to all Member States of the European Union, are used to define good environmental status.



Figure 3-4: Good Environmental Status' descriptors (source: EMODNET)

The Directive establishes 11 qualitative descriptors, on which three are state related (D1/D4/D6), eight are pressure related (D2/D3/D5/D7/D8/D9/D10/D11) and one is both (D3):

### State Descriptors that characterise marine biodiversity :

- > **D1** – Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climate conditions.
- > **D4** - All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.
- > **D6** - Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected

**Pressures descriptors that relate to human-induced pressures:**

- > **D2** - Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem.
- > **D5** - Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters.
- > **D7** - Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.
- > **D8** - Concentrations of contaminants are at levels not giving rise to pollution effects.
- > **D9**- Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.
- > **D10** - Properties and quantities of marine litter do not cause harm to the coastal and marine environment.
- > **D 11** - Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

**One descriptor is both a state and pressure descriptor as it related to aspects such as the level of fishing activity (pressure) and population age, size distribution and biomass indices (state):**

- > **D3** - Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.

The following table shows some of the criteria used to assess each descriptor.

Descriptor	Primary/secondary criteria
D1 - Biodiversity - Benthic habitats	<b>D6C4</b> : Loss of Benthic Habitat Type extent <b>D6C5</b> : Adverse effects on the status of benthic habitat type extent
D1 - Biodiversity - Pelagic habitats	<b>D1C6</b> : Characteristics of pelagic habitat type
D1 - Biodiversity - Mammals	<b>D1C1</b> : By-catch mortality rate <b>D1C2</b> : Population Abundance <b>D1C3</b> : Demographic Characteristics of Populations <b>D1C4/D1C4</b> : Spatial distribution of populations <b>D1C5/D1C5</b> : Species Habitat
D1 - Biodiversity - Birds	<b>D1C1</b> : By-catch mortality rate <b>D1C2</b> : Population Abundance <b>D1C3</b> : Demographic Characteristics of Populations <b>D1C4/D1C4</b> : Spatial distribution of populations <b>D1C5/D1C5</b> : Species Habitat
D1 - Biodiversity - Fish & D1 - Biodiversity - Cephalopods	<b>D1C1</b> : By-catch mortality rate <b>D1C2</b> : Population Abundance <b>D1C3/D1C3</b> : Demographic Characteristics of Populations <b>D1C4/D1C4</b> : Spatial distribution of populations <b>D1C5/D1C5</b> : Species Habitat
D1 - Biodiversity - Turtles	<b>D1C1</b> : By-catch mortality rate <b>D1C2</b> : Population Abundance <b>D1C3</b> : Demographic Characteristics of Populations <b>D1C4/D1C4</b> : Spatial distribution of populations <b>D1C5/D1C5</b> : Species Habitat
D2 - No-indigenous species	<b>D2C1</b> : Newly introduced non-native species <b>D2C2</b> : Established non-native species <b>D2C3</b> : Adverse effects due to the presence of non-native species
D3 - Population of commercial fish/shellfish	<b>D3C1</b> : Fishing mortality rate <b>D3C2</b> : Spawning stock biomass <b>D3C3</b> : Population Distribution by Age/Size
D4 - Elements of marine food webs	<b>D4C1</b> : Trophic Guild Species Diversity <b>D4C2</b> : Abundance in Trophic Guilds <b>D4C3</b> : Trophic Guild Size Distribution <b>D4C4</b> : Trophic Guild Productivity
D5 - Eutrophisation	<b>D5C1</b> : Nutrient concentrations <b>D5C2</b> : Chlorophyll-a concentration <b>D5C3</b> : Harmful Algal Blooms <b>D5C4</b> : Seal limit (transparency) of the water column <b>D5C5</b> : Dissolved oxygen concentration <b>D5C6</b> : Abundance of Opportunistic Macroalgae <b>D5C7</b> : Macrophyte communities in benthic habitats <b>D5C8/D5C8</b> : Macrofaunal communities in benthic habitats
D6 - Sea floor integrity	<b>D6C1</b> : Physical loss of the seabed <b>D6C2</b> : Physical disturbance of the seabed <b>D6C3</b> : Adverse effects due to physical disturbances
D7 - Alteration of hydrological conditions	<b>D7C1</b> : Permanent change in hydrographic conditions <b>D7C2</b> : Adverse effects due to permanent change in the hydrographic conditions
D8 - Concentration of contaminants	<b>D8C1</b> : Contaminants in the environment <b>D8C2</b> : Effects of Contaminants on Species and Habitats <b>D8C3</b> : Significant episodes of acute pollution <b>D8C4</b> : Effects of significant acute pollution episodes

D9 - Contaminants in fish/seafood for human consumption	<b>D9C1</b> : Contaminants in Seafood Products for Human Consumption D9C2 (national criteria): Pathogenic microbiological contamination
D10 - Marine litter	D10C1 : Waste (excluding micro-waste) <b>D10C2</b> : Micro-waste <b>D10C3</b> : Ingested wastes <b>D10C4</b> : Adverse effects of waste
D11 - Introduction of energy including underwater noise	<b>D11C1</b> : Anthropogenic impulsive noise <b>D11C2</b> : Low-frequency anthropogenic continuous noise

Table 1 : GES descriptors' evaluation criteria (source : IFREMER)

Given the nature of the marine environment, for each of these descriptors, GES must be determined at the marine region or subregion levels. In fact, according to article 5, and in line with the ecosystem-based approach guiding the MSFD, although marine strategies are to be applied to national waters, also the development of targets, monitoring programs and programs of measures, must take into account the marine (sub)region.

On the basis of methodological standards defined by the European Commission, GES was specified at the national level and notified to the Commission at the end of December 2012. Each Member State must adapt or even complete the standards harmonized at the European level in view of its territory and the scientific advances at its disposal. The definition of GES is thus revised every 6 years.

### 3.3.3. Step 3 - Environmental objectives

Environmental objectives aim to reduce the pressures exerted by human activities on the marine environment to levels consistent with maintaining and achieving GES of marine waters by the end of the current MSFD cycle. Thus, the environmental objectives adopted by the coordinating authorities of the seafront in 2019 should make it possible to reduce the pressures exerted by activities between now and 2026.

Environmental objectives are proposed either for the entire perimeter of the seafront or for geographically localised ecological issues and/or areas particularly concerned by high levels of pressure.

In order to be assessable, the environmental objectives come along with quantitative indicators (threshold value or trend) and have defined targets. These are proposed with a view to achieving or maintaining GES of marine waters. In other words, the environmental objectives are levers for achieving or maintaining the GES. Their definition takes into account existing public policies.

#### 3.3.4. Step 4 - Monitoring Programme (MoP)

The monitoring program defines the monitoring necessary for the ongoing assessment of the marine environment and describes all the systems for collecting or producing data to meet the objectives set by the Directive. It must be updated every 6 years. In particular, it is intended to allow:

- > The analysis of the characteristics of the ecosystem and of the pressures and impacts that make it possible to carry out the analysis of the ecological status under Article 8 of the MSFD,
- > The evaluation of the achievement of GES,
- > The assessment of the achievement of environmental objectives as defined in the corresponding *Marine Action Plans (MAP)*
- > The evaluation of the effectiveness of the measures implemented under the programme of measures;
- > The construction of the GES descriptors and those associated with the environmental objectives.

Each MoP is structured into 13 thematic programmes, each corresponding to a MSFD descriptor, except for the descriptors related to biodiversity for which monitoring is organized by compartment or ecosystem component.

The MoPs adopted in 2015 will be revised in 2021 through the adoption of monitoring systems for strategic facade documents.

#### 3.3.5. Step 5 – Programme of measures (PoM)

The programme of measures shall include all the concrete and operational actions to be implemented in order to achieve or maintain GES in marine waters by 2020. They shall be based on an analysis of the adequacy of existing measures under other policies with regard to environmental objectives and shall identify on this basis complementary measures for the achievement of these objectives.

The PoMs include national measures, some of which can however be implemented at the local level, and measures specific to the challenges of the marine sub-regions.

In the PoM adopted in April 2016 under the 1st cycle of MSFD implementation, the measures concern the following themes:

- > Marine biodiversity,
- > Integrated management of the land-sea interface,
- > Development and supervision of the planning of specific activities that may impact the marine environment;
- > Communication, awareness and training,
- > Two emerging topics: non-native species and underwater noise.

3.3.6. 2.3.6 MSFD's implementation cycles

The first 6-year cycle ended in 2020 and the first step of the second cycle has then started.

- > First Cycle: 2012 – 2018
- > Second Cycle : 2018 – 2024
- > Third Cycle : 2024 - 2030

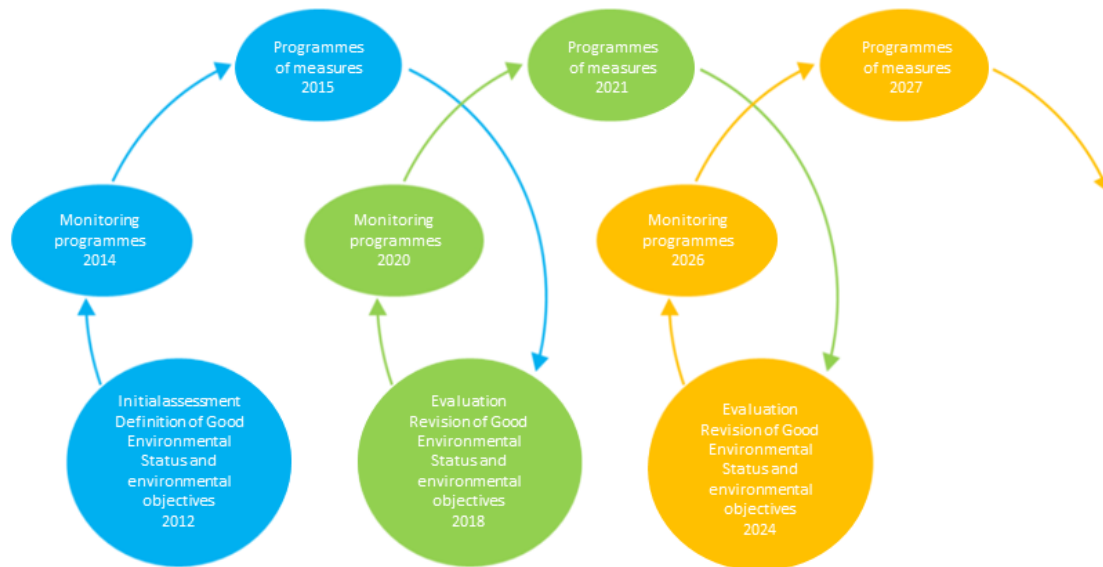


Figure 3-5 : MSFD's implementation cycles (source : MilieuMarinFrance)

As a result of the assessment made during the first cycle, the Commission made some recommendations to be taken forward at different levels. To improve adequacy and coherence of GES, proposed actions at the EU level included the revision and strengthening of the Commission decision on criteria and methodological standards on GES and further developing common understanding on the obligations under article 9 (including GES assessment methods, scales and aggregation rules) to allow a pan-European assessment of marine ecosystems.

At the regional level, the Commission highlighted the need to enhance regional cooperation, namely, in the context of Regional Sea Conventions. The purpose is to ensure that MS and the EC work together towards a systematic identification of gaps in knowledge that prevents a more ambitious risk-based setting of GES. The ambition is to collaborate to close those gaps and further develop region or ecosystem specific criteria to determine and assess GES, ensuring regional work

benefits from progress at the EU level. These elements will be revised during the second cycle.

All the results of the work carried out during the first cycle are available on the EC's website<sup>1</sup>.

### 3.4. Generic responsibility for EU Member States

The MSFD requires that Member States must cooperate with each other and in particular when they share a marine region (or subregion). This is to ensure that each element of their marine strategies is coherent and coordinated across the concerned marine region (or subregion).

The Directive splits Europe's waters into 4 marine regions and associated sub-regions:

- > Baltic Sea (No Sub-regions),
- > The North East Atlantic Ocean (The Greater North Sea including the Kattegat and the English Channel; The Celtic Seas; The Bay of Biscay and the Iberian Coast; The Macaronesian Biogeographic region (the waters surrounding the Azores, Madeira and the Canary Islands),
- > The Mediterranean Sea (The Western Mediterranean Sea; The Adriatic Sea, The Ionian Sea and the Central Mediterranean Sea, The Aegean-Levantine Sea),
- > The Black Sea (No Sub-regions).

A suitable implementation of the Directive requires, both, a good understanding of the relationships between activities, pressures and the ecosystems, and the cooperation and coordination of MS at a regional and sub-regional level, in order to (1) assess possible cumulative impacts and the state of the marine ecosystem and (2) set targets and measures accordingly.

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<sup>1</sup> [https://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/implementation/reports\\_en.htm](https://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/implementation/reports_en.htm)



Figure 3-6 : MSFD's marine regions & sub-regions (source: European Commission)

In order to facilitate the work, the coordination is being carried out through a series of working groups led by the European Commission known as the Common Implementation Strategy (CIS). The CIS is composed of the following working groups:

- > **Marine Directors:** Highest level political group focused on ensuring the overall implementation of the Directive;
- > **Marine Strategy Coordination Group:** Link between Marine Directors and Working Groups, preparing material for the Marine Directors and overseeing the work of the Working Groups. This group (and its subgroups) is a Commission expert group within the meaning of Commission decision C(2016)3301;
- > **The Working Group on GES:** It focuses on issues concerning the characteristics of GES and the associated targets and indicators, with the aim of ensuring comparable approaches are taken across the EU;
- > **The Working Group on Economic and Social Analysis:** It supports Member States in meeting the economic and social assessment



requirements of the Directive, with the aim of ensuring comparable approaches are taken across the EU.

- > **The Working Group on Data, Information and Knowledge Exchange:** It has been set up to develop a coordinated MSFD information and data reporting process. The working group is developing proposals for reporting Programme of Measures. It will also address the development of the data infrastructures that are needed to facilitate the implementation of the Directive at European- and Member State-level, working as far as possible to use existing data initiatives and to remove duplication of reporting with related Directives.



Figure 3-7 : MSFD's coordination groups (source: European Commission)

There are also four European technical subgroups, on marine litter (Descriptor 10), noise (Descriptor 11), seabed and data, which have a remit to review monitoring methodologies and develop proposals for new monitoring; provide a platform for sharing best practice on the development of GES characteristics, targets and indicators; and

recommend proposals for further research.

The EC also relies on the work of the European Environment Agency (EEA), the Joint Research Centre (JRC) and the International Council for the Exploration of the Sea (ICES) to advance knowledge and to provide technical support to its on-going work.

## 4. Marine Strategy Framework Directive (Directive 2008/56/EC) in France

### 4.1. Procedures

In France, the Marine Strategy Framework Directive applies to metropolitan areas under French jurisdiction, divided into 4 marine sub-regions: the English Channel-North Sea, the Celtic Seas, the Bay of Biscay and the Western Mediterranean (Figure 4-1).

In order to achieve objectives, set for 2020, France has decided to implement the requirements of the MSFD through Marine Action Plans (MAP). Each MAP corresponds to a metropolitan marine sub-region and is made up of the 5 steps of the MSFD implementation.

The content of the MAPs is defined by the coordinating authorities (Prefectures) of the four metropolitan marine sub-regions, in consultation with the stakeholders concerned who are members of each Maritime Councils (representatives of socio-economic sectors, scientific experts, researchers, NGOs, elected officials, etc.).

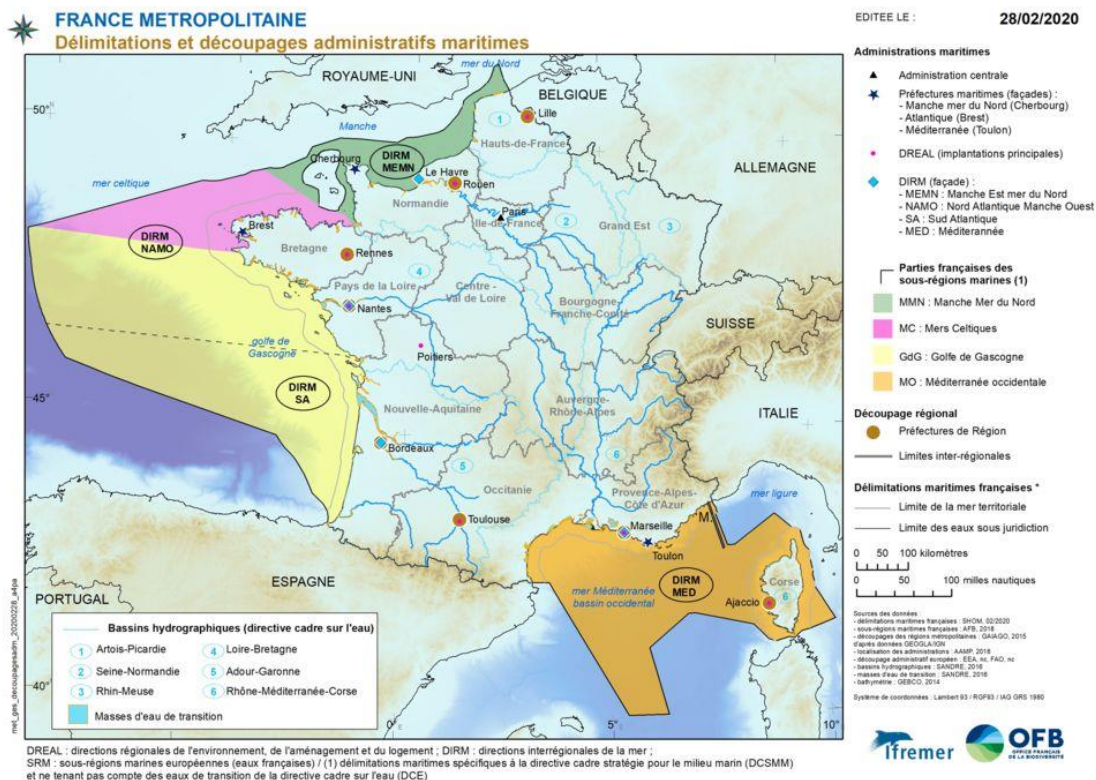


Figure 4-1: French waters limitations for MSFD (source: IFREMER & OFB)

#### 4.2. Governance

The governance of the MSFD is based on competent administrative authorities at the national level - the Ministry in charge of the Environment (Directorate of Water and Biodiversity) and at the level of each marine sub-region (Prefectures coordinating seafronts). Within each seafront, the coordinating authorities rely on the coordinating role of the interregional directorates of the East Channel-North Sea, North Atlantic-West Channel, South Atlantic and Mediterranean.

The implementation of the MSFD is also carried out in close consultation with the actors of the maritime field gathered within the Maritime Councils of the coasts. The competent authorities shall draw on the scientific and technical work carried out by a wide network of partners to develop and revise the various elements of the Marine Action Plans. In particular, the French Biodiversity Office (OFB) and the French National Institute for Ocean Science (IFREMER) are in charge of the MSFD implementation and provide technical and scientific support.

All elements of the Marine Action Plans are notified to the European Commission. The Commission assesses their conformity with the requirements of the Directive and their consistency within the marine sub-regions and the Community as a whole.

For the second cycle of implementation of the MSFD, the Marine action plans (MAP) have been integrated into the Strategic Maritime Fringe Document (DSF), of which they constitute the environmental component (Decree No. 2017-724 of May 3, 2017). Each element of the MAP is therefore included in one of the elements of the DSF. The integration of the MAPs in the DSF has confirmed the strong need for scientific and technical support to the implementation of the DSF as well as the need to implement marine policies in an integrated manner.

#### 4.3. Operators

At the national and local levels, the stakeholders of the MSFD implementation are the government services and public establishments, public institutions, territorial authorities, maritime economy actors, scientists and NGOs. Detailed and respective roles are described in Table 2.

To further investigate, a set of interviews were planned to better understand the complex implementation of the MSFD and to clearly identify who is doing what.

While most of the responses provided an understanding of the MSFD implementation and have enabled the writing of this report, it should be noted that all of the structures interviewed were in line saying that the coordination in France is running well as the ministry is deeply involved in the overall process. It is also getting better and better as each structure wants to reach the same objective and is taking advantage of the lessons learned during the first implementation cycle.

*"For the first reporting cycle, each involved entity was working on its own, they were some discussion but not so much. For the second cycle (the current one), the idea is to work closely and involve as many people as possible. The coordination of the 11 descriptors have the same baseline and methods to evaluate the environmental criteria."*

**OFB, MSFD French coordination team**

	Thematic responsible	Monitoring Responsible
D1 - Biodiversity - benthic habitat	UMS PatriNat (OFB)- Dinard / Ifremer	OFB Brest – OFB Granville
D1 - Biodiversity - pelagic habitats		OFB Brest
D1 - Biodiversity - Mammals	UMS 3462 PELAGIS, La Rochelle	OFB Brest
D1 - Biodiversity - Birds	MNHN - Station marine de Concarneau	OFB Brest
D1 - Biodiversity - Fish & D1 - Biodiversity - Cephalopods	Ifremer, Nantes - UMS PatriNat (OFB), Dinard	Ifremer, Nantes - UMS PatriNat (OFB), Dinard
D1 - Biodiversity - Turtles	MNHN	OFB Brest
D1 and D2 - International Biodiversity Coordination	MNHN	
D2 - No-indigenous species	UMS PatriNat (OFB) – Station marine d’Arcachon	UMS PatriNat (OFB) – Station marine d’Arcachon
D3 - Population of commercial fish/shellfish	Ifremer Port en Bessin - Ifremer Nantes	Ifremer Nantes
D4 - Elements of marine food webs	-	-
D5 - Eutrophisation	Ifremer, Boulogne sur Mer	OFB Brest
D6 - Sea floor integrity	BRGM Orléans - BRGM	BRGM Orléans - BRGM
D7 - Alteration of hydrological conditions	SHOM Brest	SHOM Brest
D8 - Concentration of contaminants	Ifremer Nantes	Ifremer Nantes
D9 - Contaminants in fish/seafood for human consumption	ANSES	ANSES
D10 - Marine litter	Ifremer Bastia - Ifremer La Seyne sur Mer - CEDRE Brest	OFB Brest
D11 - Introduction of energy including underwater noise	SHOM Brest	SHOM Brest

Table 2: French structures involved in the MSFD implementation (source: IFREMER)

However, relations with others MS are almost non-existent for thematic and monitoring responsible. Only ministries are working together within the various working groups. This is certainly something that will have to be modified during the second implementation cycle since it is part of the Commission's recommendations.

*"In the EC working groups, there is a wish to work closely all together, to harmonize the monitoring processes and procedures and to work jointly on some descriptors."*

### **IFREMER, MSFD French coordination team**

These interviews were also and primarily conducted to identify how to align/use the substantial capabilities of Copernicus for the MSFD and to inventory in which agencies in charge Copernicus is used and if not, what are the reasons why (inputs to be found in MAREOS D1.2).

#### 4.4. Conclusions

The analysis of the actions launched under the first MSFD implementation cycle shows that, even though considerable efforts have been made or will be accomplished in the near future, in most Member States additional action is needed to ensure reaching GES. More progress needs to be made to ensure that approaches are comparable across Member States and to make sure the monitoring programmes are improved so they constitute an appropriate framework that meets the MSFD requirements.

Part of the response to these bottlenecks could certainly be found in existing initiatives and programmes such as Copernicus.

Indeed, as the European Union's Earth Observation Programme is composed of several tools that present numerous advantages regarding surveillance and monitoring that could help the implementation of the MSFD.

## TASK 2. DATA GAPS ANALYSIS IN THE IMPLEMENTATION OF EU DIRECTIVES

### 5. Introduction to Task 2

Data gaps have been analysed through a consultation with practitioners, stakeholders and relevant administrations in the context of the Marine Strategy Framework Directive or the Marine Spatial Planning Directive.

This technical report presents the results of the survey conducted among Spanish stakeholders to fulfil Task 2. Additionally, it provides initial insights for Task 3, examining how the identified data gaps among Spanish stakeholders could potentially be addressed using Copernicus data. Moreover, it also provides preliminary results for Task 4, exploring services of higher interest required by the different marine sectors. The **objectives of the survey** are:

- To identify the current needs and gaps of Spanish stakeholders to better understand their current usage of Copernicus data, across different marine sectors, in the implementation of both EU Marine Directives (Task 2 and Task 3).
- To identify the Copernicus services of higher interest for the marine sectors involved in the implementation process (Task 4).

### 6. Methodology

The survey was compiled from contributions, by the different action partners, and a final English version with 34 questions was agreed upon (Annex I). It should be noted that this action is being coordinated with other actions, part of Working Group Oceans, namely, Action 2021-2-42 (Copernicus uptake for the maritime sector) and Action 2021-2-47 (Coastal coordination of user needs and methodologies), and, therefore, the survey included questions that contributed to all three actions, to improve efficiency and avoid stakeholder fatigue. The final survey was then translated to the different languages of the participating countries for dissemination. Survey questions were organised in the following sections:

- GENERAL INFORMATION (Q.1)
- MARINE SECTORS (Q2-Q13)
- MARINE SECTOR & MSP GAPS (Q14-Q16)
- EU MARINE DIRECTIVES (Q17-Q23)
- MARINE STRATEGY FRAMEWORK DIRECTIVE GAPS (Q24-Q27)
- COPERNICUS (Q28- Q34)

The identification of stakeholders and dissemination of the survey was done independently by each partner leveraging contacts, partners, previous email campaigns, social media outreach, as well as personalised invitations to encourage participation. The objective was to gather diverse perspectives, maximise participation and enrich the outcome of the project.

For the French survey, the list of stakeholders identified was more limited but amounted to around 100 stakeholders. This list was built up over the years in relation to the various projects in the maritime field and comes from the cross-database CNES / Pole Mer Bretagne-Atlantique (French Sea Innovation Cluster), which targets the end users linked to the subject. The survey was distributed by email.



## 7. Results for survey conducted in France

### 7.1. General overview of stakeholder's profile for the maritime sector in France

The survey for France received a total number of 15 responses. A list with the stakeholder's participant in the survey is presented in Annex II.

The profile of the stakeholders that responded to the survey is shown in Figure 7-1. Regarding their **entity type**, most are from the research sector and public administrations which corresponds to the entities responsible for implementing the marine directives in France.

Regarding their **area of activity** (coastal, marine, inland), they are mostly working in Coastal area followed by Marine area and only one works in the inland area. However, respondents could select more than one sector and so 6 of the respondents who work in marine sector, they work in coastal sector as well.

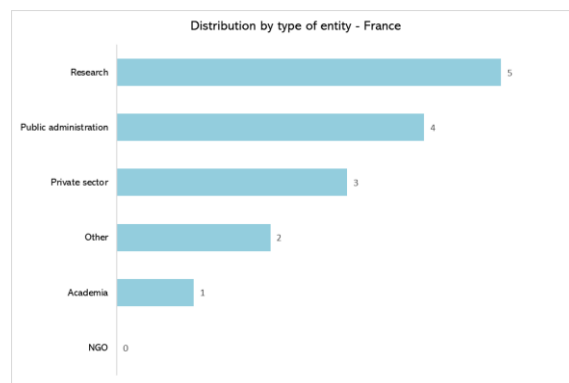


Figure 7-1. Stakeholder's profile by type of entity for France.

The overall **relation of stakeholders to the various sectors** was evaluated with a multiple answer question, so that respondents could select more than one sector of their interests or involvement. Results are shown in Figure 7-2.

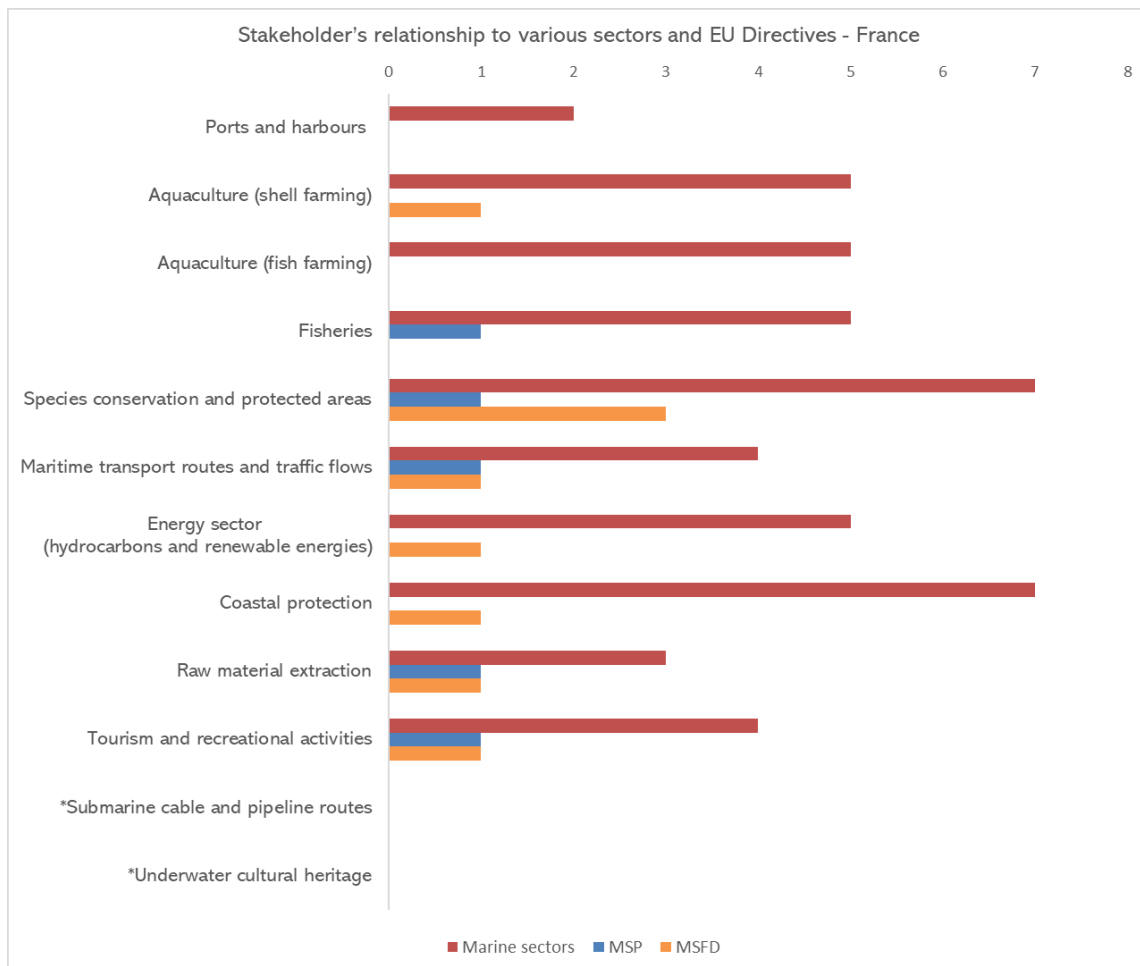


Figure 7-2. Stakeholder's relationship to various sectors and EU Directives implementation

Regarding the stakeholder's profile involved in implementation of the **EU Marine Strategy Framework Directive (MSFD)** in France, they are consistent with the descriptors of the directive which covers the physicochemical domain. However, it is difficult to conclude on the stakeholder's profile involved in implementation of the **EU Marine Spatial Planning Directive (MSP)** given the low number of respondents (2).

## 7.2. Stakeholder’s areas of interest for the maritime sector in France

The overall **services of interest to the various sectors** were evaluated with a multiple answer question, so that respondents could rate services by order of interest (Figure 7-3).

The results indicate that the areas of higher interest for the maritime sector in France are the identification of pressures and environmental monitoring, maritime climate and the effects of climate change. A shared lower interest emerged for the “infrastructure monitoring” services across most marine sectors.

Services of most interest for marine sectors - France

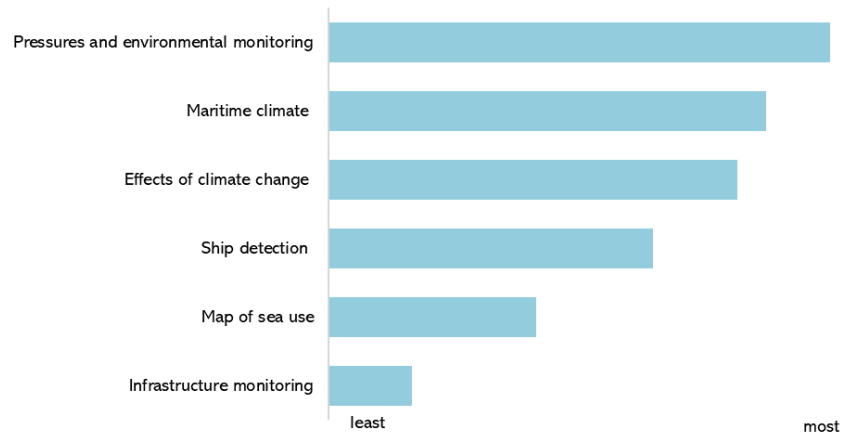


Figure 7-3. Stakeholder’s services of most interest among all sectors

Figure 7-4 shows a detailed analysis of the services of interest for each of the marine sectors listed in Figure 7-2.

2 stakeholders selected **"Ports and harbours"** as a sector of their involvement in France. "Navigation and dredging operations" emerged as the most interesting service for these stakeholders, followed by "Ship detection" service. "Infrastructure monitoring" received the lowest level of interest.

5 stakeholders selected **"Aquaculture (shell farming)"** as a sector of their involvement in France. "Pollution and environmental monitoring" emerged as the most interesting services for these stakeholders followed by "Marine water quality data" and "Oceanographic data: waves, tides, temperature". "Selection of suitable site locations and species" received the lowest level of interest.

5 stakeholders selected **"Aquaculture (fish farming)"** as a sector of their involvement in France. "Marine water quality data" emerged as the most interesting service for these stakeholders, followed by "Oceanographic data: waves, tides, temperature". "Effects of climate change" received the lowest level of interest.

5 stakeholders selected **"Fisheries"** as a sector of their involvement in France. "Fishing area characterizations" emerged as the most interesting service for these stakeholders, followed by "Ship detection". "Fisheries certification" received the lowest level of interest.

7 stakeholders selected **"Species conservation and protected areas"** as a sector of their involvement in France. "Pressures" emerged as the most interesting service for these stakeholders, followed by "Environmental monitoring". "Map of sea use" received the lowest level of interest.

4 stakeholders selected **"Maritime transport routes and traffic flows"** as a sector of their involvement in France. "Pollution and environmental monitoring" emerged as the most interesting service for these stakeholders, followed by "Ship detection". "Sea ice covered area" received the lowest level of interest.

6 stakeholders selected **"Energy sector (hydrocarbons and renewable energies)"** as a sector of their involvement in France. "Selection of suitable renewable energy locations" emerged as the most interesting services for these stakeholders, followed by "Maritime climate". "Energy production surveying" received the lowest level of interest.

7 stakeholders selected **"Coastal protection"** as a sector of their involvement in France. "Bathymetry and sedimentation" emerged as the most interesting service for these stakeholders, followed by "Coastline delineation". "Characterisation of emerged coastal areas (" received the lowest level of interest.

3 stakeholders selected "**Raw material extraction**" as a sector of their involvement in France. "Map of sea use" emerged as the most interesting service for these stakeholders, followed by "Maritime climate". "Ship detection" received the lowest level of interest.

4 stakeholders selected "**Tourism and recreational activities**" as a sector of their involvement in France. "Water quality" and "Effects of climate change" emerged as the most interesting services for these stakeholders, followed by "Maritime climate". "Landscape quality" received the lowest level of interest.

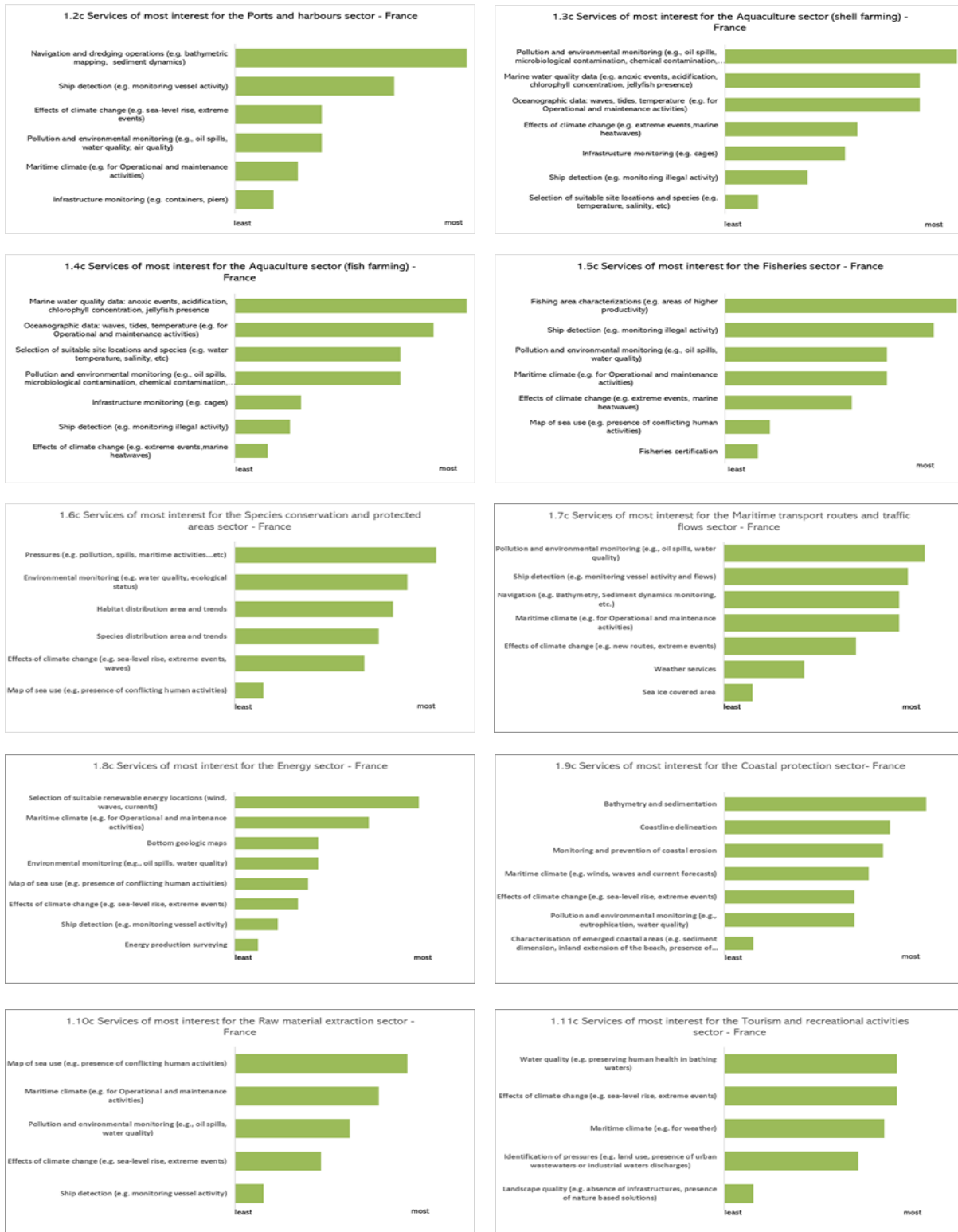


Figure 7-4. Detail of services of most interest for the overall sector in France

### 7.3. Data gaps and needs in the implementation process of EU Directives in France

#### 7.3.1. Stakeholders involved in EU Marine Spatial Planning Directive implementation

##### 7.3.1.1. Problems encountered when working with the data available

Regarding general data usage, the French stakeholders involved in Marine Spatial Planning Directive implementation (2), when asked about the most common problems encountered when working with data (Figure 7-5), mentioned the challenges associated with “unsuitable resolution” followed by “Inaccessible data or unavailability of data”, “Incomplete Temporal distribution” and “Incomplete Spatial distribution”, “Heterogeneous data collection methodologies”, “Heterogeneous sources” and “Data reliability” in contrast to “complexity of data”, “data format” and “Lack of tools to manipulate and visualise the data” that do not seem to pose a problem. However, the number of respondents is too low on this subject to consider these responses as a trend.

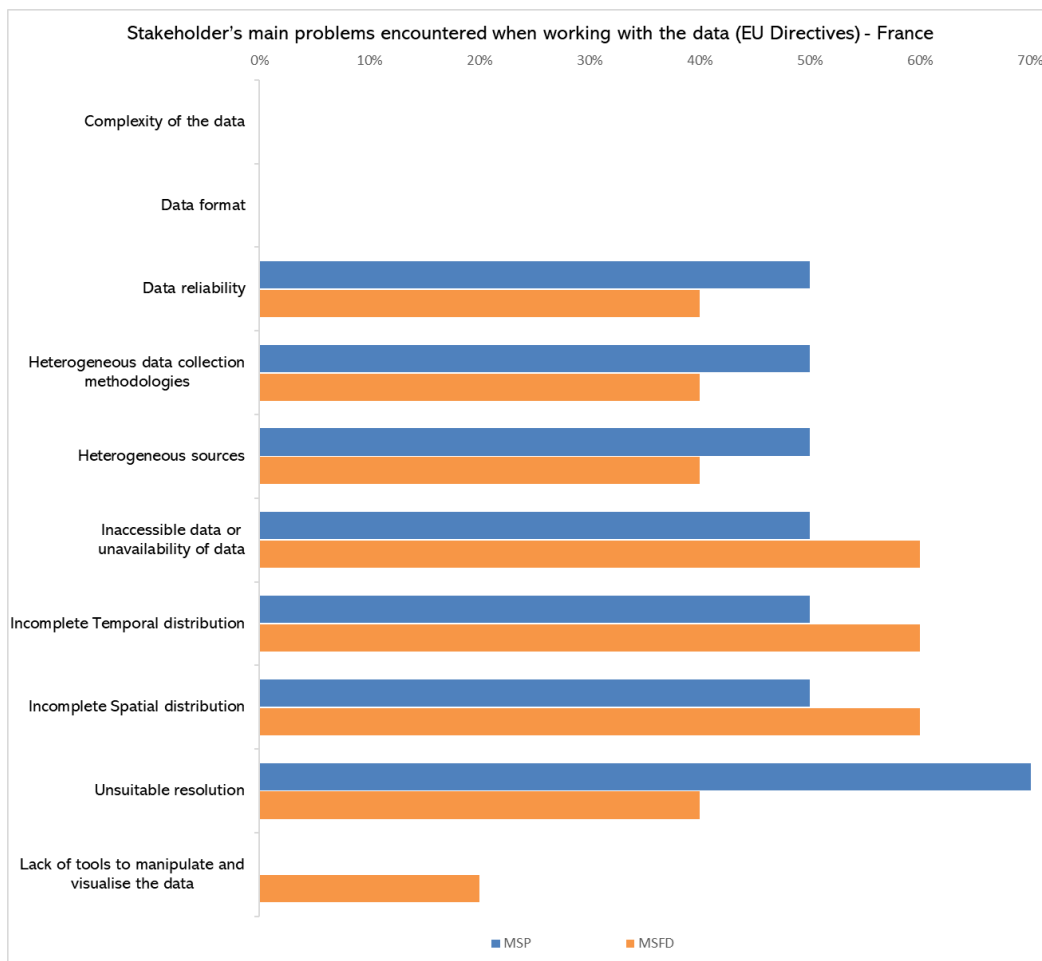


Figure 7-5. Stakeholder's main problems encountered when working with the data available in the implementation process of EU Directives in France

7.3.1.2. Needs regarding temporal extent of the data

The French stakeholders involved in Marine Spatial Planning Directive implementation (2), when asked about their needs regarding temporal extent of the data (Figure 7-6), expressed a clear need for all the kind of temporal extent from the “real time” to “long term historical data series”.

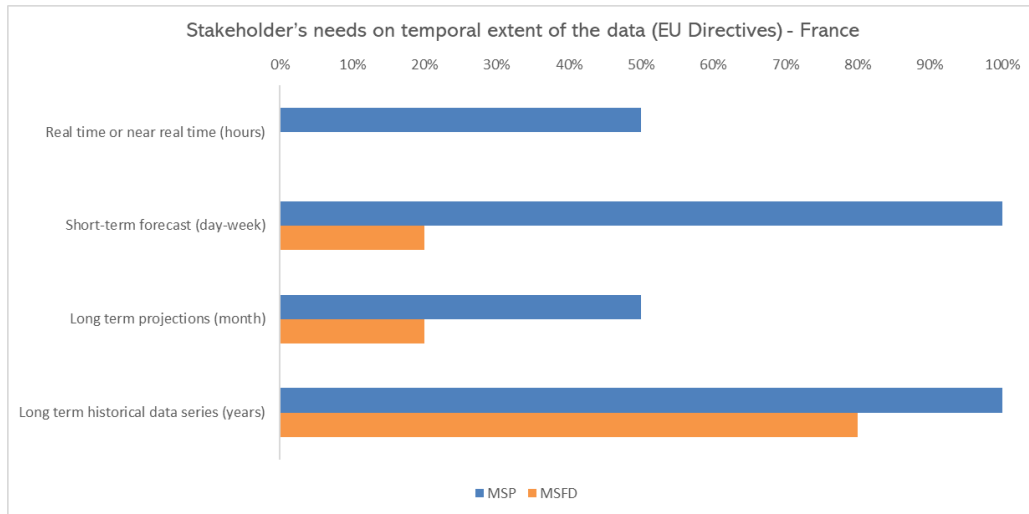


Figure 7-6. Stakeholder’s needs on temporal extent of the data in the implementation process of EU Directives in France

7.3.1.3. Needs regarding spatial resolution of the data of the data

The French stakeholders involved in Marine Spatial Planning Directive implementation (2), when asked about their needs regarding spatial resolution of data (Figure 7-7), expressed the need for medium to very high resolution.

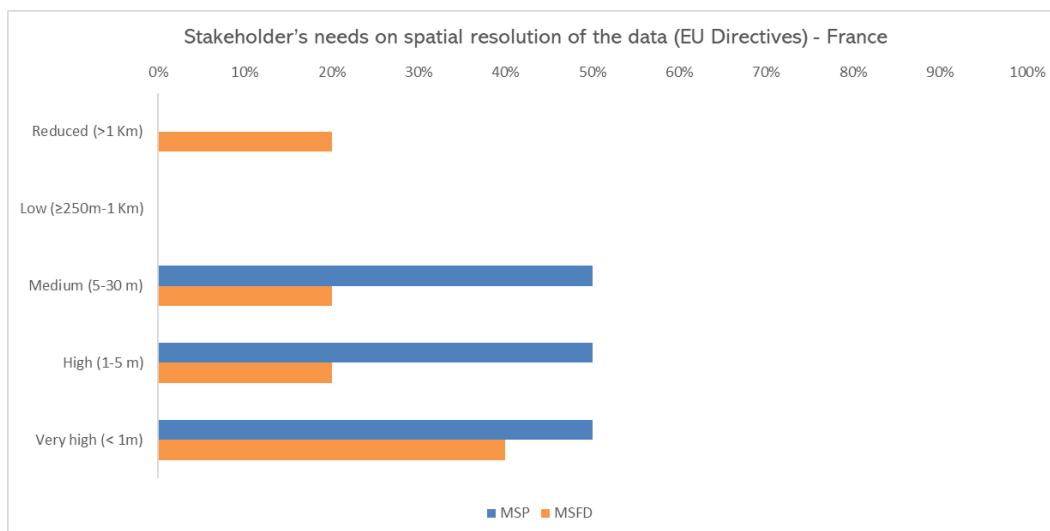


Figure 7-7. Stakeholder’s needs on spatial resolution of the data in the implementation process of EU Directives in France



### 7.3.2. Stakeholders involved in EU Marine Strategy Framework Directive implementation

#### 7.3.2.1. *Knowledge gaps encountered when working with the descriptors*

French stakeholders involved in Marine Strategy Framework Directive implementation (5), when asked about the most common problems encountered when implementing COMMISSION DECISION (EU) 2017/84, mentioned that they faced challenges related to data accessibility, incomplete temporal and spatial distribution of data, data reliability, heterogeneous data collection methodologies, and inadequate spatial resolution.

#### 7.3.2.2. *Problems encountered when working with the data available*

Regarding general data usage, most of French stakeholders involved in Marine Strategy Framework Directive implementation (5), when asked about the most common problems encountered when working with data (Figure 7-5), mentioned the challenges associated with "inaccessible data or unavailability of data", "Incomplete temporal distribution" and "Incomplete spatial distribution", followed by "Data reliability", "Heterogeneous data collection methodologies", "Inaccessible data or unavailability of data" and "Inadequate resolution" in contrast to "complexity of data" and "data format" that does not seem to pose a problem.

#### 7.3.2.3. *Needs regarding temporal extent of the data*

Most of French stakeholders involved in Marine Strategy Framework Directive implementation (5), when asked about their needs regarding temporal extent of the data (Figure 7-6), expressed a clear higher need for "long term historical data series" and a little of and no need for "Long term projections" and "Short term forecast", there is no need for "Real time or near real time".

#### 7.3.2.4. *Needs regarding spatial resolution of the data of the data*

Most of French stakeholders involved in Marine Strategy Framework Directive implementation (5), when asked about their needs regarding spatial resolution of data (Figure 7-7), expressed the need for the whole range of spatial resolution with a stronger need on very high resolution.

### 7.3.3. Marine sectors affected by EU Marine Directives implementation

#### 7.3.3.1. *Problems encountered when working with the data available*

Regarding general data usage, when analysed marine sectors in France (Figure 7-8), most stakeholders, when asked about the most common problems encountered when working with data, mentioned the challenges associated with "Lack of tools to manipulate and visualise the data" and Unsuitable resolution.

Figure 7-8 shows a detailed analysis of the stakeholder's main problems encountered when working with the data available for each of the marine sectors listed in The overall **relation of stakeholders to the various sectors** was evaluated with a multiple answer question, so that respondents could select more than one sector of their interests or involvement. Results are shown in Figure 7-2.

Figure 7-2.

Regarding data usage in "**Ports and harbours**" sector, stakeholders stated that the most common challenges encountered when working with data are related with Data format, Inaccessible data or unavailability of data, Unsuitable resolution and Lack of tools to manipulate and visualise the data (6%). None of the stakeholders encountered problems with the other problematics.

Regarding data usage in "**Aquaculture**" sector, stakeholders stated that the most common challenges encountered when working with data are related with Unsuitable resolution and Lack of tools to manipulate and visualise the data (18%), followed by Complexity of the data for the fish farming (12%). All other problematics seem less important for the users (0 to 6%).

Regarding data usage in "**Fisheries**" sector, stakeholders stated that the most common challenges encountered when working with data are related with Lack of tools to manipulate and visualise the data (24%), Unsuitable resolution, Heterogeneous data collection methodologies and Complexity of the data (12%) Least problematic seemed to be the Data format, Heterogeneous sources and Incomplete Temporal and Spatial distribution (6%).

Regarding data usage in "**Species conservation and protected areas**" sector, stakeholders stated that the most common challenges encountered when working with data are related with Lack of tools to manipulate and visualise the data (24%). They also encountered difficulties with Unsuitable resolution, Heterogeneous data collection methodologies (18%) and Complexity of the data, Heterogeneous sources, Inaccessible data or unavailability of data, Incomplete Temporal and Spatial distribution (12%). Least problematic seemed to be the Data format (6%).

Regarding data usage in "**Maritime transport routes and traffic flows**" sector, stakeholders stated that the most common challenges encountered when working with data are related with Lack of tools to manipulate and visualise the data (18%). They also encountered difficulties with Unsuitable resolution and Heterogeneous data collection methodologies (12%). All other problematics seem less important for the users (0 to 6%).

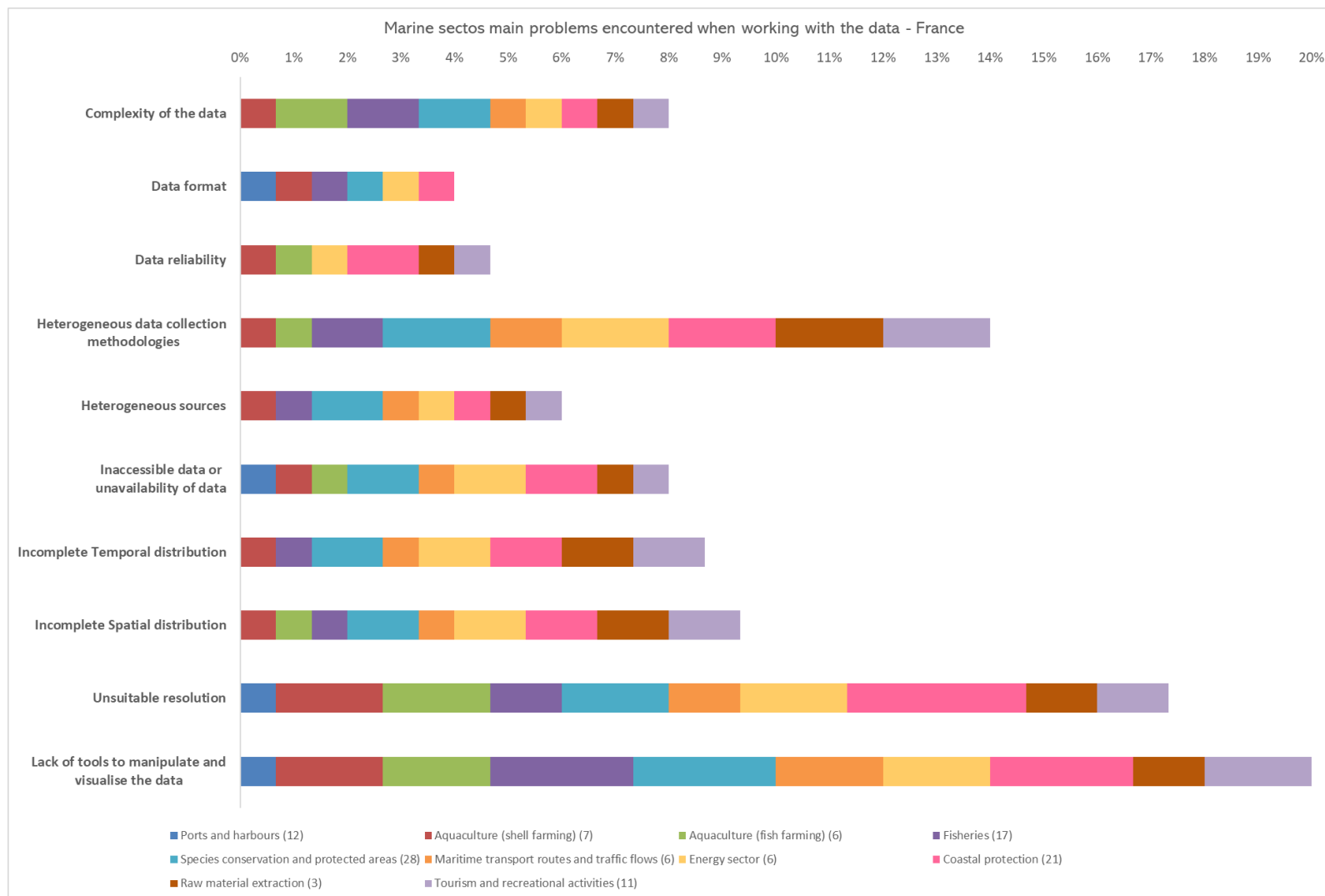


Figure 7-8. Marine sectors main problems encountered when working with the data available in France

Regarding data usage in **“Energy sector”**, stakeholders stated that the main challenge encountered when working with data is related Heterogeneous data collection methodologies, Unsuitable resolution and Lack of tools to manipulate and visualise the data (18%). They also encountered difficulties with the Inaccessible data or unavailability of data, Incomplete Temporal and Spatial distribution (12%). All other problematics seem less important for the users (6%).

Regarding data usage in **“Coastal protection”** sector, stakeholders stated that the most common challenges encountered when working with data are related with Unsuitable resolution (30%) followed by far by Lack of tools to manipulate and visualise the data (24%), Heterogeneous data collection methodologies (18%), Data reliability, Inaccessible data or unavailability of data and Incomplete Temporal and Spatial distribution (12%). All other problematics seem less important for the users (6%).

Regarding data usage in **“Raw material extraction”** sector, stakeholders stated that the most common challenges encountered when working with data are related with Heterogeneous data collection methodologies (18%), Lack of tools to manipulate and visualise the data, Unsuitable resolution, Incomplete Temporal and Spatial distribution (12%) All other problematics seem less important for the users (0 to 6%).

Regarding data usage in **“Tourism and recreational activities”** sector, stakeholders stated that the most common challenges encountered when working with data are related with Lack of tools to manipulate and visualise the data, Heterogeneous data collection methodologies (18%) Unsuitable resolution, Incomplete Temporal and Spatial distribution (12%). All other problematics seem less important for the users (0 to 6%).

#### *7.3.3.2. Needs regarding temporal extent of the data*

In terms of the temporal extent of data, when analysed marine sectors in France (

), depending on the themes, some needs are highlighted such as a Real time or near real time need for the management of flows in ports while the exploitation of mining resources only requires long-term information. Aquaculture requires monitoring at all scales even if there is a greater need in real time for farm management. Fisheries management like coastal protection requires both real-time management and a historical vision of developments. The conservation of species and protected areas requires historical monitoring of developments. Finally, maritime routing, marine energies and tourism require a vision at all temporal extent.



Figure 7-9. Marine sectors needs regarding temporal extent of data in France

### 7.3.3.3. Needs regarding spatial resolution of the data

In terms of the spatial resolution of data, when analysed marine sectors in France (Figure 7-10), in the same way, some trends are highlighted regarding the themes addressed. Conservation work on species and protected areas requires the most precision (very high). Most of the themes above all require a resolution ranging from medium to high resolution, from 1m to 1km: the management of maritime traffic, marine energies, fisheries management, coastal protection and tourism. We also note a greater need for resolution for shell farming (less than 1m to 1 km) than for fish farming (5m to more than 1 km). The management traffic flow in ports requires a resolution mainly between 1 and 30 m, like extraction activities.

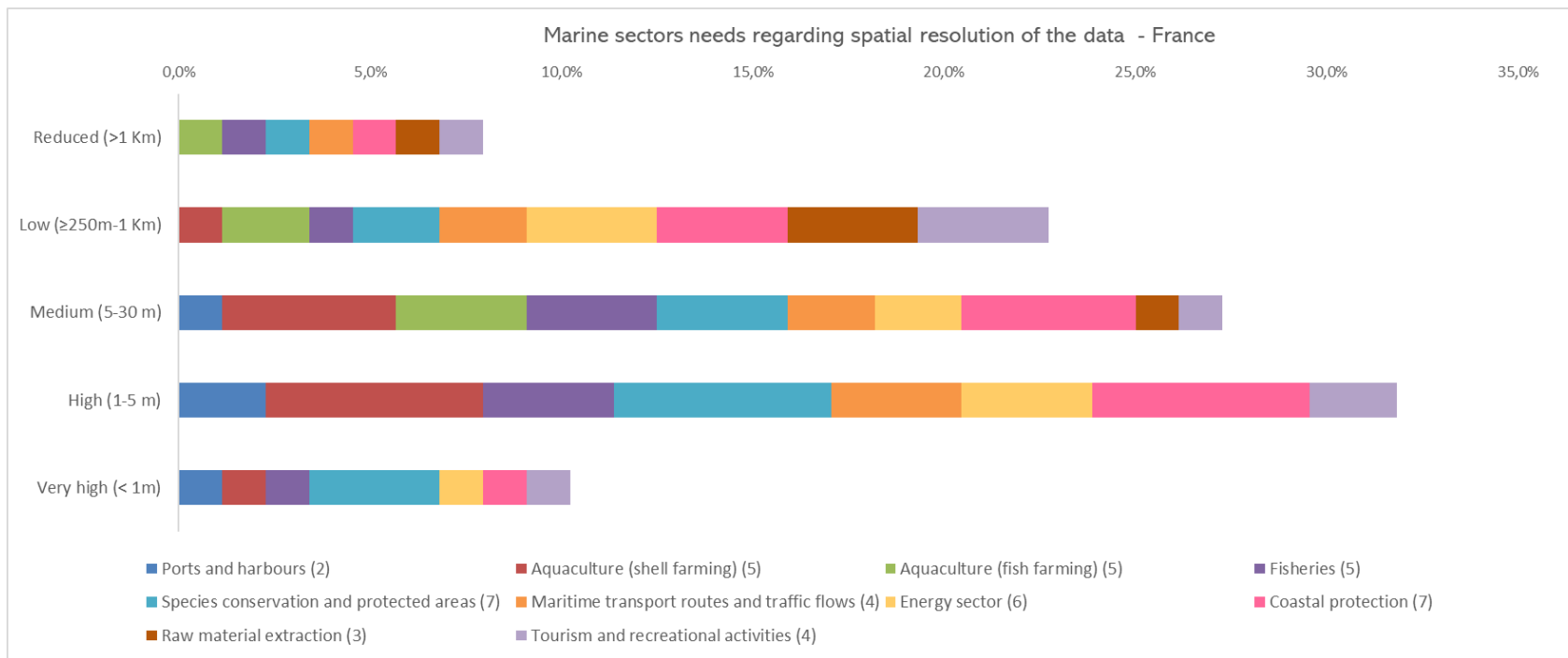


Figure 7-10. Marine sectors needs regarding spatial resolution of the data in France

#### 7.4. Copernicus usage in the implementation process of EU Directives in France

The following analysis focuses on the part of the survey aimed to understand the general issues, awareness and data usage related with Copernicus products of those marine sectors and stakeholders involved in the implementation process of the two EU Directives in France.

Regarding **stakeholder’s awareness of the Copernicus program** (Figure 7-11), we can note that the most part of the users questioned are aware of the Copernicus program. 20% of stakeholders involved in the implementation of the MSFD say they are not familiar with the program.

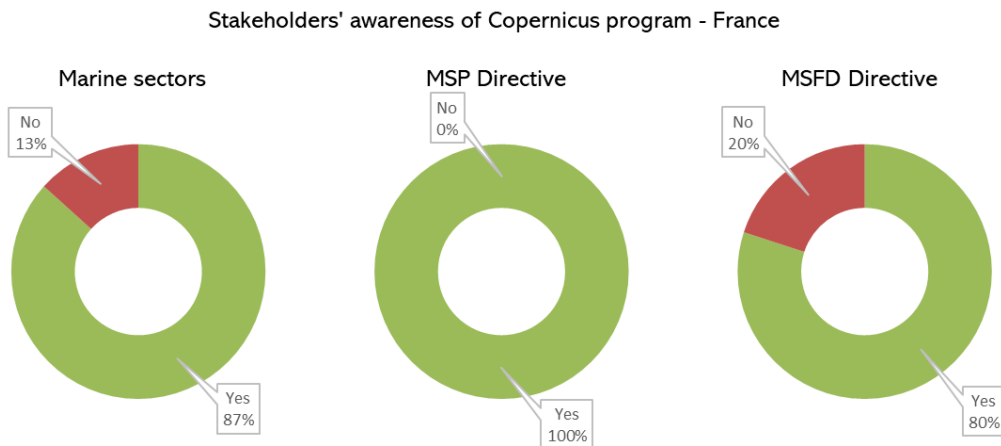


Figure 7-11. Stakeholders’ awareness of the Copernicus program in France across marine sectors and EU Directives in France

For the stakeholders that mentioned being aware of the program it was further questioned their **usage of Copernicus Data** (Figure 7-12). It is quite clear that although knowing the existence of the Copernicus program, a large number of stakeholders do not use the data available, around 60%.

Stakeholders' use of Copernicus Data - France

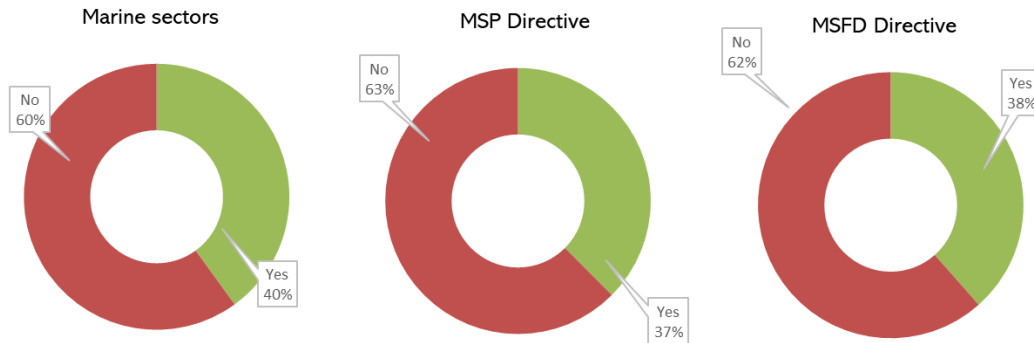


Figure 7-12. Stakeholders' use of Copernicus Data across marine sectors and EU Directives in France

For the stakeholders that **declared not using Copernicus**, 44% say they do not have enough staff and time to do it and 11% say they do not have sufficient knowledge or skills to use these data and models.

For the stakeholders that **declared using Copernicus data**, the periodicity of usage and type of data used were further inquired (Figure 7-13). Users declare a frequency of use of Copernicus data at 67% monthly and 33% weekly and no one declares using them once a year. Moreover, 100% of Copernicus users say they use In Situ data and not Satellite or model derived products.

Stakeholders' periodical use of Copernicus Data - France

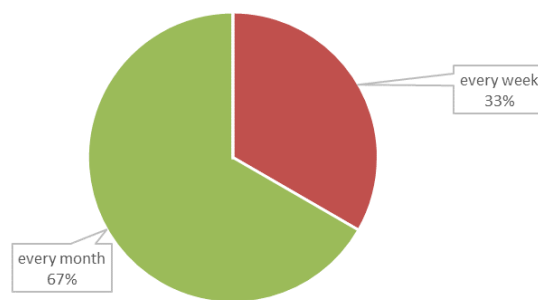


Figure 7-13. Stakeholders' that declared using Copernicus data in France: periodicity

For the stakeholders that **declared using Copernicus data**, one open-ended question (Q.30ii) was asked to get further information to know what stakeholders' purpose was for using Copernicus data. In summary, French stakeholders highlighted the importance of Copernicus data in various applications. These applications included the validation of oceanographic



models, the use of Sentinel images for mapping marine habitats and the development of algorithms for predicting algal blooms in coastal areas. Users nevertheless specify that these tools are currently not operational. Additionally, stakeholders highlighted the value of Copernicus data for generating time series, whether through models or measurements, to monitor key environmental parameters such as winds, waves and currents.

Detailed summary to the question Q30ii is reported in the Annex II.

### 7.5. Copernicus needs in the implementation process of EU Directives in France

The following analysis focuses on the main challenges encountered by stakeholders involved in the implementation process of the two EU Directives in France regarding usage of Copernicus products. The survey analyses, on the one hand, the difficulties and needs in terms of Copernicus tool usage and data access. On the other hand, it examines space solutions and data analysis tools used to work with Copernicus data.

#### 7.5.1. Data analysis and visualisation tools

Regarding needs related with tools for **data transformations** for the implementation process in France of the two Directives, stakeholders were asked about most-used data tools for Copernicus data analysis and visualisation (Figure 7-14). The most used tools are, far ahead, mapping software with almost 50% of the actors responsible for implementing the two directives. For the MSP and therefore the planning, image processing software is an important tool while for the MSFD and maritime sector it is rather the programming languages which are used. Very few stakeholders use visualization tools.

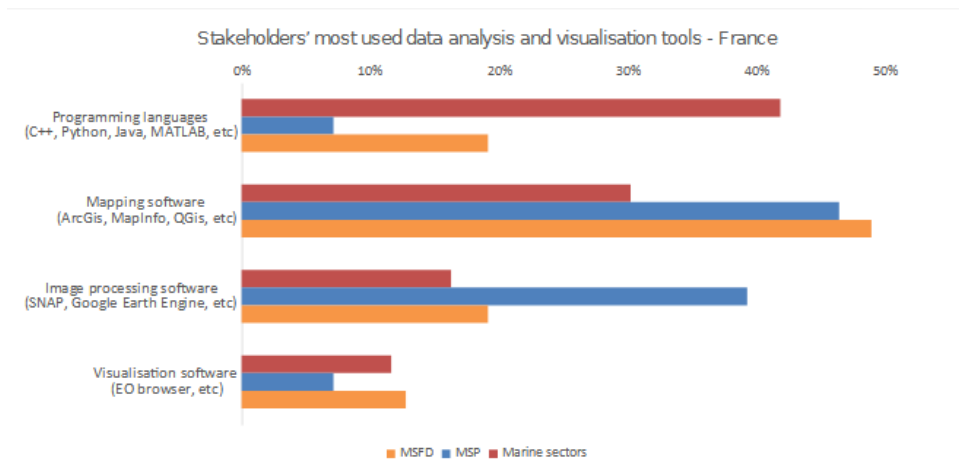


Figure 7-14. Stakeholders' most used data analysis and visualisation tools at all marine sectors in France

#### 7.5.2. Space solutions relevant to the maritime domain

One open-ended question (Q.33) was asked to get further information on stakeholders' relevant space solutions for the maritime domain. In summary, French stakeholders highlighted the use of in situ data sources such as sea surface temperature, altimetry, sea ice and water color.

Additionally, stakeholders highlighted the importance of using VMS data from the Vessel Monitoring System, Synthetic Aperture Radar imaging for vessel detection as well as radio frequency detection. Optical imaging remains the reference vector for coastal monitoring and stakeholders have expressed their interest in the use of hyperspectral data. Finally, they would like to see the existence of space products dedicated to marine renewable energies.

They mentioned their intention to explore other data providers such as WorldView and hyperspectral data sources like Prisma and EnMap as well as the use of Pléiades satellites. They also highlight the role of data offered by EMODnet, SHOM or NOAA.

Detailed summary to the question Q33 is reported in the Annex II.

#### 7.5.3. Data needs besides Copernicus data

One more open-ended question (Q.32) was asked to get further information on stakeholders' needs besides Copernicus data. In summary, French stakeholders highlighted the need for

Detailed summary to the question Q32 is reported in the Annex II.

#### 7.5.4. Suggestions for Copernicus improvement

Another open-ended question (Q.30vi) was asked to get further information on how users think that Copernicus data can be improved. Unfortunately, none of the French stakeholders answered this question.

## 8. Conclusions for Task 2

Analysing the results of this report, it becomes clear that the parties involved in the implementation of European Union directives in the maritime sector in France present diverse characteristics and needs. The data collected highlights significant gaps that deserve special attention to optimize the effectiveness of the implementation of these guidelines.

First, it is crucial to note that most parties involved are from the research sector and public administrations, which correspond to the entities responsible for the implementation of marine directives in France. However, it has emerged that some parties struggle to distinguish between Copernicus satellite data and

associated service products, highlighting the need for clearer communication and tailored training.

Regarding stakeholder needs, it is interesting to note that the most common problems encountered when handling data relate to issues of inadequate resolution, inaccessibility or unavailability of data, as well as incomplete temporal and spatial distribution. This clearly indicates a need for improvement in data quality, accessibility and availability to meet stakeholder expectations.

Additionally, the results reveal that different categories of parties have specific service needs. For example, actors involved in aquaculture show particular interest in pollution and environmental monitoring, while those linked to maritime transport favour ship detection. This segmentation of needs highlights the importance of personalizing services and solutions to meet the specific demands of each sector.

Finally, knowledge gaps remain among stakeholders, particularly regarding the use of Copernicus data. Some actors are fully aware of the solutions available and their potential, while others require more information and awareness. To fully realize the benefits of Copernicus in marine research and informed decision-making, it is essential to fill these gaps and expand awareness of these valuable resources.

In conclusion, this study highlights the diversity of parties involved in the implementation of marine directives in France, as well as their specific needs in terms of data and services. This information is essential to guide future efforts to strengthen the use of Copernicus data and support marine research and informed decision-making in the French maritime sector. This multifaceted use of Copernicus data highlights their importance for advancing marine research and supporting informed decision-making in the French marine sector.

## TASK 3. IDENTIFICATION ON HOW TO USE COPERNICUS DATA IN THE IMPLEMENTATION OF EU

### 9. Introduction to Task 3

The Copernicus program, established by the European Union, offers a comprehensive and continuous supply of marine data. This data comes from a variety of sources, primarily Earth observation satellites, and is used to monitor and analyse various marine parameters and phenomena in the maritime sector. The Copernicus program includes several services that will contribute to a better implementation of the EU marine Directives.

In **Task 3** (*Identification on how to use Copernicus Data in the implementation of EU marine Directives*) the main objective is to develop a jointly standardized set of protocols. These protocols aim to facilitate the development of enhanced methodologies for use in national reporting. To achieve this, the requirements outlined in the EU marine Directives and the data gaps identified in the survey developed in task 2 will be compared with the advantages and opportunities provided by Copernicus data services.

### 10. Gap filling based on Copernicus data

To address data gaps and meet the specific requirements of the Marine Directives, a two-phase approach is planned, starting from September 2023. The first phase will involve close collaboration among public authorities from participating countries, stakeholders, including aquaculture companies, offshore renewable energy entities, and maritime navigation operators. However, it is essential to note that some user categories have been underrepresented in current discussions, underscoring the need to invite additional groups for a more comprehensive discussion.

It is therefore essential to identify the descriptors concerned to make these stakeholders aware of the use of Copernicus data and to question them about their needs. The survey did not make it possible to reach a large enough panel to highlight a trend on a descriptor. Indeed, invite all stakeholders responsible for implementing the MSFD to an awareness workshop on the possibilities offered by the Copernicus program would be a relevant first action.

This initial phase will help identify common issues, such as inadequate data resolution, limited data accessibility or unavailability, as well as incomplete temporal and spatial distribution. User categories that have been

underrepresented so far will be specifically invited to participate in these discussions to gain a better understanding of their unique data needs.

Targeted awareness-raising will play a crucial role in this endeavour. Efforts will be made to inform stakeholders accurately about how Copernicus data services can address these data gaps. For instance, aquaculture companies will be educated on how Copernicus data, including marine water quality and ship detection, can enhance their management practices. Similarly, offshore renewable energy companies will be sensitized to the use of data for suitable site selection.

This first phase will lay the groundwork for the optimal use of Copernicus data services to address identified needs, thereby supporting the implementation of the Marine Directives and informed decision-making in the maritime sector

## ANNEXES

### Annex I: Survey questions

#### Survey on the use of Copernicus data for the Marine sector

The marine sector faces several challenges regarding management and sustainability. It is becoming evident that the challenges linked to marine data and information availability will become even more important during the implementation of certain policies and strategies. Users from different marine sectors can use Copernicus data to extract information to determine the environmental status of coastal waters, to support sustainable development or growth in certain maritime areas and activities.

Under this context, the Framework Partnership Agreement on Copernicus User Uptake (FPCUP) aims at a better integration of Copernicus data in the European regulatory framework by increasing the number of users and applications derived from Copernicus through 3 different actions:

- Action A2021-2-33 pursues "to promote the use of Copernicus data in the implementation of the EU Marine Spatial Planning Directive (Directive 2014/89/EU; MSP) and EU Marine Strategy Framework Directive (Directive 2008/56/EC; MSFD),
- Action A2021-2-42 pursues "to promote the use of Copernicus data across the maritime sector, focusing on Ports and Harbours, Aquaculture and Fisheries",
- Action A2021-2-47 pursues "to define the roadmap to guide the future evolution of Copernicus products to fulfil the needs of users in coastal areas".

The aim of this survey is to identify the current needs and gaps of the stakeholders to better understand the current usage of Copernicus data across different sectors:

- implementation of the two Directives (Action 33),
- marine sector, focusing on Ports and Harbours, Aquaculture and Fisheries (Action 42),
- national coastal users (Action 47).

By participating in this survey, you will have the opportunity to join future Copernicus training events that will be organised in the scope of the FPCUP project.

For this survey, please consider the following definitions and policies:

"[Copernicus](#) program" is the Earth Observation program of the European Union.

"Copernicus satellite data" are the data from Sentinel satellite missions (Sentinel 1, 2, 3, 5P and 6), as well as data from satellite missions of other space agencies and commercial providers, called Contributing Missions.

"Copernicus service products" are the products provided by the 6 Copernicus Services (Land, Marine, Atmosphere, Climate Change, Emergency, Security), that use satellite and in situ data as inputs.

"[EU Marine Strategy Framework Directive](#) (Directive 2008/56/EC)". This Directive establishes a framework within which Member States shall take the necessary measures to achieve or maintain good environmental status in the marine environment.

"[Commission Decision \(EU\) 2017/848](#)" laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment.

"[EU Marine Spatial Planning Directive](#) (Directive 2014/89/EU)". This Directive establishes a framework for maritime spatial planning aimed at promoting the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources.

"[Water Framework Directive](#) (Directive 2000/60/EC)". This Directive requires EU Member States to achieve good status in all bodies of surface water and groundwater by 2027.

"[Habitats Directive](#) (Directive 92/43/EEC)". This Directive ensures the conservation of a wide range of rare, threatened or endemic animal and plant species.

### Survey

**(in bold below was for internal reading)**

1. General information
  - a. Entity
  - b. Department
  - c. Contact name:
  - d. Email:
  - e. Job position:
  - f. City:
  - g. Country:
  - h. Type of Entity
    - i. Academia
    - ii. Research
    - iii. Public administration
    - iv. Another public entity
    - v. Private sector
    - vi. Non-Governmental Organization (NGO)
    - vii. Other (please specify)
  - i. What is your area of activity? (**Multiple choices allowed**)
    - i. Inland
    - ii. Coastal
    - iii. Marine
  - j. In terms of Copernicus Data, do you consider yourself a:
    - i. End-user
    - ii. Service provider
2. Which of these marine sectors are you related with? (**Multiple choices allowed**)
  - a. Ports and harbours
  - b. Aquaculture (shell farming)
  - c. Aquaculture (fish farming)
  - d. Fisheries
  - e. Species conservation and protected areas
  - f. Maritime transport routes and traffic flows
  - g. Energy sector (hydrocarbons and renewable energies)
  - h. Coastal protection
  - i. Raw material extraction
  - j. Tourism and recreational activities
  - k. Other
3. (**If chosen "Ports and harbours" in Q2**) For the "Ports and harbours" sector, which services are of higher interest to you? (Rank by order of interest, with 1 being the highest interest) (**bold means it is a common option between marine sectors**)
  - a. **Maritime climate (e.g., for Operational and maintenance activities)**
  - b. **Ship detection (e.g., monitoring vessel activity)**
  - c. **Pollution and environmental monitoring (e.g., oil spills, water quality, air quality)**
  - d. **Effects of climate change (e.g., sea-level rise, extreme events)**
  - e. Infrastructure monitoring (e.g., containers, piers)
  - f. Navigation and dredging operations (e.g., bathymetric mapping, sediment dynamics)
  - g. Others (specify)
4. (**If chosen "Aquaculture (shell farming)" in Q2**) For the "Aquaculture" sector, which services are of higher interest to you? (Rank by order of interest, with 1 being the highest interest)

- a. **Oceanographic data: waves, tides (e.g., for Operational and maintenance activities)**
  - b. **Ship detection (e.g., monitoring illegal activity)**
  - c. **Pollution and environmental monitoring (e.g., oil spills, microbiological contamination, chemical contamination, biotoxins)**
  - d. **Effects of climate change (e.g., extreme events, marine heatwaves)**
  - e. **Marine water quality data (e.g., anoxic events, acidification, chlorophyll concentration, jellyfish presence)**
  - f. Infrastructure monitoring (e.g., cages)
  - g. Selection of suitable site locations and species (e.g., temperature, salinity, etc)
  - h. Others (specify)
5. **(If chosen "Aquaculture (fish farming)" in Q2)** For the "Aquaculture" sector, which services are of higher interest to you? (Rank by order of interest, with 1 being the highest interest)
- a. **Oceanographic data: waves, tides (e.g., for Operational and maintenance activities)**
  - b. **Marine water quality data: anoxic events, acidification, chlorophyll concentration, jellyfish presence**
  - c. **Ship detection (e.g., monitoring illegal activity)**
  - d. **Pollution and environmental monitoring (e.g., oil spills, microbiological contamination, chemical contamination, biotoxins)**
  - e. **Effects of climate change (e.g., extreme events, marine heatwaves)**
  - f. Infrastructure monitoring (e.g., cages)
  - g. Selection of suitable site locations and species (e.g., water temperature, salinity, etc)
  - h. Others (specify)
6. **(If chosen "Fisheries" in Q2)** For the "Fisheries" sector, which services are of higher interest to you? (Rank by order of interest, with 1 being the highest interest)
- a. **Maritime climate (e.g., for Operational and maintenance activities)**
  - b. **Ship detection (e.g., monitoring illegal activity)**
  - c. **Pollution and environmental monitoring (e.g., oil spills, water quality)**
  - d. **Effects of climate change (e.g., extreme events, marine heatwaves)**
  - e. Fishing area characterizations (e.g., areas of higher productivity)
  - f. Fisheries certification
  - g. Map of sea use (e.g., presence of conflicting human activities)
  - h. Others (specify)
7. **(If chosen "Species conservation and protected areas" in Q2)** For the "Species conservation and protected areas" sector, which services are of higher interest to you? (Rank by order of interest, with 1 being the highest interest)
- a. **Pressures (e.g., pollution, spills, maritime activities...etc.)**
  - b. **Environmental monitoring (e.g., water quality, ecological status)**
  - c. **Effects of climate change (e.g., sea-level rise, extreme events)**
  - d. Habitat distribution area and trends
  - e. Species distribution area and trends
  - f. Map of sea use (e.g., presence of conflicting human activities)
  - g. Others (specify)
8. **(If chosen "Maritime transport routes and traffic flows" in Q2)** For the "Maritime transport routes and traffic flows" sector, which services are of higher interest to you? (Rank by order of interest, with 1 being the highest interest)
- a. **Maritime climate (e.g., for Operational and maintenance activities)**
  - b. **Ship detection (e.g., monitoring vessel activity and flows)**
  - c. **Pollution and environmental monitoring (e.g., oil spills, water quality)**
  - d. **Effects of climate change (e.g., new routes, extreme events)**
  - e. Weather services



- f. Navigation (e.g., Bathymetry, Sediment dynamics monitoring, etc.)
  - g. Others (specify)
9. **(If chosen "Energy sector" in Q2)** For the "Energy sector" sector, which services are of higher interest to you? (Rank by order of interest, with 1 being the highest interest)
- a. **Maritime climate (e.g., for Operational and maintenance activities)**
  - b. **Ship detection (e.g., monitoring vessel activity)**
  - c. **Environmental monitoring (e.g., oil spills, water quality)**
  - d. **Effects of climate change (e.g., sea-level rise, extreme events)**
  - e. Selection of suitable renewable energy locations (wind, waves, currents)
  - f. Bottom geologic maps
  - g. Energy production surveying
  - h. Map of sea use (e.g., presence of conflicting human activities)
  - i. Others (specify)
10. **(If chosen "Coastal protection" in Q2)** For the "Coastal protection" sector, which services are of higher interest to you? (Rank by order of interest, with 1 being the highest interest)
- a. **Maritime climate (e.g., winds, waves and current forecasts)**
  - b. **Pollution and environmental monitoring (e.g., eutrophication, water quality)**
  - c. **Effects of climate change (e.g., sea-level rise, extreme events)**
  - d. Monitoring and prevention of coastal erosion
  - e. Bathymetry and sedimentation
  - f. Coastline detection
  - g. Characterisation of emerged coastal areas (e.g., sediment dimension, inland extension of the beach, presence of dunes)
  - h. Others (specify)
11. **(If chosen "Raw material extraction" in Q2)** For the "Raw material extraction" sector, which services are of higher interest to you? (Rank by order of interest, with 1 being the highest interest)
- a. **Maritime climate (e.g., for Operational and maintenance activities)**
  - b. **Ship detection (e.g., monitoring vessel activity)**
  - c. **Pollution and environmental monitoring (e.g., oil spills, water quality)**
  - d. **Effects of climate change (e.g., sea-level rise, extreme events)**
  - e. Map of sea use (e.g., presence of conflicting human activities)
  - f. Others (specify)
12. **(If chosen "Tourism and recreational activities" in Q2)** For the "Tourism and recreational activities" sector, which services are of higher interest to you? (Rank by order of interest, with 1 being the highest interest)
- a. **Maritime climate (e.g., for weather)**
  - b. **Effects of climate change (e.g., sea-level rise, extreme events)**
  - c. Water quality (e.g., preserving human health in bathing waters)
  - d. Identification of pressures (e.g., land use, presence of urban wastewaters or industrial waters discharges)
  - e. Landscape quality (e.g., absence of infrastructures, presence of nature-based solutions)
  - f. Others (specify)
13. **(If chosen "Other" in Q2)** For "Other" sectors, select one of the lists below and describe which services are of higher interest to you.
- a. Military
  - b. Exploration, exploitation, and extraction
  - c. Scientific research
  - d. Underwater cultural heritage
  - e. Submarine cable and pipeline routes

Concerning the sectors mentioned above, we will analyse the challenges you have encountered when searching/working for data related with them.

14. Within the framework of your current activities, what problems do you encounter when working with the data available to you? (**Multiple choices allowed**)
- Complexity of the data
  - Data format
  - Data reliability
  - Heterogeneous data collection methodologies
  - Heterogeneous sources
  - Inaccessible data or unavailability of data
  - Incomplete Temporal distribution
  - Incomplete Spatial distribution
  - Unsuitable resolution
  - Lack of tools to manipulate the data.
  - Other, please specify.
15. Within the framework of your current activities, what temporal extent of the data would you need? (**Multiple choices allowed**)
- Real time or near real time (h)
  - Short term forecast (day-week)
  - Long term projections (month)
  - Long term historical data series (years)
16. Within the framework of your current activities, what spatial resolution of the data would you need? (**Multiple choices allowed**)
- Reduced (>1Km)
  - Low ( $\geq 250$  m-1Km)
  - Medium (5-30 m)
  - High (1-5 m)
  - Very high (< 1 m)
17. Have you participated in the implementation of these Directives in your Country? (**Multiple choices allowed**)
- EU Marine Strategy Framework Directive (Directive 2008/56/EC; MSFD)
  - EU Marine Spatial Planning Directive (Directive 2014/89/EU; MSP)
18. (**If yes in Q17.b**)
- In what period? (**Multiple choices allowed**)
    - 2012-2018
    - 2018-2024
  - In what phase of MSP? (**Multiple choices allowed**)
    - Establishment of management objectives
    - Diagnosis of the current situation
    - Land-sea interactions
    - Maritime spatial plans
19. In what period? (**Multiple choices allowed**)
- 2012-2018
  - 2018-2024
20. In what phase of MSFD? (**Multiple choices allowed**)
- initial assessment
  - determination of good environmental status
  - establishment of environmental targets and associated indicators
  - monitoring programme
  - programme of measures
21. What Marine Region do you belong to?
- Baltic Sea
  - North-east Atlantic Ocean

- c. Mediterranean Sea
  - d. Black Sea
22. What subdivisions (if exist) of the Marine region do you belong to? (**Each country please specify yours**)
- a. North-Atlantic
  - b. Sud-Atlantic
  - c. ...
  - d. ...
  - e. ...
23. Following the classification in COMMISSION DECISION (EU) 2017/848, which of the following descriptors and Criteria elements are you related with? (**Multiple choices allowed**)
1. Biodiversity
    - Species groups (specify which):
      - birds,
      - mammals,
      - reptiles,
      - fish
      - cephalopods
    - Pelagic habitats (specify which)
    - Benthic habitats (specify which)
    - Ecosystems, including food webs (specify which)
  2. non-indigenous species
  3. Commercial fish species
  4. Food webs
    - Ecosystems, including food webs (specify which)
  5. Eutrophication
  6. Sea floor
    - Benthic habitats (specify which)
  7. Hydrographical conditions
  8. Contaminants and effects
  9. Contaminants in seafood
  10. Marine litter
  11. Introduction of energy (including underwater noise)

Concerning the descriptors/criteria mentioned above, we will analyse the challenges you have encountered when searching/working for data related with them.

24. What are the main knowledge gaps descriptors you encountered when working with the descriptor/criteria specified above? (**Multiple choices allowed**)
- a. Abundance
  - b. Biomass
  - c. Concentration
  - d. Duration
  - e. Genetics
  - f. Pressures and impacts
  - g. Spatial cover/ extent
  - h. Spatial distribution
  - i. Temporal distribution
  - j. Other, please specify.
25. Within the framework of your current activities, what problems do you encounter when working with the data available to you? (**Multiple choices allowed**)
- a. Complexity of the data
  - b. Data format
  - c. Data reliability

- d. Heterogeneous data collection methodologies
  - e. Heterogeneous sources
  - f. Inaccessible data or unavailability of data
  - g. Incomplete Temporal distribution
  - h. Incomplete Spatial distribution
  - i. Unsuitable resolution
  - j. Lack of tools to manipulate the data.
  - k. Other, please specify.
26. Within the framework of your current activities, what temporal extent of the data would you need?  
**(Multiple choices allowed)**
- a. Real time or near real time (h)
  - b. Short term forecast (day-week)
  - c. Long term projections (month)
  - d. Long term historical data series (years)
27. Within the framework of your current activities, what spatial resolution of the data would you need?  
**(Multiple choices allowed)**
- a. Reduced (>1 Km)
  - b. Low ( $\geq 250$  m - 1 Km)
  - c. Medium (5-30 m)
  - d. High (1-5 m)
  - e. Very high (< 1 m)
28. Have you ever heard before about the Copernicus program?
- a. Yes
  - b. No
29. **(If yes in Q28)** Are you familiar with the different definitions of "Copernicus Satellite Data" and "Copernicus Service Products".
- a. Yes
  - b. No
- 30. (If yes in Q28 go to a; If no in Q28 go to b)** Do you use data from Copernicus?
- a. If Yes
    - i. How often?
      - 1. every week
      - 2. every month
      - 3. every year
    - ii. For what purpose (i.e., use case)? (Please specify)
    - iii. What kind of Copernicus data do you use?
      - 1. In situ data
      - 2. Satellite-derived products
      - 3. Modelled-derived products.
    - iv. Do you consider yourself as a basic, intermediate, or advanced Copernicus data user?
      - 1. Basic
      - 2. Intermediate
      - 3. Advance
    - v. What is your level of satisfaction with Copernicus? (Set from 1(low) to 5 (very high))
      - 1. 1
      - 2. 2
      - 3. 3
      - 4. 4
      - 5. 5

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ANNEXES

- vi. How can Copernicus data be improved (e.g., new products, different spatial/temporal resolutions, improved access)? (Please specify)
- b. If No, why?
  - i. I do not have enough knowledge or skills to use them.
  - ii. I do not have enough staff or time to do it.
  - iii. Not relevant for me
  - iv. Other
- 31. Within the framework of your current activities, do you use most: (**multiple choices allowed**)
  - a. Programming languages (C++, Python, Java, MATLAB, etc)
  - b. Mapping software (ArcGIS, MapInfo, Qis, etc)
  - c. Image processing software (SNAP, Google Earth Engine, etc)
  - d. Visualisation software (EO browser, etc)
  - e. I do not use any.
- 32. Besides Copernicus data, what kind of data or services would you need? (Please specify)
- 33. From your entity's perspective, which space solutions (e.g., products, providers) are relevant to the maritime domain, that you are familiar with/have you heard of? (Please specify)
- 34. Would you be interested to attend a workshop presenting the different tools and services offered by Copernicus?
  - a. Yes
  - b. No

## Annex II: Stakeholders for France survey

Ifremer (5 replies)
Shom
Comité départemental des pêches et des élevages marins du Morbihan
Exail
Cerema
CNES
Comité National de la Conchyliculture
Bio-Littoral
BiOceanOr
France Energies Marines
Cedre

## Annex II: open-ended questions summary replies

### Purposes for using Copernicus data (Q.30ii)

- Validation of oceanographic models,
- sentinel image for marine habitat mapping,
- sentinel image for marine
- Development of coastal bloom prediction algorithms, not currently operational habitat mapping,
- Time series (models or measurements) winds/waves/currents

### Suggestions for Copernicus improvement (Q.30vi)

No answer

### Data needs besides Copernicus data (Q.32)

- A better adaptation to the coastal in the resolution and the treatment models (atmospheric correction, calculation of chlorophyll)
- Better spatial resolutions; easier use of satellite data.

### Space solutions relevant to the maritime domain (Q.33)

- SST, altimetry, sea ice, water color,
- VMS data
- SHOM, NOAA, EMODNET
- SAR imagery (vessel detection) Optical imagery (coastal surveillance) RF detection (vessel detection)
- Pleiades, hyperspectral
- We are mainly interested in water color products, mainly Sentinel, and we plan to study other providers such as WorldView, or hyperspectral data (Prisma, EnMap).
- Products dedicated to marine renewable energies
- EMODnet
- I don't know