

Monitoring framework

Strategic document for the North Atlantic - Western Channel coastline



Ministry of the
<https://mer.gouv.f>

Ministry of Ecological Transition
<https://www.ecologie.gouv.f>


**MINISTÈRE
DE LA MER**
*Liberté
Égalité
Fraternité*


**MINISTÈRE
DE LA TRANSITION
ÉCOLOGIQUE**
*Liberté
Égalité
Fraternité*

Table of contents

INTRODUCTION	3
1 - MARINE ECOSYSTEMS: STATUS AND PRESSURES	8
1.1 - Sea Birds (Biodiversity) Monitoring Programme	8
1.2 - Monitoring programme "Marine Mammals - Marine Turtles (biodiversity)"	11
1.3 - Monitoring programme "Fish and cephalopods (biodiversity)"	14
1.4 - Monitoring programme "Benthic habitats (biodiversity)"	17
1.5 - Pelagic habitats (biodiversity) monitoring programme	21
1.6 - Monitoring programme "Non-native species"	24
1.7 - Commercial species monitoring programme	25
1.8 - Eutrophication monitoring programme	28
1.9 - Seabed Integrity Monitoring Programme	32
1.10 - Monitoring programme "Hydrographic changes"	36
1.11 - Contaminants monitoring programme	39
1.12 - Monitoring programme "Health issues"	41
1.13 - Marine Waste Monitoring Programme	43
1.14 - "Underwater noise" monitoring programme	47
2 - ACTIVITIES, USES AND PUBLIC POLICIES	50
1.1 - Sectors of activity	50
1.1.1 - Common devices	50
1.1.2 - Exploitation and development of mineral resources	50
1.1.3 - Exploitation and development of biological resources	52
Professional fishing	52
Aquaculture.....	55
Marketing and processing of seafood products	57
Agriculture	58
1.1.4 - Coastal tourism and leisure	59
Coastal tourism	59
Boating and water sports	61
Recreational fishing	63
1.1.5 - Industries and activities in the secondary sector	64
Maritime and river public works.....	64
Industries	66
Electricity generation	68
Maritime transport and ports	70
1.2 - Public policy	72
1.2.1 - Occupation and management of coastal areas	72
Land artificialisation and coastal risk management	72
Protection and enhancement of natural environments, sites, landscapes and cultural heritage	74
1.2.2 - Research, innovation and training	76
Research and development	76
Maritime training	78
1.2.3 - Territorial economy	79

1.2.4 - Safety and security of maritime spaces	80
1.2.5 - Preservation of resources, biodiversity and marine environments.....	82
ANNEXES	85

Introduction

General framework of the monitoring system in the Sea Basin Strategy Document

For each of the maritime coastlines in mainland France, a planning document, the Sea Basin Strategy Document (SBSD), must specify and complete the guidelines of the national strategy with regard to the economic, social and ecological issues specific to each coastline. France has chosen to articulate within these documents the transposition of two European framework directives:

- The Marine Strategy Framework Directive (2008/56/EC, MSFD), which aims to achieve or maintain good environmental status in the marine environment for a healthy, clean and productive sea.
- The Maritime Spatial Planning Framework Directive (2014/89/EU, MSPD) which establishes a framework for maritime planning and requires Member States to ensure coordination of the various activities at sea.

The Sea Basin Strategy Document comprises four parts (see diagram below), each of which is intended to be enriched and amended in the light of improved knowledge. They will be updated in the revisions of the document, which are planned every six years.



Figure 1-Sea Basin Strategy Document presentation - Source: DML (2021)

The monitoring scheme is the third part of these documents. It therefore follows on from the first two parts, which represent the strategic part of the DSFs adopted in 2019 (status of the existing situation; strategic targets and maritime spatial planning). Together with the action plan (Part 4), it forms the operational part of the Sea Basin Strategy Document. The multi-stage development of the Sea Basin Strategy Document requires that the monitoring system considers compliance with the main guidelines and principles set out in the strategic section.

As a reminder, the enforceability of the DSFs is governed by Article L.219-4 of the French Environment Code. The scheme is twofold:

- Compatibility for plans, programmes and schemes relating to activities exclusively located at sea,
- Consideration for plans and programmes likely to have significant impacts on the sea.

Objective of the monitoring system

The development of this monitoring system enables France to meet its Community obligations to transpose and implement the two framework directives on Marine Strategy (MSFD) and Maritime Spatial Planning (MSPD), particularly with regard to

- Articles 5, 11, 17 and 18 of the MSFD, relating to the obligation to develop a monitoring programme for the ongoing assessment of the environmental status of marine waters and the periodic updating of environmental targets; and the obligation to update and revise marine strategies, and to report on progress to the European Commission;
- Articles 10 and 14 of the MSPD, relating respectively to the use and sharing of environmental, social and economic data necessary for the development of maritime spatial planning documents; and to the implementation of the monitoring of these documents, which should enable progress to be reported to the European Commission.

More specifically, the monitoring system of the Sea Basin Strategy Document defines the monitoring strategy to be implemented in order to meet the following objectives:

- Update and clarify the evolution of the existing situation within the perimeter of the maritime coastline;
- Evaluate the achievement of the strategic targets of each coastline.

To meet these two objectives, this document is based on a set of collection and monitoring mechanisms. These schemes may be common to the four maritime coastlines (Eastern Channel – North Sea, North Atlantic – Western Channel, Southern Atlantic, Mediterranean), or, if necessary, specific to a coastline or a subset of coastlines. In the long term, the monitoring system aims to include schemes that meet three criteria:

- Recurrence: data collected on a regular basis
- Reliability: data meeting quality and objectivity requirements
- Accessibility: how to access the data verified with the producers.

These principles have guided the work initiated with this first cycle, which is intended to be improved in future planning cycles.

Information on the ecological status of marine environments, maritime activities and public policies on marine environments is produced by various systems. This document aims to facilitate access to information on the marine environment. Indeed, the monitoring system is part of an overall process consisting of:

- Encourage the development of benchmarks,
- Bank or ensure the traceability of the data collected in response to the need to evaluate public policies,
- Make data accessible and reusable, in compliance with the provisions of the texts.

Nevertheless, the monitoring system is targeted at the issues identified during the development of the maritime coastal strategies and at the indicators selected to monitor the strategic targets. It is therefore not intended to be a complete inventory of all possible existing data sources. In this sense, any source of information should be considered for the initial assessment exercise carried out at the beginning of each planning cycle, including the results of ad hoc or local studies not included in the monitoring system.

Management and sharing of monitoring device data

In order to reference the collection and monitoring systems, the monitoring system is based on several existing data infrastructures:

- "Sextant" (Ifremer): a data portal which aims to document, disseminate and promote a catalogue of data relating to the marine environment. Sextant provides tools that promote and facilitate the archiving, consultation and availability of geographical data resulting from the research work and scientific programmes of Ifremer's laboratories and its partners.
- "Géolittoral" (Cerema): portal of data on the sea and coastline of the Ministries of Ecological Transition and the Sea. In particular, it disseminates geographical data produced in the context of the implementation of public policies and makes available information and documents to explain these policies and their implementation and to facilitate consultation.
- The "sea and coastline" section of the portal on the environment in France (CGDD): formerly known as the national sea and coastline observatory, this portal offers a set of analysis sheets based on all these data sources on most of the themes of the Sea Basin Strategy Document.

Once collected, the data listed under the Sea Basin Strategy Document monitoring scheme are integrated into the MSPD and MSFD information systems (in particular the referencing of metadata). They are also made available (subject to distribution rights) via the Marine Environment Information System (SIMM). The information system aims to facilitate the sharing and dissemination of data on the marine environment. To do this, it relies on the databases and information systems already organised in this field, and creates new ones. More broadly, the SIMM federates the public data players on the marine environment (State and local authority services, public establishments, etc.).

Structuring the monitoring system

The Sea Basin Strategy Document monitoring scheme defines the integrated monitoring strategy for environmental, social and economic issues. The minimum scope of the themes of the monitoring strategy is defined by the order of 20 September 2019: it includes *"maritime and coastal activities, marine and coastal ecosystems, sites, landscapes and cultural heritage, risks, knowledge, research, innovation and training, local planning or integrated management initiatives for the sea and the coast, interactions between activities and between activities and the environment"*. For this first implementation cycle, the presentation of the monitoring strategy responds to the integrative aim of the DSFs through a main document and five annex documents.

The main document, which is non-technical in nature, presents the main elements necessary for the implementation of the two framework directives in two complementary parts:

- Part 1: "Marine Ecosystems: Status and Pressures": includes the 14 monitoring programmes under the second cycle of the MSFD (subject to reporting to the European Commission). It aims to define the monitoring necessary for the regular assessment of the ecological status of marine waters and the periodic updating of the Environmental Objectives (EOs).
- Part 2 "Activities, uses and public policies": deals with the activities, uses and public policies (including the costs incurred by the degradation of the marine environment) of maritime and coastal areas. On these themes, it aims to define the monitoring necessary for the periodic updating of the Socio-Economic Objectives (SEOs) and Environmental Objectives (EOs), and for the regular assessment of the ecological status of marine waters and of the economic and social analysis.

Each of these two parts has a standard structure which is broken down into three subheadings. The latter present successively what is covered by the sector of activity/public policy/monitoring programme concerned; the variables of interest linked to them; and the monitoring and data collection mechanisms that allow these variables to be informed.

More detailed information on strategic targets, indicators, monitoring and data collection arrangements is provided in the annexes. In particular, they make it possible to identify the need to develop these systems and/or to assess the level of adequacy between indicators and systems:

Annex 1	Monitoring programmes under the second cycle of the MSFD – Part 1
Annex 2	Reminder of strategic targets and criteria – Part 2
Annex 3	Indicators and data collection devices per coastline – Part 2
	3a - Focus on Socio-Economic Objectives (SEO)
	3b - Focus on Environmental Objectives (EO), Good Environmental Status (GES) criteria and Economic and Social Analysis (ESA)
Annex 4	Data collection devices – Part 2
Annex 5	Glossary

The diagram below sets out two use cases for reading the monitoring device:

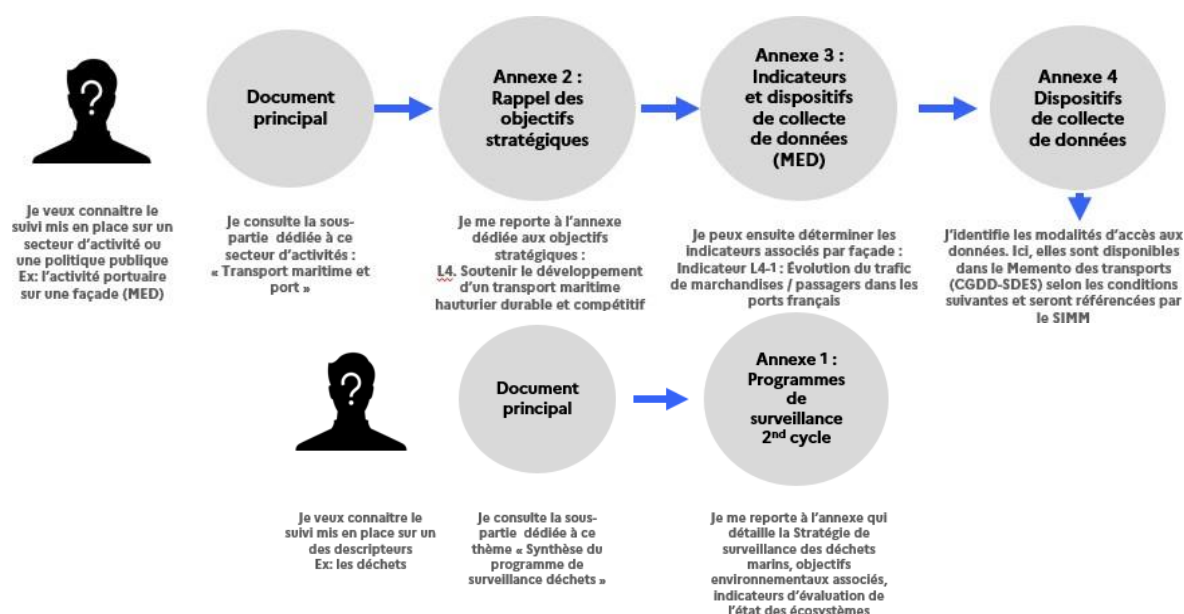


Figure 2 - Use cases for mobilising the monitoring system - Source: DML -DEB (2021)

1 - Marine ecosystems: status and pressures

1.1 - Sea Birds (Biodiversity) Monitoring Programme



What does this monitoring programme cover?

The Sea Birds Monitoring Programme defines the monitoring necessary for the ongoing assessment of the environmental status of marine waters and the periodic updating of Environmental Objectives (EOs) under:

- descriptor 1 "Biodiversity" of the MSFD for the component "Sea Birds", described as: *"Biological diversity is conserved. The quality and number of habitats and the distribution and abundance of species shall be adapted to the prevailing physiographic, geographic and climatic conditions"* (Directive 2008/56/EC).
- descriptor 4 "Food webs" of the MSFD, described as: *"All components of the marine food web, as far as is known, are present in normal abundance and diversity and at levels that can ensure the long-term abundance of species and the full maintenance of their reproductive capacity"* (Directive 2008/56/EC).

The objective of this programme is to acquire data to assess both:

- The status of sea bird populations (abundance, distribution and demographic characteristics) and their functional habitats.
- The pressures exerted on these populations and their impacts (both terrestrial pressures and those directly linked to human activities at sea).

The Sea Birds Monitoring Programme is organised into five sub-programmes, according to geographical distribution (water birds *versus* sea birds):

- Sub-programme 1 – Foreshore birds
- Sub-programme 2 – Breeding sea birds
- Sub-programme 3 – Birds at sea
- Sub-programme 4 – Stranded birds
- Sub-programme 5 – Sea bird Interactions with Human Activities at Sea

These sub-programmes address both the state of the environment and the pressures and impacts of human activities on the marine environment.

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".



What are the elements identified and to be filled in?

Good environmental status

The assessment of the achievement of good environmental status (GES) of marine waters under Descriptor 1 "Biodiversity" for the component "Sea birds" is based, according to Decision 2017/848/EU, on two primary criteria (D1C1 and D1C2) and three secondary criteria (D1C3, D1C4 and D1C5):

- D1C1 – Incidental catch mortality rate: The mortality rate per species due to incidental catches is below the level that would pose a threat to the species, so the long-term viability of the species is assured.
- D1C2 – Population abundance: Anthropogenic pressures do not adversely affect the abundance of populations of the species concerned, so that the long-term viability of these populations is guaranteed.
- D1C3 – Demographic characteristics of populations: The demographic characteristics (e.g. size or age structure, sex distribution, fecundity rates, survival rates) of the species' populations indicate a healthy population, unaffected by anthropogenic pressures.
- D1C4 – Spatial distribution of populations: The range of the species and, where appropriate, their pattern of distribution within that range shall be consistent with prevailing physiographic, geographic and climatic conditions.
- D1C5 – Species habitat: The habitat of the species provides the extent and conditions necessary for the species to complete the different stages of their life cycle.

It should be noted that the "Sea Birds" monitoring programme also provides data for the following criteria: D8C4 (Effects of significant acute pollution episodes), D10C3 (Ingested waste) and D10C4 (Adverse effects of waste). (See monitoring programmes "Contaminants" and "Marine waste").

The GES criteria for descriptor 4 depend on cross-referencing data from several monitoring programmes to reconstruct the whole food web, in line with Decision 2017/848/EU, and will therefore require a dedicated strategy to be put in place. The methodological standards relating to these criteria will be completed following additional studies and the list of trophic guilds considered will be specified at a later date, as provided for in Article 6 of the Order of 9 September 2019.

According to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, five GES indicators can be used to assess criteria D1C2, D1C3 and D1C4. Two of these indicators are common to the indicators defined under the OSPAR Convention, while the other three have been developed at national level. Some of these indicators are operational but still require some adaptation in the next cycle and threshold definitions. This is the case, for example, for the indicators "Growth rate of wintering coastal shorebird populations" and B1 OSPAR, which feed into criterion D1C2 on the abundance of bird populations. Other indicators, however, still need to be improved to be more robust and operational, such as the "Abundance of sea birds observed at sea" indicator, the indicator "Distribution of sea birds observed at sea" and the OSPAR indicator B3 on breeding success of sea birds.

Environmental objectives

The "Sea birds" monitoring programme is concerned with seven environmental objectives relating to accidental catches (D01-OM-OE01), collisions with infrastructures at sea (D01-OM-OE02), loss of functional habitats (D01-OM-OE03, D01-OM-OE05), introduced and domesticated species (D01-OM-OE04), physical, noise and light disturbance (D01-OM-OE06), or the taking on the public maritime domain of species identified under the International Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA) and threatened at European level (D01-OM-OE07).

Twelve operational EO indicators have been defined for the second cycle and apply to all marine sub-regions of the MSFD:

- Five EO indicators are reported only by sub-programmes 1 and 2 of the "Sea Birds" monitoring programme.
- One indicator (D01-OM-OE05-ind1) is filled in by the collection systems from the sub-programmes of the "Activities, uses and public policies" part of the monitoring system for Coastline Strategic Documents (see Annex 3b).
- Two indicators (D01-OM-OE01-ind1 and D01-OM-OE06-ind3) are reported by both the sub-programmes of the "Marine birds" monitoring programme and the "Activities, uses and public policies" part (see Annex 3b).
- Four indicators do not require monitoring to be completed because the obligation of compatibility of offshore authorisations and SDAGEs with the environmental objectives (defined in Article L. 219-4 of the French Environmental Code) is sufficient to ensure that the target associated with these indicators is achieved (D01-OM-OE02-ind1 and ind2, D01-OM-OE03-ind1, and D01-OM-OE07-ind1).

What are the data collection devices?

Information on the operability of the monitoring schemes and their link with the EO/EEO indicators and the maritime façades is given in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

MONITORING DEVICE	SP	DESCRIPTION
Monitoring of coastal shorebirds (resting places)/OPNL	SP1	Monitoring of coastal shorebird numbers to characterise resting areas.
Monitoring of wintering birds (International Wetlands Programme)	SP1	Monitoring of wintering coastal shorebirds and wintering anatidae in coastal wetlands.
National Survey of Breeding Waders and Anatidae	SP1	Monitoring of breeding numbers of shorebirds and anatidae.
National monitoring of breeding sea bird numbers	SP2	Monitoring of breeding sea bird numbers, based on the number of breeding sea bird pairs for each colony sampled.

MONITORING DEVICE	SP	DESCRIPTION
National monitoring of young production of breeding sea birds	SP2	Monitoring of the average number of fledglings per breeding pair to assess the reproductive success of sea birds nesting.
Monitoring of macro-waste in crested cormorant nests	SP2	Monitoring of the number of macro-waste present in the nests of crested cormorants, carried out in several sites and colonies (Iroise Natural Marine Park, Breton colonies, Norman colonies, corsican colonies and Channel-North Sea colonies).
Monitoring birds at sea from the coast	SP3	Counting the number of birds over a given time interval, on birds in movement (monitoring of flocks at sea) or on sites known to host large numbers of stationary birds (rafts, significant groups) visible from the coast.
Aerial campaigns to monitor large-scale marine megafauna and floating macro-waste (SAMM, SCANS, ASI)	SP3	Overflights of the metropolitan maritime area and its bordering zones for the observation of seabirds, marine mammals and other megafauna species and human activities (floating waste).
Optimised FAD fishing campaigns - Marine Megafauna and floating macro-waste (Megascope programme)	SP3	Monitoring of marine megafauna, floating waste and human activities by observers on board Ifremer vessels during benthic fisheries surveys annual meetings (IBTS, PELGAS, PELMED, CGFS and EVHOE).
Monitoring of stranded birds on the Normandy and Hauts de France coasts	SP4	Monitoring of stranded birds on the Normandy and Hauts de France coasts according to 2 protocols: monitoring of the proportion of stranded birds of all species and monitoring of the proportion of oiled stranded Guillemots and stranded Fulmars that have ingested micro-plastics.
Observation of catches at sea (OBSMER)	SP5	Programme to place observers on voluntary fishing vessels to record catches and discards, including incidental catches of marine mammals, sea turtles and seabirds.

1.2 - Monitoring programme "Marine Mammals - Marine Turtles (biodiversity)"



What does this monitoring programme cover?

The "Marine Mammals - Marine Turtles" monitoring programme defines the monitoring necessary for the permanent assessment of the ecological status of marine waters and the periodic updating of the environmental objectives (EO) under:

- descriptor 1 "Biodiversity" of the MSFD for the components "Marine Mammals" and "Marine Turtles", described as: "Biological diversity is conserved. The quality and number of habitats, as well as

the distribution and abundance of species are adapted to the prevailing physiographic, geographic and climatic conditions" (Directive 2008/56/EC).

- descriptor 4 "Food webs" of the MSFD, described as: "All components of the marine food web, as far as is known, are present in normal abundance and diversity and at levels that can ensure the long-term abundance of species and the full maintenance of their reproductive capacity" (Directive 2008/56/EC).

The objective of this monitoring programme is to acquire data that will allow both:

- Assess the ecological status of marine mammal and sea turtle populations (abundance, demographic characteristics, spatial distribution, habitat use).
- Assess the impact of pressures on populations.
- Understand the structure and functioning of marine ecosystems and the food web.

The "Marine Mammals - Sea Turtles" monitoring programme is organised into five sub-programmes, divided geographically (coast versus open sea) and thematically (state of the environment, pressures and impacts of activities on the environment):

- Sub-programme 1 - Coastal cetacean populations
- Sub-programme 2 - Grey seal and seal calf populations
- Sub-programme 3 - Marine mammals and sea turtles in the open sea
- Sub-programme 4 - Stranding of marine mammals and sea turtles
- Sub-programme 5 - Interactions between human activities, marine mammals and marine turtles

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good environmental status

The assessment of the achievement of good environmental status (GES) of marine waters under Descriptor 1 "Biodiversity" for the components "Marine Mammals" and "Marine Turtles" is based, according to Decision 2017/848/EU, on four primary criteria (D1C1, D1C2, D1C4 and D1C5) and one secondary criterion (D1C3):

- D1C1 – Incidental catch mortality rate: The mortality rate per species due to incidental catches is below the level that would pose a threat to the species, so the long-term viability of the species is assured.
- D1C2 – Population abundance: Anthropogenic pressures do not adversely affect the abundance of populations of the species concerned, so that the long-term viability of these populations is guaranteed.
- D1C3 – Demographic characteristics of populations: The demographic characteristics (e.g. size or age structure, sex distribution, fecundity rates, survival rates) of the species' populations indicate a healthy population, unaffected by anthropogenic pressures.
- D1C4 – Spatial distribution of populations: The range of the species and, where appropriate, their pattern of distribution within that range shall be consistent with prevailing physiographic, geographic and climatic conditions.
- D1C5 – Species habitat: The habitat of the species provides the extent and conditions necessary for the species to complete the different stages of their life cycle.

It should be noted that the "Marine Mammals - Sea Turtles" monitoring programme also provides data for this criterion: D10C3 (Ingested waste) (see monitoring programme "Marine waste").

The GES criteria for descriptor 4 depend on cross-referencing data from several monitoring programmes to reconstruct the whole food web, in line with Decision 2017/848/EU, and will therefore require a dedicated strategy to be put in place. The methodological standards relating to these criteria will be completed following additional studies and the list of trophic guilds considered will be specified at a later date, as provided for in Article 6 of the Order of 9 September 2019.

According to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, eleven GES indicators can be used to assess criteria D1C1, D1C2, D1C3 and D1C4:

- Eight GES indicators are used to inform criteria D1C1, D1C2, D1C3 and D1C4 for the "Marine Mammals" component. Four of these indicators are common to the indicators defined under the OSPAR Convention (common indicators M3, M4-a, M4-b and M6), while the other four have been developed at national level. All of these indicators have been used to assess whether or not certain species have achieved the GES for certain marine sub-regions, with the exception of OSPAR indicator M6 due to the lack of a threshold. Adaptations of some indicators are underway to assess other species or other marine sub-regions, in particular in the MMN Western Mediterranean where no marine mammal species could be quantitatively assessed in the GES Assessment.
- Three GES indicators are defined to feed criteria D1C1 (provisional indicator), D1C2 and D1C4 for the marine turtle component. However, due to patchy data and lack of thresholds, the achievement or non-achievement of GES for marine turtle species could not be determined in the 2018 Assessment.
- No GES indicators could be defined for criterion D1C5 (Species habitat) for either marine mammals or marine turtles. Consideration is being given to the development of indicators for this criterion for the next evaluation.

Environmental objectives

In the second cycle of implementation of the environmental objectives (EOs), three EOs were defined to achieve good environmental status (GES) for marine mammals and sea turtles. They concern in particular human disturbance, accidental catches and collisions.

Six operational EO indicators have been defined for the second cycle and apply to all marine sub-regions of the MSFD, with the exception of indicator D01-MT-OE01-ind2, which applies only to the NMR MMN. It should be noted that two EO indicators (D01-MT-OE02-ind1 and ind3) are reported both by the monitoring systems of the "Marine Mammals - Sea Turtles" programme and by the collection systems of the sub-programmes of the "Activities, uses and public policies" part of the monitoring system for the French Coastline Strategic Documents (cf. Annex 3b).

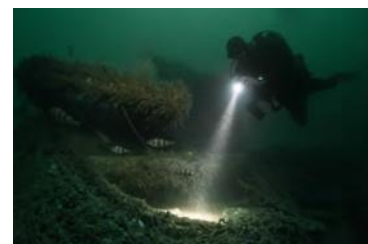
What are the data collection devices

Information on the operability of the monitoring schemes and their link with the EO/EEO indicators and the maritime coastlines is set out in Annex 1 "Monitoring programmes under the second cycle of the MSFD"

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
Monitoring of coastal bottlenose dolphin populations by MPA associations and managers	SP1	Monitoring of the ecological status of coastal bottlenose dolphin groups by visual observation from small vessels, inputting information into the OBSenMER application and photo-identification, carried out by MPA associations and managers (GECC, Al Lark, PNMI, MIRACETI).
Monitoring of seal colonies by MPA associations and managers	SP2	Monitoring of the ecological status of grey and calf seal groups or colonies by ground and photo counting identification, carried out by MPA associations and managers.
Aerial campaigns to monitor large-scale marine megafauna and floating macro-waste (SAMM, SCANS, ASI)	SP3	Overflights of the metropolitan maritime area and its adjacent areas for the observation of sea birds, marine mammals, other species of pelagic megafauna and human activities (floating waste).
Optimised FAD fishing campaigns – Marine Megafauna and floating macro-waste (Megascope programme)	SP3	Monitoring of marine megafauna, floating waste and human activities by observers on board Ifremer vessels during annual bentho-demersal fishing surveys (IBTS, PELGAS, PELMED, CGFS and EVHOE).
Monitoring campaigns for marine megafauna and floating macro-waste from vessels of opportunity.	SP3	Monitoring of marine megafauna, floating wastes and human activities by observers on board maritime platforms of opportunity (commercial passenger lines (ferries) or vessels of the State action at sea), according to the megascope protocol or equivalent.
Réseau National Échouage des mammifères marins (RNE) [National Marine Mammal Stranding Network]	SP4	Monitoring of marine mammal strandings on the French coastline, by RNE correspondents, coordinated at national level by the PELAGIS Observatory.
Marine turtle stranding monitoring networks (RTMAE, RTMMF)	SP4	Monitoring of marine turtle strandings on the French coastline, by the RTMMF correspondents in the Western Mediterranean, coordinated by the Société Herpétologique de France, and by the RTMAE in the Atlantic, coordinated by the Aquarium La Rochelle.
Observation of catches at sea (OBSMER)	SP5	Programme to place observers on voluntary fishing vessels to record catches and discards, including incidental catches of marine mammals, sea turtles and sea birds.

1.3 - Monitoring programme "Fish and cephalopods (biodiversity)"

What does this monitoring programme cover?



The "Fish and Cephalopods" monitoring programme defines the monitoring necessary for the ongoing assessment of the ecological status of marine waters and the periodic updating of environmental objectives (EOs) under:

- descriptor 1 "Biodiversity" of the MSFD for the components "Fish" and "Cephalopods", described as: "Biological diversity is conserved. The quality and number of habitats and the distribution and abundance of species are adapted to the existing physiographic, geographic and climatic conditions." (Directive 2008/56/EC).
- descriptor 4 "Food webs" of the MSFD, described as: "The known components of the marine food chain must be present in normal abundance and diversity, and at levels that can ensure the full maintenance of the reproductive capacity of the species in the long term." (Directive 2008/56/EC).

The aim of this programme is to determine the distribution of fish and cephalopod species, the size of populations, the ecological status of species and their habitats and the effects of pressures on them. It should also provide an understanding of the structure and functioning of ecosystems and the food web.

It should be noted that this monitoring programme is partly based on devices common to the monitoring programme "Commercial species".

The "Fish and Cephalopods" monitoring programme is divided into four sub-programmes, organised according to a triple environmental gradient: distance from the coast (coastal vs. continental shelf and offshore environments), position in the water column (benthic-demersal vs. pelagic species), and nature of the bottom (soft vs. hard substrates and/or biogenic habitats):

- Sub-programme 1 – Benthic-demersal fish and cephalopods on hard substrates and coastal biogenic habitats
- Sub-programme 2 – Benthic-demersal fish and cephalopods on coastal soft substrates
- Sub-programme 3 – Pelagic fish and cephalopods in coastal environments
- Sub-programme 4 – Pelagic and benthic fish and cephalopods on the continental shelf and offshore

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good environmental status

The assessment of the achievement of good environmental status (GES) of marine waters under descriptor 1 for the components

"Fish" and "Cephalopods" are, according to Decision 2017/848/EU, based on five criteria:

- D1C1 – Incidental catch mortality rate: The mortality rate per species due to incidental catches is below the level that would pose a threat to the species, so the long-term viability of the species is assured.
- D1C2 – Population abundance: Anthropogenic pressures do not adversely affect the abundance of populations of the species concerned, so that the long-term viability of these populations is guaranteed.
- D1C3 – Demographic characteristics of populations: The demographic characteristics (e.g. size or age structure, sex distribution, fertility rate, survival rate) of the species' populations indicate a healthy population, unaffected by anthropogenic pressures.
- D1C4 – Spatial distribution of populations: The range of the species and, where appropriate, their pattern of distribution within that range, is consistent with prevailing physiographic, geographic and climatic conditions.

- D1C5 – Species habitat: The habitat of the species provides the extent and conditions necessary for the species to complete the different stages of their life cycle.

The GES criteria for descriptor 4 depend on cross-referencing data from several monitoring programmes to reconstruct the whole food web, in line with Decision 2017/848/EU, and will therefore require a dedicated strategy to be put in place. The methodological standards relating to these criteria will be completed following additional studies and the list of trophic guilds considered will be specified at a later date, as provided for in Article 6 of the Order of 9 September 2019.

According to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, the GES indicators that inform the criteria of descriptor 1 for the components

"Fish" and "Cephalopods" are:

- recovery of the abundance of populations of continental shelf benthic species sensitive to fishing pressure (corresponding to the OSPAR common indicator "FC1") which is used to assess criterion D1C2 for some species.
- for commercially exploited fish and cephalopod stocks, the assessment of criteria D3C1 and D3C2 (see monitoring programme "Commercial species") contributes to the assessment of criterion D1C2.
- for commercially exploited fish and cephalopod stocks, the assessment of criterion D3C3 (see monitoring programme "Commercial species") contributes to the assessment of criterion D1C3; in the absence of an indicator, this criterion is not currently assessed.

For the other species and criteria, the indicators are currently being developed methodologically and threshold and/or reference values are being defined.

Environmental objectives

In the second cycle of implementation of the environmental objectives (EOs), five EOs were defined for better management of populations and limitation of incidental catches concerning elasmobranchs (D01-PC-OE01; D01-PC-OE02), amphihaline species (D01-PC-OE03) and vulnerable and endangered Mediterranean species (D01-PC-OE04). The aim is also to reduce all pressures on important fisheries functional areas (D01-PC-OE05).

Seven operational indicators have been defined for the second cycle and are reported by the collection systems resulting from the sub-programmes of the "Activities, uses and public policies" part of the monitoring system for the Coastline Strategic Documents (see Annex 3b).

What are the data collection devices

Information on the operability of the monitoring schemes and their link with the EO/GES indicators and the maritime coastlines is given in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
Fish monitoring in salt marshes - RNF-OPNL network	SP1	This device is aimed at monitoring fish in loose intertidal vegetated environments (salt meadows).

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
Fisheries observation campaigns: nurseries	SP2	Network of campaigns in coastal nursery areas for benthic-demersal fish, which are essential habitats for many marine species.
Fisheries observation campaigns: stock assessment	SP2 SP4	Network of standardised scientific campaigns* aimed at characterising the state and medium-term evolution of exploited species, populations (of fisheries interest or not) and the marine environment. Each cruise provides a quantitative representation of all pelagic, demersal and benthic species in the study area at a given time. *By marine sub-regions: Western Mediterranean: PELMED, MEDITS GoG N/S: PELGAS, ORHAGO, EVHOE MRS: IBTS, CGFS Celtic Sea: CGFS, EVHOE
Observation of catches at sea (OBSMER)	SP2 SP4	A scheme that collects catch data (voluntary and incidental) on board voluntary commercial fishing vessels.
Aerial campaign to monitor bluefin tuna	SP4	Aerial bluefin tuna monitoring campaign deployed in the Gulf of Lion with the objective of counting schools of bluefin tuna in order to construct an abundance index used in stock assessments.

1.4 - Monitoring programme "Benthic habitats (biodiversity)"



What does this monitoring programme cover?

The "Benthic Habitats" Monitoring Programme defines the monitoring required for the ongoing assessment of the environmental status of marine waters and the periodic updating of environmental objectives (EOs) under:

- descriptor 1 "Biodiversity" of the MSFD for the component "Benthic habitats", described as: "Biological diversity is conserved. The quality and number of habitats and the distribution and abundance of species are adapted to the existing physiographic, geographic and climatic conditions." (Directive 2008/56/EC).
- descriptor 6 "Integrity of the seabed" of the MSFD, described as: "The level of integrity of the seabed ensures that the structure and functions of ecosystems are preserved and that benthic ecosystems in particular are not disturbed." (Directive 2008/56/EC).

The objective of this programme is to determine the distribution, extent and ecological status of benthic habitats from the coast to the bathyal zone. To do this, it relies on the monitoring of state parameters describing the benthic habitats of metropolitan waters (structural, functional and surface parameters). Pressure parameters

of anthropogenic origin (biological, chemical and physical) and activities that are sources of pressure are monitored within other MSFD monitoring programmes in order to study the impacts of these pressures on marine ecosystems. Linking status parameters and pressure parameters provides a better understanding of the state of benthic habitats and enables relevant management measures to be taken to limit these pressures and their impacts.

The 'Benthic Habitats' monitoring programme is organised into seven sub-programmes, corresponding to groupings of broad habitat types listed in Decision 2017/848/EU, according to the physical nature of the habitat and their gradient of distance from the coast:

- Sub-programme 1 – Mediolittoral biogenic rocks and reefs
- Sub-programme 2 – Mediolittoral sedimentary habitats
- Sub-programme 3 – Coastal sub- and circalittoral biogenic rocks and reefs
- Sub-programme 4 – Coastal sub- and circalittoral sedimentary habitats
- Sub-programme 5 – Circalittoral biogenic rocks and reefs in the open sea
- Sub-programme 6 – Offshore circalittoral sedimentary habitats
- Sub-programme 7 – Upper and lower bathyal rocks, biogenic reefs and sedimentary habitats

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good environmental status

The assessment of the achievement of good environmental status (GES) of marine waters under descriptor 1 and in relation to descriptor 6 for the component "Benthic habitats" is based, according to Decision 2017/848/EU, on two primary criteria (D6C4 and D6C5):

- D6C4 – Extent of benthic habitat type loss: The extent of loss of the habitat type as a result of anthropogenic pressures does not exceed a given proportion of the natural extent of the habitat type in the assessment area.
- D6C5 – Extent of adverse effects on the condition of the benthic habitat type: The extent of adverse effects related to anthropogenic pressures on the condition of the habitat type, including alteration of its biotic and abiotic structure and functions (e.g. characteristic species composition and relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), does not exceed a given proportion of the natural extent of the habitat type in the assessment area.

During the second cycle of the GES assessment in 2018, it was not possible to assess whether or not the GES for "benthic habitats" had been achieved, mainly because of ongoing methodological development work on the indicators and the absence of threshold values. Criterion D6C5 could nevertheless be partially filled in for certain major types of benthic habitat on soft substrates by the BenthVal indicator, which quantifies the loss of species abundance (in time or space). This indicator was calculated on the basis of stationary data on the benthic invertebrate macrofauna, acquired within the framework of the WFD Benthos – Benthic Macroinvertebrates (WFD-BIM) between two years of the 2012-2018 cycle. However, this indicator is not yet operational and cannot be deployed on a large scale and for all habitat types. Further research is envisaged to improve its application and consideration will be given to the use of other indicators.

Environmental objectives

The "Benthic Habitats" monitoring programme should make it possible to feed environmental objectives (EO) concerning the reduction of pressures of anthropic origin (loss of habitats, physical disturbances, abrasion, smothering, artificialisation of the coastline, proliferation of filamentous macroalgae) on salt meadows, intertidal rocky habitats, sabellarid bioconstructions (hermella), eelgrass beds, subtidal and circalittoral sedimentary habitats, Mediterranean phanerogam beds, coralligenous, vulnerable marine ecosystems and hydraulic dunes.

The majority of the operational indicators defined for the second cycle are based on area-based habitat data. It should be noted that five indicators (D01-HB-OE02-Ind1; D01-HB-OE05-Ind1; D01-HB-OE07-Ind1; D01-HB-OE09-Ind3; D01-HB-OE11-Ind2) are collected by the sub-programme-based data collection systems of the "Activities, uses and public policies" part of the monitoring system for the strategic documents for the coastline (cf. Annex 3b) and that five other indicators (D01-HB-OE05-Ind2, D01-HB-OE09-Ind1; D01-HB-OE11-Ind1; D01-HB-OE11-Ind3; D01-HB-OE11-Ind4) are not included in the monitoring system

do not require monitoring to be completed as the obligation of compatibility of offshore authorisations and SDAGEs with environmental objectives (defined in Article L. 219-4 of the French Environment Code) is sufficient to ensure that the target associated with these indicators is achieved. It should also be noted that the "Benthic Habitats" and "Seabed Integrity" monitoring programmes are complementary and provide input to the EO indicators of both programmes.

What are the data collection devices?

Information on the operability of the monitoring schemes and their link with the EO/EEO indicators and the maritime façades is given in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
WFD Benthos – Intertidal macroalgae	SP1	Monitoring of algal belts and repertoire of intertidal macroalgal species.
REBENT Brittany stationary – Intertidal macroalgae	SP1	Monitoring of intertidal macroalgae and repertoire of macroalgal species within each algal belt, with sampling of associated macrofauna, conducted within the framework of REBENT Brittany stationary Phase II.
REEHAB – National network for monitoring intertidal bioconstructions with Sabellariidae	SP1	Monitoring of reef bioconstructions with <i>Sabellaria alveolata</i> selected following field surveys and larval connectivity analyses on the Atlantic and Channel coasts.
WFD Benthos – Macroalgae (CARLIT method)	SP1	Monitoring of macroalgae using the CARtografia LITtoral (CARLIT) method, which combines exhaustive mapping of the distribution of upper mediolittoral communities and their abundances with the geomorphology of the coast.
WFD Benthos – Angiosperms – stationary – <i>Zostera noltei</i>	SP2	Stationary monitoring network for <i>Zostera noltei</i> meadows.
WFD Benthos – Angiosperms – surface – <i>Zostera noltei</i>	SP2	Surface monitoring network for <i>Zostera noltei</i> meadows.

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
WFD Benthos – Benthic Macroinvertebrates (WFD-BIM)	SP2 SP4	Stationary monitoring network of soft substrate habitats from the mediolittoral to the coastal circalittoral zone conducted under the WFD.
REBENT Brittany stationary – Benthic macroinvertebrates	SP2 SP4	Station monitoring of soft substrate habitats from the mediolittoral to the coastal circalittoral zone carried out within the framework of the REBENT Brittany stationary Phase II.
WFD Benthos – Subtidal Macroalgae	SP3	Stationary monitoring network for subtidal macroalgae conducted under the WFD.
REBENT Brittany stationary – Subtidal macroalgae	SP3	Monitoring of subtidal macroalgae within the framework of REBENT Brittany stationary Phase II.
CORalligenous Network (RECOR)	SP3	Monitoring of the spatio-temporal evolution of coralligenous assemblages (description of the state and functioning) on the French Mediterranean coastline.
SURFSTAT – - Coralligenous surface monitoring	SP3	Network to complete the existing 2D seabed mapping and to establish the 3D correspondence of habitats, with a focus on coralligenous habitats. It also makes it possible to measure various variables that can be used as surface indicators of coastal water quality from the continuous mapping of marine habitats.
WFD Benthos – Angiosperms – stationary – <i>Zostera marina</i>	SP4	Stationary monitoring network of <i>Zostera marina</i> beds conducted under the WFD.
REBENT Brittany stationary – <i>Zostera marina</i>	SP4	Station monitoring of <i>Zostera marina</i> meadows and the macrofauna associated with the meadow carried out within the framework of REBENT Brittany stationary Phase II.
WFD Benthos – Angiosperms – surface – <i>Zostera marina</i>	SP4	Surface monitoring network for <i>Zostera marina</i> meadows.
REBENT Brittany stationary – Maerl	SP4	Monitoring of maerl beds in the Celtic Seas and the North Bay of Biscay conducted within the framework of the REBENT Brittany stationary Phase II.
TEMPO – Monitoring of Posidonia meadows (includes the Posidonia WFD)	SP4	Monitoring network for Posidonia meadows to collect descriptive data on the state and functioning of Posidonia meadows and to follow their spatio-temporal evolution.
SURFSTAT – Surface monitoring of Posidonia meadows	SP4	Network to complete the existing 2D mapping of the seabed and to establish the 3D correspondence of habitats, with a focus on Posidonia meadows. It also makes it possible to measure various variables that can be used as surface indicators of coastal water quality from the continuous mapping of marine habitats.

1.5 - Pelagic habitats (biodiversity) monitoring programme

What does this monitoring programme cover?

The Pelagic Habitats Monitoring Programme defines the monitoring required for the ongoing assessment of the environmental status of marine waters and the periodic updating of environmental objectives (EOs) under:

- descriptor 1 "Biodiversity" of the MSFD for the component "Pelagic habitats", described as: "Biological diversity is conserved. The quality and number of habitats and the distribution and abundance of species are adapted to the existing physiographic, geographic and climatic conditions." (Directive 2008/56/EC).
- descriptor 4 "Food webs" of the MSFD, described as: "The known components of the marine food chain must be present in normal abundance and diversity, and at levels that can ensure the full maintenance of the reproductive capacity of the species in the long term." (Directive 2008/56/EC).

This programme aims to characterise the spatial distribution, temporal evolution and ecological status of pelagic habitats. To do this, it relies on joint monitoring:

- environmental (or contextual) conditions through the acquisition of "base" parameters describing the hydrological and physico-chemical conditions of the environment (e.g. temperature, salinity, nutrients, turbidity, dissolved oxygen, etc.)
- planktonic communities, making it possible to obtain parameters of the state of the environment in terms of both structure (composition, diversity) and stock (abundance, biomass), these two parameters conditioning in particular the structure and functioning of the food web.

The Pelagic Habitats monitoring programme is organised into four sub-programmes:

- Sub-programme 1 – Hydrology and Physical Chemistry
→ description of the environment/environmental conditions.
- Sub-programme 2 – Phytoplankton
→ includes autotrophic plant plankton, i.e. those that produce their organic matter by photosynthesis.
- Sub-programme 3 – Zooplankton
→ groups together heterotrophic multicellular animal plankton, i.e. which feed by assimilating organic matter already produced.
- Sub-programme 4 – Micro-organisms
→ the term 'micro-organisms' here includes heterotrophic and mixotrophic phytoplankton (capable of feeding either autotrophically or heterotrophically) such as nanoflagellates, dinoflagellates, bacteria, viruses and single-celled zooplankton (e.g. ciliates).

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good environmental status

The assessment of the achievement of good environmental status (GES) of marine waters under Descriptor 1 "Biodiversity" for the component "Pelagic habitats" is based, according to Decision 2017/848/EU, on the sole primary criterion:

- D1C6 – Pelagic habitat type characteristics: The characteristics of the habitat type, including its biotic and abiotic structure and functions, are not adversely affected by human pressures.

The GES criteria for descriptor 4 depend on cross-referencing data from several monitoring programmes to reconstruct the whole food web, in line with Decision 2017/848/EU, and will therefore require a dedicated strategy to be put in place. The methodological standards relating to these criteria will be completed following additional studies and the list of trophic guilds considered will be specified at a later date, as provided for in Article 6 of the Order of 9 September 2019.

According to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, three indicators can be used to assess criterion D1C6 at the scale of the MMN:

- changes in plankton functional groups
- changes in phytoplankton biomass and zooplankton abundance
- changes in plankton biodiversity

They correspond to common indicators developed under the OSPAR Convention (PH1/FW5, PH2 and PH3 respectively) and need to be adapted for the MMN Western Mediterranean.

Changes in plankton communities over time via the GES 'Pelagic Habitats' indicators reflect the effects of prevailing environmental conditions (e.g. climatic, hydrological, physical-chemical). Depending on the context, a change in the state of planktonic communities may reflect an evolution linked to natural phenomena or an evolution towards a degraded state. Thus, these indicators act as warning signals from which management actions (precautionary principle) and/or research actions (state-pressure link studies) can be undertaken. They are calculated from quantitative data acquired at monthly intervals and over long time series (at least 10 years).

In the absence of threshold values, the achievement or non-achievement of the 'Pelagic Habitats' GES could not be assessed in 2018 under the second GES assessment cycle. For the next evaluation cycle, methodological development work will continue, in conjunction with European-level working groups (e.g. ICG-COBAM-PH; see 2.3.1), with the aim of producing operational GES indicators.

Environmental objectives

There are no environmental objectives (EOs) for the Pelagic Habitats monitoring programme. Indeed, the issues related to this programme are covered by the monitoring programmes "Hydrographic changes" and "Eutrophication".

What are the data collection devices?

Information on the operability of the monitoring schemes and their link with the EO/EEO indicators and the maritime façades is given in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
WFD monitoring - REPHY Monitoring, PHYTOBS and regional/local networks	SP1 SP2	Phytoplankton and phycotoxin monitoring network + SOMLIT stations labelled in the framework of PHYTOBS (national network for the observation of microphytoplankton).
REPHY station monitoring Observation (outside WFD)	SP1 SP2	Phytoplankton and phycotoxin observation network, outside the WFD.
ECO-MARS3D model	SP1 SP2	Coupled hydrodynamic/biogeochemical model in the Atlantic/Channel. Allows the simulation of hydrodynamic and state variables to describe the biogeochemical cycles of nitrogen, phosphorus and silicon.
Satellite networks operated by NASA and the ESA	SP1 SP2	Surface monitoring of hydrological and physical-chemical parameters (turbidity, surface temperature), phytoplankton biomass (chlorophyll-a concentration), and phytoplankton functional groups (under development).
Service d'Observation en Milieu Littoral (SOMLIT)	SP1 SP2 SP4	French National Coastal and Marine Ecosystem Observation Service. It allows the monitoring of phytoplankton, certain micro-organisms and the acquisition of hydrological and physical-chemical data.
Network of Marine Stations and Observatories (RESOMAR-Pelagos)	SP1 SP2 SP3 SP4	Collaborative work by the French Marine Stations and Observatories Network on marine plankton (phytoplankton, zooplankton, micro-organisms) and associated environmental parameters (hydrology, physical-chemistry).
Impacts of Major Developments (IGA)	SP1 SP2 SP3	Monitoring of the marine environment (hydrology, physico-chemistry, phytoplankton, zooplankton, bacteriology) related to discharges from coastal nuclear power plants.
STARESO monitoring – Calvi Bay	SP1 SP2 SP3	Long-term monitoring of the STATION de REcherche océanographique et SOus-marine de Calvi (hydrology, physical-chemistry, phytoplankton, zooplankton). Few anthropogenic pressures, WFD reference.
Monitoring of the pelagic environment of MPAs	SP1 SP2 SP3	Monitoring of Marine Protected Areas (hydrology, physical-chemistry, phytoplankton, zooplankton).
Mediterranean Ocean Observing System for the Environment (MOOSE)	SP1 SP2 SP3 SP4	Multi-platform (fixed stations (1), gliders (2), large-scale sea campaigns (3)) and multi-site observation system in the Mediterranean.
Continuous Plankton Recorder Survey (CPR Survey) – Marine Biological Association	SP2 SP3	Long-term monitoring of plankton communities (phytoplankton, zooplankton) by continuous sampling via the CPR, an instrument towed at a depth of 10 m by commercial vessels, operated by the Marine Biological Association.

1.6 - "Non-native species" monitoring programme

What does this monitoring programme cover?

The "Non-native species" monitoring programme defines the monitoring required for the ongoing assessment of the ecological status of marine waters and the periodic updating of environmental objectives (EOs) under descriptor 2 "Non-native species" of the MSFD. Descriptor 2 is described as: "Non-native species introduced through human activities are at levels that do not disturb ecosystems. (Directive 2008/56/EC).

This programme aims to monitor and assess the pressure of non-native species from its source, i.e. the introduction of NIS into their new range, to the impacts it may have on marine ecosystems.

The monitoring programme "Non-native species" is organised in three sub-programmes:

- Sub-programme 1 – Introduction of non-indigenous species through the main vectors: ballast water and sediments, bio-fouling, transfer of living organisms
- Sub-programme 2 – Dedicated monitoring in risk areas and areas sensitive to bio-pollution
- Sub-programme 3 – Characterising the status and impacts of non-native species

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good environmental status

The assessment of the achievement of good environmental status (GES) of marine waters under descriptor 2 "Non-native species" is based, according to Decision 2017/848/EU, on one primary criterion (D2C1) and two secondary criteria (D2C2 and D2C3):

- D2C1 – Newly introduced non-native species: The number of non-native species newly introduced into the natural environment through human activities per assessment period (six years) is reduced to a minimum and eventually to zero.
- D2C2 – Established non-native species: Abundance and spatial distribution of established non-native species, particularly invasive species, which contribute significantly to adverse effects on particular species groups or broad habitat types.
- D2C3 – Adverse effects due to the presence of non-native species: Proportion of the species group or spatial extent of the broad habitat type adversely affected by the presence of non-native species, especially invasive non-native species.

According to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, only one GES indicator is sufficiently developed: the indicator "Trends in new introductions of non-native species", which makes it possible to fill in criterion D2C1. This GES indicator corresponds to the OSPAR NIS3 indicator. The threshold used for this indicator, on a provisional basis, is a trend: the GES is reached when there is a significant decrease in the number of new introductions of non-native species over at least two consecutive cycles. However, the lack of data and the uncertainty of the available data did not allow for a quantitative assessment of the achievement or non-achievement of the GES in the second round GES assessment. It should be noted that, according to

in the Order of 9 September 2019, single-cell species are not considered in the assessment of criterion D2C1. The GES indicators for the D2C2 and D2C3 criteria are not currently operational.

Environmental objectives

The monitoring programme "Non-native species" is concerned with four environmental objectives (EO) relating to the limitation of introduction (D02-OE01; D02-OE03), transfer (D02-OE02) and spread of NIS (D02-OE03; D02-OE04).

Four OE indicators have been defined for the second cycle. Indicators D02-OE01-Ind1 and D02-OE04-Ind2 are operational but lack data and dedicated monitoring. It should be noted that indicator D02-OE01-Ind1 requires collection systems from the sub-programmes of the "Activities, uses and public policies" part of the monitoring system for Coastline Strategic Documents (see Annex 3b). Finally, indicators D02-OE03-Ind1 and D02-OE04-Ind1 are operational and do not require monitoring to be completed, as the obligation to ensure that offshore authorisations and SDAGEs are compatible with environmental objectives (defined in Article L. 219-4 of the French Environment Code) is sufficient to guarantee that the target associated with these indicators will be met.

What are the data collection devices

The monitoring programme "Non-native species" is under development. The monitoring systems of sub-programme 2 relating to the monitoring of NIS in ports, shellfish areas and areas sensitive to bio-pollution are being set up for operational monitoring at the end of the second cycle.

1.7 - Commercial species monitoring programme



What does this monitoring programme cover?

The monitoring programme "Commercial species" defines the monitoring necessary for the continuous assessment of the ecological status of marine waters and the periodic updating of the environmental objectives (EOs) under:

- Descriptor 3 "Commercial species" of the MSFD, described as: "The populations of all commercially exploited fish and shellfish are within safe biological limits, with an age and size distribution of the population that indicates a healthy stock. (Directive 2008/56/EC).
- descriptor 4 "Food webs" of the MSFD, described as: "The known components of the marine food chain must be present in normal abundance and diversity, and at levels that can ensure the full maintenance of the reproductive capacity of the species in the long term." (Directive 2008/56/EC).

The objective of this programme is to enable the assessment of the ecological status of stocks of exploited species taken as a reference for the definition of good environmental status (Descriptor 3, relating to commercially exploited species). To this end, it describes the collection of data relating to the exploited stocks under consideration and the harvesting of these species. The programme also integrates the monitoring of the location of fishing activity (professional/recreational) in order to contribute to the assessment of the pressures and impacts of this activity on habitats, species and the food web as a whole. This includes the preservation of forage species (e.g. anchovies, sardines), which are an essential link in the food chain, to ensure the maintenance of top predators of commercial interest.

The Commercial Species monitoring programme is organised into six sub-programmes:

- Sub-programme 1 – Professional fisheries
- Sub-programme 2 – Recreational fisheries
- Sub-programme 3 – Catch sampling and biological parameters
- Sub-programme 4 – Fisheries monitoring campaigns
- Sub-programme 5 – Interactions between birds and fishing activities
- Sub-programme 6 – Interactions between marine mammals and sea turtles and fishing activities

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good ecological status

The assessment of the achievement of good environmental status (GES) of marine waters under Descriptor 3 'Commercial species' is based, according to Decision 2017/848/EU, on three primary criteria (D3C1, D3C2 and D3C3):

- D3C1 – Fishing mortality rate: The fishing mortality rate on commercially exploited species is at or below the level that would allow maximum sustainable yield to be achieved. Appropriate scientific bodies shall be consulted in accordance with Article 26 of Regulation (EU) No 1380/2013.
- D3C2 – Spawning stock biomass: The spawning stock biomass of commercially exploited populations of species is above the level to achieve maximum sustainable yield. Appropriate scientific bodies shall be consulted in accordance with Article 26 of Regulation (EU) No 1380/2013.
- D3C3 – Population structure by age/size: The age and size distribution of individuals in the populations of commercially exploited species indicates a healthy stock. This is characterised by a high proportion of old/large individuals and limited negative effects of exploitation on genetic diversity.

The GES criteria for descriptor 4 depend on cross-referencing data from several monitoring programmes to reconstruct the whole food web, in line with Decision 2017/848/EU, and will therefore require a dedicated strategy to be put in place. The methodological standards relating to these criteria will be completed following additional studies and the list of trophic guilds considered will be specified at a later date, as provided for in Article 6 of the Order of 9 September 2019.

According to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, operational GES indicators are used to inform criteria D3C1 and D3C2 and are calculated from assessment models using information on the exploitation of fisheries resources and the biology of species:

- The GES indicator used to inform criterion D3C1 is the fishing mortality rate. If it cannot be assessed for the stock in question, then the ratio between catch and biomass index can be used.
- The GES indicator used to inform criterion D3C2 is the spawning stock biomass. If it cannot be assessed for the stock in question, then a spawning biomass index can be used.
- The indicators and threshold values associated with criterion D3C3 are to be developed and will be specified at a later date as provided for in Article 6 of the Order of 9 September 2019.

Each population (or stock) of a given species shall be assessed, at an ecologically relevant geographical scale, by the institutions mentioned in Decision 2017/848/EU: the International Council for the Exploration of the Sea (ICES), the General Fisheries Commission for the Mediterranean (GFCM), the

Food and Agriculture Organisation of the United Nations (FAO) for the Macaronesian biogeographical region, and the International Commission for the Conservation of Atlantic Tunas (ICCAT).

It should be noted that the assessment of criteria D3C1 and D3C2 contributes to the assessment of criterion D1C2 relating to the abundance of populations (cf. "Fish and Cephalopods" monitoring programme). Similarly, the assessment of criterion D3C3 could eventually contribute to the assessment of criterion D1C3 relating to the demographic characteristics of the populations (cf. the "Fish and Cephalopods" monitoring programme).

Environmental objectives

The monitoring programme "Commercial species" is concerned with seven environmental objectives (EOs):

- An environmental objective of Descriptor 1 "Biodiversity" for the component "Benthic habitats": D01-HB-OE08, on the sustainable use of kelp fields.
- Three environmental objectives of Descriptor 3 'Commercial species': D03-OE01, D03-OE02 and D03-OE03, relating to the adaptation of fishing mortality for: 1/ Achieving a maximum sustainable yield (D03-OE01); 2/ ensuring sustainable management of local stocks (D03-OE02) and adapting recreational fishing catches to achieve or maintain good stock status (D03-OE03).
- Three environmental objectives of Descriptor 4 'Food Webs': D04-OE01, D04-OE02, D04-OE03, concerning the restoration, maintenance and preservation of fisheries resources. These EOs relate respectively to limiting damage to sensitive links in the food chain, adapting fishing mortality on forage species and maintaining a zero harvest level on oceanic micronekton.

Six operational indicators have been defined for the second cycle. These are mortality rates (D03-OE01-Ind1; D04-OE01-Ind2; D04-OE02-Ind1), biomass calculations (D04-OE01-Ind1; D04-OE02-Ind1), removal rates (D04-OE03-Ind1) and tonnage harvested per year (D01-HB-OE08-Ind1). All of these indicators are reported both by the monitoring systems of the "Commercial species" monitoring programme and by the collection systems of the sub-programmes of the "Activities, uses and public policies" part of the monitoring system of the Coastline Strategic Documents (see Annex 3b).

What are the data collection devices?

Information on the operability of the monitoring schemes and their link with the EO/EEO indicators and the maritime façades is given in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
Observation of catches at sea (OBSMER)	SP1 SP3 SP5 SP6	A scheme that collects catch data (voluntary and incidental) on board voluntary commercial fishing vessels.
Observation of auction sales (OBSVENTES)	SP1 SP3	A device that develops a sampling plan for the catch, with the aim of producing catch size structures of the main commercial species.
Spatialised fishing activity and environmental data network (RECOPECA)	SP1 SP3	A scheme to equip volunteer professional vessels with sensors to estimate the spatial distribution of fishing effort and catches, and to characterise the fishermen's working areas from an environmental point of view.

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
Fisheries Information System (FIS)	SP1	Ifremer's data collection system centralises data relating to the observation of fisheries resources and associated uses. It is responsible for organising data acquisition (collection or integration of data from external flows), data banking, data qualification/validation, production of indicators and dissemination of data and indicators to end-users.
Fisheries and Aquaculture Information System (SIPA)	SP1	Collection system developed within the framework of the application of maritime fisheries and aquaculture policies by the DPMA, which is the project manager. The SIPA covers, among other things, the management of fishing rights, the collection of data, fisheries monitoring, data processing and dissemination.
Recreational fishing surveys	SP2	Monitoring of recreational fishing through telephone surveys and monitoring of volunteer panels of fishermen.
Fisheries observation campaigns: stock assessment	SP3 SP4	Network of standardised scientific campaigns* aimed at characterising the state and medium-term evolution of exploited species, populations (of fisheries interest or not) and the marine environment. Each cruise provides a quantitative representation of all pelagic, demersal and benthic species in the study area at a given time. *By marine sub-regions: Western Mediterranean: PELMED, MEDITS <u>GoG N/S</u> : PELGAS, ORHAGO, LANGOLF-TV, EVHOE <u>MRS</u> : IBTS, CRUSTAFLAM, CGFS <u>MC</u> : CGFS, EVHOE
Fisheries observation campaigns: nurseries	SP3 SP4	Network of campaigns in coastal nursery areas for benthic-demersal fish, which are essential habitats for many marine species.
Monitoring of local deposits	SP3 SP4	Monitoring of local deposits, which concern resources of limited spatial extent, often not shared with neighbouring Member States, and which are subject to specific valuation methods.
Aerial campaign to monitor bluefin tuna	SP4	Aerial bluefin tuna monitoring campaign deployed in the Gulf of Lion with the aim of counting bluefin tuna schools in order to build a index of abundance used in stock assessments.

1.8 - "Eutrophication" monitoring programme

What does this monitoring programme cover?

The Eutrophication monitoring programme defines the monitoring required for the ongoing assessment of the environmental status of marine waters and the periodic updating of environmental objectives (EOs) under Descriptor 5 "Eutrophication" of the MSFD. Descriptor 5 is described as: "Human-induced eutrophication, in particular

in terms of its adverse effects, such as biodiversity loss, ecosystem degradation, toxic algal blooms and deoxygenation of bottom waters, is minimised (Directive 2008/56/EC).

The aim of this programme is to monitor the evolution of the eutrophication process by evaluating both the pressures linked to eutrophication (i.e. monitoring of nutrient concentrations and fluvial and atmospheric nutrient inputs), and the direct and indirect impacts of these phenomena on the functioning of marine ecosystems and, in particular, on the biological compartments (phytoplankton, macroalgae and phanerogam beds). To do this, it relies on joint monitoring:

- base parameters describing environmental conditions (hydrology and physical-chemistry);
- environmental pressure parameters describing the sources of eutrophication (riverine and atmospheric inputs) and their direct and indirect impacts on pelagic (phytoplankton) and benthic (extent and loss of benthic habitats) habitats.

The "Eutrophication" monitoring programme is organised into six sub-programmes:

- Sub-programme 1 – Hydrology and Physical Chemistry
→ abiotic characteristics of the environment
- Sub-programme 2 – Phytoplankton
→ plant plankton
- Sub-programme 3 – Macroalgae and phanerogam beds
→ includes macrophytes (algae and grass beds visible to the naked eye)
- Sub-programme 4 – Green tides
→ opportunistic algal blooms
- Sub-programme 5 – Riverine nutrient inputs
→ nutrient inputs from rivers
- Sub-programme 6 – Atmospheric nutrient inputs
→ nutrient inputs from atmospheric deposition

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good ecological status

The assessment of the achievement of good environmental status (GES) of marine waters under Descriptor 5 "Eutrophication" is based, according to Decision 2017/848/EU, on three primary criteria (D5C1, D5C2, D5C5) and five secondary criteria (D5C3, D5C4, D5C6, D5C7, D5C8):

- D5C1 – Nutrient concentration: Nutrient concentrations are not at levels indicating adverse effects related to eutrophication.
- D5C2 – Chlorophyll-a concentration: Chlorophyll-a concentrations are not at levels indicating adverse effects related to nutrient enrichment.
- D5C3 – Harmful algal blooms: The number, spatial extent and duration of toxic algal blooms are not at levels indicative of adverse effects associated with nutrient enrichment.
- D5C4 – Photic limit (transparency) of the water column: The photic limit (transparency) of the water column is not reduced by an increase in the amount of suspended algae to a level that indicates adverse effects related to nutrient enrichment.

- D5C5 – Dissolved oxygen concentration: Dissolved oxygen concentration is not reduced by nutrient enrichment to levels indicating adverse effects on benthic habitats (including associated biota and mobile species).
- D5C6 – Abundance of opportunistic macroalgae: The abundance of opportunistic macroscopic algae is not at a level indicating adverse effects of nutrient enrichment. D5C7 – Macrophyte communities of benthic habitats: The species composition and relative abundance or depth distribution of macrophyte communities reach values that indicate an absence of adverse effects due to nutrient enrichment, including reduced water transparency.
- D5C8 – Macrofaunal communities of benthic habitats: The species composition and relative abundance of the macrofaunal communities reach values indicating an absence of adverse effects due to nutrient and organic matter enrichment.

It should be noted that criterion D5C8 is not currently assessed within the "Eutrophication" monitoring programme.

According to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, the indicators used to assess the state of eutrophication at the scale of the coastal zones of the French marine sub-regions correspond, for the most part, to the existing indicators under the WFD. Beyond coastal waters, the WFD indicators have been adapted (e.g. median nitrate concentrations beyond the nautical mile, P90 Chlorophyll-a and P90 turbidity) and thresholds, for the time being provisional, have been defined on a national scale. Work on these thresholds is currently being carried out within the framework of the Regional Seas Conventions (RSCs) within the OSPAR intersessional correspondence groups and the technical groups responsible for defining the common procedure.

Environmental objectives

The "Eutrophication" monitoring programme provides information on four environmental objectives (EO), concerning the reduction and/or maintenance of riverine nutrient inputs according to the sensitivity of the areas concerned to eutrophication, and the reduction of atmospheric nutrient inputs.

Eight indicators have been defined for the second cycle and apply to all the marine sub-regions of the MSFD, with a breakdown according to the issues and pressures identified.

Indicators 1 and 2 of EOs D05-EO01, D05-EO02 and D05-EO03 on riverine nutrient inputs to each marine sub-region are expected to be operational in the third assessment cycle (methods stabilised). It should be noted that EO indicators D05-EO3-Ind1 and D05-EO3-Ind2, which are concerned with not increasing nutrient inputs to areas with little or no eutrophication, are consistent with the oligotrophic character of the MMN Western Mediterranean.

EO indicators D05-EO01-ind3 and D05-EO02-ind3 relate to wastewater treatment before discharge into the sea. The aim is to equip coastal agglomerations with wastewater treatment plants (WWTPs) in accordance with the Urban Wastewater Directive (UWWDD), which regulates the collection, treatment and discharge of wastewater in order to limit the pollution of water by suspended solids, organic matter and nutrients of anthropogenic origin. These two EO indicators are provided by the data collection systems resulting from the sub-programmes of the "Activities, uses and public policies" part of the monitoring system for the Coastline Strategic Documents (see Annex 3b).

What are the data collection devices?

Information on the operability of the monitoring schemes and their link with the EO/EEO indicators and the maritime façades is given in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
WFD monitoring - REPHY Monitoring, PHYTOBS and regional/local networks	SP1 SP2 SP5	Phytoplankton and phycotoxin monitoring network + SOMLIT stations labelled within the framework of PHYTOBS (national network for the observation of microphytoplankton) + regional monitoring networks (particularly for nutrients).
Network of Marine Stations and Observatories (RESOMAR-Pelagos)	SP1 SP2	Collaborative work from the French Marine Stations and Observatories Network (REseau des Stations et Observatoires MARins français) on marine plankton, particularly phytoplankton, and associated environmental parameters (hydrology, physical-chemistry).
Satellite networks operated by NASA and the ESA	SP1 SP2	Surface monitoring of hydrological and physical-chemical parameters (turbidity, surface temperature), phytoplankton biomass (chlorophyll-a concentration), and phytoplankton functional groups (under development).
Service d'Observation en Milieu Littoral (SOMLIT)	SP1 SP2	French National Coastal and Marine Ecosystem Observation Service. In particular, it allows the monitoring of phytoplankton (chlorophyll-a) and the acquisition of hydrological and physical-chemical data.
REPHY station monitoring Observation (outside WFD)	SP1 SP2	Phytoplankton and Phycotoxin Monitoring Network, outside the WFD.
ECO-MARS3D model	SP1 SP2	Coupled hydrodynamic/biogeochemical model in the Atlantic/Channel. Allows the simulation of hydrodynamic variables and physico-chemical (nitrogen nutrients, phosphates and silica) and biological (chlorophyll-a concentrations; some modules can be added to simulate the dynamics of certain harmful and/or toxic algae such as <i>Phaeocystis globosa</i> <i>Karenia mikimotoi</i> and <i>Pseudo-nitzschia</i> sp.
3DVAR-OGSTM-BFM model	SP1 SP2	Biogeochemical model that can be coupled to the Med-Current hydrodynamic model to acquire data on physical-chemical (nutrients, dissolved oxygen) and biological parameters (chlorophyll-a, phytoplankton groups).
Network of buoys instrumented with multiparameter sensors	SP1 SP2	Automated systems deployed on fixed systems (e.g. buoys). This system is based on the network of buoys instrumented with multi-parameter sensors (IR ILICO Coast-HF network, SOMLIT buoy network, MOOSE network).
Impacts of Major Developments (IGA)	SP1 SP2	Monitoring of the marine environment (hydrology, physical-chemistry, phytoplankton) related to discharges from coastal nuclear power plants.
STARESO monitoring – Calvi Bay	SP1 SP2	Long-term monitoring of the STATION de REcherche océanographique et SOus-marine de Calvi (hydrology, physico-chemistry, phytoplankton). Little anthropogenic pressure, WFD reference.
Monitoring of the pelagic environment of MPAs	SP1 SP2	Monitoring of Marine Protected Areas (in particular hydrology, physical chemistry and phytoplankton composition/biomass).
Mediterranean Ocean Observing System for the Environment (MOOSE)	SP1 SP2	Multi-platform (fixed stations (1), gliders (2), large-scale sea campaigns (3) and multi-site observation systems in the Mediterranean. Allows the acquisition of hydrological and physico-chemical data (nutrients, turbidity, dissolved oxygen) and biological (chlorophyll-a concentration).
WFD Benthos – Intertidal macroalgae	SP3	Monitoring of algal belts and repertoire of intertidal macroalgal species.
WFD Benthos – Subtidal Macroalgae	SP3	Stationary monitoring network for subtidal macroalgae conducted under the WFD.

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
WFD Benthos – Angiosperms – stationary – <i>Zostera marina</i>	SP3	Stationary monitoring network of <i>Zostera marina</i> beds conducted under the WFD.
WFD Benthos – Angiosperms – stationary – <i>Zostera noltei</i>	SP3	Stationary monitoring network for <i>Zostera noltei</i> meadows.
WFD Benthos – Angiosperms – surface – <i>Zostera noltei</i>	SP3	Surface monitoring network for <i>Zostera noltei</i> meadows.
WFD Benthos – Angiosperms – surface – <i>Zostera marina</i>	SP3	Surface monitoring network for <i>Zostera marina</i> meadows.
WFD monitoring of green tides	SP4	Monitoring of green tides in the Channel and the Atlantic thanks to aerial overflights and surveys of municipalities, carried out by the CEVA (Centre d'Etude et d'Aide Médicale) valorisation of Algae) for the WFD.
Network of river flow measurement stations of the HYDRO bank	SP5	Database (HYDRO) supplied by the State, flood forecasting services, departmental agriculture and forestry directorates, water agencies, but also by Electricité de France, research organisations and other organisations than by the development companies.
WFD monitoring of continental surface waters	SP5	Aims to provide a coherent and comprehensive picture of the status of waters within each river basin by monitoring hydrological parameters (temperature, salinity) and physical-chemical parameters (nutrients, oxygen balance).
European Monitoring and Evaluation Program (EMEP)	SP6	Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe. Nitrogen fluxes from atmospheric deposition are calculated from emission data coupled with an atmospheric chemical transport model.
Mediterranean Ocean Observing System for the Environment (MOOSE) – atmospheric deposition monitoring	SP6	Monitoring of atmospheric deposition (dry (1) and wet (2)) from the Cap Béar, Frioul and Cap Ferrat stations in the western Mediterranean. The challenge for MOOSE is to maintain a network that separates the anthropogenic inputs from the natural terrigenous inputs from North Africa (Saharan contributions).

1.9 - "Seabed Integrity" Monitoring Programme

What does this monitoring programme cover?

The Seabed Integrity Monitoring Programme defines the monitoring necessary for the ongoing assessment of the environmental status of marine waters and the periodic updating of environmental objectives (EOs) under:

- descriptor 1 "Biodiversity" of the MSFD for the component "Benthic habitats", described as: "Biological diversity is conserved. The quality and number of habitats and the distribution and abundance of species are adapted to the existing physiographic, geographic and climatic conditions." (Directive 2008/56/EC).
- descriptor 6 "Integrity of the seabed" of the MSFD, described as: "The level of integrity of the seabed ensures that the structure and functions of ecosystems are preserved and that benthic ecosystems in particular are not disturbed." (Directive 2008/56/EC).



The aim of this programme is to monitor the extent and intensity of physical pressures generated by anthropogenic activities and uses likely to have an effect on the integrity of the seabed, both on the coast and offshore, in order to characterise the resulting sedimentary and morphological modifications. It will also be necessary to determine whether these modifications are reversible (known as physical disturbances) or whether they are permanent (known as physical losses) and to assess the potentially harmful effects on benthic habitats.

The anthropogenic activities and uses considered by this monitoring programme are coastal and offshore structures, selective extraction of materials from the sea and beach nourishment, dredging and dumping of materials at sea, anchoring, aquaculture, and professional and recreational fishing. To do this, it relies on joint monitoring:

- activities and uses of the environment (surface area of the areas exploited, duration and intensity of activities, characteristic parameters of each activity, etc.),
- the pressures of these activities on the topography and nature of the seabed.

It should be noted that the implementation of the "Integrity of the seabed" monitoring programme is partly common with the "Activities, uses and public policies" part of the monitoring system, which is set out in the Coastline Strategic Documents (cf. Annex 3b).

The Seabed Integrity monitoring programme is organised into seven sub-programmes corresponding to the main anthropogenic activities that are sources of physical pressure on the seabed:

- Sub-programme 1 – Coastal and seabed enhancement
- Sub-programme 2 – Selective removal of material from the sea and beach nourishment
- Sub-programme 3 – Dredging and disposal of materials at sea
- Sub-programme 4 – Moorings
- Sub-programme 5 – Aquaculture
- Sub-programme 6 – Professional fisheries
- Sub-programme 7 – Recreational fisheries

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good environmental status

The assessment of the achievement of good environmental status (GES) of marine waters under Descriptor 6 is based on five primary criteria according to Decision 2017/848/EU. The Seabed Integrity Monitoring Programme defines the monitoring required for the following three primary criteria:

- D6C1 – Physical loss of the seabed: Spatial extent and distribution of physical loss (permanent change) of the natural seabed, including intertidal areas
- D6C2 – Physical disturbance of the seabed: Spatial extent and distribution of physical disturbance pressures on the seabed, including intertidal areas.
- D6C3 – Adverse effects due to physical disturbances: Spatial extent of each habitat type adversely affected by changes in biotic and abiotic structure and function (e.g. changes in species composition and relative abundance of species, absence of particularly sensitive or fragile species or species providing a key function, species size structure) due to physical disturbance.

Criteria D6C4 and D6C5, relating to the surface areas of benthic habitats impacted, are provided by the joint monitoring of the seabed and benthic habitats, implemented in the "Seabed integrity" and "Benthic habitats" monitoring programmes respectively.

According to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, criteria D6C1, D6C2, D6C3 are each assessed by a set of indicators relating to certain activities, depending on whether the activity is a source of physical loss, physical disturbance, and adverse effects due to disturbance.

It should be noted that the indicators related to criteria D6C1 and D6C2 (physical losses and physical disturbances), declined for material extraction, are only defined for the MMN, MC and GoG, due to the absence of this industrial activity in the MMN Western Mediterranean.

Environmental objectives

The "Seabed Integrity" monitoring programme provides information on a number of environmental objectives (EOs) for benthic habitats, seabed integrity and seabirds. These objectives concern disturbance and loss of habitats due to artificialisation (D06-OE01 and D01-OM-OE03), maritime structures and activities (D06-OE02), fishing on foot (D01-HB-OE03), extraction of materials (D01-HB-OE11), anchoring and seabed fishing gear (D01-HB-OE05, D01-HB-OE09 and D01-HB-OE10).

A set of indicators has been defined for the environmental objectives (EOs) relating to physical pressures and seabed integrity. All of the systems in the "Integrity of the seabed" monitoring programme, as well as the data collection systems from the sub-programmes of the "Activities, uses and public policies" part of the monitoring system for the Coastline Strategic Documents (see Annex 3b), can be used to collect information on these environmental objective (EO) indicators. It should be noted that indicator D06-OE02-ind1 does not require monitoring to be completed, as the obligation to ensure that offshore authorisations and SDAGEs are compatible with environmental objectives (defined in Article L. 219-4 of the French Environment Code) is sufficient to guarantee that the target associated with this indicator is achieved.

What are the data collection devices?

Information on the operability of the monitoring schemes and their link with the EO/EEO indicators and the maritime façades is given in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

MONITORING/COLLECTION DEVICE	SP	DESCRIPTION
Artificialisation database WFD - MSFD	SP1	Monitoring of the surfaces artificially modified by coastal structures and developments and the coastal area (Source: BRGM-Cerema)
French Mediterranean coasts: inventory and impact of reclaimed developments on the marine domain (MEDAM)	SP1	Inventory of the developments reclaimed from the sea for the French Mediterranean coasts. The database covers the inventory of structures built on the sea above 100 m ² and offers a cartographic visualisation.
Mining permits and authorisations for aggregate extraction	SP2	Collection of data, in cartographic format (GIS), of the perimeters of marine material extraction sites authorised or under instruction and of research permits applied for in metropolitan France. Source/Producer: IFREMER
Open digital mining cadastre (register): mining titles and authorisations (CAMINO)	SP2	Digital services portal including an interactive map of the national mining area and ongoing projects.
National survey on dredging in seaports ("dredging survey")	SP3	Annual survey aimed at collecting a set of data and information relating to port dredging and sediment dumping operations, such as the quantities of sediments dredged, the techniques used, their destination, the level of contamination of the sediments compared to the reference level Source: CEREMA
Aerial Observatory of the uses in the Mediterranean (MEDOBS)	SP4	Aerial observatory of uses at sea Information relating to the location and quantification of the pressures of uses at sea (water sports, aquaculture farms, fishing, underwater diving, etc.) and more particularly the anchoring of fishing boats are referenced and geo-located.
Regulated Anchorage Areas	SP4	Data on the extent of regulated anchorage areas. Source: DDTM
Aquaculture cadastres	SP5	Area data of the areas used. Source/Producer: Cerema /DDTM-DIRM
Fishing vessel monitoring system - VMS data	SP6	Satellite monitoring system for fishing vessels, mandatory for professional fishing vessels over 12 metres in length, under EU flag, since 1 January 2012. It provides data on the position, course and speed of vessels to the fisheries authorities at regular intervals. Source/Producer: DPMA/SIH
Monitoring of fishermen's attendance and monitoring of recreational fishermen surveys (BD ESTAMP)	SP7	Monitoring of fishermen's attendance and monitoring of recreational fishermen surveys. The data is stored in the BD ESTAMP.

1.10 - Monitoring programme "Hydrographic changes"



What does this monitoring programme cover?

The 'Hydrographic Changes' monitoring programme defines the monitoring required for the ongoing assessment of the environmental status of marine waters and the periodic updating of Environmental Objectives (EOs) under Descriptor 7 'Hydrographic Change' of the MSFD. Descriptor 7 is described as: "A permanent change in hydrographic conditions does not harm marine ecosystems" (Directive 2008/56/EC).

The objective of this programme is to monitor the extent, distribution and intensity of permanent changes in hydrographic conditions (changes in seabed type, bathymetry, current, tidal and wave regimes, temperature, salinity and turbidity) induced by human activities and uses on the seabed and water column, both onshore and offshore. The next step will be to assess whether permanent changes in hydrographic conditions may impact benthic habitats and to determine the extent of the risk of adverse effects by major benthic habitat type.

The anthropogenic activities and uses considered by this monitoring programme are coastal and offshore structures, selective extraction of materials at sea, dredging and dumping of materials at sea, aquaculture, power plants, submarine cables and pipelines, and professional fishing:

- activities and uses of the environment (areas exploited, duration and intensity of activities, characteristic parameters of each activity, etc.),
- the hydrographic modifications induced by these activities.

It should be noted that the implementation of the "Hydrographic changes" monitoring programme is partly common with the "Activities, uses and public policies" part of the monitoring system for Coastline Strategic documents (cf. Annex 3b).

The monitoring programme "Hydrographic changes" is organised in four sub-programmes:

- Sub-programme 1 – Hydrodynamic and hydrological changes related to anthropic activities
- Sub-programme 2 – Physico-chemical changes related to anthropic activities
- Sub-programme 3 – Morpho-sedimentary modifications of the seabed related to anthropic activities
- Sub-programme 4 – Background data on abiotic water conditions

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good environmental status

The assessment of the achievement of good environmental status (GES) of marine waters under Descriptor 7 'Hydrographic changes' is based, according to Decision 2017/848/EU, on two sub-criteria, one assessing the levels of pressures associated with changing hydrographic conditions (D7C1), and the other (D7C2), the impact of these pressures on benthic habitats:

- D7C1 – Permanent change in hydrographic conditions: Spatial extent and distribution of permanent changes in hydrographic conditions (e.g. changes in wave action, currents, salinity, temperature) on the seabed and in the water column, associated, inter alia, with physical loss of the natural seabed.
- D7C2 – Adverse effects due to permanently altered hydrographic conditions: Spatial extent of each benthic habitat type adversely affected (physical and hydrographic features and associated biological communities) due to permanent changes in hydrological conditions.

Note that the monitoring programme "Hydrographic changes" also provides data for criteria D1C6 (Characteristics of the pelagic habitat type) and D6C5 (Extent of adverse effects on the status of the benthic habitat type) (see monitoring programmes "Pelagic habitats" and "Benthic habitats"). According to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, two GES indicators have been defined to assess criteria D7C1 and D7C2. In the second cycle GES assessment, seven pressures relating to hydrographic conditions were considered (changes in bottom character and current, tidal, wave, temperature, salinity and turbidity regimes) and initial estimates were provided of the exposure indices of spatial extents potentially subject to hydrographic pressures and the spatial extent of benthic habitats potentially subject to cumulative risks of alteration. However, the incompleteness and uncertainties of the input data (unavailable data, insufficient time series or data quality, incompleteness of the data, etc.), the ongoing methodological developments of the indicators and the lack of thresholds did not allow the evaluation of criteria D7C1 and D7C2.

Environmental objectives

In the second cycle of implementation of the environmental objectives (EOs), four EOs were defined to avoid anthropogenic changes in water conditions.

Eight operational EO indicators have been defined for the second cycle. Three EO indicators are only filled in by the collection systems resulting from the sub-programmes of the "Activities, uses and public policies" part of the monitoring system for the Coastline Strategic documents (cf. Annex 3b) and the other five EO indicators do not require monitoring to be filled in, as the obligation to ensure that authorisations at sea and SDAGEs are compatible with environmental objectives (defined in Article L. 219-4 of the French Environment Code) is sufficient to guarantee that the target associated with these indicators will be reached.

What are the data collection devices?

Information on the operability of the monitoring schemes and their link with the EO/EEO indicators and the maritime façades is given in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
REPHY Surveillance	SP1 SP2	Phytoplankton and phycotoxin monitoring network. This device also collects data on temperature, salinity, turbidity, dissolved oxygen, chlorophyll, nutrients (N,P,Si).
Artificialisation database DCE-MSFD	SP1 SP2 SP3	Monitoring of the surfaces artificially modified by coastal structures and developments and the coastal area (Source: BRGM-Cerema)

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
French Mediterranean coasts: inventory and impact of reclaimed land on the marine domain (MEDAM)	SP1 SP2 SP3	Inventory of the developments reclaimed from the sea for the French Mediterranean coasts. The database covers the inventory of structures built on the sea and larger than 100 m ² and offers a cartographic visualisation.
Mining permits and authorisations for aggregate extraction	SP1 SP2 SP3	Collection of data, in cartographic format (GIS), of the perimeters of marine material extraction sites authorised or under instruction and of research permits applied for in metropolitan France. Source/Producer: IFREMER
Aquaculture cadastres	SP1 SP2 SP3	Area data of the areas used. Source/Producer: Cerema /DDTM-DIRM
National survey on dredging in seaports ("dredging survey")	SP1 SP2 SP3	Annual survey aimed at collecting a set of data and information relating to port dredging and sediment dumping operations, such as the quantities of sediments dredged, the techniques used, their destination, the level of contamination of the sediments compared to the reference level Source: CEREMA
Location of power plants (Source: EDF-ENGIE)	SP1 SP2 SP3	Location of power plants, type of plants (nuclear, gas, etc.) and total area (spatial footprint) of power plants in the coastal zone. Source: EDF-ENGIE
Protection zones for nuclear power plants (Source/Producer: IAEA)	SP1 SP2 SP3	Security perimeters around nuclear power plants. Source: International Atomic Energy Agency (IAEA)
Submarine cables and pipes (Source: Shom)	SP1 SP2 SP3	Geographical position of the cables, nature of the cables, nationality of the cables and name of the cables
Fishing vessel monitoring system - VMS data	SP2 SP3	Satellite monitoring system for fishing vessels, mandatory for professional fishing vessels over 12 metres in length, under EU flag, since 1 January 2012. It provides data on the position, course and speed of vessels to the fisheries authorities at regular intervals. Source/Producer: DPMA/SIH
Numerical ocean circulation model (HYCOM)	SP4	The HYCOM (Hybrid Coordinate Ocean Model) is a numerical model of ocean evolution (current, temperature, salinity, water level).
Post-production of operational coastal oceanographic data (OCO)	SP4	Numerical Ocean Circulation Model (HYCOM) products.

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
Satellite networks operated by NASA and the ESA	SP4	Surface monitoring of hydrological and physical-chemical parameters (turbidity, surface temperature), phytoplankton biomass (chlorophyll-a concentration), and phytoplankton functional groups (under development).

1.11 - "Contaminants" monitoring programme

What does this monitoring programme cover?

The Contaminants Monitoring Programme defines the monitoring required for the ongoing assessment of the environmental status of marine waters and for the periodic updating of the environmental objectives (EOs) under Descriptor 8

"Contaminants" of the MSFD. Descriptor 8 is described as: "The level of concentration of contaminants does not cause pollution effects" (Directive 2008/56/EC).

The "Contaminants" monitoring programme is organised into five sub-programmes:

- Sub-programme 1 – Chemical contaminants in marine organisms
- Sub-programme 2 – Chemical contaminants in the environment
- Sub-programme 3 – Effects of contaminants on marine organisms
- Sub-programme 4 – Riverine inputs of contaminants
- Sub-programme 5 – Acute pollution episodes

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good ecological status

The assessment of the achievement of good environmental status (GES) of marine waters under Descriptor 8 "Contaminants" is based, according to Decision 2017/848/EU, on two primary pressure criteria (D8C1 and D8C3) and two secondary impact criteria (D8C2 and D8C4):

- D8C1 – Contaminants in the environment: In coastal, territorial and offshore waters, contaminant concentrations do not exceed threshold values.
- D8C2 – Effects of contaminants on species and habitats: Species health and habitat condition characteristics are not adversely affected by contaminants, including cumulative and synergistic effects.
- D8C3 – Significant episodes of acute pollution: The spatial extent and duration of significant acute pollution episodes are minimised.
- D8C4 – Effects of significant acute pollution episodes: Adverse effects of significant acute pollution episodes on species health and habitat status (such as species composition and relative abundance) are minimised and, where possible, eliminated.

According to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment:

- Three types of GES indicators can be used to assess criterion D8C1 depending on the matrix used (bivalve molluscs, fish and sediment). It should be noted that in the coastal zone work is underway to harmonise the parameters, thresholds and assessment methods for criterion D8C1 between the WFD and the MSFD.
- Three GES indicators are used to inform criterion D8C2 depending on the species considered (health status of gastropods, health status of bivalves, health status of fish). Work is underway on the methodological development of these GES indicators, including thresholds, integration methods and assessment scales.
- A GES indicator is defined to feed into criterion D8C4, but could not be assessed in the second round BEE Assessment due to lack of representativeness and disparity of data.
- No GES indicators could be defined for criterion D8C3 mainly due to the mismatch between the data from the POLREP reports and the definition of this criterion in Decision 2017/848/EU.

Environmental objectives

In the second cycle of implementation of the environmental objectives (EOs), seven EOs were defined to enable the reduction of contaminant inputs to the marine environment.

Thirteen operational EO indicators have been defined for the second cycle and apply to all marine sub-regions of the MSFD:

- Four EO indicators (D08-OE02-ind1, ind2 and ind3; D08-OE07-ind3) are reported by sub-programmes 3 and 5 of the "Contaminants" monitoring programme.
- Seven EO indicators (D08-OE01-ind1; D08-OE03-ind1 and ind2; D08-OE04-ind1; D08-OE06-ind1 and ind2; D08-OE07-ind2) are provided by the data collection systems resulting from the sub-programmes of the "Activities, uses and public policies" part of the monitoring system for the French Coastline Strategic Documents (cf. Appendix 3b).
- Two EO indicators (D08-OE05-ind1 and ind2) do not need to be monitored to be filled in because the obligation of compatibility of offshore authorisations and SDAGEs with the environmental objectives (defined in Article L. 219-4 of the French Environment Code) is sufficient to guarantee that the target associated with these indicators is achieved.

What are the data collection devices?

Information on the operability of the monitoring schemes and their link with the EO/EEO indicators and the maritime façades is given in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
Chemical Contamination Observation Network - Living Matter (ROCCH-MV)	SP1	Coastal monitoring stations for chemical contaminants (metals, organochlorines and polycyclic aromatic hydrocarbons) in bivalve molluscs.
Réseau INTégrateurs BIOlogiques (RINBIO)	SP1	Coastal monitoring stations for chemical contaminants (metals, organochlorines and polycyclic aromatic hydrocarbons) in engaged bivalve molluscs.
Optimised FAD fishing campaigns - Contaminants in food webs (CoRePh plateau/ Contamed)	SP1	Offshore monitoring of contaminants (metals and organochlorines) in fish and cephalopods.
Chemical Contamination Monitoring Network – Sediment (ROCCH-sediment)	SP2	Monitoring stations for chemical contaminants (metals, organochlorines, TBT and polycyclic aromatic hydrocarbons) in the sediment.
National Water and Sediment Quality Monitoring Network for the Seaports (REPOM)	SP2	Monitoring of contaminants (metals, organochlorines, TBT and polycyclic aromatic hydrocarbons) in seaport sediments.
Imposex Network	SP3	Monitoring the effect of TBT on coastal gastropods (<i>Nucella lapillus</i>) at some coastal monitoring stations of the ROCCH network.
Toxicity Measurement Network (REMTX)	SP3	Monitoring the toxic potential of sediments on the embryo-larval development of marine bivalves (<i>Crassostrea gigas</i>).
HYDRO river flow bank	SP4	Database (HYDRO) supplied by the State, flood forecasting services, the departmental directorates of agriculture and forestry, water agencies, but also by Electricité de France, research organisations and development companies.
WFD monitoring of continental surface waters	SP4	Monitoring stations for inland surface water quality within each river basin.
Data from CROSS POLREP pollution reports	SP5	CEDRE database containing information from the POLREP reports of the Regional Rescue and Surveillance Centres (CROSS): date, position and extent of the pollution, wind strength and direction, sea state, characteristics of the pollution, or source of the pollution when known
Monitoring of stranded birds on the Normandy and Hauts de France coasts	SP5	Monitoring of dead beached birds during winter on the coasts of Nord-Pas-de-Calais, Picardy and Normandy respectively by the associations Groupe Ornithologique and Naturaliste du Nord-Pas-de-Calais (GON), Picardie Nature (PN) and Groupe Ornithologique Normand (GONm)

1.12 - "Health issues" monitoring programme

What does this monitoring programme cover?

The monitoring programme "Health Issues" defines the monitoring required for the ongoing assessment of the environmental status of marine waters and the periodic updating of Environmental Objectives (EOs) under Descriptor 9 "Health Issues" of the MSFD. Descriptor 9 is described as: "The amounts of contaminants

in fish and other seafood intended for human consumption do not exceed the thresholds set by EU legislation or other applicable standards" (Directive 2008/56/EC).

The Health Issues monitoring programme is organised into three sub-programmes:

- Sub-programme 1 — Chemical contaminants in marine organisms
- Sub-programme 2 – Phycotoxin contamination of shellfish
- Sub-programme 3 – Microbiological contamination



Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good ecological status

The assessment of the achievement of good environmental status (GES) of marine waters under descriptor 9 "Health issues" is based, according to Decision 2017/848/EU, on the sole primary criterion:

- D9C1 — Contaminants in seafood for human consumption: The level of chemical contaminants in edible tissues (muscle, liver, eggs, flesh or other soft parts, as appropriate) of seafood (fish, crustaceans, molluscs, echinoderms, algae and other marine plants) caught or collected in the natural environment (excluding fish from aquaculture) does not exceed the thresholds for good environmental status.

This criterion provides information on the levels of chemical contaminants listed in Regulation (EC) No 1881/2006 on the setting of maximum levels for certain contaminants in foodstuffs. Furthermore, in the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, France has included phycotoxins in the assessment of criterion D9C1 and added a national criterion: D9C2 – Pathogenic microbiological contamination: The level of pathogenic microbiological contaminants in molluscs caught or collected in the natural environment and in bathing waters does not exceed the regulatory thresholds.

This choice is based, on the one hand, on the health risk represented by microbiological and phycotoxic contamination and, on the other hand, on the (partly) anthropogenic origin of these various contaminations.

According to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, four GES indicators can be used to assess criteria D9C1 and D9C2. The thresholds for exceeding these GES indicators are set by different European regulations, however, a reflection is underway on the threshold for concluding on the GES (i.e. the frequency of exceeding the regulatory threshold). During the second cycle of the GES assessment, the GES threshold was set at 0% exceedance of the maximum regulatory limits for each of the indicators, which means that the GES was not achieved in the marine sub-region for a single exceedance out of several dozen or even hundreds of measurements.

Environmental objectives

In the second implementation cycle of the environmental objectives (EOs), EO D09-EO01 was defined to reduce direct transfers of microbiological pollutants, in particular to bathing areas and shellfish production areas.

To meet this environmental objective, two indicators (D09-OE01-ind1 and D09-OE01-ind2) have been defined for the second cycle and apply to all marine sub-regions. The monitoring systems of sub-programme 3 relating to microbiological contamination (REMI and sea bathing water quality reports) and the collection systems from the sub-programmes of the "Activities, uses and public policies" part of the monitoring system for the façade strategic documents (cf. Annex 3b) can be used to provide information on these EO indicators.

What are the data collection devices?

Information on the operability of the monitoring schemes and their link with the EO/EEO indicators and the maritime façades is given in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

MONITORING/COLLECTION DEVICE	SP	DESCRIPTION
Chemical Contamination Observation Network - Living Matter (ROCCH-MV)	SP1	Coastal monitoring stations for chemical contaminants (metals, organochlorines and polycyclic aromatic hydrocarbons) in bivalve molluscs.
Optimised FAD fishing campaigns - Contaminants in food webs (CoRePh plateau/ Contamed)	SP1	Offshore monitoring of contaminants (metals and organochlorines) in fish and cephalopods.
The Monitoring and Control Plans (MCP) of the Directorate General for Food (DGAI)	SP1 SP2 SP3	Monitoring of chemical, phycotoxin and microbiological contamination in unprocessed seafood.
Monitoring network for phycotoxins in marine organisms (REPHYTOX)	SP2	Coastal monitoring stations for phycotoxins in shellfish (diarrhoeal toxins (DSP), paralytic shellfish toxins (PSP) and amnesia toxins (ASP)).
Microbiological Monitoring Network (REMI)	SP3	Microbiological monitoring of shellfish production areas to control the level of contamination of <i>Escherichia coli</i> bacteria in bivalve molluscs.
Sea bathing water quality reports	SP3	Sanitary control of bathing waters, implemented by the Regional Health Agencies, to monitor the contamination of <i>Escherichia coli</i> and intestinal enterococci in water.

1.13 - "Marine waste" monitoring programme

What does this monitoring programme cover?

The Marine Waste monitoring programme defines the monitoring required for the ongoing assessment of the environmental status of marine waters and for the periodic updating of the environmental objectives (EOs) under Descriptor 10 "Marine Waste" of the MSFD. Descriptor 10 is described as: "The properties and quantities of marine litter do not cause damage to the coastal and marine environment" (Directive 2008/56/EC).

The aim of this programme is to acquire data to assess the composition, quantity and spatial distribution of the waste present in the environment and its evolution, as well as its impact on marine fauna. It does this through joint monitoring:

- pressures on the environment (macro-waste on the coastline including estuaries, floating macro-waste, macro-waste on the bottom, micro-waste in the water column and in the coastal sediments),
- impacts of litter on seabirds, marine mammals and sea turtles (ingestion, entanglement, strangulation).

The Marine Waste monitoring programme is organised into nine sub-programmes grouped into three themes:

- Coastal and river basin waste (sub-programmes 1 to 3)
 - o Sub-programme 1 - Macro-waste on the coast
 - o Sub-programme 2 - Macro-waste from river basins
 - o Sub-programme 3 - Micro-waste on the coast
- Waste at sea (sub-programmes 4 to 6)
 - o Sub-programme 4 - Floating macro-waste
 - o Sub-programme 5 - Macro-waste on the ground
 - o Sub-programme 6 - Floating micro-waste
- Interactions between marine fauna and marine litter (sub-programmes 7 to 9).
 - o Sub-programme 7 - Waste ingested by birds
 - o Sub-programme 8 - Waste ingested by marine mammals and sea turtles
 - o Sub-programme 9 - Wildlife entanglement/entanglement by waste

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good ecological status

The assessment of the achievement of good environmental status (GES) of marine waters under descriptor 10 "Marine waste" is based, according to Decision 2017/848/EU, on two primary criteria (D10C1 and D10C2) and two secondary criteria (D10C3 and D10C4):

- D10C1 - Waste (excluding micro-waste): The composition, quantity and spatial distribution of litter on the coastline, on the surface of the water column and on the seabed are at levels that do not harm the coastal and marine environment.
- D10C2 - Micro-waste: The composition, quantity and spatial distribution of micro-waste on the coastline, at the surface of the water column and in the seabed sediments are at levels that do not harm the coastal and marine environment.
- D10C3 - Ingested waste: The amount of litter and micro-waste ingested by marine animals is at a level that does not harm the health of the species concerned.
- D10C4 - Adverse effects of waste: Number of individuals of each species suffering adverse effects from waste (entanglement and other forms of injury or mortality) or health problems.

According to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, six GES indicators can be used to assess criteria D10C1, D10C2 and D10C3. These indicators have been developed in the framework of the European MSFD Working Group on Marine Litter (TG Marine Litter) and are shared with other Member States. Work on the definition of thresholds for exceeding these GES indicators is still ongoing in this working group, in order to propose a common definition of thresholds.

It should be noted that the indicator for criterion D10C3 on waste ingested by birds is currently only defined for the MMN MRS. For the other marine sub-regions, the methodological standards for this indicator will be specified following further studies.

The indicator for criterion D10C4 for assessing the adverse effects of waste is not yet operational and is undergoing methodological development.

Environmental objectives

The "Marine waste" monitoring programme provides information on two environmental objectives (EO), concerning both waste of terrestrial origin found at sea and on the coast (D10-EO1) and waste at sea from maritime activities, uses and developments (D10-EO2).

Three indicators have been defined for the second cycle and apply to all marine sub-regions. The monitoring mechanisms of sub-programmes 1 and 5, relating respectively to macro-waste on the coast ("National Monitoring Network for Macro-Waste on the Coast") and macro-waste on the bottom ("Optimised Fisheries Campaigns - Seabed Waste"), provide information for indicators D10-OE01-ind1 and D10-OE02-ind1. Indicator D10-OE02-ind2 is filled in by the data collection systems resulting from the sub-programmes of the "Activities, uses and public policies" part of the monitoring system for Coastline Strategic Documents (see Annex 3b).

What are the data collection devices?

Information on the operability of the monitoring schemes and their link with the EO/EEO indicators and the maritime façades is given in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
National Coastal Macro-Waste Monitoring Network (RNS- MD-L)	SP1	Macro-waste monitoring network, with sites spread over the entire coastline of Metropolitan France
Aerial campaigns to monitor large-scale marine megafauna and floating macro-waste (SAMM, SCANS, ASI)	SP4	Overflights of the metropolitan maritime area and its bordering zones for the observation of seabirds, marine mammals, other species of pelagic megafauna and human activities (floating waste).
Optimised DCF fisheries campaigns – Marine Megafauna and floating macro-waste (Megascope programme)	SP4	Monitoring of marine megafauna, floating waste and human activities by observers onboard Ifremer vessels during the annual benthodemersal fisheries surveys (IBTS, PELGAS, PELMED, CGFS and EVHOE).
Monitoring campaigns for marine megafauna and floating macro-waste from vessels of opportunity.	SP4	Monitoring of marine megafauna, floating wastes and human activities by observers on board maritime platforms of opportunity (commercial passenger lines (ferries) or vessels of the State action at sea), according to the megascope protocol or equivalent.
Optimised FAD fishing campaigns – Seabed waste	SP5	Monitoring of bottom macro-waste via the annual benthodemersal fishing campaigns (IBTS, CGFS, MEDITS, EVHOE) collected per haul.
Optimised FAD fishing campaigns – Micro-waste	SP6	Monitoring of floating micro-waste in the sub-surface, using a Manta net since the annual fishing campaigns (IBTS, CGFS, EVHOE).
Three-year WFD campaigns in the Western Mediterranean – Micro waste	SP6	Monitoring of floating micro-waste at the surface, using a Manta net since the WFD multidisciplinary campaigns.
Monitoring of stranded birds on the Normandy and Hauts de France coasts	SP7	Monitoring of micro-waste present in the stomachs of northern fulmars stranded on the MMN coast (Picardy, Normandy, North) according to the OSPAR protocol.
Marine turtle stranding monitoring networks (RTMAE, RTMMF)	SP8 SP9	Monitoring of marine turtle strandings on the French coastline, by the RTMMF correspondents in the MO region, coordinated by the Société Herpétologique de France, and by the RTMAE in the Atlantic region, coordinated by the Aquarium La Rochelle.
National Marine Mammal Stranding Network (RNE)	SP8 SP9	Monitoring of marine mammal strandings on the French coastline, by RNE correspondents, coordinated at national level by the PELAGIS Observatory.
Monitoring of macro-waste in crested cormorant nests	SP9	Monitoring of the number of macro-waste present in the nests of crested cormorants, carried out in several sites and colonies (Iroise Natural Marine Park, Breton colonies, Norman colonies, corsican colonies and Channel-North Sea colonies).

1.14 - "Underwater noise" monitoring programme

What does this monitoring programme cover?

The Underwater Noise monitoring programme defines the monitoring required for the ongoing assessment of the environmental status of marine waters and for the periodic updating of the Environmental Objectives (EO) under Descriptor 11 "Underwater Noise" of the MSFD. Descriptor 11 is described as: "The introduction of energy, including underwater sound sources, shall be at levels that do not harm the marine environment." (Directive 2008/56/EC).

The aim of this programme is to acquire the data needed to monitor the noise status of metropolitan waters (spatial and temporal distribution of the main anthropogenic noise pressures as well as their intensity) and to assess the impacts of anthropogenic noise on underwater fauna.

The "Underwater Noise" monitoring programme is thus based on a three-pronged strategy:

- Collect data from noise generating activities (continuous and impulsive) in order to model underwater noise in terms of spatial and temporal distribution taking into account noise levels;
- Measure underwater noise in situ;
- Quantify noise disturbance and study its effects on sensitive species.

The "Underwater Noise" monitoring programme is organised into four sub-programmes according to a thematic breakdown:

- Sub-programme 1 - Continuous broadcasts
 - collection of vessel traffic data and continuous noise modelling
- Sub-programme 2 - Impulsive emissions
 - collection of data on activities generating impulsive emissions and estimation of the spatial and temporal distribution of these emissions
- Sub-programme 3 - In situ underwater noise measurements
 - in situ underwater noise measurement (continuous and impulsive emissions)
- Sub-programme 4 - Effects of noise disturbance on sensitive species
 - quantification of noise disturbance and study of its effects on sensitive species

Information on this monitoring programme is detailed in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

What are the elements identified and to be filled in?

Good ecological status

The assessment of the achievement of good environmental status (GES) of marine waters under descriptor 11 "Underwater noise" is based, according to Decision 2017/848/EU, on two primary criteria:

- D11C1 - Anthropogenic impulsive noise: The spatial distribution, temporal extent and levels of anthropogenic impulsive sound sources do not exceed levels that are harmful to marine animal populations.
- D11C2 - Low frequency anthropogenic continuous noise: The spatial distribution, temporal extent and level of anthropogenic continuous sound do not exceed levels that are harmful to marine animal populations.

In the second round of GES assessment in 2018, due to the lack of consensus among Member States on the definition of quantitative thresholds, the achievement or non-achievement of GES under descriptor 11 could not be assessed. Nevertheless, according to the Order of 9 September 2019 on the definition of good environmental status (GES) of marine waters and the methodological standards for assessment, a methodology is proposed based on indicators characterising three types of risk for marine mammals:

- Noise pollution (risk of disturbance)
- Masking of mysticete communications (risk of masking)
- Excess mortality from noise exposure (risk of excess mortality).

Consultation at European level, in particular within the TG Noise (see 2.3.2), is necessary to establish relevant thresholds and to enable a quantitative assessment of GES under Descriptor 11.

Environmental objectives

In the second implementation cycle of the environmental objectives (EOs), two EOs were defined to reduce noise levels from impulsive emissions and to maintain or reduce continuous noise levels.

Three operational indicators were defined for the second cycle: indicator D11-OE01-Ind1 on the spatial extent of impulsive emissions, indicator D11-OE02-Ind1 on the maximum level and spatial extent of continuous noise, and indicator D11-OE01-Ind2 which does not require any monitoring to be completed as the obligation to ensure that offshore authorisations and SDAGEs are compatible with the environmental objectives (defined in Article L. 219-4 of the French Environment Code) is sufficient to guarantee that the target associated with these indicators is achieved.

What are the data collection devices?

Information on the operability of the monitoring schemes and their link with the EO/EEO indicators and the maritime façades is given in Annex 1 "Monitoring programmes under the second cycle of the MSFD".

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
Optimised DCF fishing campaigns — AIS data of opportunity for offshore collaborative vessels (AISOP)	SP1	This system is based on the systematic collection of AIS situations observed during the fishing campaigns (CGFS, EVHOE, IBTS, MEDITS, PELGAS and PELMED) conducted under the Common Fisheries Policy on the Ifremer research fleet. The AIS data is archived at SISMER. Source: Ifremer

DEVICE FOR MONITORING/COLLECTION	SP	DESCRIPTION
ENVInternational Analysis Service by Automatic Identification System – AIS data (ENVISIA)	SP1	System created and operated by CEREMA and designed to process all AIS data from European maritime surveillance (SafeSeaNet) collected by the Member States. At the national level, these data are based on the SPATIONAV programme under the joint supervision of the Direction Générale de l'Armement (DGA) and the Direction des Affaires Maritimes (DAM). CEREMA is the national operator in charge of archiving AIS data flows from the national network of land stations. The data is banked internally. Source: CEREMA
Lloyd's List Intelligence – vessel traffic data (LLI)	SP1	Data collected from all over the world from three sources of observation: <ul style="list-style-type: none"> Land-based AIS data from a network of stations operated by Lloyd's Satellite AIS data from market operators (ORBCOM) Declarative data on the movements of ships affiliated to Lloyd's collected by the company's port agents. Source: Lloyd's List Intelligence
Fishing vessel monitoring system – VMS data	SP1	Satellite monitoring system for fishing vessels, mandatory for professional fishing vessels over 12 metres in length, under EU flag, since 1 January 2012. It provides regular data on the position, course and speed of vessels to the fisheries authorities. Source/Producer: DPMA/SIH
Register of impulsive emissions (SIRENE)	SP2	A device that compiles data on impulsive emissions of a level that could potentially disturb underwater fauna. Source: Shom
Multimodal BOuée for Biodiversity and OceanophYsics (BOMBYX)	SP3	Acoustic acquisition station of the University of Toulon. The data are stored in the SAMBA database of the Shom.
Acoustic Monitoring and Noise Measurements on Opportunities (MAMBO)	SP3	Park of acoustic stations operated by the Shom. The data are stored in the SAMBA database of the Shom.
Monitoring Network for the Acoustic Characterisation of the Mediterranean Coast and its Ecosystems (CALME)	SP3	Observation network dedicated to the measurement and exploitation of Mediterranean underwater acoustic landscapes, created by Chorus in partnership with the Rhone-Mediterranean-Corsica Water Agency. The data are stored in the SAMBA database of the Shom and MEDTRIX operated by the Rhône Méditerranée Corse Water Agency and Andromède Océanologie.

2 - Activities, uses and public policies

1.1 - Sectors of activity

1.1.1 - Common devices

For each sector of activity, whether it is to carry out the inventory or to monitor the strategic targets, the monitoring process seeks to report on the dynamism and economic performance, through data on turnover, added value, employment, the nature and structure of companies. These data are collected as part of general statistics, mainly by INSEE and social security bodies. The data collection mechanisms mentioned here will not be repeated in the presentation of each sector of activity.

In addition, a number of Socio-Economic Objectives (SEO) indicators relate to administrative decisions, the implementation of projects, plans, charters or events. These indicators relate to the collection of administrative acts and/or the direct implementation of action plans. During the implementation of the first cycle, the central and devolved services will study the opportunity and feasibility of filling them in.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Central Agency for Social Security Organisations (ACOSS)	Sequoia database
National Institute for Statistics and Economic Studies (INSEE)	Compilation of Annual Enterprise Statistics (ESANE)
	Flores device

1.1.2 - Mineral resource exploitation and development

What does the activity sector cover?

The activity of extraction of marine materials covers the exploitation of marine deposits of siliceous materials or, in a more specific way, of calcareous materials (shell sands). These extracted materials are used for various activities such as public works, soil improvement, water treatment, or beach nourishment.

These activities represent a socio-economic stake for the coasts, insofar as they generate jobs on the aggregate extraction vessels, in the ports of landing and storage, and via the activities using these materials.

The extraction of these materials generates impacts on the marine environment, the main ones being the modification of the nature of the seabed, and thus the impact on the benthic habitats and the species present; noise disturbances, or modifications of the coastline (erosion or fattening). It can also be accompanied by the resuspension of particles, and release nutrients present in these particles with an indirect impact on eutrophication.

The challenge for the façades is therefore to maintain the sector while supporting it towards practices with limited impacts on the marine environment.

What are the elements identified and to be filled in?

The monitoring system integrates socio-economic variables relating to location (location, surface area of authorised concessions and surface area exploited: surface area of production actually exploited, AIS data from mining vessels), the productivity of the sector and the distribution of resources landed on the coast. Thus, the variables of interest concern the exploitation authorisations (start and end dates of concessions issued, number of research permits issued, volumes of marine aggregates, silica sands and shell sands extraction authorised annually), and the actual exploitation of materials (volumes of marine aggregates extracted annually, volumes extracted of marine silica sands and marine shell sands). The actual production data as well as the spatialisation data of the activity provide information on its impact on marine habitats (distribution of permanent changes in hydrographic conditions, distribution of physical disturbance of natural seabed).

The monitoring system also includes variables relating to the landing and use of materials (volume of marine aggregates broken down by landing point; number of ports of unloading, number of aggregate landing points, breakdown by port of unloading of quantities of marine aggregates extracted, breakdown by sector of quantities of aggregates extracted).

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
French Research Institute for Exploitation of the Sea (Ifremer)	Production of marine materials
	Mining titles and work permits relating to aggregates extraction
Ministry of Ecological Transition (MTE) / Directorate General for Planning, Housing and Nature (DGALN)	Open digital mining cadastre: mining tenure and work permits (CAMINO)

1.1.3 - Exploitation and development of biological resources

Professional fishing

What does the sector of activity cover?

The professional fishing sector refers to all fishing activities that provide an income for the fisherman. The marketing of products is dealt with in the section "Marketing and processing of seafood products". There are two main types of professional fishing: fishing onboard and fishing on foot.

On-board fishing covers a wide range of practices, depending on the type of vessel used, the duration of the activity and the location of the activity. Four categories of on-board fishing are thus identified: they are presented in the following summary table.

	Official classification ¹	Other classifications	
Type of fishing onboard	Duration of activity	Type of vessel used	Location of the activity
Offshore fishery	More than 20 days	Vessels of tonnage > 1000 GRT, including large trawlers and tuna vessels of 70 to 80 m	High seas (especially off the coast of Africa – Zone 34, and in the Indian Ocean – Zone 51)
Offshore (or deep-sea) fishing	More than 96 hours	Deep-sea trawlers (>25m) and artisanal vessels Deep sea (16 to 25 m)	Beyond 12 miles
Coastal fishing (or artisan intensive)	Between 24 and 96 hours	Ships under 16 m	In the 12 miles zone
Small-scale fishing (or artisan)	Less than 24 hours	Ships under 16 m	In the 12 miles zone

A historical sector of activity of the maritime façades and a generator of employment, professional fishing is facing new challenges: difficulties in the necessary renewal of the fleet (ageing vessels, energy transition of the sector), challenges of transmission of businesses and attractiveness of the sector (difficulties in recruiting and renewing crews and skippers, evolution of professional training, improvement of working and safety conditions), or difficulties of access to the sea (especially in a border context) and preservation of access to port areas.

Professional fishing is a sector that depends on the ecological state of the marine environment, so it must adapt its production to the evolution of stocks for the sustainability of the resource (with the objective of reaching the maximum sustainable yield per species), improve its practices to make them more selective (thus reducing accidental catches of species whose harvesting is forbidden) and reduce its physical pressure on the seabed. Moreover, professional fishing is one of the sectors that generates marine waste: there is therefore a challenge to change practices on board and to equip fishing ports to collect waste from professional fishing.

¹ Official Journal of 29 December 1993

Finally, the sanitary quality of the products, partly dependent on the microbiological quality of the coastal waters, is also an important issue for professional fishing, and in particular for professional foot fishing.

For the maritime façades, the challenge is to reconcile professional fishing practices with other uses, but also to accompany the evolution of these practices to guarantee both their sustainability and the preservation of the environment on which they depend. This sector of activity therefore represents an important part of the adopted strategic targets, both socio-economic and environmental.

What are the elements identified and to be filled in?

The economic dynamism of the sector can be informed by variables specific to fishing. Thus, the monitoring system includes variables on the average price per kg of professional fisheries products, the number of files validated under the FEAMP measures (measures 26, 31, 37, 43, 66, 68, 68R and 69 of the 2014-2020 programme of measures), as well as variables relating to fleet entries and exits (number of fishing vessels registered on the coastline, number of incoming fishing vessels including number of new vessels, number of outgoing vessels) and fleet modernisation (number of modernisation dossiers studied in CORESEL and CRGF).

The variables for spatialising the activity make it possible to identify the sectors where conflicts of access to space at sea may arise, as well as the areas of pressure on the marine environment. Thus, the monitoring system integrates authorised fishing zones (for the French fishing fleet and for fishing on foot), zones where fishing is prohibited in priority fishing sectors, and spatialisation data from on-board fishing (VMS). It also includes variables concerning onshore facilities (mentions in PLU, surface) and places dedicated to professional fishing in ports.

The variables characterising fishing effort and production are used to describe both the material resources deployed and the resulting fishing pressure. The fishing fleet is thus characterised by the consumption of vessels, the average age of vessels by district, the classes of vessels by coastline (size, power, tonnage, date of entry, district of registration of vessels, category of navigation), the ports of operation, the trades practised by the vessels (gear/target species pairs), the period of activity of the vessels at sea (number of days at sea or fishing), and the types of fishing operations. Production effort is measured by the volume and value of fish products landed, by species, or the tonnage harvested, for kelp. For the harvesting of marine plants, the volumes taken are not always accessible: for example, only the authorised tonnage is accessible for the harvesting of saltwort. On the Mediterranean coast, specific fisheries exist, and the monitoring system therefore includes the number of authorisations for professional fishing for red coral underwater, and the number of vessels eligible for the gangui AEP.

The main potential impacts of professional fishing on the marine environment are overexploitation of resources, incidental catches of non-target species, degradation of the seabed, noise, waste production and, to a lesser extent, effluent management.

There are many variables to characterise the management of fisheries resources, for example: population structure of exploited species (total abundance in the area, total biomass in the area, average weight of an individual, average size of an individual, age), stock assessment (estimated volume of stocks by species, distribution of stocks), as well as fishing mortality (of commercial species, forage species and their spawning stock). The monitoring system must pay particular attention to three groups of species: elasmobranchs, amphihalines and micronekton, which are particularly threatened by overfishing. Elasmobranchs and micronekton are all the more important as these groups are located at both ends of the trophic chain

(tertiary and primary consumers respectively). Data are sought on the level of harvesting suffered by these groups, the location of this harvesting, and the possible control of catches through licence quotas and access rights to basins (for fishing in estuaries). On the Mediterranean coast, red coral fishing is also regulated, and the monitoring system includes the number of dedicated authorisations.

The variables of interest concerning incidental catches linked to professional fishing are of two types: on the one hand, the number of individuals observed or declared with traces of incidental catches, and on the other hand, the measures to avoid or reduce catches that have been put in place (identification of maximum density perimeters for sea birds, number of vessels equipped with "pingers", number of projects to improve fishing techniques to make them more selective). With regard to the degradation of the seabed, the variables of interest are surface (abrasion surfaces exerted by professional fishing vessels, areas of fishing with bottom dragging gear, vulnerable marine ecosystems subject to bottom fishing in the Atlantic). The risks of acoustic masking are also integrated into the monitoring system via variables of spatial distribution of ambient noise.

Finally, the production of waste by professional fishing is addressed from two angles: the production of waste as such (nature and volume of waste generated by fishing activity and collected in fishing ports or on beaches) and the recycling of this waste (volume of waste reused, number of ports along the coast equipped with a system for recovering fishing waste or waste collection points, creation of recycling channels, existing "pilot" projects). Some ports are equipped with careening areas with effluent treatment systems and this information is integrated into the monitoring system.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Centre for studies and expertise on risks, the environment, mobility and development (CEREMA)	Waste management in marinas, fishing ports and commercial ports
Comité national des pêches maritimes et des élevages marins (CNPMM)	Quotas of access rights per basin for estuarine and migratory fish fisheries
General Fisheries Commission for the Mediterranean (GFCM)	Validated stock assessment forms (SAFs)
International Commission for the Conservation of Atlantic Tunas (ICCAT)	ICCAT stock assessment
International Council for the Exploration of the Sea (ICES)	ICES opinion
Directorate responsible for reporting under the EU Single Use Directive	
Interregional Maritime Directorates (DIRM)	
Regional Directorates for the Environment, Planning and Housing (DREAL)	
National Institute for Agricultural Research and the Environment (INRAE)	Sturwild database

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Ministry of Agriculture and Food (MAA) / Directorate of Maritime Fisheries and Aquaculture (DPMA)	Fisheries Information System - Annual activity calendars of professional fishing vessels registered in the French maritime districts
	Système d'Information Halieutique - Annual data on landings by fishing vessels in the French fleet
	Fisheries Information System - Regional sheets
	By-catch reporting
	Fishing vessel monitoring system - VMS data
	Declarative catch and effort data (SACAPT database)
	Sales observation (OBSVENTES)
	Production and effort data (SACROIS)
	List of operations of the FEAMP national programme 2014-2020
	Administrative data from the "Community Fishing Fleet" (CFP) file
	Capacity Report
French Biodiversity Office (OFB)	Summary maps of all risks (of harming conservation objectives through fishing) for each Natura 2000 habitat at the scale of Natura 2000 sites)

Aquaculture

What does the sector of activity cover?

Aquaculture activities cover two main types of production: shellfish farming (oysters, mussels, other shellfish), and fish farming (sea bass, sea bream, turbot, salmonids, etc.). They also include more anecdotal activities such as seaweed or shrimp farming. The marketing of products is dealt with in the section "Marketing and processing of seafood products".

These activities generate employment on the coast, although some of this employment is precarious (many seasonal jobs, particularly in oyster farming). The link between aquaculture and environmental quality is strong, insofar as this sector is very sensitive to water quality, chronic pollution (organic, chemical, microbiological) or accidental pollution (e.g. oil spills), freshwater management upstream, and the presence of invasive alien species. Conversely, this sector of activity also has the potential to generate negative impacts on the environment on which it depends: introduction of non-native species, modification of habitats, over-exploitation of primary trophic resources (impacts on wild species). In some places, aquaculture activities can lead to siltation and organic enrichment of the sediments, or be a source of disturbance for fauna, through the noise generated by scaring techniques.

Through their strategic targets, the coastlines encourage the transition of aquaculture towards sustainable practices with less impact on the environment.

What are the elements identified and to be filled in?

One of the issues for the aquaculture sector is access to the public maritime domain for operators. The monitoring system therefore includes variables on the location of the activity, providing surface or cadastral information on the plots of land used for shellfish farming, fish farming and, as far as possible, seaweed farming. The location variables also include surface information on shellfish wasteland.

The socio-economic variables also concern economic performance (value of production, aid obtained under measures 47, 48, 51, 66, 68 and 69 of the FEAMP fund, or co-activity projects within pilot wind farms) as well as the productivity of this sector (production volumes of each type of aquaculture activity, variables relating to biological productivity: growth rates and mortality rates associated with salinity zones).

Aquaculture is a sector that is both dependent on the sanitary quality of production waters, and therefore on the good environmental status of the marine environment, and a sector that can generate negative impacts. The monitoring system therefore includes data on the monitoring of the sanitary quality of shellfish waters and sanitary risks (evolution of the number of areas classified as A over the last 3 years, number of production areas favouring the maintenance of marketing in the event of a sanitary risk, etc.) and bans on the marketing of products of insufficient sanitary quality (orders prohibiting transfers between aquaculture production basins, duration of the ban on the marketing of aquaculture products).

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
French Agency for the Development and Promotion of Organic Agriculture (Agence BIO)	Surveys of economic operators in the organic sector
Centre for Risk Studies and Expertise, environment, mobility and development (CEREMA)	Aquaculture cadastres
Ministry of Agriculture and Food (MAA) / Directorate of Maritime Fisheries and Aquaculture (DPMA)	Declarative catch and effort data (SACAPT database)
	Production and effort data (SACROIS)
	List of operations of the FEAMP national programme 2014-2020
	Data Collection Regulation (DCF) - Economic performance of aquaculture in the EU
Ministry of Agriculture and Food (MAA) / Direction Générale de l'Alimentation (DGAL or DGA)	Atlas of shellfish production and relaying areas
Ministry of Agriculture and Food (MAA) / Service de la statistique et de la prospective (SSP)	Annual aquaculture survey
	French Shellfish Census

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
	Census of fish, algae and cyanobacteria farming
National Institute of Origin and Quality (INAO)	Annual key figures

Marketing and processing of seafood products

What does the sector of activity cover?

The seafood marketing and processing sector covers the whole part of the seafood chain, from the landing of the catch or harvest (professional fishing and aquaculture), to the sale of finished products. When the fish is landed, there are two possibilities for selling it: direct sale or sale in a fish market.

The fish trade provides products from fresh fisheries, with initial processing (cleaning, gutting, heading, filleting, wrapping and packaging). Processing companies provide consumer goods for human consumption by smoking, canning or preparing delicatessen products. It should be noted that the fish trade and processing companies use a significant amount of imported raw materials to supplement the supply from French fisheries for their production of processed products. The finished products are then sold for distribution to fishmongers, as well as to the central purchasing offices of large and medium-sized retailers.

This sector represents an important economic challenge for the façades, as it is based on a network of companies that generate employment. Nevertheless, to maintain its competitiveness, the sector must modernise: this is particularly the case for the network of fish markets on the NAMO coast. Faced with the sustainability constraints of fisheries resources, the sector must also diversify, by developing co-products or by offering new species for consumption. The challenge is to reduce fishing pressure on species whose stocks are threatened, without endangering the stocks of newly exploited species. Sustainable fishing practices are thus promoted, for example by encouraging the labelling of fisheries.

The sector generates little or no direct environmental impact on the marine environment, but it is closely linked to those of the upstream sector and to the issue of sustainable management of fisheries resources: purchase prices, product quality and labelling are strong interacting factors. On the other hand, the sector has negative environmental impacts on air quality: the transport of raw materials and the routing of processed products generates greenhouse gas emissions, which is why some coastlines would like to reduce the distance between the place of landing, the place of processing and the place of *final* marketing.

The challenge for the façades is therefore to encourage the maintenance of the local fabric of companies making up the seafood marketing and processing sector, while promoting sustainable production initiatives.

What are the elements identified and to be filled in?

The economic performance indicator variables of the sector make it possible to evaluate the dynamism of the sector. They include sales data (volumes of imported and exported products, average price per kg per species marketed, volume and value of sales by nationality of vessels in the fish markets, species most

sold in volume and value), and data relating to European aid (files validated under measures 37, 43, 48, 51, 66, 68R, 69 of the FEAMP).

The monitoring system also includes variables that indicate the sustainability of fisheries and products for sale: fisheries labelling (number of fisheries and aquaculture operations with a quality label, volume of products landed with a quality label), and communication actions implemented on the coastlines to promote sea products.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
French Agency for Development and Promotion of Organic Agriculture (Agence BIO)	Surveys of economic operators of the organic sectors
Centre for the Study and Enhancement of Algae (CEVA)	WFD monitoring
Etablissement National des Produits de l'Agriculture et de la Mer (FranceAgriMer)	Visiomer
	Key figures for the fisheries and aquaculture sectors in France
National Institute of Origin and Quality (INAO)	Annual key figures
Ministry of Agriculture and Food (MAA) / Directorate of Maritime Fisheries and Aquaculture (DPMA)	List of operations of the FEAMP national programme 2014-2020
Ministry of Agriculture and Food (MAA)/ Directorate-General for Food (DGAL or DGAI)	Animal and plant health surveillance
Ministry of Agriculture and Food (MAA) / Service de la statistique et de la prospective (SSP)	Annual aquaculture survey
French Biodiversity Office (OFB)	Nitrate monitoring network: assessment of the implementation of the Nitrates Directive in France

Agriculture

What does the sector of activity cover?

This sector includes all types of plant and animal production, located on the coast (such as salt meadows) or in the whole catchment area. Forests are included in this sector of activity, in particular to take into account the impact of land use on the artificialisation of coastal environments and landscapes.

Agriculture is still mainly considered, on all the coasts, as a major factor in the anthropisation of environments, through its impact on the quantity and quality of water in coastal waters and the catchment area. Nevertheless, agriculture can play a positive role in the occupation of the coastal area in the context of the fight against the artificialisation of space and the maintenance of natural environments, particularly coastal marshes.

The agricultural sector is sometimes a significant stakeholder in the management of ports, whether in terms of environmental issues in the surrounding natural areas or in the maintenance of import (fertilisers, animal feed) or export (cereals, potatoes, dairy products, etc.) maritime traffic.

What are the elements identified and to be filled in?

The monitoring system integrates data concerning withdrawals by irrigation of agricultural land throughout the catchment area, the quantity of inputs of nutrients, contaminants (municipalities in zones vulnerable to nitrate pollution, sale of phytosanitary products) and sediments linked to the erosion of cultivated land.

Other data focus on the evolution of agricultural practices and areas (nature and volume of production, percentage of areas under organic farming, permanent grassland, percentage of irrigated areas, evolution of wetland areas, etc.).

Finally, agriculture is also characterised by its need for marine inputs (aggregates, limestone and silica, algae, etc.). For example, the NAMO coast wishes to better understand and monitor the use of marine aggregates as agricultural soil improvers. This activity is also qualified by the development of agricultural products which are sold in local shops, or by the maintenance and restoration of typical landscapes (hedgerows, dry stone walls) which contribute to the tourist attraction of the coast.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
French Agency for the Development and Promotion of Organic Agriculture (Agence BIO)	Surveys of economic operators in the organic sector
French Ministry of Agriculture and Food (MAA) / Directorate General for Education and Research (DGER)	Agricultural Census (RA)
French Biodiversity Office (OFB)	National Bank of Distributors' Sales of Phytopharmaceutical Products BNVD
	Nitrate monitoring network: assessment of the implementation of the Nitrates Directive in France

1.1.4 - Coastal tourism and leisure

Coastal tourism

What does the sector of activity cover?

The coastal tourism sector covers all activities providing goods or services to people travelling for leisure or business in coastal municipalities. This includes, for example, accommodation, catering, shops, leisure and cultural services. This sector also covers seaside activities, which are restricted here to bathing activities and beach visits.



All leisure and sports activities or pleasure activities, taking place on beaches or in the water, are analysed in the section "Recreational boating and water sports".

For the coastal municipalities, and a fortiori the maritime façades, this sector represents an important economic weight. Indeed, the influx of tourists in these municipalities allows the installation of shops and small businesses, the creation of jobs (especially seasonal) and these municipalities therefore have every interest in promoting what makes them attractive: enhancement of the natural and cultural heritage, offer of services, or maritime events (events, festivals, etc.), among others. The use of beaches is an important tourist asset for coastal communities. It is strongly influenced by weather conditions in the high season, but also by the opening of bathing areas: this type of activity is therefore dependent on sufficient quality of bathing water, but it is also exposed to the risks linked to the stranding of certain macro-algae or waste.

The dominance of tourism in some coastal areas is leading to an increase in land artificialisation. This aspect is developed in the section "land artificialisation and coastal risk management". The seasonal increase in the population in coastal areas leads to an increased production of wastewater and waste, for which the treatment plants are not always designed (hence the recurrent problems of pollution of bathing waters by microbial pathogens), as well as an increase in greenhouse gas emissions. The problem of waste does not only concern the waste collected, but also the waste abandoned by users, both in urban and natural environments.

The challenge for the coastlines is therefore to maintain their attractiveness to tourists, without neglecting the balance of the coastal territories. The sustainability of bathing activities and the use of beaches requires increased vigilance regarding the quality of bathing water. Another challenge is to diversify the tourism offer and to move towards a deseasonalisation of the activity. The issues relating to the environmental impact of this sector have been developed in the section "Protection and enhancement of natural environments, sites, landscapes and cultural heritage".

What are the elements identified and to be filled in?

The variables of interest concern the demographic pressure induced by tourism, in particular an estimate of the population in the coastal municipalities, the number of monthly overnight stays, the average length of stay and the number of tourists accommodated in market and non-market tourist accommodation. The ratio between the number of tourist beds and the year-round resident population provides information on the increase in population due to tourism, i.e. on the tourist pressure.

The economic weight of the coastal tourism sector is significant for all the coasts, but also in relation to the tourism sector on a national scale. The monitoring system integrates the variables that describe the socio-economic structure of coastal tourism and the economic performance of the sector. On some coasts, a significant part of tourism is linked to the cruise sector. For this reason, we are interested in data relating to calls made by cruise passengers and variables relating to ports that can accommodate cruise ships.

The intensity of the activity can also be informed by data on beach use. They include data on the opening of beaches and sports facilities installed for bathing (sea bathing areas, sea bathing areas identified under Directive 2006/7/EC, operated beaches). The monitoring of bathing water quality, i.e. the classification of bathing waters using microbiological monitoring networks, is of particular importance as it determines the opening or closing of bathing areas and beaches.

Finally, concerning the environmental impacts of bathing and beach activities, the "Blue Flag" certification process guarantees the commitment of a coastal municipality to 4 criteria: environmental education, waste management, water management, and the integration of environmental issues in the management of coastal areas.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Commissariat Général au Développement Durable (CGDD) / Service de la donnée et des études statistiques (SDES)	Transport memento
	Report on the State of the Environment in France (REE)
National Institute for Statistics and Economic Studies (INSEE)	Tourist accommodation capacity of municipalities
	RP
Ministry of Agriculture and Food (MAA) / Direction Générale de l'Alimentation (DGAL or DGAI)	Animal and plant health surveillance
	Atlas of shellfish production and relaying areas
Ministry of Solidarity and Health (MSS) / Directorate General of Health (DGS)	SISE – Bathing Water
Ministry of Economy, Finance and Recovery (MEFR) / Directorate General for Enterprise (DGE)	Report on the Tourism Demand Monitoring Survey (SDT): French tourist travel
Ministry of Sports	Census of Sports Facilities (RES)
French Biodiversity Office (OFB)	Nitrate monitoring network: assessment of the implementation of the Nitrates Directive in France
TERAGIR	Blue Flag marinas and beaches

Boating and water sports

What does the sector of activity cover?

The boating, water sports and activities sector covers:

- Beach sports activities, such as beach volleyball, sand yachting, or beach clubs
- Water sports activities, such as windsurfing, surfing, kite-surfing, rowing or water-skiing
- Underwater sports activities, such as underwater hiking or snorkelling
- Recreational activities, including both boating and marina-related activities.

Sporting and leisure activities contribute to the dynamism and attractiveness of the waterfronts, since they represent both an employment and leisure opportunity for residents, and a definite tourist asset, both for the practice of activities and for the associated events (sporting events, festivals, nautical events). Aimed at a wide audience, they are also an important vehicle for raising awareness of the marine environment for all ages. Yachting activities are a potential lever for ecological, energy and solidarity transition for the coastlines,



through changes in practices, with less impact on the marine environment, or through more sustainable port facilities and amenities.

Indeed, the practice of recreational activities and water sports potentially generates negative impacts on the marine environment, whether in terms of pollution (macro-waste, hazardous liquid waste, microbiological contaminants), disturbance of fauna and habitats, or even loss of habitats. These impacts are linked, for some users, both to bad practices at sea and to the number of people practising them. Moreover, these activities represent a source of land pressure due to the number and surface area of the dedicated facilities. The challenge for the coastlines is to reconcile access to the coast for these activities, which generate attractiveness and dynamism, and their balance with other coastal and maritime activities, while encouraging their sustainability and their least environmental impact.

What are the elements identified and to be filled in?

The monitoring scheme includes variables on the geographical distribution and extent of boating and water sports activities. This includes the location of sports facilities, the zoning of authorisations or prohibitions for activities, the boundaries of marinas and anchorage areas. The variables of interest also concern the number of sports facilities, the number of sports associations/clubs, the number of participants (licensed or not), the number of marinas and their capacity, the capacity of mooring areas and light facilities, the number of pleasure boats and their type, or a number of variables concerning the amenities and services provided by the marinas. In addition, the monitoring system incorporates variables that make it possible to qualify the occupation of the DPM by recreational activities (SURICATE application).

The strategic targets of the coastlines mainly concern the transition of yachting-related activities towards more sustainable practices and equipment with less environmental impact. The socio-economic variables of interest then mainly concern the management of waste and effluents at the level of vessels and marinas, the environmental certification / labelling of marinas, the presence of renewable energy recharging and refuelling points and ecological moorings.

The variables of interest characterising the impact of this sector on the environment concern the physical disturbance of these activities on the seabed, the discharge of contaminants and liquid effluents into the environment or the spread of non-indigenous species (careening of vessels and submerged equipment). Changes in hydrographic conditions and the risk of acoustic masking are also integrated into the monitoring system via activity spatialisation variables.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Rhone-Mediterranean-Corsica Water Agency (AERMC)	Aerial Observatory of the uses in the Mediterranean (MEDOBS)
Centre for studies and expertise on risks, environment, mobility and development (CEREMA)	Ports-Polmar
	Environmental Analysis Service by Automatic Identification System – AIS data (ENVISIA)
	Docking areas in marinas, anchorages and private boatyards
	Geographical data at sea and on the coast

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
	List of Clean Ports certifications
	List of Clean Ports Active in Biodiversity certifications
Commissariat Général au Développement Durable (CGDD) / Service de la donnée et des études statistiques (SDES)	Report on the State of the Environment in France (REE)
Departmental Directorates for the Territories and the Sea (DDTM)	
French Research Institute for Exploitation of the Sea (Ifremer)	Optimised DCF fishing campaigns – AIS data of opportunity for offshore collaborative vessels (AISOP)
National Institute for Youth and Popular Education (INJEP)	Census of licences and clubs with approved sports federations
Lloyd's List Intelligence	Lloyd's List Intelligence – vessel traffic data (LLI)
Ministry of Ecological Transition (MTE) / Directorate General for Infrastructure, Transport and the Sea (DGITM) / Directorate of Maritime Affairs (DAM)	Observatory of marinas
	Yachting in figures
Ministry of Sports / National Nature Sports Resource Centre	SURICATE application: national public database of Spaces, Sites and Itineraries (ESI)
TERAGIR	Map of Blue Flag ports

Recreational fishing

What does the sector of activity cover?

Recreational fishing includes three types of fishing: fishing on foot (glasswort, shellfish, seaweed and crustaceans), fishing from the shore (rock fish, sea bass, etc.) and fishing on board (shad, herring, sardines, mackerel, sea bass, pollack, sea bream, etc.). It is a popular leisure activity for residents of the coastal municipalities, but also for residents of other municipalities in the coastal departments and for tourists. It therefore represents an asset in terms of living environment for residents and in terms of attractiveness for more occasional users (particularly for tourism).

However, this activity generates potential negative impacts on coastal and marine ecosystems, both on habitats (turning over of blocks, over-frequentation of sites, use of destructive or non-selective gear) and on the populations of the species fished (failure to respect quotas or minimum sizes).

What are the elements identified and to be filled in?

The socio-economic variables of interest of this activity concern its conditions of practice and its economic impact on the local economy. As a result, the monitoring system includes data on the location of the activity (recreational fishing areas on board, on foot and on the shore), the users (number of users by type of fishing, etc.), the type of fishing and the type of fishing carried out

(recreational fishing, number of members of the French federations Pêches Sportives and Pêcheurs en mer) and domestic consumption related to recreational fishing (fishermen's expenditure by type of recreational fishing and by expenditure item).

The impacts of recreational fishing on the environment are characterised by variables of interest which concern physical disturbances linked to human frequentation of habitats, catches of vulnerable or accidental species, monitoring of fish stocks and the presence of waste at sea resulting from recreational fishing activities.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Departmental Directorates for the Territories and the Sea (DDTM)	
Directorate responsible for reporting under the EU Single Use Directive	
Interregional Maritime Directorates (DIRM)	
Regional Directorates for the Environment, Planning and Housing (DREAL)	
Etablissement National des Produits de l'Agriculture et de la Mer (FranceAgriMer)	Evaluation of recreational fishing activity in mainland France
National Federation of Yachting and Sea Fishing (FNPP)	
French Biodiversity Office (OFB)	Summary maps of all risks (of harming conservation objectives through fishing) for each Natura 2000 habitat at the scale of Natura 2000 sites)
	ESTAMP database

1.1.5 - Industries and activities in the secondary sector

Maritime and river public works

What does the sector of activity cover?

Maritime public works (MPW) include all offshore and underwater works, marine dredging operations, construction and renovation activities (ports, dykes, quays, etc.), implementation of outfalls and flood protection works. The MPW sector also includes the cable business, which includes the manufacture, installation and maintenance of submarine cables for

carrying communications or electrical power. Marine energies are a new niche activity requiring maritime public works services.

The upstream and downstream activity of the industry involves the manufacturing and sale of equipment (e.g. barges and dredges) and services (e.g. consultancy, port management, public service regulating the activity). The manufacturing activity and the cable laying and maintenance activities are very different activities: the first activity refers to high-tech manufacturing production, the second activities refer to specialised offshore work. Maritime public works generate significant added value, as this sector requires a particular technicality, which necessitates the use of qualified jobs.

These activities have a significant impact on the marine environment. During the construction phase, the impacts are linked to the risk of accidental pollution with the release of hydrocarbons and chemical products, the emission of underwater noise caused by pile-driving, excavations or trenching by mechanical trenching machines (cable activity), which can be sources of major disturbance. Other impacts with a strong persistence over time can also be mentioned (turbidity, hydromorphological modification, loss of ecological functionality of the environments, etc.). Dredging and clamming activities in particular are regulated at the international, European and national levels, to allow controlled and environmentally-friendly management. Finally, construction and renovation in ports (dikes, riprap, etc.) have important effects on sediment dynamics. Some maritime works can nevertheless have positive impacts on the environment by creating habitats suitable for certain species. This is particularly the case for certain filled-in spaces on the foreshore or areas where rocky materials are dumped or the reef effect observed on certain foundations. The field of ecological engineering, covering eco-design of offshore infrastructures, as well as restoration and compensation methods, is booming. **What are the elements identified and to be filled in?**

Some socio-economic variables are related to the spatialisation of the activity (evolution, extent and distribution of the surfaces subject to dredging and of the immersed volumes of dredged material, position of the cable ships, geographical position of the cables). They provide an account of the dynamism of this sector, as well as its contribution to the local economy and to employment. Other variables relate to the improvement of practices, particularly with regard to their impact on the marine environment.

The monitoring system also includes variables that allow the evolution of the pressure of this sector on the environment to be characterised for maritime public works (number of developments subject to an operation to optimise their ecological role and share of the volume of dredged sediments reused) and dredging actions (spatial extent and distribution of the physical disturbance of the seabed: tonnage of dredged materials treated, surface area of the dredged areas, position of the vessels, areas and surface area of the dumping/scraping operations and discharge by force mains). Finally, a certain number of these variables concern the optimisation of dredging actions (number of authorisations and dredging operations including mutualisation, onshore treatment and recovery of dredged sediments, tonnes of fine marine sediments treated onshore), the limitation of contaminant inputs of certain sediments into the sea, as well as the monitoring of the temporal and spatial distribution of acoustic emissions related to maritime and river public works activities.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Bureau de Recherches Géologiques et Minières (BRGM)	
Centre for studies and expertise on risks, environment, mobility and development (CEREMA)	Environmental Analysis Service by Automatic Identification System – AIS data (ENVISIA)

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Centre for studies and expertise on risks, environment, mobility and development (CEREMA)	National survey on dredging in seaports ("dredging survey")
	Surfaces allowed for immersion
French Research Institute for Exploitation of the Sea (Ifremer)	Optimised DCF fishing campaigns – AIS data of opportunity for offshore collaborative vessels (AISOP)
Lloyd's List Intelligence	Lloyd's List Intelligence – vessel traffic data (LLI)
Ministry of Ecological Transition (MTE) / Directorate General for Infrastructure, Transport and the Sea (DGITM) / Directorate of Maritime Affairs (DAM)	Balance sheet of the commercial fleet under French flag
Naval Hydrographic Service (SHOM)	Submarine cables and pipes
	Register of impulsive emissions (SIRENE)
Syndicat Professionnel des fabricants de fils et de câbles électriques et de communication (SYCABEL)	

Industries

What are the elements identified and to be filled in?

Industry refers to economic activities that combine factors of production (facilities, supplies, labour, knowledge) to produce material goods for the market. These mainly land-based activities are not necessarily all related to the marine environment. However, they represent an important part of the coastal economy and reflect its dynamism.

These activities can be sources of pressure and impact on the marine environment (pollution from hazardous substances, waste, thermal pollution, etc.) and are covered by the directive on industrial emissions (integrated pollution prevention and control), which reinforces the measures for defining pollutant emission thresholds.

The shipbuilding and marine sector in particular is divided into sub-sectors that are distinct in terms of their products and markets. It includes civil shipbuilding (commercial, fishing and service vessels), military shipbuilding and repair, civil ship repair, pleasure boat building and repair, and shipbreaking (dismantling and recycling of ships). Upstream of the construction chain is the naval equipment industry, which includes the manufacture and supply of capital goods (propulsion, on-board handling, pumps, ventilation, painting, etc.) and the provision of services (installation of ventilation, cabin areas, etc.). French shipyards are dynamic and specialised in defence vessels, passenger ships, offshore service vessels, fishing vessels and port services. The French shipbuilding and ship repair industry employs around 42,000 people directly, and ranks 2nd in Europe in the global civil and military market, 4th in the world in the production of motor ships, and world leader in the sailing and gliding markets.

What are the elements identified and to be filled in?

The state of play of the industrial sector on the coastlines can be characterised by location variables (SEVESO sites, ICPE installations), or variables of resource abstraction and/or waste production (data on freshwater abstraction by department in m³, abstraction of water volumes by industry, hazardous waste produced by industrial activities).

Certain variables (number of vessels put on the market, number of boats dismantled annually on the coast, number of pleasure boats out of use dismantled in dismantling centres, volume of waste from dismantling reused) make it possible to qualify the intensity of activity in this sector. Finally, variables are sought to characterise the environmental impact of the industries and their products (number of APER-labelled dismantling centres on the coastline, number of certified clean ports, average age of the registered pleasure boat fleet, number of companies respecting the principles of eco-construction on the coastline, number of vessels with an alternative propulsion method placed on the market, number of vessels equipped with clean domestic discharge solutions). These variables of interest also concern noise reduction, in particular by monitoring the temporal and spatial distribution of impulsive emissions.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Association for Eco-Responsible Yachting (APER)	Location of dismantling centres
Commissariat Général au Développement Durable (CGDD) / Service de la donnée et des études statistiques (SDES)	Freshwater withdrawals in France by use and by resource
French Customs	Foreign trade figures
EVOLEN	
Fédération Française des Assurances (FFA) / Statistics Department	
IFP Énergies nouvelles	
National Institute of Intellectual Property (INPI)	Patent database
National Institute for Statistics and Economic Studies (INSEE)	Business and establishment register (REE)
	Tables of the French economy
	Annual national accounts
Ministry of Ecological Transition (MTE) / Directorate General for Risk Prevention (DGPR)	Geohazards: Pollution Emission Register

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Ministry of Ecological Transition (MTE) / Directorate General for Infrastructure, Transport and the Sea (DGITM) / Directorate of Maritime Affairs (DAM)	List of deletions
	Yachting in figures
	SNOSAN: summer season review
Ministry of Ecological Transition (MTE) - Ministry of Economy, Finance and Recovery (MEFR)	Minergies: the French portal for access to underground data collected from operators
Naval Hydrographic Service (SHOM)	Register of impulsive emissions (SIRENE)

Power generation

What does the sector of activity cover?

Electricity generation on coastlines covers two types of generation:

- Electricity production by nuclear power plants (and anecdotally by a power plant – 1 project in Corsica)
- Electricity production by marine renewable energy.

The production of electricity by nuclear power plants is largely in the majority, but the production of electricity by marine renewable energies (floating or land-based wind turbines, tidal, tidal and wave power) is set to develop significantly, particularly with the installation of floating or land-based wind farms.

This sector gives rise to different types of environmental impacts. Coastal nuclear power plants generate very little artificial development on the coast (the plants are already established and their number is not likely to increase). However, they withdraw marine water for reactor cooling and the higher temperature of the discharged water can locally disturb coastal ecosystems. Renewable marine energies, which by definition are favourable to the preservation of the environment, nevertheless have an impact on the marine environment both in terms of the artificialisation of the seabed and coastal environments (degradation or even loss of habitats, increased turbidity), but also in terms of the nuisance generated (risk of collision for marine birds, particularly migratory birds, and for chiropterans; noise and light pollution). However, their impacts are not well known and are subject to long-term monitoring. Furthermore, the development of this type of energy is associated with landscape issues and compatibility issues with other activities at sea, which are a source of tension.

The challenge for the façades is therefore to maintain the production of nuclear energy (for the façades concerned), and to develop the share of renewable marine energy, while minimising the environmental and social impacts.

What are the elements identified and to be filled in?

The socio-economic variables of interest in this sector concern the installations and their characteristics (types of power stations, types of MRE installations, dimensions of MRE, duration of installation and life of MRE), the structure of the sector (number of clusters, number of companies representing the entire value chain represented within clusters), as well as turnover indices for the MRE sector, by sector. Other variables focus on the development of MRE, and more particularly on the evolution of their productivity, the setting up of pilot projects and test sites, and on the measures to support the deployment of the sector. The

data concern: the production capacity allocated through calls for tenders, as well as the connected production capacity, variables relating to the development of pilot projects or test sites (number and location of test sites) and their characteristics (mutualised connection via modular platforms, experimentation of co-activities, multi-use modular platforms supporting innovation, acquisition of knowledge or the coexistence of uses at sea).

The environmental impacts of this sector of activity are mainly measured by variables relating to the physical disturbance of the seabed, changes in hydrographic conditions and the temporal and spatial distribution of impulsive emissions. The water discharged for the power plants (total monitoring in m³ of heated water discharged, location of discharge points, biological monitoring of water discharged into the environment, volumes of water in m³ permanently or temporarily withdrawn from the natural environment) and the variables relating to the artificialisation of the seabed (spatial extent of anchorages on the seabed, modifications to the seabed caused, temporal evolution of the polygons of the structures and electricity production facilities on the coastline at the land-sea boundary) also make it possible to characterise the environmental impacts of this activity.

There is a strong need for the façades to strengthen the dialogue with all stakeholders on the subject of MRE development. In this respect, the monitoring system includes variables relating to the existence of governance bodies promoting the exchange and pooling of knowledge between stakeholders, as well as variables relating to the representativeness of stakeholders within the Sea Basin Council on the subject of MRE.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
International Atomic Energy Agency (IAEA)	
Bureau de Recherches Géologiques et Minières (BRGM) - Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement (CEREMA)	Artificialisation database DCE-MSFD
Commissariat Général au Développement Durable (CGDD) / Service de la donnée et des études statistiques (SDES)	Freshwater withdrawals in France by use and by resource
EDF - ENGIE	
Electricity Transmission System Operator (RTE) - GRT gaz	Open Data Energy networks
Ministry of Ecological Transition (MTE) / Directorate General for Energy and Climate (DGEC)	Multiannual energy plans (MPE)
Naval Hydrographic Service (SHOM)	Register of impulsive emissions (SIRENE)
UMR Marine Coastal Ecosystems and Stress Responses (ECOSEAS)	French Mediterranean coasts: inventory and impact of reclaimed developments on the marine domain (MEDAM)

Maritime transport and ports

What does the sector of activity cover?

The maritime transport and port activities sector covers both freight and passenger transport activities. This sector of activity represents a major challenge at national level, as it is an important link in international logistics chains. For the coastlines, it also represents a sector that generates employment and a vector of attractiveness.

In addition, the maritime transport and port activities sector is associated with several types of environmental impacts: the spread of non-indigenous species via the goods transported or via ballast water; the pollution of coastal waters through the discharge of grey and black water and through careening; and airborne emissions of pollutants and greenhouse gases from port infrastructures and from maritime transport and service vessels.

The commercial ports are bearers of economic development challenges, but they are also potential industrial platforms for the ecological and energy transition. The challenge for the coastlines is to reconcile the maintenance and development of port and maritime transport activities with their contribution to the ecological and energy transition objectives.

What are the elements identified and to be filled in?

The monitoring system integrates socio-economic variables relating to the characterisation of the merchant fleet, maritime services and maritime traffic on a national scale. The variables concerning the merchant fleet include the number of French-flagged or French-owned shipping and maritime services vessels, their total capacity, and the average age of the shipping fleet (French-flagged or French-owned). The variables related to national maritime traffic include the identification of the main passenger ports and the number of passengers transiting through the ports, as well as the size of the ships accessible in the ports and the tonnage of goods transported by sea (by type of goods).

Other variables of interest focus on characterising the competitiveness and international influence of the ports: tonnages of goods transiting through the ports of the coastlines, traffic to or from Europe passing through the ports of the coastline, European rank of the main French ports in the transport of goods. The monitoring system also includes data on port land management (surface area of port land identified as suitable for the establishment of new activities in the strategic projects of the MPAs, surface area of unconverted port wasteland on the coastline, surface area of natural areas of the Grands Ports Maritimes (GPMs) covered by a management plan), the implementation of port strategies and management plans (number of management plans, development plans, master plans, strategies or strategic port projects underway in the ports of the coastline), and the integration of commercial ports into the territory (charters or contractual documents or agreements), (number of management plans, development plans, master plans, strategies or strategic port projects underway in the ports of the coastline), and the integration of commercial ports into the territory (charters or contractual documents or participation bodies between commercial ports and citizens, number of freight and passenger shuttle projects in the relevant territories of the coastline). In order to strengthen their integration on the coastline, some ports are implementing inter-port cooperation or inter-regional coordination initiatives (number of ports involved in these initiatives).

In terms of logistics, other variables concern the massification of flows and the digitalisation of procedures in ports (amount of port investments under the CPER/CPIER for the development of logistics activities and the massification of flows in seaports, the ecological and energy transition of ports, national indicator: creation of a single maritime and port office, number of ports that have adapted their information

system at the one-stop-shop for maritime and port information). The system also includes data relating to intermodality and/or modal shift (amount of port investments under the CPER/CPIER/FEDER/FNADT for the development of port areas, multimodal platforms, infrastructures favouring intermodality, shares of river and rail transport in pre- and post-carriage at the level of the MOCs, modal shift rate (rail, river and sea), volume of goods passing from the sea to the rivers or from the sea to the railways, number of ships passing from the sea to the rivers).

The energy transition is also a future issue for ports and ships, which can be characterised by several types of variables (number of recharging and refuelling points (electric, hydrogen, LNG) in ports, number of ships refuelling with alternative fuels, number of infrastructures allowing ships to be electrically connected at the quayside, number of ships using the electric connection at the quayside, number of ships using LNG, volume of annual bunkering with LNG).

More generally, the ecological transition of ports is also monitored (GHG emissions generated by the Nantes Saint Nazaire MOC, number of ships inspected as non-compliant in the Channel and North Sea emission control areas, number of ports involved in an environmental certification process, number of commercial ports involved in environmental initiatives and innovative projects, number of ship owners involved in the ecological and energy transition, number of ships involved in the ecological and energy transition). With the same aim of reducing the environmental impact of maritime transport and commercial ports, the monitoring system includes variables relating to the treatment of wastewater and ballast water (number of ports equipped with careening areas with an effluent treatment system, number of careening areas meeting WFD standards on the coastline, number of ports with a wastewater and ballast water treatment system, number of ports offering the possibility of directly sucking up residual water from the bilges of ships and wastewater from the bunkering area).

To complete the picture, the monitoring system integrates variables relating to the location and intensity of impacts linked to maritime transport (position of merchant ships on the coastline, types of merchant ships sailing), variables relating to the spread of non-indigenous species and the contamination of waters generated by maritime transport activities (for example via the use of anti-fouling paints: concentration of contaminants). Finally, the monitoring system also includes variables of interest concerning the noise generated by this activity.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA				COLLECTION DEVICE	
Study and the environment, (CEREMA)	Centre Ri sk Ex pe rti se	mobility	and	Ports-Polmar	List of Clean Ports certifications
					List of Clean Ports certifications active in biodiversity,
					development
					Environmental Analysis Service by Automatic Identification System – AIS data (ENVISIA)
					Geographical data at sea and on the coast
Commissariat Général au Développement Durable (CGDD) / Service de la donnée et des études statistiques (SDES)					Transport memento
					Activity of French seaports
					Datalab: key transport figures
Eurostat					Maritime transport database
Large Marine Port of Nantes Saint-Nazaire (GPMNSN)					

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
French Research Institute for Exploitation of the Sea (Ifremer)	Optimised DCF fishing campaigns – AIS data of opportunity for offshore collaborative vessels (AISOP)
Lloyd's List Intelligence	Lloyd's List Intelligence – vessel traffic data (LLI)
Ministry of Ecological Transition (MTE) / Directorate General for Infrastructure, Transport and the Sea (DGITM) / Directorate of Maritime Affairs (DAM)	Balance sheet of the commercial fleet under French flag
Ministry of Agriculture and Food / Service d'Inspection Vétérinaire et Phytosanitaire aux Frontières (SIVEP)	TRACES system
SafeSeaNet	
Naval Hydrographic Service (SHOM)	Register of impulsive emissions (SIRENE)
TERAGIR	Blue Flag marinas and beaches

1.2 - Public policies

1.2.1 - Occupation and management of coastal areas

Artificialisation of territories and coastal risk management

What do these public policies cover?

Artificialisation of coastal areas refers to the transformation of land use, the coastline, or part of the marine area by development actions. These actions are accompanied by a loss of the qualities of the 'natural' environment. The artificialisation of coastal areas is the result of two main phenomena: the attractiveness of maritime and coastal areas for human activities and uses, and the implementation of flood, submersion and marine erosion risk management to protect them. This sector therefore also covers public policies related to coastal risk management, involving the artificialisation of the coastline and waterways. The management of these risks ensures the safety of property and people.

The development of activities and uses in certain coastal areas is leading to an increase in the amount of land being built up (in particular for the benefit of second homes for the tourism sector), which is also taking up land to the detriment of housing needs. This artificialisation of land is associated with an increase in the consumption of water resources, which represents a real challenge for coastal municipalities, and a very significant one for island territories, whose resources may be limited and are already heavily used for the irrigation of agricultural land. This has an impact on the flow of some small coastal rivers and has an

impact on the ecology of their estuaries. Coastline development also leads to increased inputs of waste and contaminants transferred to the marine environment, and loss of habitats (terrestrial and marine).

The sealing of soils and the artificialisation of the coastline result in an increase in the risks of flooding (by multiplying obstacles and increasing the flow of surface water), erosion and submersion (increase in the number of people and property exposed to hazards).

Given the various impacts of coastal development on the environment and on the risk to human activities and uses, the main challenge of these public policies is to reduce the development and the level of risks (flooding, erosion, submersion) associated with these activities.

What are the elements identified and to be filled in?

As the public policies concerned in this section are mainly focused on the safety of goods and people, the monitoring system includes many variables related to the management of the coastline by the public authorities. An important part concerns the number of integrated coastal management strategies or projects (including spatial recomposition projects or laissez faire) under consideration or in progress. The number of PPRNs on a coastline can also provide information on the issues of limiting human issues on each coastline. Other variables are used to monitor the number of people and buildings exposed to coastal risks.

This sector can also be characterised by its impact on the coastal and maritime environment. The monitoring system therefore includes variables of interest that make it possible to characterise the spatial extent of land artificialisation. To do this, variables that allow their extent to be quantified and qualified are integrated into the monitoring system (surface reclaimed from the sea, number of structures, number of artificial obstacles, land use). The urban sprawl linked to the reception of new populations is also documented (housing stock, number of inhabitants and population, density of residential areas).

Lastly, the monitoring system seeks to identify the artificialisation generated by coastal tourism, i.e. land consumption (number of tourist infrastructures created in the back-coastal zone, monitoring of the ratio of renovation of buildings to new construction in tourist accommodation, services, restaurants, etc.) and exposure to coastal risks increased by tourism (number of people exposed, number of tourist properties exposed, particularly in the 500 m zone from an eroding coastline). Finally, the contribution of contaminants linked to the artificialisation of the territories can be informed by the annual data of the wastewater treatment plants.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Agency for the Environment and Energy Management (ADEME)	SINOE waste
Bureau de Recherches Géologiques et Minières (BRGM) - Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement (CEREMA)	Artificialisation database DCE-MSFD
Commissariat Général au Développement Durable (CGDD) / Service de la donnée et des études statistiques (SDES)	Land use – CorineLandCover
	The report on the state of the environment in France (REE)
Conservatoire du littoral (CdL)	Adapto in figures

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
National Institute for Statistics and Economic Studies (INSEE)	RP
Ministry of Ecological Transition (MTE) / Directorate General for Planning, Housing and Nature (DGALN)	Geoportail de l'urbanisme (GPU)
	Information portal on municipal sanitation
Ministry of Ecological Transition (MTE) / Directorate General for Risk Prevention (DGPR)	GASPAR database (Geohazards)
French Biodiversity Office (OFB)	Flow obstruction repository (ROE)
UMR Marine Coastal Ecosystems and Stress Responses (ECOSEAS)	French Mediterranean coasts: inventory and impact of reclaimed developments on the marine domain (MEDAM)

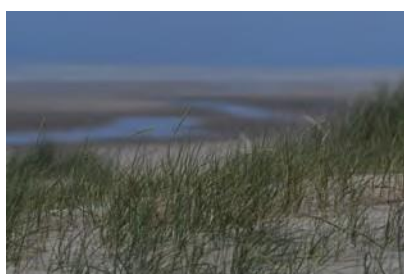
Protection and enhancement of natural environments, sites, landscapes and cultural heritage

What do these public policies cover?

This sector includes public policies carried out with the aim of protecting the environment and landscapes, and enhancing coastal areas, as well as their tangible and intangible heritage. Public action in this sector can address several issues: preservation of certain habitats and associated biodiversity, preservation of sites and landscapes, maintenance of cultural heritage, maintenance of public access to the coast, transmission of local knowledge, etc.

It mobilises site and space classification tools, in particular protected areas, listed and classified sites, and major sites. It also includes land protection policies: sensitive natural areas, coastal conservatory, coastal State forest. Other more programmatic tools such as architectural and landscape charters, departmental strategies for the management of the public maritime domain, itinerary plans, major site operations, etc. are also used. Environmental preservation can also be achieved through environmental restoration operations. Finally, an important lever in favour of the protection of natural environments and heritage is also the raising of awareness of the general public and users and environmental education, for example implemented by the permanent centres for environmental initiation (CPIE), participative science operations, the organisation of events and demonstrations or in the framework of marine educational areas. Lastly, the inventory and conservation of maritime cultural heritage, museums and support for cultural events that contribute to a living maritime culture are considered here.

For the coastal municipalities, and especially the maritime coastlines, this sector represents a major interest for the safeguarding of natural spaces, as well as the tangible and intangible heritage. In addition, it is strongly linked to coastal tourism, which is an important economic factor. Indeed, the influx of tourists in these municipalities (which allows the installation of shops and small businesses, and the creation of jobs) depends to a large extent on public policies for the protection and/or enhancement of the local natural and cultural heritage. It is therefore in the interest of the territories to promote what makes them attractive. However, tourism can have significant environmental impacts. Increased use of walking routes increases disturbance to coastal flora and fauna, as well as trampling (particularly of the grasslands). For species of marine fauna and flora, coastal tourism also means increased visual, noise and light disturbance, and even degradation (removal of species, degradation of the seabed). If it is associated with environmental risks,



this sector of activity can nevertheless be considered as a privileged vector of user awareness of the preservation of the marine environment and coastal areas, since it concerns a large number of users, with varied profiles and of all ages.

What are the elements identified and to be filled in?

The data sought concerns the number and spatial extent of protected areas and land protections, as well as all the data of the sites and landscapes policy. The number of restoration operations also makes it possible to qualify and quantify public environmental protection policies.

The development of the sites also involves maintaining or developing their public access (linear coastline open to the public by right of way, number of slipways under management or planned), while limiting their degradation. The data must therefore also cover the field of awareness-raising actions carried out by the various CPIE actors, NGOs, scientific bodies, aquariums, museums, educational establishments, etc.

Maritime events and demonstrations contribute to the tourist appeal of the coasts, and data concerning them are therefore sought: census of events, attendance generated, census of organising or participating municipalities. More generally, the tangible and intangible maritime cultural heritage and its enhancement (inventories, museums, events) are part of the information that is sought. Knowledge of the number and quality of beneficiaries is also important.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Rhone-Mediterranean-Corsica Water Agency (AERMC)	GDAI (Gestion Des Aides aux Investissements) database
Water Agencies - French Research Institute for Exploitation of the Sea (Ifremer)	WFD Atlas (Envlit)
Centre for studies and expertise on risks, environment, mobility and development (CEREMA)	Coastal path survey
Commissariat Général au Développement Durable (CGDD) / Service de la donnée et des études statistiques (SDES)	The report on the state of the environment in France (REE)
Regional Directorates for the Environment, Planning and Housing (DREAL)	
Ministry of Ecological Transition / Directorate of Housing, Urban Planning and Landscapes (DHUP) / Directorate of Housing, Urban Planning and Landscapes (DHUP)	National file of classified sites
Ministry of Ecological Transition (MTE) / Directorate General for Planning, Housing and Nature (DGALN)	Objective landscapes: interactive map
National Museum of Natural History (MNHN)	National Inventory of Natural Heritage (INPN)

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
French Biodiversity Office (OFB)	List of "Marine Education Areas"
	Marine Protected Areas Portal France
Network of major sites in France	The member sites of the Réseau des Grands Sites de France
UNESCO	World Heritage List
International Union for Conservation of Nature (IUCN)	IUCN Red List

1.2.2 - Research, innovation and training

Research and development

What do these public policies cover?

This sector covers all scientific research, development and innovation activities.

Public sector research and development covers entities that perform or finance research and experimental development (R&D) for the state, for higher education institutions or for non-profit institutions (associations and foundations). This activity mainly involves Ifremer, university and CNRS/INSU oceanography laboratories, the French Navy's Hydrographic and Oceanographic Service (SHOM), the French Institute for Development Research (IRD) and the French Polar Institute Paul-Emile-Victor (IPEV) (resource agency). It also includes a space component with Earth observation satellites and space systems designed and implemented by the Centre national d'études spatiales (CNES), generally in the framework of bilateral or multilateral cooperation. Often, the object studied requires a multidisciplinary and interdisciplinary approach, thus involving several scientific disciplines. Other organisations may therefore be involved in ocean research: Météo-France, the French National Institute for Agricultural, Food and Environmental Research (INRAE), the Centre for International Cooperation in Agronomic Research for Development (CIRAD), and the Geological and Mining Research Bureau (BRGM).

Private R&D is sensitive information about which companies do not communicate much. It is nevertheless largely associated with public research and is organised in a cooperative manner in terms of innovation through the competitiveness clusters, three of which are dedicated to the maritime sector: the Brittany-Atlantic and Mediterranean sea clusters, which operate in a twinned fashion, and the Aquimer cluster in Boulogne-sur-Mer.

This sector represents an important development issue for all the coastlines. Increased knowledge of the sea allows for better adaptation and control of the impact of human activities on the ocean, but also for better exploitation of blue growth. This development is largely due to the need for technical and technological innovations, allowing for the collection of quantitatively and qualitatively superior data. This development of knowledge also requires an improvement in the quality of training in the maritime professions.

Another challenge in this sector is to facilitate the availability of data to the public and to the stakeholders of the maritime area. Data producers (scientific laboratories, associations, public research bodies, higher education establishments, etc.) are tending to involve citizens (participatory science) and certain private players more and more. The interoperability of the data collected thus makes it possible to improve their accessibility and reuse. The creation of national portals, for example, makes this circulation of knowledge more fluid. Finally, the increasing pressures on the environment caused by various human activities require a fully interdisciplinary approach to research programmes.

What are the elements identified and to be filled in?

The monitoring system includes variables that make it possible to quantify the public research effort carried out on the various coastal areas based on data relating to organisations specialising in the production of knowledge on the marine environment and the activities that take place there. The variables of interest therefore concern the number of research units and their themes (number of public and private research laboratories in the maritime area specialising in the study of marine ecosystems and maritime activities, etc.). We are also interested in the incentive funding of research: public and private investments, future investment, European programmes and international programmes. The system also includes the number of scientific publications or research projects and patents (number of scientific publications concerning the Eastern Channel and North Sea, number of research and development projects relating to the ecological and energy transition of maritime activities, monitoring of scientific publications: number of articles published, number of research projects aimed at technological and environmental innovation, etc.). Through publications and patents, the aim is to measure scientific production in relation to the thematic priorities set out in the strategic targets for knowledge and innovation.

The coastlines also want to encourage innovation in various activity sectors. Information on innovative research projects (number of companies on the coast proposing eco-design and ecological restoration processes, number of companies on the coast allowing biomass to be used through biotechnologies) is therefore also sought.

Finally, some variables concerning the impact of this sector on the environment (temporal and spatial distribution of impulsive emissions), directly related to *in-situ* research activities.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Agency for the Environment and Energy Management (ADEME)	Thematic review
Commissariat Général au Développement Durable (CGDD) / Service de la donnée et des études statistiques (SDES)	The report on the state of the environment in France (REE)
National Institute of Intellectual Property (INPI)	Patent database
French Research Institute for Exploitation of the Sea (Ifremer)	Marine Science and Technology Survey: a national quantitative and qualitative inventory of public research resources

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
	French oceanographic fleet operated by Ifremer
Ministry of Agriculture and Food (MAA) / Directorate of Maritime Fisheries and Aquaculture (DPMA)	List of operations of the FEAMP national programme 2014-2020
Sea Centres	Logbooks of labelled projects
Naval Hydrographic Service (SHOM)	Register of impulsive emissions (SIRENE)
AMURE Joint Research Unit	

Maritime training

What do these public policies cover?

Maritime training is considered here in the broadest sense, both for maritime training leading to jobs as seafarers in the merchant navy, fishing, aquaculture, yachting and marine mechanics, which are regulated professions, and for training leading to jobs related to the sea and the coast, whether in industry, water sports and leisure, management of natural areas, regional planning, research, etc.

On the one hand, this includes specialised training courses such as the professional maritime high schools and the Ecole Nationale Supérieure Maritime, the Ecole Navale, engineering courses specialising in the maritime industries (École Centrale de Nantes, ENSTA Bretagne, etc.), and postgraduate courses in maritime law or oceanography. On the other hand, this covers training which is not specifically maritime but which leads in part to occupations which are: leisure, biotechnologies, energy industry, digital, culture, etc. and which are linked to the objectives of ecological transition for example, or the development of maritime culture.

Maritime training is often a cross-cutting socio-economic issue, overlapping with many other issues. Firstly, employment, with the need to train a qualified workforce corresponding to the needs of the sectors, allowing both the creation of sustainable and attractive jobs and professional retraining. Maritime training (information, awareness-raising, communication) also helps to enhance the value of seafaring occupations and the products resulting from these activities, as well as their social acceptability. Raising the awareness of the general public and professionals also aims to better take into account the impacts and pressures of activities on the environment. Finally, a last part of the challenges in this sector concerns the acquisition, dissemination and sharing of data and knowledge on marine and coastal activities and environments.

What are the elements identified and to be filled in?

The data sought concerns the supply of training and the satisfaction of quantitative and qualitative hiring needs, particularly in order to cope with the evolution of jobs due to the ecological transition or the emergence of new activities.

It must be possible to measure the activity of maritime training: number of graduates of secondary maritime education on the coast by sector of activity, number of approved training centres and their specialities, number of days of continuous training in maritime vocational colleges and vocational training centres. It should also be assessed in terms of attractiveness by putting it in perspective with variables analysing the rates of

employment integration (number of people hired after maritime training, FTE offers by maritime economic sector, share of maritime jobs in coastal areas).

Certain variables relating to maritime training make it possible to characterise the attractiveness of certain sectors, such as professional fishing (number of regional or joint State-Region strategies for the training of fishermen and managers of maritime enterprises, number of training courses available for fishermen, number of approved training centres on the coastline for fishermen, number of days of training in maritime vocational colleges), aquaculture (number of people trained in aquaculture, number of training courses available for fish farmers and managers of aquaculture companies, number of approved training centres, number of days of training in aquaculture in vocational colleges, and development of regional or State-regional strategies for the training of fish farmers), or the power generation and industry sector.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Association pour la Gestion de la Formation des Salariés des PME (AGEFOS-PME) / Section paritaire professionnelle Pêche et Cultures Marines (SPP-PCM)	
Commissariat Général au Développement Durable (CGDD) / Service de la donnée et des études statistiques (SDES)	The report on the state of the environment in France (REE)
Interregional Maritime Directorates (DIRM)	
National Maritime School (ENSM)	
Ministry of Ecological Transition (MTE) / Directorate General for Infrastructure, Transport and the Sea (DGITM) / Directorate of Maritime Affairs (DAM)	

1.2.3 - Economy of the territories

What do these public policies cover?

Some strategic targets deal with the economy of the territories in a cross-cutting manner, either because they aim to develop and promote different types of economy on the scale of the façades (circular economy, blue economy, social and solidarity economy), or because they deal with the economy of a particular type of territory (island territories for example). The indicators linked to these objectives, as well as the data collection mechanisms they imply, are cross-cutting to the different sectors of activity, and cannot be linked to only one, or a few.

What are the elements identified and to be filled in?

The monitoring system includes variables that allow the development of the circular economy to be characterised (number of innovative initiatives for the collection and recovery of waste by and from maritime activities, number of innovative initiatives for the collection and recovery of land-based waste arriving at sea, holders of NF Environnement and European ecolabelled products, number of ecological transition contracts set up), the blue economy (areas identified in the PLU of coastal municipalities and the various planning and urban development documents of local authorities for the development of blue economy activities, quarterly/annual monitoring of the blue economy, number of access points to the sea for blue economy activities), and the social and solidarity economy (number of companies).

The objectives relating to the development of the islands of the NAMO coastline include variables relating to social and generational diversity (evolution of the unemployment rate in coastal municipalities since 1990, poverty rate of different age groups in coastal employment areas, share of over-occupied housing in coastal municipalities, share of unintegrated young people in coastal employment areas), as well as to the energy transition.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Commissariat Général au Développement Durable (CGDD) / Service de la donnée et des études statistiques (SDES)	The report on the state of the environment in France (REE)
Commissariat Général au Développement Durable (CGDD) / Service de la donnée et des études statistiques (SDES) - Institut national de la statistique et des études économiques (INSEE)	Territorial indicators of sustainable development
Regional Directorates for Enterprise, Competition, Consumer Affairs, Labour and Employment (DIRECCTE)	List of SSE (Social and Solidarity Economy) enterprises
Ministry of Ecological Transition (MTE) / Directorate General for Planning, Housing and Nature (DGALN)	Mapping: territories involved in ecological transition contracts

1.2.4 - Safety and security of maritime spaces

What do these public policies cover?

Maritime Territorial Defence (MDT) meets the objectives of national defence at sea, and is the military counterpart of the State's action at sea (AEM), which aims to maintain order and safeguard goods and people. These two components together form the "Permanent Maritime Security Posture".

Beyond the 300 m zone from the coastline, the responsibilities and police powers of the State are exercised. The missions covered by the State Action at Sea are defined in the decree of 22 March 2007, and six of them are qualified as priorities: saving human life and assisting ships in difficulty, combating illegal trafficking by sea, repressing illegal discharges at sea and combating major marine pollution, combating illegal fishing activities (via fisheries control), monitoring and preserving marine protected areas, and security at sea.

Defined in the Defence Code, Maritime Territorial Defence "*contributes to ensuring the security of the national territory, and in particular the protection of priority defence installations*". It complements civil defence, operational territorial defence and air defence. It is permanent and its purpose is:

- 1° To monitor the approaches to the national territory on its maritime façades, to detect and evaluate the threat that may be posed on or in the sea;
- 2° To inform the civil and military authorities of suspicious or hostile activities at sea and threats of maritime origin which concern their areas of responsibility;
- 3° To oppose actions by sea against national territory and adverse undertakings against national interests in the approaches to that territory, in particular, against national activities in all coastal and maritime areas where France has exploitation rights.

The units of the French Navy, including those of the Maritime Gendarmerie, permanently ensure the surveillance of the maritime approaches within the framework of both the MEA and the LMD, in order to ensure the land-sea and defence-security continuum along the French maritime coastlines.

The implementation of the Permanent Maritime Safety Posture is therefore a matter for national coordination, under the authority of the Prime Minister.

This strategy concerns the coastlines in two ways: on the one hand, on the deployment of means and actions to preserve safety and security at sea; on the other hand, on an economic aspect, through the number of infrastructures and jobs concerned.

What are the elements identified and to be filled in?

The socio-economic variables of maritime defence activities and state action at sea are concerned with the location of these activities, and the means deployed to ensure maritime safety and security. The precise location variables of the activities cannot be disclosed for reasons of defence of national interests, but the monitoring system nevertheless includes the perimeter of the maritime sectors used by Defence (for test firing, training sectors, or overflights by aircraft), as well as the perimeter of intervention by CROSS.

The variables relating to the resources allocated mainly concern the budget allocated to the French Navy, but also the employment directly or indirectly linked to this sector of activity (civilian and military personnel employed in the dockyards, personnel engaged in the permanent maritime safeguard posture), or the companies supplying Defence (in particular the shipbuilding/dismantling companies) and their output (number of military ships built or deconstructed).

Other variables make it possible to characterise the means deployed (number of ships deployed, average age of the air-sea fleet, number of air and sea assets deployed for surveillance at sea and for surveillance of vital coastal points). They also concern the characterisation of the operations carried out (monthly number of overflights by a State aircraft, number of CleanSeaNet satellite passes in the month, number of hours at sea and their hourly cost for the State's action at sea, number of flight hours and their hourly cost for the State's action at sea, number and type of counter-mining operations). Lastly, the monitoring system includes variables relating to maritime surveillance systems (detection and identification range of surface vectors; integration time in surface situation analysis systems of detections by surveillance aircraft and surface vessels), the implementation of actions under the ORSEC POLMAR system (implementation rate, number of reports of illegal oil discharges at sea, number of accidental spills of contaminants at sea), and non-hydrographic zones.

The activities related to the permanent maritime safety posture generate positive impacts on the environment (preservation of marine protected areas, including Natura 2000, fight against pollution, fight against illegal fishing) but they also have negative impacts in terms of underwater noise pollution. The monitoring system therefore also includes variables relating to impulsive emissions of high to very high acoustic levels generated by these activities.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Ministry of Ecological Transition (MTE) / Directorate General for Infrastructure, Transport and the Sea (DGITM) / Directorate of Maritime Affairs (DAM)	Security systems for goods, persons and installations in a sensitive maritime area (SECMAR)
Ministry of the Armed Forces / Naval Staff	
Naval Hydrographic Service (SHOM)	Register of impulsive emissions (SIRENE)
	National Hydrography Programme

1.2.5 - Preservation of resources, biodiversity and marine environments

What do these public policies cover?

This section deals with the 'costs of degradation' of the marine environment. This analysis allows the socio-economic impacts of the deterioration of the marine environment to be estimated. It includes all existing public policies aimed at monitoring the state of the marine environment, its resources and biodiversity, preventing/avoiding their degradation and mitigating its effects. These public policies can be exclusively marine, as is the case for fisheries policy, or have a broader spectrum of application, as is the case for water quality protection or biodiversity conservation policies. In this second case ("broad-spectrum" public policies), the monitoring system only includes collection systems that are related to the marine environment, its resources and its biodiversity.

What are the elements identified and to be filled in?

The concept of costs of degradation refers to the actions required to degrade the marine environment and the costs to society as a whole. The aim is therefore to evaluate the costs associated with the various existing management measures, but also to combine this expenditure for the maintenance of the marine environment with an assessment of their effectiveness by listing the residual impacts, i.e. the differences observed between the current situation and the desired state of the marine environment.

Ten degradation themes are monitored, which have been defined with reference to the descriptors of the Good Environmental Status of marine waters, the list of pressures and impacts mentioned in Annex III of the MSFD, and the organisation of expenditure related to the protection of the marine environment:

- costs related to microbial pathogens (pressure)
- costs related to eutrophication (D5)
- costs related to micropollutants (D8, D9)
- costs related to the degradation of fisheries resources (D3)



- costs related to the degradation of shellfish resources (D3)
- costs related to the loss of biodiversity and seabed integrity (D1, D4, D6)
- costs related to marine litter (D10)
- costs related to oil spills and illegal discharges (D8, D9)
- costs related to the impacts of non-native species (D2)
- costs related to the introduction of energy into the environment and changes in the hydrological regime (D7, D11)

Measures to combat biodiversity erosion are largely cross-cutting to all degradation issues: the approach adopted for the evaluation of the costs related to this issue is therefore to evaluate the costs not taken into account by the prism of the other issues, most of which are built around specific anthropogenic pressures.

For each degradation theme, costs are estimated for four types of measures:

- information and monitoring measures, which include actions related to information gathering, applied research and monitoring and surveillance arrangements associated with a degraded marine environment;
- preventive measures, which consist of investments or economic incentives aimed at the prevention of behaviour harmful to the marine environment; they include awareness-raising measures, management measures and monitoring and control measures;
- preservation measures, which consist, when harmful behaviour could not be prevented, in avoiding that it leads to impacts on the marine environment, in particular through depollution measures (for example, wastewater treatment to avoid chemical or bacteriological contamination);
- remediation measures, which consist, when impacts on the marine environment could not be avoided, of putting in place curative measures aimed at restoring the quality of the marine environment or protecting human populations against the impacts of the degradation.

What are the data collection devices?

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
Water Agencies	
Comité National des Pêches Maritimes et des Élevages Marins (CNPMMEM)	
Conservatoire du Littoral (CdL)	
National Institute of Statistics and Economic Studies (INSEE)	Survey on investments in industry to protect the environment (ANTIPOL)
Ministry of Ecological Transition / Directorate of Water and Biodiversity (DEB)	
Ministry of Agriculture and Food (MAA) / Directorate of Maritime Fisheries and Aquaculture (DPMA)	
Ministry of Ecological Transition (MTE) / Directorate General for Planning, Housing and Nature (DGALN)	Information portal on municipal sanitation

PRODUCER/CONCENTRATOR OF THE DATA	COLLECTION DEVICE
French Biodiversity Office (OFB)	

ANNEXES

Annex 1. Monitoring programmes under the second cycle of the MSFD - Part 1 Annex 2.

Reminder of strategic targets and criteria – Part 2

Annex 3. Indicators and data collection devices for the coastline - Part 2 3a. Focus on Socio-Economic Objectives (SEOs)

3b. Focus on Environmental Objectives (EOs), Good Environmental Status (GES) criteria and Economic and Social Analysis (ESA)

Annex 4. Data collection devices - Part 2 Annex 5. Glossary

Photo credits

Page 8

- Date of shooting: 05/10/2017
- Title: Megascopie campaign on board the Thalassa
- Caption: Gannet (*Morus bassanus*).
NB: the Megascopie campaigns consist of observing marine megafauna from oceanographic vessels during IFREMER's fisheries campaigns
- Place of shooting: Channel
- Origin of the fund: Parc naturel marin des estuaires picards et de la mer d'Opale; "Territories and biodiversity as an objective"
- Free keywords: Megascopie campaign; Birds flying; Fool; Photo competition 2018; Hauts-de-France - Normandy selection
- Photographer: Benjamin Guichard
- Credit: Benjamin Guichard / French Biodiversity Office

Page 8:

- Date of shooting: 17/04/2010
- Title: Birds seen by Biotope
- Caption: For most of the year, the parasitic jaeger (*Stercorarius parasiticus*) is a pelagic species, although it rarely strays more than 50 kilometres from the coast.
- Place of shooting: Espiguette
- Origin of the fund: Headquarters
- Free keywords: Bird flying; Labbe
- Photographer: Xavier Rufray
- Credit: Xavier Rufray / Biotope
- End date: 28/06/2021
- Additional credit:
- Protected area: Natura 2000/Special Area of Conservation - ZSC/Occitanie/FR9102014/Bancs sableux de l'Espiguette;
- Natural environment:
- Shooting: Outdoor;
- Thesaurus Keywords: Rights/External author; Biodiversity/Wildlife/Chordates/Birds/Stercorariidae/Parasitic skua (*Stercorarius parasiticus*)

page 11:

- Date of shooting: 26/05/2017
- Title: Focus on... seals
- Caption: Grey seal (*Halichoerus grypus*) basking on the rocks of the Etoc archipelago.
- Place of shooting: Penmarc'h
- Origin of the fund: Headquarters
- Free keywords: Marine mammal; Seal; Natura 2000 area; Resting place
- Photographer: Cécile Gicquel
- Credit: Cécile Gicquel / French Biodiversity Office
- Protected area: Natura 2000/Special Area of Conservation - ZSC/Bretagne/FR5312009/Roches de Penmarc'h;
- Natural environment: Marine;
- Shooting: Outdoor;
- Thesaurus Keywords: Rights/Public Agent; Oceans and Seas/Atlantic Ocean/Atlantic Coast; Biodiversity/Wildlife/Chordates/Mammals/Carnivores/Phocids/Grey Seal (*Halichoerus grypus*);
- Geographical area: Metropolis

Page 14:

- Date of shooting: 17/09/2014
- Title: On the trail of the U95 wreck
- Caption: Trawl net trapped on the wreck of the U95, a submarine reported missing by the Germans on 06 February 1918
- Place of shooting: Channel
- Origin of the fund: Marine Natural Park of the Picardy Estuaries and the Opal Sea
- Free keywords: Wreck; Diver
- Photographer: Nicolas Job
- Credit: Nicolas Job / French Biodiversity Office
- End date: 02/09/2024
- Protected area: Marine Natural Park/Parc naturel marin des estuaires picards et de la mer d'Opale;

- Natural environment:
- Shooting: Submarine;
- Thesaurus Keywords: Rights/External author/Fee-paying contract; Oceans and Seas/Atlantic Ocean/Channel-North Sea; Human activity/Sport and leisure/Scuba diving/Wreck diving;
- Geographical area: Metropolis

Page 17:

- Date of shooting: 16/07/2015
- Title: Underwater atmosphere
- Caption: Cave in the seabed of Cape Corse
- Place of shooting: Cap Corse
- Origin of the fund: Cape Corse and Agriate Marine Natural Park
- Free keywords: Cave;Pebble
- Photographer: Sylvain Michel
- Credit: Sylvain Michel / French Biodiversity Office
- Protected area: Marine Natural Park/Cape Corse and Agriate Marine Natural Park;
- Natural environment:
- Shooting: Submarine;
- Thesaurus Keywords: Rights/Public Agent; Oceans and Seas/Atlantic Ocean/Mediterranean; Environments and Landscapes/Underwater Landscape;
- Geographical area: Metropolis

Page 25:

- Date of shooting: 11/09/2012
- Title: Monitoring of the lobster box
- Caption: Release of a lobster after tagging
- Place of shooting: Chaussée de Sein
- Origin of the fund: Iroise Natural Marine Park
- Free keywords: Scientific monitoring;Tagging;Field action;Lobster box
- Photographer: Armel Bonneron
- Credit: Armel Bonneron / French Biodiversity Office
- Protected area: Marine Natural Park/Iroise Marine Natural Park;
- Natural environment:
- Shooting:
- Thesaurus Keywords: Rights/Public Agent; Oceans and Seas/Atlantic Ocean/Atlantic Coast/Iroise Sea Page

32

- Date of shooting: 17/10/2014
- Title: MEDSEACAN 3D
- Caption: Located at a depth of 200 m, the 'rocky peak' of the Cassidaigne canyon has been modelled in 3 dimensions. This biodiversity hotspot is a spectacular site. The interest of 3D modelling is to visually archive a site that is difficult to access and to establish a micro-map of sessile benthic species.
In this picture: white coral (*Madrepora oculata*).
- Place of shooting: Cassidaigne Canyon
- Origin of the fund: Mediterranean Antenna
- Free keywords: Knowledge acquisition campaign;Oceanographic campaign;MEDSEACAN;Mediterranean Canyon;Underwater exploration;White coral
- Photographer:
- Credit: French Biodiversity Office / Comex
- Protected area: National Park/Calanques National Park;
- Natural environment: Marine;
- Shooting: Submarine;
- Thesaurus Keywords: Rights/Public Agent; Oceans and Seas/Atlantic Ocean/Mediterranean;
- Geographical area: Metropolis

Page 32:

- Date of shooting: 05/08/2010
- Title: Scientific monitoring
- Caption: Diver sampling the sandy bottom as part of the CRAPO project (characterisation of the diet of brittle stars populations)
- Place of shooting: Iroise
- Origin of the fund: Iroise Natural Marine Park
- Free keywords: Fauna survey,Scientific monitoring,Scientific diving,Diver,Park agent,CRAPO,Sampling,Ophiure;Field action;Best-of
- Photographer: Yannis Turpin

- Credit: Yannis Turpin / French Biodiversity Office
- Protected area: Marine Natural Park/Iroise Marine Natural Park;
- Natural environment:
- Shooting: Submarine;
- Thesaurus Keywords: Rights/Public Agent; Oceans and Seas/Atlantic Ocean/Atlantic Coast/Iroise Sea; Biodiversity/Wildlife/Echinoderm/Ophiuroids;
- Geographical area: Metropolis

Page 36:

- Date of shooting: 07/11/2008
- Title: Exploring the canyons of the Mediterranean
- Caption: Preparation of the submarine for an exploratory dive of the Mediterranean submarine canyon heads, an ambitious operation to improve the knowledge of these submarine valleys
- Place of shooting: Mediterranean Canyon
- Origin of the fund: Headquarters; Parc naturel marin du golfe du Lion
- Free keywords: Mediterranean Canyon; Underwater exploration; ROV; Technology; Oceanographic campaign; Knowledge acquisition campaign; MEDSEACAN
- Photographer: Olivier Brosseau
- Credit: Olivier Brosseau / French Biodiversity Office
- Protected area: Marine Natural Park/Marine Natural Park of the Gulf of Lion;
- Natural environment:
- Shooting:
- Thesaurus Keywords: Rights/Public Agent; Oceans and Seas/Atlantic

Ocean/Mediterranean Page 42 :

- Date of shooting: 21/02/2019
- Title: Mussel farming activity
- Caption: Mussel farming activities during winter (February) on the Bouchots of the Saumonards beach
- Place of shooting: Oléron Island
- Origin of the fund: Marine Natural Park of the Gironde Estuary and the Pertuis Sea
- Free keywords: Mussel farming; Bouchot mussels
- Photographer: Cécile Barreaud
- Credit: Cécile Barreaud / French Biodiversity Office
- Protected area: Parc naturel marin/Parc naturel marin de l'estuaire de la Gironde mer des Pertuis;
- Natural environment:
- Shooting: Exterior; Tight shot;
- Thesaurus Keywords: Rights/Public Agent; Oceans and Seas/Atlantic Ocean/Atlantic Coast/Biscay Bay;
- Geographical area: Metropolis

Page 59:

- Date of shooting: 12/07/2018
- Title: Focus on... seals
- Caption: Group of grey seals (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*)
- Place of shooting: Authie Bay
- Origin of the fund: Marine Natural Park of the Picardy Estuaries and the Opal Sea
- Free keywords: Seals; Tourist traffic
- Photographer: Benjamin Guichard
- Credit: Benjamin Guichard / French Biodiversity Office
- Protected area: Marine Natural Park/Parc naturel marin des estuaires picards et de la mer d'Opale;
- Natural environment: Marine;
- Shooting: Exterior; Overall plan;
- Thesaurus Keywords: Rights/Public Agent; Oceans and Seas/Atlantic Ocean/Channel/North Sea; Biodiversity/Wildlife/Chordates/Mammals/Carnivores/Phocids/Grey Seal (*Halichoerus grypus*); Biodiversity/Wildlife/Chordates/Mammals/Carnivores/Phocids/Calf Seal (*Phoca vitulina*);
- Geographical area: Metropolis

Page 61:

- Date of shooting: 13/10/2017
- Title: Focus on... dolphins
- Caption: Randy, a solitary dolphin, in Douarnenez Bay near Belem.
- Place of shooting: Douarnenez Bay
- Origin of the fund: Iroise Marine Natural Park; "Territories and biodiversity in the objective"
- Free keywords: Dolphin; Marine mammal; The Belem; Traditional boat; Tall ship; Photo contest 2018; Selection Bretagne - Pays de la Loire; Selection "Tous à Lille"; Winner photo contest 2018
- Photographer: Livier Schweyer

- Credit: Livier Schweyer / French Biodiversity Office
- Protected area: Marine Natural Park/Iroise Marine Natural Park;
- Natural environment: Marine;
- Shooting: Outdoor;
- Thesaurus Keywords: Rights/Public Agent; Biodiversity/Wildlife/Chordates/Mammals/Cetaceans/Delphinids/Big dolphin (*Tursiops truncatus*); Oceans and Seas/Atlantic Ocean/Atlantic Coast/Iroise Sea;
- Geographical area: Metropolis

Page 74:

- Date of shooting: 12/06/2019
- Title: On the coast
- Caption: Atmosphere and landscape, Fort-Mahon beach.
- Place of shooting: Fort-Mahon
- Origin of the fund: Marine Natural Park of the Picardy Estuaries and the Opal Sea
- Free keywords: Beach;Grass
- Photographer: Sylvain Dromzée
- Credit: Sylvain Dromzée / French Biodiversity Office
- Protected area: Marine Natural Park/Parc naturel marin des estuaires picards et de la mer d'Opale;
- Natural environment: Land;
- Shooting: Exterior; Tight shot;
- Thesaurus Keywords: Rights/Public Agent;
- Geographical area: Metropolis

Page 82:

- Date of shooting: 16/07/2015
- Title: Focus on... jellyfish
- Caption: Pelagia (Pelagia noctiluca): this jellyfish always swims close to the surface and likes temperate and warm areas
- Place of shooting: Cap Corse
- Origin of the fund: Cape Corse and Agriate Marine Natural Park
- Free keywords: Medusa
- Photographer: Sylvain Michel
- Credit: Sylvain Michel / French Biodiversity Office
- Protected area: Marine Natural Park/Cape Corse and Agriate Marine Natural Park;
- Natural environment:
- Shooting: Submarine;
- Thesaurus Keywords: Rights/Public Agent; Oceans and Seas/Atlantic Ocean/Mediterranean; Biodiversity/Wildlife/Cnidarians/Scyphozoa/Semiostomes/Pelagiids/Pelagia (Pelagia noctiluca)
- Geographical area: Metropolis

Ministry of the Sea
Interregional Directorate
for the North Atlantic-
West Channel
2 boulevard Allard
BP 78 749 - 44187
Nantes Cedex 4 www.dirm.nord-atlantique-manche-ouest.developpement-durable.gouv.fr

