SUMMARY OF THE MONITORING PROGRAMMES

FOR THE MARINE STRATEGIES,

FIRST CYCLE(2012-2018)

EsMarEs
Marine Strategies of Spain, protecting the sea for all

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1. UNDERLYING CRITERIA OF MONITORING PROGRAMMES

Article 11 of the Marine Strategy Framework Directive (D. 2008/56/EC, MSFD) states that Member States shall design and implement monitoring programmes enabling the continuous assessment of environmental status.

These programmes shall be based on the existing monitoring procedures in accordance with other Directives or obligations, specifically the Water Framework Directive (D. 2000/60/EC), the Birds and Habitats Directives (D. 2009/147/EC and D. 92/43/EC), and the Regional Sea Conventions (RSCs) which, in the case Spain, are the OSPAR Convention for the protection of the Marine Environment of the North-east Atlantic and the Barcelona Convention for the protection of the marine environment and the coastal area of the Mediterranean.

This document includes the proposal of monitoring programmes for the five Spanish marine strategies. Likewise, these monitoring programmes shall meet the monitoring obligations arising from several Biodiversity Directives and Regional Sea Conventions (OSPAR and Barcelona).

For the purpose of reaching a consensus among all the European countries on the content of the monitoring programmes, it has been established that the basic criteria to be followed by the monitoring programmes are:

- The main purpose of the monitoring programmes is the continuous assessment of the environmental status of the marine environment, and of the environmental objectives of the marine strategies. The remaining elements of Article 11 (1) and (2), as well as Annex V of the MSFD, are detailed specifications for this purpose. One of these specifications is that the following elements should be considered:
    - The elements of Annex I of the Law for the Protection of the Marine Environment (essential features and characteristics, pressures and impacts);
    - Criteria and indicators applicable to each descriptor;
    - The environmental targets set for each Member State;
    - The Monitoring Programmes shall provide information for establishing if Good Environmental Status (GES) is achieved and if the environmental targets are met.
- Monitoring programmes shall be coordinated (in concepts, in parameters), compatible (with other existing monitoring requirements), coherent (regarding

sampling strategies), consistent (regarding methodologies and standards), and comparable (data and methodologies may be compared among Member States).

- They shall be organised on the basis of the existing monitoring programmes (Birds and Habitats Directives, Water Framework Directive, OSPAR and Barcelona Conventions).
- The resulting data shall be filled and shared in an interoperable way, considering the process of "Marine Knowledge 2020[1]".
- Programmes shall be adaptive in order to tackle emerging issues.
- The monitoring process shall be linked to the assessment needs, using an approach based on the risk analyses and the precautionary approach.
- Differences shall be taken into account regarding the existing scientific knowledge in relation to different GES descriptors.

All this set of recommendations and principles has been taken into account in the design process of the monitoring programmes of the first cycle of the Marine Strategies of Spain.

[1] Green Book Marine Knowledge 2020: from the cartography of seafloors to the oceanic forecasts.

2. REGIONAL COORDINATION FOR THE MARINE MONITORING PROCESS

Spain has marine waters in two marine regions: the North-east Atlantic and the Mediterranean.

Within the North-east Atlantic, Spanish waters are divided in two marine subregions: Bay of Biscay and Iberian coasts, and the Macaronesian subregion (Canary Islands).

The first one of these subregions is included in the geographic scope of the OSPAR Convention. For the marine North Atlantic and South Atlantic subdivisions, some monitoring programmes associated with the obligations of this Convention were implemented some time ago, providing very important information for the initial assessment of marine strategies. These monitoring programmes, derived from OSPAR, are an essential tool for regional cooperation.

Along with this, within the OSPAR framework, a great deal of work has been carried out over recent years in order to improve coordination between the contracting parties of the Convention. Common indicators have been established for monitoring and joint assessment in the North-east Atlantic. Likewise, "candidate" indicators have been defined, which include those requiring a greater methodological development before their inclusion as common indicators. Among them, the "priority candidates" are those for which there is great commitment on the part of the Contracting Parties[2].

OSPAR works in accordance with a common monitoring strategy, named JAMP (Joint Assessment and Monitoring Program). In 2017, as a first result of the implementation of the common strategy, JAMP, a joint assessment on the environmental status of the marine environment in the Atlantic region was carried out ("Intermediate Assessment"), which will provide the basis for the review of the initial assessment that Member States will carry out in 2018. In this regard, in 2021, the QSR ("Quality Status Report") will be published.

With regard to the Canary Islands (Macaronesian region), marine waters in this archipelago are not covered by any Regional Sea Convention (RSC), so the coordination process is performed bilaterally with Portugal, the only Member State that shares this subregion with Spain.

[2] For further information on common indicators and candidates, please check document VI.1. Indicators of Monitoring Programmes:
http://www.mapama.gob.es/es/costas/temas/proteccion-medio-marino/vi1_anexo_fichas_indicadores_tcm30-130955.pdf

Regarding the Mediterranean marine region, within the Barcelona Convention, the Ecosystem Approach Process has been implemented. As part of the ECAP, a set of common indicators have been established and a common monitoring programme has been designed.

This proposal on common indicators for the Mediterranean is based, like the OSPAR, on indicators that have already been used within the MEDPOL framework (Assessment and Control Programme of Marine Pollution), but with new contributions, in particular regarding biodiversity and littering aspects.

Finally, in order to reinforce coordination of monitoring among the 8 Mediterranean Member States, a specific project was undertaken, financed by the European Commission, which enabled the agreement of a set of common indicators for the eight countries, as well as the design of some descriptive fact-sheets of the monitoring programmes for the descriptors of noise, litter, eutrophication, pollution and contaminants in fish.

3. PREPARATION
PROCESS OF THE MONITORING PROGRAMMES (MP)

The definition of environmental targets and associated indicators, established in 2012 for each of the five marine subdivisions and approved by Agreement of the Council of Ministers, was taken as the starting point for the preparation of the monitoring programmes.[3] Therefore, establishing the monitoring programmes is the fourth stage of the design of marine strategies, first undertaken in 2012, and is in line with the work previously carried out.

The preparation of the MPs was structured as follows:

- Scientific-technical discussion on indicators.
- Inventory of existing monitoring programmes, critical analysis and proposal for integration of same within the monitoring programmes of marine strategies.
- Proposal of the structure of programmes and subprogrammes, included in the design of new monitoring programmes.
- Discussion with the authorities responsible for the monitoring of each component, and agreements on the final design of such programmes.

The design of monitoring programmes has been made considering the scope based on the "risk analysis" (recommended by the EC). This aspect is especially relevant in the case of Spain, with more than 1 million km^2 of marine water under sovereignty and jurisdiction. Within this reality, monitoring programmes based on "traditional" approaches (regular samplings, grids, etc.) cannot be used in many situations. For this reason, considering the results of the initial assessment, data collection has been prioritised in those components/areas identified as areas subject to a concentration of pressure or areas especially valuable due to their natural components, or both.

3.1. Indicators Proposal

The monitoring programs shall provide information on the elements, pressures and impacts on the marine environment included in Annex III of the MSFD, following the criteria and the indicators of the Community Decision regarding Good Environmental Status, as well as on the indicators related to the environmental targets of the marine strategies. Monitoring programmes of the first cycle were prepared based on the GES Decision 2010/477/EU, and

[3] Resolution of 13 November 2012, of the State Secretariat for the Environment, which sets forth the Agreement of the Council of Ministers of 2 November 2012, which approves the environmental targets of the Spanish marine strategies. (Spanish Official State Gazette No. 285, Tuesday 27 November 2012)

the one stated herein, which was subsequently replaced by Decision 2017/848, after an in-depth review.

Monitoring programmes shall be based on the assessment and monitoring provisions established by the Community Law. Within this legislative background, the monitoring process established by the Water Framework Directive (Dir. 2000/6/EC) and associated directives such as the Birds Directive (Dir. 2009/147/EC) and the Habitats Directive (Dir. 1992/43/EC). On the other hand, th RSCs have gained considerable experience in the coordinated monitoring of the marine environment, and for decades they have guaranteed supranational cooperation so that similar sampling and analysis methods may be used by several countries within a marine region. The indicators proposed in the RSCs may be useful for the monitoring programmes of the marine strategies.

This document includes the proposal of the indicators that will form part of the monitoring programmes of the Spanish marine strategies, using the definition of the Community Directive, which establishes that an **indicator** is a parameter, or a combination of parameters, chosen to represent (indicate) a specific situation or aspect and to simplify a complex reality. Within the context of the MSFD implementation, the indicators are specific attributes of each GES criterion, which can be measured in order to apply these criteria, enabling the monitoring of the subsequent change in the attribute over time.

The level of development of the established indicators has considered the level of scientific knowledge for each one of the GES descriptors.

3.1.1. Biodiversity indicators (Descriptors 1, 4 and 6)

Decision 2010/477/EU sets lays down the criteria and the indicators in order to define the GES at species, population, habitat and ecosystem levels. Descriptors 1 (Biodiversity), 4 (Food webs) and 6 (Integrity of the seafloor) have been jointly managed due to the bonds existing among them, making the data and information needs in order to develop them partially shared.

The proposal of indicators for the biodiversity descriptors is summarised in the following table:

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	ESAL	LEBA	CAN

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	ESAL	LEBA	CAN
AV-Dem	Demographic features of the population	D1	AV	AV2, AV4, AV5	X	X	X	X	X
AV-Dist	Distribution range and pattern of the populations	D1	AV	AV1, AV3, AV5	X	X	X	X	X
AV-Est	Ecosystem Structure (Biodiversity)	D1	AV	AV3	X	X	X	X	X
AV-Tam	Size of the populations (reproductive)	D1	AV	AV1, AV2, AV3, AV5	X	X	X	X	X
AV/RT-Abu	Abundance of key feeding groups (sea birds)	D4	AV	AV2, AV3, AV4	X	X	X	X	X
HB-RangBat	Bathymetric range	D1	HB	HB1, HB2, HB3, HB4, HB5,HB6	X	X	X	X	X
HB-RangGeo	Geographic range	D1	HB	HB1, HB2, HB3, HB4 HB5,HB6, HB7	X	X	X	X	X
HB-PerdHab	Habitat loss area	D6	HB	HB1, HB2, HB3, HB4, HB6, HB7	X	X	X	X	X
HB-ÁreaAfec	Habitat area affected significantly by human activities	D6, D7	HB	HB8	X	X	X	X	X
HB-Bio	Area percentage occupied by biogenic substrate	D1, D6	HB	HB1, HB2, HB3, HB4, HB7	X	X	X	X	X
HB-Daño	Physical damage to habitats	D6	HB	HB8	X	X	X	X	X
HB-Est	Quantifying the structural species	D1, D6	HB	HB1, HB2, HB5, HB3, HB4, HB7	X	X	X	X	X
HB-MMI	Multimetric indices	D6	HB	HB1, HB2, HB3, HB4, HB7,	X	X	X	X	X

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HB-Riq	Species richness	D1, D6	HB	HB1, HB2, HB5, HB3, HB4, HB7	X	X	X	X	X
HB-Div	Diversity	D1, D6	HB	HB1, HB2, HB3, HB4, HB7	X	X	X	X	X
HB-TSC	Composition of typical species	D1, D6	HB	HB1, HB2, HB3, HB4, HB5,HB7	X	X	X	X	X
HB-DMAInv 1	WFD benthic invertebrates (BOPA and MEDOCC)	D1, D6	HB	HB2			X	X	
HB-DMAInv 2	WFD benthic invertebrates (BO2A)	D1, D6	HB	HB2	X				
HB-DMAInv 3	WFD benthic invertebrates (M-AMBI)	D1, D6	HB	HB2		X			
HB-DMAMa c1	WFD macroalgae (CARLIT)	D1, D5, D6	HB	HB1, HB7			X	X	
HB-DMAMa c2	WFD macroalgae (RICQI)	D1, D5, D6	HB	HB1, HB7	X				
HB-DMAMa c3	WFD macroalgae (CFR)	D1, D5, D6	HB	HB1, HB7	X				
HB-DMAang io	WFD Angiosperms (POMI and Valencian)	D1, D6	HB	HB5				X	
HB-DemP	Demographic characteristics of grasslands of *P. oceanica*	D1, D5	HB	HB5			X	X	
HB-CondAm bP	Environmental conditions in grasslands of marine	D1	HB	HB5		X	X	X	X

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	angiosperms								
HB-Op	Abundance of opportunistic organisms in grasslands of angiosperms	D1, D5, D6	HB	HB5		X	X	X	X
HP-Bio	Evolution of biodiversity indices (diversity, species richness, equity, dominance) of planktonic components	D1	HP	HP2	X	X	X	X	X
HP-Abu	Evolution of abundance / biomass of key species, key groups and types of plankton size.	D1, D4, D5	HP	HP1, HP2	X	X	X	X	X
HP/RT-Lifeform	Changes in indices of functional groups of plankton (life forms)	D1, D4, D5, D6	HP	HP2	X	X	X	X	X
RT-LFI	Proportion of big fish	D1, D4	PC	PC4	X	X	X	X	
RT-MTI	Change in the average feeding level of predatory species	D1, D4	AV, MT, PC, HB	PC4	X	X	X	X	X
RT-Fito	Phytoplankton production	D1, D4, D5	HP, EUT	HP1, HP2	X	(X)	(X)	(X)	(X)
RT-Zoo	Evolution of abundance / biomass of key species, key groups and types	D1, D4	HP	HP2	X	(X)	(X)	(X)	(X)

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	ESAL	LEBA	CAN
	of plankton size.								
MT-Dem	Demographic features of the population (e.g. mortality rate)	D1	MT	(MT1, MT2, MT3) MT4, MT5	X	X	X	X	X
MT-Dist	Distribution range and pattern of the populations	D1	MT	MT1, MT2, MT3	X	X	X	X	X
MT-Tam	Population size	D1	MT	MT1, MT2, MT3	X	X	X	X	X
PC-Rango	Distribution range of characteristic species	D1	PC	PC2, PC3, PC4, PC5	X	X	X	X	X
PC-Pat	Distribution pattern of characteristic species	D1	PC	PC1, PC2, PC3, PC4, PC5	X	X	X	X	X
PC-Abu	Abundance/weigh t of populations of characteristic demersal species	D1	PC	PC1, PC2, PC3, PC4, PC5	X	X	X	X	X
PC/EC-MML	Maximum average size of fish and demersal elasmobranchs	D1, D3	PC	PC4, EC1, EC2	X	X	X	X	
PC/EC-P95	Evolution of 95th percentile of the size distribution	D1, D3	PC	PC4, EC1, EC2	X	X	X	X	
PC-Bycatch	Demersal elasmobranch by-catch	D1	PC	(PC4)	(X)	(X)	(X)	(X)	(X)
PC-CSF	Conservation status of fish UICN	D1	PC	PC4	X	X	X	X	

Table 1. Proposed indicators for the biodiversity descriptors (D1, D4 and D6)

Some features regarding design of indicators depending on the different functional types are listed as follows:

Indicators for fish and cephalopods: these are based on the information and data obtained from the resources assessment campaigns organised around the Common Fisheries Policy and co-funded by the European Union. These scientific campaigns developed under a methodology that is quite standardised also provide valuable information on several non-commercial species.

Indicators for marine mammals (cetaceans) and reptiles (turtles):

During the initial assessment of marine mammals and turtles, the term "management unit" was proposed for marine mammals and turtles, as the ensemble of animals belonging to a species that live in a determined area where the management of human activities is applied and the GES is assessed. Indicators MT-Dist, MT-Tam and MT-Dem are applied to these management units.

Bird indicators:

Spain has a great diversity of sea birds, although these populations appear to be few in number; that is why there has been an attempt to prioritise as evaluation elements those most appropriate according to their geographical representation (well-distributed species within each marine subdivision), ecological representativeness (selection of different species with different habitat requirements and differences in their reproductive biology), seasonality (species in both reproductive and non-reproductive seasons), threat level, existence of information and existence of monitoring programmes (or programmes that may be easily implemented). For each marine subdivision, certain species have been prioritised, and populations of species with limited representation but sensitive and worthy of monitoring have also been included in the monitoring process.

Indicators for benthic habitats:

Regarding benthic habitats, a total of 22 indicators (some of them corresponding to groups of indicators), related to the distribution (area) of the habitat, the composition and quantification of species associated with that habitat and the condition (status) of the structural species.

Indicators for pelagic habitats:

Pelagic habitats are classified according to their hydrodynamic characteristics, which imply a direct relationship with descriptor D7 (hydrographic conditions). The proposed indicators have low resilience to specific pressures (unusual procedures, changes of system, global change) and, within the MSFD framework, are considered as relevant for the adoption of management measures, applicable at a regional level. These three indicators also provide information for assessing Good Environmental Status (GES) in relation to descriptors D2, D3, D4 y D5, and HP/RT-lifeform in relation to descriptors D6 and D4

Indicators for food webs (Descriptor 4)

The associated criteria and indicators that appeared in Commission Decision 2010/477/EU were not considered appropriate for assessing the Good Environmental Status of food webs, as in no cases did they consider the feeding interactions among different compartments of the ecosystem. For this reason, the set of indicators of the Spanish monitoring programmes, with respect to D4, include all the compartments of the ecosystem, from phytoplankton to sea birds, and they are intended to fill these gaps.

3.1.2. Indicators for non-indigenous species (Descriptor 2)

Indicators for non-indigenous species show the duality in this descriptor, since these species are both an integral element of ecosystems and a pressure over the same. However, these indicators by themselves are not enough for assessing GES, since, although the detection of non-indigenous species in an area is proof of non-optimal status, it does not necessarily prevent the environmental status from being classified as good, because what is relevant is not the mere presence of non-indigenous species, but their impact upon the local biota.

In order to assess fulfilment of the environmental targets regarding this descriptor if there is no direct evidence available on its negative effect, it has been proposed to carry out this evaluation indirectly, linking it to the indicators developed for other descriptors, essentially those on biodiversity (1, 4 and 6).

Thus, the indicators finally proposed result from the direct transposition or from the specification of those proposed by the Group of Experts organised by the JRC and the DG-ENV (European Commission).

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					NOR	SUD	ESAL	LEBA	CAN
EAI-Ratio	EIA / native species ratio	D2	EIA	EA1, EA2, EA3, EA4, EA5	X	X	X	X	X
EAI-Tasa	EIA introduction rate (in a defined term)	D2	EIA	EA1, EA2, EA3, EA4, EA5	X	X	X	X	X
EAI-Tend	Trends in abundance, temporal frequency and spatial distribution of non-indigenous species	D2	EIA	EA1, EA2, EA3, EA4, EA5	X	X	X	X	X
EAI-Imp	EIA Impacts	D2	EIA	EA1, EA2, EA3, EA4, EA5	X	X	X	X	X

Table 2. Indicators proposed for non-indigenous species (D2)

3.1.3. Indicators of commercially exploited species (Descriptor 3)

The level of GES achievement is assessed exclusively in relation to those stocks that have indicators defined in Decision 2010/477/EU; this is the only way of assessing GES accepted by the Commission.

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	ESAL	LEBA	CAN
EC-F	Fishing mortality (F)	D3	EC	EC1, EC2	X	X	X	X	X
EC-SSB	Spawning stock biomass (SSB)	D3	EC	EC1, EC2	X	X	X	X	X
EC-Biomasa	Biomass index	D3	EC	EC1, EC2	X	X	X	X	X
EC-Captura	Catches /Biomass ratio	D3	EC	EC1, EC2	X	X	X	X	X
EC-Large	Proportion of fish larger than the mean size of the first sexual	D3	EC	EC1, EC2	X	X	X	X	X

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	ESAL	LEBA	CAN
	maturation								
EC-Size	Size at first sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation	D3	EC	EC1, EC2	X	X	X	X	X
PC/EC-MML	Mean maximum length across all species found in research vessel surveys	D3, D1	EC	EC1, EC2, PC3, PC4, PC5	X	X	X	X	X
PC/EC-P95	95% percentile of the fish length distribution observed in research vessel surveys	D3, D1	EC	EC1, EC2, PC3, PC4, PC4	X	X	X	X	X

Table 3. Indicators proposed for the monitoring process of Descriptor 3

3.1.4. Indicators for eutrophication (Descriptor 5)

The election of eutrophication indicators has been made considering the requirements of Commission Decision 2010/477/EU, the aspects already taken into account in the assessment of the state of coastal waters in accordance with Water Framework Directive and the agreements reached within the framework of Regional Sea Conventions.

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	LEBA	ESAL	CAN
EUT-Nutri	Nutrient concentration in the water column	D5	EUT	EUT.1, EUT.2	X	X	X	X	X

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	LEBA	ESAL	CAN
EUT-Ratio	Nutrient molar ratios	D5	EUT	EUT.1, EUT.2	X	X	X	X	X
EUT-Cloro	Chlorophyll a	D5	EUT	EUT.1, EUT.2	X	X	X	X	X
EUT-Trans	Transparency of the water column	D5	EUT	EUT.1, EUT.2	X	X	X	X	X
EUT-Fito	Abundance of diatoms and flagellates	D5	EUT	EUT.1, EUT.2	X	X	X	X	X
EUT-O2	Oxygen concentration	D5	EUT	EUT.1, EUT.2	X	X	X	X	X
EUT-Mor	Organic matter in the water column	D5	EUT	EUT.1, EUT.2			X	X	
EUT-Red	Red tide	D5	EUT	EUT.1, EUT.2	X	X	X	X	

Table 4. Summary of eutrophication indicators proposed within the MSFD framework

3.1.5. Indicators for hydrographic alterations (Descriptor 7)

Descriptor 7 is aimed at identifying possible alterations of the "hydrographic conditions" in the marine environment due to human actions, where applicable characterising its interference with marine ecosystems.

Indicators for descriptor 7 consider the pressure level (7.1.1, the extension of the area affected by permanent alterations) and the impact level (7.2.1, space extension of habitats affected by permanent alterations and 7.2.2, changes in habitats and functions developed therein).

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	LEBA	ESAL	CAN
AH-VarGE	Variability and trends in hydrography and/or large-scale circulation	D7	AH	AH1	X	X	X	X	X
AH-AreaInfr	Extension of areas affected by infrastructures localised in maritime domain or effluents. Alteration of the hydrographic and hydrodynamic system	D7	AH	AH2	X	X	X	X	X
AH-ChanHab	Changes in habitats due to alterations in the hydrographic conditions.	D7	AH	AH1, AH2	X	X	X	X	X

Table 5. Summary of indicators for hydrographic alterations proposed within the MSFD framework

3.1.6. Indicators for contaminants (Descriptor 8)

The purpose of the Marine Strategy in relation to descriptor 8 is to ensure that concentrations of contaminants do not reach levels giving rise to pollution effects.

Chemical indicators have been established in the three matrices (water, sediment and biota) in order to measure the concentration of different substances. With regard to the biota indicators, as an indicator organism common to all the marine subdivisions, the mussel has been selected, which can provide a view of contaminants in the water column and in the most coastal area where its habitat is located.

Two more indicators have also been included, which cover the efforts made in the scope of the WFD in coastal waters: the concentration of substances identified as priorities in D. 2008/105/EC and its reviews (CONT-DMA-A indicator) and other water contaminants and the analysis of hexachlorobutadiene in marine biota (CONT-HCBD-b indicator), since, in the case of this contaminant, it is the matrix chosen by the WFD for its monitoring process.

A monitoring process will also be carried out on activity indices and concentrations of different radionuclides, measured in the marine environment by means of the

Environmental Radiological Surveillance Programme (CSN), which collects data from different points of the five subdivisions (CONT-Radmedio indicator).

A register of significant acute pollution events (CONT-Agu indicator) will be maintained, based on information provided by the Directorate General for the Merchant Navy.

Finally, it is intended to integrate the existing information in relation to the analysis of faecal coliforms (*E. coli*) and enterococcus in water, collected from the sanitary control of bathing water carried out by the competent authorities (CONT-micro indicator). This information is generated and forwarded by the Autonomous Regions to the Ministry of Health, Social Services and Equality in order to comply with the current regulations on quality required for bathing waters and is publicly available on the website http://nayade.msc.es/

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	ESAL	LEBA	CAN
CONT-WFD-A	Concentration of priority substances and other contaminants in coastal waters (WFD)	D8	CONT	CONT1	X	X	X	X	X
CONT-HCBD-B	Hexachlorobutadiene concentration in marine biota	D8	CONT	CONT1	X	X	X	X	X
CONT-Met-b	Metal concentration in biota (Hg, Cd, Pb)	D8	CONT	CONT 1, CONT 2	X	X	X	X	(X)
CONT-Met-s	Metal concentration in sediment (Hg, Cd, Pb)	D8	CONT	CONT 1, CONT 2	X	X	X	X	(X)
CONT-OE-s	Organotin compound concentration in sediment	D8	CONT	CONT 1, CONT 2	X	(X)	(X)	(X)	(X)
CONT-PAH-b	PAH concentration in biota	D8	CONT	CONT 1	X	X	X	X	(X)
CONT-PAH-s	PAH concentration in sediment	D8	CONT	CONT 1, CONT 2	X	X	X	X	(X)
CONT-PBDE-b	PBDE concentration in biota	D8	CONT	CONT 1, CONT 2	X	X	(X)	(X)	(X)
CONT-PBDE-s	PBDE concentration in sediment	D8	CONT	CONT 1, CONT 2	X	X	(X)	(X)	(X)

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	ESAL	LEBA	CAN
CONT-PCB-b	PCB concentration in biota	D8	CONT	CONT 1, CONT 2	X	X	X	X	(X)
CONT-PCB-s	PCB concentration in sediment	D8	CONT	CONT 1, CONT 2	X	X	X	X	(X)
CONT-PO-b	Concentration of lindane in biota and its isomers in biota, DDT and its metabolites, hexachlorobenzene, dieldrin, endrin, isodrin, aldrin.	D8	CONT	CONT 1, CONT 2	X	X	X	X	(X)
CONT-PO-s	Concentration of lindane in sediment and its isomers in biota, DDT and its metabolites, hexachlorobenzene, dieldrin, endrin, isodrin, aldrin.	D8	CONT	CONT 1, CONT 2	X	X	X	X	(X)
CONT-AChE	Neurotoxic effects: Inhibition of the acetilcholinesterase enzyme activity	D8	CONT	CONT 1, CONT 2	X	X	X	X	(X)
CONT-Cl	Larval growth of sea urchins	D8	CONT	CONT 1, CONT 2	X	X			(X)
CONT-EROD	EROD	D8	CONT	CONT 1, CONT 2	-	-	X	X	-
CONT-Imp	Imposex	D8	CONT	CONT 1	X	X	(X)	(X)	(X)
CONT-Inter	Intersex in fish	D8	CONT	CONT 1, CONT 2	-	-	(X)	(X)	-
CONT-LMS	Stability of the lysosomal membrane	D8	CONT	CONT 1	X	X	X	X	
CONT-Mb	Metabolite concentration of PAHs in fish bile	D8	CONT	CONT 1, CONT 2	X	X	X	X	X
CONT-Mn	Frequency of micronuclei (MN)	D8	CONT	CONT 1, CONT 2	(X)	-	X	X	-

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	ESAL	LEBA	CAN
CONT-MT	Concentration of metallothioneins: indicator of exposure to biologically-active concentrations of heavy metals.	D8	CONT	CONT 1	-	-	X	X	-
CONT-SFG	Scope for Growth	D8	CONT	CONT 1	X				
CONT-SoS	Stress on stress: biomarker of general stress in mussels	D8	CONT	CONT1			X	X	
CONT-Radmedio	Radioactivity in the marine environment	D8	CONT	CONT 3	X	X	X	X	X
CONT-Agu	High pollution episodes	D8	CONT	CONT4	X	X	X	X	X
CONT-Micro	Microbiological pollution in bathing waters	D8	CONT	CONT5	X	X	X	X	X

Table 6. Summary of contaminant indicators proposed within the MSFD framework

3.1.7.Contaminant indicators for fish (Descriptor 9)

The criterion for Good Environmental Status applicable to descriptor 9 is that marine contaminants, pathogens and biotoxins in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards. The contaminants considered are:

- Metals: cadmium (Cd), mercury (Hg), lead (Pb).
- Total amount of dioxins (PCDDs/Fs), total amount of dioxins and polychlorinated biphenyls similar to dioxins (DL-PCBs) and total amount of polychlorinated biphenylsno similar to dioxins (NDL-PCBs) (congeners 28, 52, 101, 138, 153 and 180).
- Polycyclic aromatic hydrocarbons (PAHs): benzo(a)pyrene and the sum of 4 PAHs
- Marine biotoxins in bivalve molluscs
- *Escherichia coli* and *salmonella* in bivalve molluscs, marine gastropods, echinoderms and tunicates

The indicators established in the monitoring programmes are: actual levels of contaminants that have been detected; the number of contaminants which have exceed the maximum regulatory levels; the frequency with which said regulatory levels are exceeded, and the microbiological quality and the marine biotoxins, present in fish and other seafood for human consumption.

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	LEBA	ESAL	CAN
CP-Niv	Actual levels of contaminants detected in fish and other seafood for human consumption	D9	CP	CP.1	X	X	X	X	X
CP-Pat	Pathogens in bivalve molluscs, gastropods, echinoderms and tunicates and marine biotoxins in bivalve molluscs.	D9	CP	CP.2	X	X	X	X	X
CP-Frec	Frequency with which regulatory levels are exceeded in fish and other seafood for human consumption.	D9	CP	CP.1	X	X	X	X	X
CP-Num	Number of contaminants in fish and other seafood for human consumption which have exceeded maximum regulatory levels.	D9	CP	CP.1	X	X	X	X	X

Table 7. Summary of contaminant indicators for fish and other seafood products for human consumption

3.1.8. Indicators for marine litter (Descriptor 10)

Criteria for the good environmental status regarding Descriptor 10 are that the properties and amounts of marine litter do not become harmful for the marine and coastal environment. Decision 2010/477/EU includes four specific indicators for monitoring characteristics of marine litter and its impacts in marine life. The indicators proposed for the monitoring programmes of the five Spanish marine subdivisions are:

- Indicator BM-Pla, litter in beaches, which aims at studying trends in the amount of litter washed ashore and/or deposited on coastlines;
- Indicator BM-Fon, litter on the seafloor, which will partially addressed the indicator 10.1.2. of Decision 2010/477/EU, by monitoring the trends in the amount of litter deposited on the sea floor;

- Indicator BM-Flo, floating litter, will complete indicator 10.1.2. by monitoring trends in the amount of litter present in the water column (including that floating on the surface);
- Indicator BM-Mic, microparticles in water and in sediments, will be addressed to indicator 10.1.3., trends in the amount of microparticles, its distribution and, if possible, its composition (in particular that of microplastic ones);
- Indicator BM-Micplaya, plastic microparticles in beaches, will collect information on the total number and mass of microplastics counted in a representative sample of beaches of each marine subdivisions;
- Indicator BM-Bio will address indicator 10.2.1. of Decision 2010/477/EU, by monitoring the trends in the amount and composition of litter ingested by marine animals. A specific approach is required for each region or subregion that will determine differences among marine subdivisions.

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	LEBA	ESAL	CAN
BM-Pla	Litter in beaches	D10	BM	BM1	X	X	X	X	X
BM-Flo	Floating litter	D10	BM	BM2	X	X	X	X	X
BM-Fon	Litter on the seafloor	D10	BM	BM3	X	X	X	X	X
BM-Mic	Microparticles in water and in sediments	D10	BM	BM4,BM5	X	X	X	X	X
BM-Micplaya	Plastic microparticles in beaches	D10	BM	BM6	X	X	X	X	X
BM-Bio	Littering impact in biota	D10	MT, AV	MT5, AV5	X	X	X	X	X

Table 8. Summary of indicators for marine littering proposed within the MSFD framework

3.1.9. Indicators for underwater noise (Descriptor 11)

The purpose of the MSFD regarding descriptor 11 is to limit the introduction of underwater noise caused by anthropogenic sources to levels that do not adversely affect the marine environment.

Two indicators have been established in the monitoring programmes: one for impulsive noise and other for environmental noise, on which some regional and European technical groups are working in order to develop comparable methodologies for monitoring noise.

CODE	INDICATOR	RELATED DESCRIPTOR	PROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
					NOR	SUD	LEBA	ESAL	CAN
RS-Imp	Impulse noise	D11	RS	RS1	X	X	X	X	X
RS-Amb	Environmental noise	D11	RS	RS2	X	X	X	X	X

Table 9. Summary of indicators for underwater noise proposed within the MSFD framework

3.1.10. Indicators associated to pressures and activities

Given that monitoring programmes must include all the relevant elements of Annex I of the Law for the Protection of the Marine Environment considered in the initial assessment, a battery of indicators aimed at collecting information on the main pressures affecting the marine environment has been developed. These pressures are:

- Inputs from rivers: The purpose is to collect information regarding the % of reduction of natural inputs of watersheds due to consumptive uses (indicator PRES.1-1), the average storage of reservoirs located in watersheds (indicator PRES.1-2), nutrient loads provided (indicator ICOM-P-3) and hazardous substance loads provided (indicator ICOM-P-4).
- Atmospheric deposition: from available modellings of programmes, such as EMEP (European Monitoring and Evaluation Programme), a monitoring of nutrient loads provided (indicator ICOM-P-3) and hazardous substance loads provided (indicator ICOM-P-4) will be carried out.
- Occasional sources of contamination: The purpose is to collect information on land-sea discharges, and in particular: the number, location and types of discharge (indicator PRES.3-5), nutrients loads provided (indicator ICOM-P-3) and hazardous substances loads provided (indicator ICOM-P-4), organic matter loads provided (indicator PRES.3-4), salinity of waste water of desalination plants (indicator PRES.3-3) and, in the case of thermal discharges, effluent temperature (indicator PRES.3-1). It is also intended to collect information on direct discharges without proper treatment (indicator PRES.3-2). In the case of the Levante-Balearic Islands

subdivision, information on radioactive effluents from the Vandellós I and Vandellós II nuclear power plants will be included (indicator PRES.3-6).

CODE	INDICATOR	RELATED DESCRIPTOR	SUBPROGRAMME WHICH IT BELONGS TO (Doc. VI.3)	MARINE SUBDIVISIONS				
				NOR	SUD	LEBA	ESAL	CAN
ICOM-P-1	Extracted sediment	D6	ACT 4, ACT 7	X	X	X	X	X
ICOM-P-2	Sealed bottom	D6,D7	ACT 4, ACT 7, ACT 8	X	X	X	X	X
ICOM-P-3	Nutrients loads provided	D5	PRES 1, PRES 2, PRES 3	X	X	X	X	X
ICOM-P-4	Contaminating substance loads provided	D8, D9	PRES 1, PRES 2, PRES 3, ACT 4	X	X	X	X	X
PRES.1-1	Reduction of natural inputs of watersheds due to consumptive uses	D7	PRES.1	X	X	X	X	
PRES.1-2	Average storage in reservoirs in watersheds	D7	PRES.1	X	X	X	X	
PRES.3-1	Thermal discharges	D7	PRES.3	X	X	X	X	X
PRES.3-2	Direct discharges without a proper treatment	D5	PRES.3	X	X	X	X	X
PRES.3-3	Waste water from desalination plants	D7	PRES.3			X	X	X
PRES.3-4	Organic matter loads provided	D5	PRES.3	X	X	X	X	X
PRES.3-5	Land-sea discharges (localisation)	D5, D7, D8, D9	PRES.3	X	X	X	X	X
PRES.3-6	Radioactivity in effluents	-	PRES.3			X		

Chart 10. Summary of pressure indicators proposed within the MSFD framework

Likewise, a monitoring of the main activities developed in each subdivision is essential. The indicators included in the monitoring programmes are the following:

CODE	INDICATOR	RELATED DESCRIPTOR	SUBPROGRAMME WHICH IT BELONGS TO	MARINE SUBDIVISION				
				NOR	SUD	LEBA	ESAL	CAN

CODE	INDICATOR	RELATED DESCRIPTOR	SUBPROGRAMME WHICH IT BELONGS TO	MARINE SUBDIVISION				
				NOR	SUD	LEBA	ESAL	CAN
ACT.1-1	Fishing effort	D1,D3,D4,D6,D10	ACT 1	X	X	X	X	X
ACT.1-2	Fishing, shellfish harvesting or harvesting involving other marine invertebrates	D1,D3,D4	ACT 1	X	X	X	X	X
ACT.1-3	Areas of mollusc production and red coral fishing	D1,D3,D4,D6	ACT 1	X	X	X	X	
ACT.2-1	Cable and pipe laying	D6	ACT 2	X	X	X	X	X
ACT.2-2	Number, position and surface occupied by artificial reefs	D6	ACT 2	X	X	X	X	X
ACT.3-1	Aquaculture production	D3,D4,D5,D8	ACT 3	X	X	X	X	X
ACT.3-2	Location of marine aquaculture facilities	D2,D3,D4,D5,D6, D8	ACT 3	X	X	X	X	X
ACT.4-1	Discharge of drainage materials to the sea	D6	ACT 4	X	X	X	X	X
ACT.4-2	Loading/unloading potential contaminants	D8	ACT 4	X	X	X	X	X
ACT.4-3	Harbour facilities	D7	ACT 4	X	X	X	X	X
ACT.5-1	Maritime traffic per type of vessel	D8,D10,D11	ACT 5	X	X	X	X	X
ACT.5-2	Mooring impact	D6	ACT 5	X	X	X	X	X
ACT.5-3	Authorised scuttling or sinking resulting from navigation accidents	D6	ACT 5	X	X	X	X	X
ACT.6-1	Marinas and berths	D6	ACT 6	X	X	X	X	X
ACT.6-2	Recreational fishing licenses	D1,D3,D4	ACT 6	X	X	X	X	X
ACT.6-3	Number of authorised whale-watching companies	D1	ACT 6			X	X	X
ACT.6-4	Number of whale- watching trips in a specific period	D1	ACT 6			X	X	X
ACT.6-5	Non-regulated anchoring impact	D6	ACT 6	X	X	X	X	X
ACT.7-1	Sand contributions in beaches	D6,D7	ACT 7	X	X	X	X	X
ACT.7-2	Proportion of artificial coast	D6,D7	ACT 7	X	X	X	X	X
ACT.7-3	Coastal defence facilities	D6,D7	ACT 7	X	X	X	X	X

CODE	INDICATOR	RELATED DESCRIPTOR	SUBPROGRAMME WHICH IT BELONGS TO	MARINE SUBDIVISION				
				NOR	SUD	LEBA	ESAL	CAN
ACT.8-1	Hydrocarbon exploration boreholes	D6	ACT 8	X	X	X	X	X
ACT.8-2	Amount of extracted hydrocarbons	D6,D8	ACT 8	X	X	X		
ACT.8-3	Injected gas to be stocked.	D6,D8	ACT 8	X				
ACT.8-4	Seismic acquisition	D11	ACT 8	X	X	X	X	X

Table 11. Summary of indicators of human activities proposed within the MSFD framework

3.1.11. Indicators related to operative environmental targets

These targets are characterised by identifying specific needs that must be met in the form of one or several measures. Therefore, the operative environmental targets can be considered the seed of future measurement programmes.

The associated indicators proposed for such targets are mostly indicators related to the application degree of one or several measures as an indirect way of assessing the effectiveness thereof.

INDICATOR CODE	INDICATOR	RELATED DESCRIPTOR	RELATED PROGRAMME (Doc. VI.3)	MARINE SUBDIVISIONS				
				NOR	SUD	ESTAL	LEVBAL	CAN
OP1	Existence of the coordination system for monitoring programmes of strandings and accidental bycatch	D1, D4	AV/MT	X	X	X	X	X
OP2	Existence of surveillance systems for the marine environment	All	Horizontal	X	X	X	X	X
OP3	Percentage of the marine subdivision included in the Spanish Network of Marine Protected Areas	D1, D6	AV/MT/PC/HB/HP	X	X	X	X	X
OP4	Existence and application of management plans	D1, D6	AV/MT/PC/HB/HP	X	X	X	X	X
OP5	Percentage of the marine subdivision included in the	D1	AV/MT/PC/HB/HP	X	X	X	X	X

INDICATOR CODE	INDICATOR	RELATED DESCRIPTOR	RELATED PROGRAMME (Doc. VI.3)	MARINE SUBDIVISIONS				
				NOR	SUD	ESTAL	LEVBAL	CAN
	Natura 2000 Network							
OP6	Percentage of spaces of the Natura 2000 Network with management plans approved and being applied.	D1	AV/MT/PC/HB/HP	X	X	X	X	X
OP7	Existence of risk analysis processes	D8	CONT	X	X	X	X	
OP8	Number of studies on atmospheric deposition	D5	EUT	X	X	X	X	X
OP8	Number of studies on pollution and its effects	D8	CONT	X	X	X	X	X
OP8	Number of studies on marine litter	D10	BM	X	X	X	X	X
OP8	Number of studies on underwater noise	D11	RS	X	X	X	X	X
OP9	Reviews of the catalogues of endangered species	D1	AV/PC/MT	X	X	X	X	X
OP10	Number of international initiatives	D1, D3, D4	MT/AV/PC	X	X	X	X	X
OP11	Number of initiatives on social participation and assessment of their results	All	Horizontal	X	X	X	X	X
OP12	Number of initiatives, projects and coordination meetings	All	Horizontal	X	X	X	X	X
OP13	Existence of management plans for activities and/or uses	D1, D3, D6	HB/MT/EC	X	X	X	X	X
OP14	Percentage of EIA studies including alterations in hydrographic conditions	D7	AH	X	X	X	X	X
OP15	Percentage of hydrological plans that consider marine ecosystems when establishing ecological flows	D7	AH	X	X	X	X	X
OP16	Access and quality level of the information available on the marine environment	All	Horizontal	X	X	X	X	X

INDICATOR CODE	INDICATOR	RELATED DESCRIPTOR	RELATED PROGRAMME (Doc. VI.3)	MARINE SUBDIVISIONS				
				NOR	SUD	ESTAL	LEVBAL	CAN
OP17	Proportion of the surface of the marine subdivision studied	D1, D6	HB	X	X	X	X	X
OP18	Proportion of coastal habitats studied	D1, D6	HB	X	X	X	X	X
OP18	Proportion of deep habitats studied	D1, D6	HB	X	X	X	X	
OP19	Availability of useful information for the assessments of recreational or professional fishing and shellfish activity	D1,D3,D4	EC					X
OP8	Number of scientific studies and projects on the effect of human activities on habitats	D1, D6, D8, D10	HB/CONT/BM	X	X	X	X	X
OP8	Number of studies carried out on the presence, spatial distribution, abundance and impact of non-indigenous species	D2	EIA	X	X	X	X	X
OP20	Percentage of the area of the marine subdivision covered by regular detection programmes	D2	EIA	X	X	X	X	X
OP21	Existence of the national system for the monitoring of hydrographic variability and oceanic hydrodynamics	D1, D7	AH/HP	X	X	X	X	X
OP22	Percentage of fishing products in point of first or second-hand sale from known origin	D9	CP	X	X	X	X	X
OP23	Existence of control programmes	D1, D2, D3, D4	HB/EIA	X	X	X	X	X
OP24	Number of measures for action on roads and vectors	D2	EIA	X	X	X	X	X
OP25	Number of invasive species and surface object of actions to eradicate or reduce	D2	EIA	X	X	X	X	X

Table 12. Indicators related to operative environmental targets

3.2 Inventory of existing monitoring programmes

One of the pillars of monitoring programmes of the marine strategies is that they must be organised based on existing programmes, aimed at optimising efforts and avoiding duplications. Therefore, the environmental monitoring to protect the marine environment carried out in order to comply with other directives has to be considered and integrated, and complemented with specific actions for determining those aspects of the environmental status of the marine environment set forth in the MSFD that have not been addressed.

The inventory of existing programmes has been supported by four information sources, which have been obtained, analysed and integrated in the design of monitoring programmes of the Spanish marine strategies:

- Monitoring derived from other European directives:

Integrating monitoring procedures of the European Directives into the MSFD monitoring programmes involves a series of difficulties: differences of approaches for assessing the status, different work scales or the need to homogenise methodologies among the corresponding authorities.

- Monitoring derived from the OSPAR and Barcelona Conventions
- The monitoring process carried out within the framework of other obligations, such as the Community Framework for collecting, managing and using data of the fishing industry (DCF) of the Common Fishing Policy and the annual data collection campaigns , coordinated by the ICES in the Atlantic area and the campaigns of the MEDITs in the Mediterranean area (*Mediterranean International Bottom Trawl Survey*).
- The monitoring process carried out by other agents: there are several agents in Spain that, due to research interests (research centres, universities) or due to environmental protection (environmental organisations), are carrying out or have carried out monitoring processes that may have inspired, or have been integrated within, the monitoring programmes of the strategies.

Between April 2013 and January 2014, a questionnaire was distributed to collect valuable information on those monitoring process carried out in Spain, being distributed in the following forums:

- Inter-Ministerial Commission for Marine Strategies
- Working Group of Marine Strategies of the MAGRAMA
- Environment Sector Conference

- Conferences "Current/emerging programmes, systems and technologies for monitoring"

The Directorate General for Coastal and Marine Sustainability also sent a specific request for information on the monitoring procedures included in their competency to coastal Autonomous Regions and Autonomous Cities.

The information gathered has been compiled in a register that includes 352 monitoring processes, most of them sent by scientific institutions and universities (39.5%) or Autonomous Regions (35%). The General State Administration, in particular the Directorate General for Fishery Resources and Aquaculture of the MAGRAMA, although the Directorate General for Water and other Ministries or Autonomous Organisations are also involved, was responsible for 13.6% of the received responses. NGOs and environmental associations represent 11.9% of the questionnaires received and the remaining 0.3% corresponds to the private sector.

3.3. Structure of monitoring programmes of the marine strategies

The programme/subprogramme structure is established for the most part by the working groups of the European Commission. Such groups agreed to establish a programme for each descriptor of Good Environmental Status, except in the case of Descriptors 1, 4 and 6 ("biodiversity descriptors") in which a program was proposed for each component of biodiversity, namely: birds, mammals and reptiles, fish and cephalopods, benthic habitats and pelagic habitats.

There are 13 monitoring programmes of the Spanish marine subdivisions, covering 65 specific subprogrammes. In addition to the specific programmes for the GES descriptors, a set of subprogrammes on pressure (PRES) and human activities (ACT) have been designed which, given their transversal nature, do not belong to a single programme, but are included in all those programmes where they provide useful information to assess the corresponding descriptor. Finally, all the programmes have a subprogramme of operative indicators (OP) aimed at obtaining the data required for feeding the indicators associated with the established environmental targets relating to the corresponding descriptor.

The indicators to be covered have been identified in each one of these subprogrammes, as well as the existing programmes that may contribute to generating useful information for such subprogramme. Based on the previous analysis, the additional needs to be addressed in each subprogramme have been identified.

It is worth highlighting that all the details provided above (indicators proposal, programme/subprogramme structure and analysis of existing programmes/detection of gaps

in coverage) have been set forth for the 5 marine subdivisions, but respecting the singularity of each. Once the gaps have been detected, specific proposals are collected in other to cover them. It is important to point out that these proposals will be covered gradually, and their implementation will be assumed by the competent authorities in each case. Likewise, those cases in which the gap solution will suffer a delay have been detected.

Programmes	Number of subprogrammes	Related descriptors
AV. Biodiversity- Birds	5	D1, D4
MT. Biodiversity- Mammals and turtles	6	D1, D4
PC. Biodiversity- fish and cephalopods	4	D1, D4
HB. Biodiversity- Benthic habitats	9	D1, D4, D6
HP. Biodiversity- Pelagic habitats	2	D1, D4
EIA. Non-indigenous species	5	D2
EC. Commercial species	2	D3
EUT. Eutrophication	3	D5
AH. Hydrographic alterations	2	D7
CONT. Contaminants	5	D8
CP. Fish contaminants	2	D9
BM. Marine litter	7	D10
RS. Underwater noise	2	D11
PRES. Pressures	3	All
ACT. Human activities	8	All

Table 13. Monitoring programmes of the marine strategies

3.3.1. AV programme: Biodiversity - Birds

The sea birds (AV) programme has been divided into five subprogrammes. In addition, the programme covers two more subprogrammes: ACT1, which assesses fishing activity, as it is a pressure for bird populations, and the OP subprogramme, which collects a set of indicators of operative environmental targets directly or indirectly affecting birds.

AV. Biodiversity- Birds Subprogrammes	Indicators (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied

AV. Biodiversity-Birds Subprogrammes	Indicators (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
AV.1. Census in colonies	Av-Tam Av-Dist (Av/RT-Abu) (Av-Est)	Autonomous Region / MAGRAMA	NOR: 162, 163, 164 LEBA: 074, 080	The spatial coverage is not complete; regularity is not always guaranteed. Some species / subdivisions insufficiently analysed	NOR, SUD, LEBA, ESAL
AV.2. Productivity	Av-Tam Av-Dem (Av-Abu)	Autonomous Region / MAGRAMA	NOR: , 164 LEBA: 074, 080, LEBA, ESAL, CAN: 166	Some species / subdivisions insufficiently analysed	NOR, SUD, LEBA, ESAL
AV.3. Census in the sea	Av-Tam Av-Dist Av/RT-Abu Av-Est (Av-Dem) (BM/Bio)	MAGRAMA / IEO (MINECO)	All DM: 165	The spatial coverage is not complete	All
AV.4. Interaction with fishing activity.	AV-Dem	MAGRAMA / IEO (MINECO)	All DM: 009 NOR, SUD, LEBA, ESAL: 167 LEBA: 074, 080, 082	Systematising the information and a more specific knowledge in certain fishing arts are required	All
AV.5 Additional data	AV-Tam AV-Dist AV/RT-Abu AV-Est AV-Dem BM-Bio	Other	LEBA, ESAL, CAN: 166 NOR, SUD, LEBA, ESAL: 167 LEBA: 074, 080, 082 CAN: 007l	Beached bird monitoring and standardisation of information in bird recovery centres.	All
ACT.1. Fisheries (*)	ACT.1-1 ACT.1-2 ACT.1-3	MAGRAMA / Autonomous Region	NOR:001,182,184,285,310 SUD:002, 265, 270,272,273,274,275,276,277-279,280,283,284 ESAL: 003, 264, 265, 266, 270, 272, 275, 277,280,284 LEBA:003, 159, 264, 266,267,268, 270,272,275,277, 280,284 CAN:004,241, All DM: 005	Yes	All

AV. Biodiversity-Birds Subprogrammes	Indicators (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
OP. Subprogrammes of Operative indicators	OP1, OP2, OP3, OP4, OP5, OP6, OP9, OP10, OP11, OP12, OP16	MAGRAMA	--	Yes	All

Table 14. Subprogrammes that can be integrated in the AV programme

(*) All existing programmes related to ACT-1 are included, although some of the programmes included in this subprogramme are not directly related to the interaction of fishing activity and birds.

3.3.2 MT programme: Biodiversity – Mammals and turtles

Monitoring subprogrammes included within the MT programme are:

MT. Biodiversity-Mammals and turtles Subprogrammes	Indicators (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
MT.1. Coastal cetaceans	MT-Tam MT-Dist	MAGRAMA / Autonomous Regions	Potentially integrable: NOR: 106, 107, 110, 115, 141, 239 SUD: 317 ESAL: 043, 317 LEBA: 66, 66bis, 117, 118 CAN: 196	Some UGs more known than others. Current monitoring processes not guaranteed	All
MT.2. Oceanic cetaceans	MT-Tam MT-Dist	MAGRAMA	Potentially integrable: NOR: 115 LEBA: 117, 118, 148, 192, 207, 208 ESAL: 192 CAN: 194, 195, 198, 201,	There are no regular monitoring processes	All
MT.3. Turtles	MT-Tam MT-Dist	MAGRAMA	Potentially integrable: NOR:141 SUD, ESAL: 123 LEBA: 065, 065bis, 123, 192	Investments must be made in marking and monitoring	All

MT. Biodiversity-Mammals and turtles Subprogrammes	Indicators (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
MT.4. Interaction with fishing	MT-Dem	MAGRAMA	Potentially integrable: NOR: 103, 104	There is no a specific monitoring programme and, therefore, the subprogramme partially covers this lack	All
MT.5. Cetacean and reptile strandings	MT-Dem BM-Bio	Autonomous Regions / MAGRAMA	Integrable: NOR: 102, 141, SUD:123 ESAL: 123 LEBA: 065, 065bis, 067, 123	Investments must be made in coordination, protocols and standardisation	All
MT.6. Additional data	Other [4]	Other	NOR: 114 LEBA: 081, 119, 149 CAN: 007l, 007p, 197 (200), 199, 202, 203, 204	Work must be done in collection and standardisation	All
RS.1. Temporal and special distribution of low and high-frequency impulse noise	RS-Imp	MAGRAMA / MINETUR	--	It is a new-design monitoring programme	All
RS.2. Continuous low-frequency noise	RS-Amb	MAGRAMA	--	It is a new-design monitoring programme	All

[4] MT.6 is not designed to provide a specific response to any of the proposed environmental targets, but it can provide basic information to improve knowledge on species and populations, their habitats and the threats they face

MT. Biodiversity-Mammals and turtles Subprogrammes	Indicators (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
ACT.1. Fisheries (*)	ACT 1.1	MAGRAMA / Autonomous Regions	NOR:001,182-184,285, 310 SUD:002, 264,265, 270, 272, 273, 274, 275,276,277, 279, 280, 283,284 ESAL: 003, 264, 265, 266, 270, 272, 275, 277,280,284 LEBA:003, 159,264, 266,267,268, 270, 272,275,277,280, 284 CAN:004,241, All DM: 005	Yes, all the parameters for all the DM	All
ACT.5. Navigation	ACT.5-1 ACT.5-2 ACT.5-3	MFOM / MAGRAMA	LEBA: 061	Yes, an analysis of the marine traffic in all the Marine Subdivisions is required.	All
ACT.6. Recreational activities	ACT.6-3 ACT.6-4	Autonomous Regions / MAGRAMA	--	Yes, the indicators are newly created	All
OP. Subprogrammes of Operative indicators	OP1, OP2, OP3, OP4, OP5, OP6, OP9, OP10, OP11, OP12, OP13, OP16	MAGRAMA	--	Yes, the indicators are newly created	All

Table 15. Subprogrammes integrated in the MT programme

(*) All existing programmes related to ACT-1 are included, although some of the programmes included in this subprogramme are not directly related to the interaction of fishing activity and mammals or turtles.

3.3.3. PC programme: Biodiversity – Fish and cephalopods

Monitoring subprogrammes included within the PC programme are:

PC. Biodiversity-fish and cephalopods Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine Suddivisions in which it will be applied
PC.1-Infralittoral fish and cephalopods of rocky bottoms	PC-Abu PC-Rango PC-Pat	MAGRAMA / Autonomous Regions	LEBA: 007d, 062a ,062b , 064 , 069 , 134 , 156 , 158 , 191	Most of the monitoring procedures are focused on Marine Protected Areas	All
PC.2. Fish and cephalopods of pelagic areas	PC-Abu PC-Rango PC-Pat	IEO MAGRAMA	NOR: 239 SUD: 240 LEBA, ESAL: 314	The existing campaigns of pelagic resources have to be complemented with methodologies that may enable the development of indicators related to descriptor 1	All
PC.3-Circalittoral and bathyal fish and cephalopods of rocky bottoms	PC-Abu PC-Rango PC-Pat	IEO MAGRAMA	--	This stratum has not been generally assessed regarding the fish component.	All
PC.4-Circalittoral and bathyal fish and cephalopods of sedimentary bottoms	PC-Abu PC-Rango PC-Pat EC/PC-P95 EC/PC-MML PC-CSF PC-Bycatch RT-LFI RT-MTI	IEO MAGRAMA	NOR: 205 SUD: 237 LEBA, ESAL: 238	Expanding the sampling process in the depth range 30-70 m and regarding depths > 500 m. Intercalibration campaign	NOR, SUD, ESAL, LEBA

PC. Biodiversity-fish and cephalopods Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine Suddivisions in which it will be applied
ACT.1. Fisheries	ACT 1.1 ACT.1-2 ACT.1-3	MAGRAMA / Autonomous Regions	NOR:001,182-184,285-310 SUD:002, 264,265, 270-72, 273, 274, 275,276,277-279, 280-283, 284 ESAL: 003, 264, 266, 270- 272, 275, 277, 280, 284 LEBA:003, 159, 264, 266,267,268, 270-72, 275, 277, 280,284 CAN:004,241, All: 005	Yes	All
ACT.6. Recreational activities	ACT.6-2	Autonomous Regions / MAGRAMA	--	--	All
OP. Subprogrammes of Operative indicators	OP2, OP3, OP4, OP5, OP6, OP9, OP10, OP11, OP12, OP16	MAGRAMA	--	Yes	All

Table 16. Subprogrammes that can be integrated in the PC programme

3.3.4. HB programme: Biodiversity - Benthic habitats

Monitoring subprogrammes included within the HB programme are:

Subprogrammes	Indicators (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied

Subprogrammes	Indicators (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
HB.1- Rocky infralittoral habitats	HB-Bio HB-Div HB-Est HB-MMI HB-PerdHab HB-RangBat HB-RangGeo HB-Riq HB-TSC	Autonomous Regions / MAGRAMA	NOR: 150, 152, 154 LEBA: 007a, 007b, , 007g, 062a, 062b, 134, 156, 186a SUD, ESAL and LEBA: 120, 124 ESAL: 130 CAN: 007o	Current coverage insufficient since the existing programmes are focused in specific areas, generally in protected marine spaces	All
HB.2- Sedimentary infralittoral habitats	HB-Div HB-Riq HB-MMI. HB-TSC HB-DMAInv1 HB-DMAInv2 HB-DMAInv3	Autonomous Regions MAGRAMA	NOR: 041, 083, LEBA: 007b, 007g, 062b, 075,077, 134, 168, 169, 186 SUD, ESAL and LEBA: 086, 087,	Additional needs are required. A progressive expansion of parameters and indicators should be necessary[5]	All:
HB.3- Rocky circalittoral and bathyal habitats	HB-RangBat HB-RangGeo HB-Div HB-Riq HB-Est HB-MMI HB-TSC HB-Bio HB-PerdHab	MAGRAMA (**)	---	These habitats are generally little prospected. At least, the EMP will be covered.	All:
HB.4- Sedimentary circalittoral and bathyal habitats	HB-RangBat HB-RangGeo HB-Div HB-Riq HB-Est HB-MMI HB-TSC HB-Bio HB-PerdHab	MAGRAMA (**)	NOR: 205 SUD: 237 LEBA, ESAL:238	Complementing the existing monitoring process should be convenient	NOR, SUD, ESAL, LEBA:
HB.5- Intertidal and infralittoral habitats of marine angiosperms	HB-RangBat HB-RangGeo HB-Est HB-DemP HB-CondAmbP HB-TSC HB-OP HB-Riq HB-DMAAngio	Autonomous Regions / MAGRAMA	CAN: 007ñ, NOR: 041 LEBA: 024, 062b, 075, 145, 168, 169, 171, 186b, 188, 189, 219, 222 ESAL: 130 ESAL, LEBA: 215 SUD: 223	Some species (Cymodocea and Zostera) are not appropriately covered. There is not a stable monitoring process in the Canary Islands	ESAL, LEBA, CAN, (SUD))
HB.6-BEN: Protected benthic invertebrates	HB- PerdHab HB-RangBat HB-RangGeo	Autonomous Regions MAGRAMA	SUD, LEBA, ESAL: 120, 124 ESAL: 130 LEBA: 007b, 007c, 007e, 007f, 007g, 062b, 147, 156	Not all the protected species have an appropriate monitoring	All

[5] Specific methodological proposals (submitted by the IEO) are taken into account in order to meet the needs, which will not be implemented in this first cycle of the marine strategy.

Subprogrammes	Indicators (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
HB7- Intertidal habitats (rocky and sedimentary)	HB-RangBat HB-RangGeo HB-Div HB-Riq HB-Est HB-MMI HB-TSC HB-Bio HB-PerdHab HB-DMAMac	Autonomous Region (*)	NOR: 041, 070, 083 LEBA: 062b, 075, 156, 171	The existing monitoring procedures only cover some parameters, which are not sometimes the same in each Autonomous Region. .[6] There are not such programmes in the Canary Islands.	NOR, LEBA
HB.8- Interaction with human activities	HB-AreaAfec HB-Daño HB-PerdHab	MAGRAMA	--	The success of this subprogramme will depend on the development of the related HB and ACT subprogrammes	All
HB. 9- Additional data	Several [7]	MAGRAMA	NOR: 128, 151, 153 LEBA: 056	Works must be done in order to establish collection and standardisation mechanisms when necessary	All
ACT.1. Fisheries (***)	ACT 1.1 ACT.1-2 ACT.1-3	MAGRAMA Autonomous Region	NOR:001,182-184,285-310 SUD:002, 264,265, 270-72, 273, 274, 275,276,277-279, 280-283, 284 ESAL: 003, 264, 266, 270- 272, 275, 277, 280, 284 LEBA:003, 159, 264, 266,267,268, 270-72, 275, 277,280,284 CAN:004,241, All: 005	Yes	All:
ACT.2. Cable and pipe laying and artificial reefs	ACT.2-1 ACT.2-2	Autonomous Region / MAGRAMA	-	Yes, all the parameters for all the DM	All:

[6] Specific methodological proposals (submitted by the IEO) are taken into account in order to meet the needs, which will not be implemented in this first cycle of the marine strategy.

[7] HB9 is not designed to provide specific responses to any of the proposed environmental targets, but it can provide basic information to improve knowledge on benthic habitats and the threats they face.

Subprogrammes	Indicators (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
ACT.4. Port activities	ICOM-P-1 ICOM-P-2 ACT.4-1 ACT.4-3	MAGRAMA State Ports MFOM	All DMs: 230	Yes, sealed surface, surface affected by the discharge of drainage materials and issues related to infrastructures are new parameters to be collected.	All:
ACT.6. Recreational activities	ACT.6-5	Autonomous Region / MAGRAMA	--	--	All:
ACT.7. Coastal defence activities	ICOM-P-1 ICOM-P-2 ACT.7-1 ACT.7-2 ACT.7-3	MAGRAMA	LEBA: 060 SUD, ESAL: 096, 097, 098, 100	Yes, some parameters in all the DM	All:
OP. Subprogrammes of Operative indicators	OP2, OP3, OP4, OP5, OP6, OP8, OP11, OP12, OP13, OP16, OP17, OP18, OP23	MAGRAMA	—	Yes	All:

Table 17. Subprogrammes that can be integrated in the HB programme

(*) The competency is the autonomous region's in general, except marine protected areas which are managed by the State
(**) Except in MPAs with ecological continuity, where the competency is the autonomous region's.
(***) All existing programmes related to ACT-1 are included, although some of the programmes included in this subprogramme are not directly related to the interaction of fishing activity and benthic habitats.

3.3.5. HP programme: Biodiversity - Pelagic habitats

Monitoring subprogrammes included within the HP programme are:

HP. Biodiversity – Pelagic habitats. Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs	Marine subdivisions where it is applied

HP. Biodiversity – Pelagic habitats. Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs	Marine subdivisions where it is applied
HP1. Pelagic habitats in coastal zone	HP-Abu (HP-Bio) (RT-Fito)	Autonomous Region / IEO/ MAGRAMA	NOR: 029, 041, 083, 178, 179 SUD: 031 SUD, LEBA, ESAL: 086, 087, 095 LEBA, ESAL: 030, 039 LEBA: 017, 019, 020, 024, 142, 144, 168, 169, 186b ESAL: 026 CAN: 032	Insufficient spatial coverage in the Canary Islands. Not all the planktonic groups have been analysed. Not optimal temporal frequency	All
HP2. Pelagic habitats of continental shelf and margin and oceanic areas, including the mesopelagic zone of the water column	HP/RT-Lifeform HP-Abu HP-Bio RT-Fito RT-Zoo PH	Autonomous Region / IEO / MAGRAMA	NOR: 015, 029, 033 SUD: 031 LEBA, ESAL: 030 CAN: 032	Some marine subdivisions do not have an appropriate coverage	All
ACT.3. Aquaculture	ACT.3-1 ACT.3-2	Autonomous Region / MAGRAMA	All DM: 231	Yes, there is only aggregated information on the activity	All
PRES.1. Inputs from rivers	PRES.1-1 PRES.1-2 ICOM-P-3 ICOM-P-4	MAGRAMA / Autonomous Region	LEBA, ESAL: 228 NOR, SUD: 014 NOR, SUD, ESAL, LEBA: 224	N	NOR, SUD, ESAL, LEBA
PRES.2. Atmospheric depositions	ICOM-P-3 ICOM-P-4	AEMET / EMEP Centres	NOR, SUD, ESAL, LEBA: 234	Yes, it is necessary to cover the Canarian subdivision	All
PRES.3. Occasional contaminating sources	PRES.3-5 ICOM-P-3 ICOM-P-4 PRES.3-4 PRES.3-1 PRES.3-2 PRES.3-3	MAGRAMA / Autonomous Region	LEBA: 172-174, 190, 226,227 All DMs: 193	Yes, what is related to desalination plants and thermal discharges	All
CONT.5. Microbial pathogens in water	CONT.5-Micro	MSSSI / Autonomous Region	All marine subdivisions:233 LEBA: 170, 225,	No	All

HP. Biodiversity – Pelagic habitats. Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs	Marine subdivisions where it is applied
OP. Subprogrammes of Operative indicators	OP2, OP3, OP4, OP5, OP6, OP11, OP12, OP16, OP21	MAGRAMA	—	Yes	All

Table 18. Subprogrammes that can be integrated in the HP programme

3.3.6. Descriptor 4: Biodiversity – Food webs

Descriptor 4 (Food webs) is not associated with a specific monitoring programme. Its assessment is included in the other programmes/subprogrammes belonging to Descriptors 1 (Biodiversity), and 6 (Integrity of seafloors), with considerable overlap between the food web descriptor and those relating to indicators and parameters to be monitored within the monitoring programmes. Presented below are the indicators that affect the monitoring of the good environmental status of food webs and, for each of them, the monitoring subprogrammes containing the evaluation of the parameters necessary to respond to these indicators:

- AV/RT-Abu indicator: Abundance of key feeding groups (sea birds): subprogrammes AV.3 and AV.5
- RT-Fito: Phytoplankton production, HP/RT-Lifeform: Changes in the indexes of the phytoplankton community and RT-Zoo: Biomass, composition of species and spatial distribution of zooplankton: HP.1 and HP.2 subprogrammes
- RT-LFI: Proportion of large fish and RT-MTI: Change in the trophic guilds of predatory species: PC.4 subprogramme
- RT-Func: Biomass and abundance of functional groups (and pending development, RT-BTS: Changes of distribution of biomass and species by trophic levels or sizes and T-Ena: Analysis of ecological networks)

The development of criteria for D4 must be addressed to establish more integrative and functional indicators that take into account multiple trophic levels or an approach to the system as a whole. The data collection to respond to these indicators will therefore be integrated in almost all of the D1 Monitoring Programmes, as well as in those D2 and D5 subprogrammes which take an analytical approach to existing communities and the variations produced therein by the disturbances in question.

The RT-BTS indicator is more focused on fish communities and, therefore, the related subprogrammes will be those focused on the assessment of fish communities (Fish and Cephalopods Biodiversity Programme), as well as some subprogrammes of the Benthic Habitat-Biodiversity Programme, like HB4, where the ichthyofauna can have a greater relevance.

In the case of the RT-Func indicator (and probably, in the future, RT-ENA), they will be integrated into almost all the Biodiversity subprogrammes, especially those that, due to their features on sampling and study of habitat and communities, are not focused on specific components of ecosystems but on all the elements present therein.

3.3.7. EIA programme: Invasive non-indigenous species

Monitoring subprogrammes that are included within the EIA monitoring programme are:

EIA. Non-indigenous species Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
EAI.1. EMPs: Specific monitoring subprogrammes for detecting and quantifying non-indigenous species in protected or sensitive marine areas.	EAI-Tasa EAI-Tend EAI-Ratio EAI-Imp	MAGRAMA / Autonomous Region	LEBA: 076; 161 LEBA: 313 CAN: 007j, 007k	Works must be done to standardise methodologies Not all the MPAs have this type of monitoring procedures	All
EAI.2. Risk areas: Sampling subprogrammes for detecting non-indigenous species in high-risk introduction areas (ports, aquaculture plants...)	EAI-Tasa EAI-Tend	MAGRAMA / Autonomous Region	NOR: 071, 176 LEBA: 068	Little generalised studies, non-existent in some cases	All
EAI.3. Invasive: Specific monitoring subprogrammes of invasive non-indigenous species	EAI-Tend EAI-Ratio, EAI-Imp	MAGRAMA / Autonomous Region	LEBA: 085, 146 NOR: 312	Works must be done to standardise methodologies. There are no monitoring processes in some cases	All
EAI.4 "DATA MINING" of biodiversity and information management programmes	EAI-Tend EAI-Ratio, EAI-Imp	MAGRAMA / Autonomous Region	(Those collecting EIA data)	A storage system for all the generated information is required	All

EIA. Non-indigenous species Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
EAI.5. Additional data	EAI-Tasa EAI-Tend EAI-Ratio EAI-Imp.	MAGRAMA / Autonomous Region		Works must be done in order to establish collection and standardisation mechanisms when necessary	All
ACT.3. Aquaculture	ACT.3-1 ACT.3-2	Autonomous Region / MAGRAMA	All DMs: 231	Yes, there is only aggregated information on the activity	All
ACT.4. Port activities	ICOM-P-1 ICOM-P-2 ICOM-P-4 ACT.4-1 ACT.4-3	MAGRAMA / State Ports / MFOM	All DMs: 230	No	All
ACT.5. Navigation	ACT.5-2	MFOM / MAGRAMA	-	Yes, the real surface for shelters	All
ACT.6. Recreational activities	ACT.6-1 ACT.6-5	Autonomous Region / MAGRAMA	-	-	All
OP. Subprogramme related to operative environmental targets	OP2, OP8, OP11, OP12, OP16, OP20, OP23, OP24, OP25	MAGRAMA	-	-	All

Table 19. Subprogrammes that can be integrated in the EIA programme

3.3.8. EC Programme: Commercially exploited species (Descriptor 3)

Monitoring subprogrammes that are included within the EC monitoring programme:

EC. Commercial species Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied

EC. Commercial species Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
EC.1. Commercial species	EC-F EC-Captura EC-SSB EC-Biomasa EC-Grande EC-MML EC-P95 EC-Talla	MAGRAMA	NOR: 001, 136, 137, 138, 182, 183, 184, 205, 239, 258, 260, 262, 263 All DM: 005, 008, 009 SUD: 002, 237, 240, 259 CAN: 261 LEBA, ESAL: 003, 238, 266	Yes. It must be complemented specially in the Canary Islands	All
EC.2. Additional data	EC-F EC-Captura EC-SSB EC-Biomasa EC-Grande EC-MML EC-P95 EC-Talla	Autonomous Region / MAGRAMA	NOR: 091, 092, 175 LEBA: 062c, 069, 078, 132, 133, 158, , CAN: 241	The integration of existing monitoring programmes will need coordination and methodological standardisation works	All
ACT.1. Fisheries	ACT.1-1 ACT.1-2 ACT.1-3	Autonomous Region / MAGRAMA	NOR:001,182-184,285-310 SUD:002, 264,265, 270-272, 273, 274, 275,276,277-279, 280-283,284 ESAL: 003, 264, 266, 270-272, 275, 277, 280,284 LEBA:003, 159, 264, 266,267,268, 270-272,275,277,280,284 CAN:004,241 All DM: 005	Yes	All
OP. Subprogrammes of Operative indicators	OP2, OP11, OP12, OP13, OP16, OP19	MAGRAMA	--	Yes	All

Table 20. Subprogrammes that can be integrated in the EC programme

3.3.9. EUT Programme: Eutrophication (Descriptor 5)

Activities that produce discharges of nutrients into the sea impact firstly on the area closest to the coast. Therefore, these marine areas need a higher sampling intensity than platform areas or open sea. For this reason, the eutrophication programme includes two subprogrammes which focus specifically on coastal AHPs (EUT.1 and HB.11) that differ from the EUT.2 subprogramme (for open waters) in the density of sampling stations. The monitoring subprogrammes included within the EUT monitoring programme are the following:

EUT. Eutrophication Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
EUT.1 Nutrients, oxygen and phytoplankton in coastal water masses	EUT-Nutri EUT-Ratio EUT-Chlorine EUT-Trans EUT-Fito EUT-O2	MAGRAMA / Autonomous Regions	ESAL: 039, 030, 086 LEBA: 017, 019, 020, 024 030, 039, 142, 144, 186, NOR: 029, 033, 041, 083, 088, 089 SUD: 031	CAN: Additional stations and samplings	All
EUT.2. Nutrients, oxygen and phytoplankton in non-coastal waters	EUT-Nutri EUT-Ratio EUT-Chlorine EUT-Trans EUT-Fito EUT-O2	MAGRAMA	CAN: 032 ESAL and LEBA: 030, 039 NOR: 029, 033 SUD: 031	ESAL, LEBA, NOR and SUD: additional stations CAN: Additional stations and samplings	All
EUT.3. Additional data	EUT-Cloro EUT-Rojas EUT-Mor EUT-Trans	MAGRAMA	ESAL: 095 LEBA: 010 068, 131 NOR: 135	-	All
HB7- Intertidal habitats	HB-DMAMac1 HB-DMAMac2 HB-DMAMac3	Autonomous Region	NOR: 041, 070, 083 LEBA: 062b, 075, 156, 171	There are not such programmes in the Canary Islands.	NOR, LEBA
HB.5- Intertidal and infralittoral habitats of marine angiosperms	HB-DemP HB-Op HB-DMAAngio	Autonomous Regions / MAGRAMA	CAN: 007ñ, NOR: 041 LEBA: 024, 062b, 075, 145, 168, 169, 171, 186b, 188, 189, 219, 222 ESAL: 130 ESAL, LEBA: 215 SUD: 223	Some species (Cymodocea and Zostera) are not appropriately covered. There is not a stable monitoring process in the Canary Islands	ESAL, LEBA, CAN (SUD)

EUT. Eutrophication Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
AH.1. Hydrographic and hydrodynamic conditions to the scale of the subdivision	AH-VarGE	MAGRAMA	NOR: 029, 033, 035, 041, 072, 073 NOR, SUD, CAN: 084 NOR, LEBA, ESAL, CAN: 036 LEBA: 019, 022, 023/54 025, 047, 048, 049, 050, 051, 053, 056, 057, 058, 157, 172-174 ESAL: 093, 094 All DM: 034	The effort of the current sampling is reasonably complete, but the synthesis and post-process effort requires more human resources	All
PRES.1. Inputs from rivers	ICOM-P-3	MAGRAMA / Autonomous Regions	NOR, SUD: 014 ESAL, LEBA: 228 NOR, SUD, ESAL, LEBA: 224	N	NOR, SUD, ESAL, LEBA
PRES.2. Atmospheric depositions	ICOM-P-3	AEMET / EMEP Centres	NOR, SUD, ESAL, LEBA: 234	Yes, it is necessary to cover the Canarian subdivision	All
PRES.3. Occasional polluting sources	ICOM-P-3 PRES.3-2 PRES.3-4 PRES.3-5	MAGRAMA / Autonomous Regions	LEBA: 172-174, 190, 226,227 All DM: 193	No	All
ACT.3. Aquaculture	ACT.3-1 ACT.3-2	Autonomous Region / MAGRAMA	All DM: 231	Yes, there is only aggregated information on the activity	All
OP. Subprogrammes of Operative indicators	OP2, OP8, OP11,OP12,OP16	MAGRAMA	--	Yes	All

Table 21. Subprogrammes that can be integrated in the EUT programme

3.3.10. AH programme: Hydrographic alterations (Descriptor 7)

The AH subprogrammes are fed with the PRES.1 (PRES.1-1, PRES.1-2 indicators), PRES.3 (PRES.3-1, PRES.3-3 indicators), ACT.4 (ACT.4-1, ACT.4-3, ICOM-P-1, ICOM-P-2 indicators), ACT.7 (ACT.7-1, ACT.7-2, ACT.7-3 ICOM-P-1, ICOM-P-2 indicators) and ACT.8 (ICOM-P-2 indicators) subprogrammes. . In addition, the HB.8 subprogramme, will provide information on the extension of habitats affected by infrastructures and/or altered effluents (HB-AreaAfec indicator).

The monitoring process carried out at present provides reasonably large-scale (AH.1) coverage, except in relation to non-basic hydrographic parameters, such as PH or turbidity. Those impacts associated with new infrastructures (AH.2) may compromise local environmental targets, and the environmental impact studies must determine the cost/benefit balance of performances. The monitoring subprogrammes included within the AH programme are the following:

AH. Hydrographic alterations. Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
AH.1. Hydrographic and hydrodynamic conditions to the scale of the subdivision	AH-VarGE AH-ChanHab	MAGRAMA	NOR: 029, 033, 035, 041, 072, 073 NOR, SUD, CAN: 084 NOR, LEBA, ESAL, CAN: 036 LEBA: 019, 022, 023/54, 025, 047, 048, 049, 050, 051, 053, 056, 057, 058, 157, 172-174 ESAL: 093, 094 All DM: 034	The effort of the current sampling is reasonably complete, but the synthesis and post-process effort requires more human resources	All
AH.2. Large-scale infrastructures able to alter dynamics and local hydrography.	AH-AreaInf AH-ChanHab	MAGRAMA	As additional information, the monitoring programmes linked to AH.1	The information provided by the environmental impact studies has to be collected	All
HB.8-Interaction with human activities	HB-AreaAfec	MAGRAMA	--	--	All

AH. Hydrographic alterations. Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
PRES.1. Inputs from rivers	PRES.1-1 PRES.1-2	MAGRAMA / Autonomous Region	NOR, SUD: 014 ESAL, LEBA: 228 NOR, SUD, ESAL, LEBA: 224	N	NOR, SUD, ESAL, LEBA
PRES.3. Occasional polluting sources	PRES.3-1 PRES.3-3 PRES.3-5	MAGRAMA / Autonomous Region	LEBA: 172-174, 190, 226,227 All DMs: 193	Yes, what is related to desalination plants and thermal discharges	All
ACT.4. Port activities	ICOM-P-2 ACT.4-3	MAGRAMA / State Ports / MFOM	All DMs: 230	Yes, sealed surface and issues related to infrastructures are new parameters to be collected.	All
ACT.7. Coastal defence activities	ICOM-P-2 ACT.7-1 ACT.7-2 ACT.7-3	MAGRAMA	LEBA: 060 SUD, ESAL: 096, 097, 098, 100	Yes, some of the parameters for all the DMs	All
OP. Subprogrammes of Operative indicators	OP2, OP11, OP12, OP14, OP15, OP16, OP21	MAGRAMA	--	Yes	All

Table 22. Subprogrammes that can be integrated in the AH programme

3.3.11. CONT programme: Contaminants (Descriptor 8)

It is subdivided and structured in 13 subprogrammes. Firstly, subprogrammes on coastal water (CONT.1) and open sea and offshore (CONT.2) contamination. Also included is a subprogramme for monitoring radionuclides (CONT.3) and monitoring accidental pollution episodes (CONT.4). The programme for controlling microbial pathogens in water (CONT.5) is also integrated therein.

Complementing the 5 above mentioned programmes, three additional subprogrammes focus on quantification of polluting inputs coming from different anthropogenic sources (PRES.1, PRES.2, PRES.3). In addition, subprogrammes of activities have been included: ACT.3 (aquaculture), ACT.4 (Port activities), ACT.5 (Navigation) y ACT.8 (Exploring and using

hydrocarbons). The reason is that these activities are potentially able to damage this descriptor. Finally, the subprogramme of operative indicators of Descriptor 8 is included.

The monitoring subprogrammes that are included within the CONT programme are the following ones:

CONT. Contaminant.Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
CONT.1. Contaminants in coastal waters	Contaminants (all the subdivisions): CONT-Met-b, CONT-Met-s, CONT-PCB-b, CONT-PCB-s, CONT-PAH-b(*), CONT-PAH-s, CONT-PBDE-b, CONT-PBDE-s, CONT-OE-s, CONT-PO-b, CONT-PO-s, CONT-DMA, CONT-HCBD-b, (*) except in SUD Effects: NOR: CONT-AChE, CONT-Imp, CONT-SFG, CONT-Cl, CONT-LMS, CONT-Mn, CONT-Mb. SUD: CONT-Imp, CONT-Cl, CONT-Mb. ESAL and LEBA: CONT-AChE, CONT-MT, CONT-SoS, CONT-LMS, CONT-Mn, CONT-EROD, CONT-Mb, CONT-Imp, CONT-Inter. CAN: CONT-Imp, CONT-Cl, CONT-AChE, CONT-Mb	MAGRAMA / Autonomous Region	NOR: 037, 041, 083 SUD: 037, 086 and 087 ESAL: 038, 086 and 087 LEBA: 038, 017, 143, 168, 169, 181, 186 CAN:__	- A previous study is required in order to apply them in the subdivision: NOR: CONT-LMS and CONT-Mn SUD: CONT-OE-s and CONT-Imp ESAL and LEBA: CONT-PBDE-s, CONT-PBDE-b and CONT-OE-s - A previous study is required in order to assess their applicability: NOR, SUD, ESAL, LEBA: CONT-Mb ESAL and LEBA: CONT-Imp, CONT-Inter CAN: All the indicators in sediment and biota	All

CONT. Contaminant.Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
CONT.2. Contaminants in open waters	NOR, SUD, ESAL and LEBA contaminants: CONT-Met-b, CONT-Met-s, CONT-PCB-b, CONT-PCB-s, CONT-PAH-s, CONT-PO-b, CONT-PO-s, CONT-PBDE-s, CONT-PBDE-b(*), CONT-OE-s, (*) excepting ESAL and LEBA All DM: CONT-DMA NOR and SUD effects: CONT-Mb, CONT-Mn, CONT-Cl. ESAL and LEBA effects: CONT-AChE, CONT-Mn, CONT-EROD, CONT-Mb, CONT-Inter	MAGRAMA / Autonomous Region	NOR, SUD: 037 ESAL, LEBA: 038	- A previous study is required in order to apply them in the subdivision: NOR: CONT-Mn NOR, SUD: CONT-Mb SUD, ESAL, LEBA: CONT-OE-s ESAL, LEBA: CONT-PBDE-s - A previous study is required in order to assess their applicability: ESAL, LEBA: CONT-Mb and CONT-Inter	NOR, SUD, ESAL and LEBA
CONT.3. Radioactive pollution	CONT-Radmedio	Nuclear Safety Council	All DM: 232	No	All
CONT.4. Accidental pollution	CONT-Agu	MFOM	--		All
CONT.5. Microbial pathogens in water	CONT.5-Micro	MSSSI / Autonomous Region	LEBA: 170, 225 All DM: 233	No	All
PRES.1. Inputs from rivers	ICOM-P-4	MAGRAMA / Autonomous Region	NOR, SUD: 014 ESAL, LEBA: 228 NOR, SUD, ESAL, LEBA: 224	No	NOR, SUD, ESAL, LEBA

CONT. Contaminant.Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
PRES.2. Atmospheric depositions	ICOM-P-4	AEMET / EMEP Centres	NOR, SUD, ESAL, LEBA: 234	Yes, it is necessary to cover the Canarian subdivision	All
PRES.3. Occasional polluting sources	ICOM-P-4 PRES.3-5 PRES.3-6	MAGRAMA / Autonomous Region	LEBA: 172-174, 190, 226,227, 316 All DM: 193	No	All
ACT.4. Port activities	ICOM-P-4	MAGRAMA / State Ports (MFOM)	All DM: 230	Yes, surface affected by the discharge of drainage materials.	All
ACT.5. Navigation	ACT.5-1	MFOM / MAGRAMA	LEBA: 061	Yes, an analysis of the marine traffic in all the Marine Subdivisions is required.	All
ACT.8. Hydrocarbon exploration and exploitation activities	ACT.8-1 ACT.8-2 ACT.8-3	MINETUR	All marine subdivisions: 229	Yes	All
OP. Subprogrammes of Operative indicators	OP2, OP7, OP8, OP11, OP12, OP16	MAGRAMA	--	Yes	All

Chart 23. Subprogrammes that can be integrated in the CONT programme

3.3.12. CP programme: Contaminants in fish (Descriptor 9)

Monitoring subprogrammes that are included within the CP programme are:

CP. Fish contaminants. Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied

CP. Fish contaminants. Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
CP.1. Contaminants in fish and other seafood for human consumption	CP-Niv CP-Num CP-Frec	Autonomous Region / MSSSI / MAGRAMA	NOR: 090, 135 LEBA: 010, 068, 131.213	Specific for each marine subdivision	All
CP.2. Pathogens in bivalve molluscs, gastropods, echinoderms and tunicates and marine biotoxins in bivalve molluscs	CP-Pat	Autonomous Region / MSSSI / MAGRAMA	NOR: 135, 177, 180 LEBA: 010, 068, 131, 213	Specific for each marine subdivision.	NOR, SUD, ESAL, LEBA, CAN partially
PRES.1. Inputs from rivers	ICOM-P-4	MAGRAMA / Autonomous Region	NOR, SUD: 014 ESAL, LEBA: 228 NOR, SUD, ESAL, LEBA: 224	No	NOR, SUD, ESAL, LEBA
PRES.2. Atmospheric depositions	ICOM-P-4	AEMET / EMEP Centres	NOR, SUD, ESAL, LEBA: 234	Yes, it is necessary to cover the Canarian subdivision	All
PRES.3. Occasional polluting sources	ICOM-P-4	MAGRAMA / Autonomous Region	LEBA: 172-174, 190, 226,227 All marine subdivisions: 193	No	All

CP. Fish contaminants. Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
ACT.1. Fishing activity	ACT.1-1 ACT.1-2 ACT.1-3	MAGRAMA / Autonomous Region	NOR:001,182-184,285-310 SUD:002, 264,265, 270-72, 273, 274, 275,276,277-279, 280-283, 284 ESAL: 003, 264, 266, 270- 272, 275, 277, 280, 284 LEBA:003, 159, 264, 266, 267, 268, 270-72, 275, 277, 280, 284 CAN:004,241, All: 005	Yes, regarding shellfish harvesting, all the parameters for all the marine subdivisions	
CONT.1. Contaminants in coastal waters	CONT-Met-b CONT-PCB-b CONT-PAH-b (excepting in SUD)	MAGRAMA / Autonomous Region	NOR: 037, 041, 083 SUD: 037, 086 and 087 ESAL: 038, 086 and 087. LEBA: 038, 017, 143, 168, 169, 181, 186	In the Canary Islands, all the indicators in biota require a pilot study for assessing their applicability	All
CONT.2. Contaminants in open waters	CONT-Met-b CONT-PCB-b	MAGRAMA / Autonomous Region	NOR: 037		NOR, SUD, LEBA, ESAL
CONT.4. Accidental pollution	CONT-Agu	MFOM	--		All
CONT.5. Microbial pathogens in water	CONT-Micro	MSSSI / Autonomous Region	LEBA: 170, 225 All marine subdivisions: 233	No	All

CP. Fish contaminants. Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
OP. Subprogrammes of Operative indicators	OP2, OP11, OP12, OP16, OP22	MAGRAMA	--	Yes	All

Table 24. Subprogrammes that can be integrated in the CP programme

3.3.13. BM programme: Marine litter (Descriptor 10)

The seven subprogrammes established are complemented with AV.5 (Stranded birds) and MT.5 Strandings subprogrammes regarding litter ingested by marine fauna. This programme is related to the pressure "Litter in the sea", within the section "Other disturbances" of Annex I of Act 41/2010. In addition, it is also related to the pressure or impact corresponding to "systematic and/or deliberate discharges of substances". For this reason, all those pressures and activities, which have a monitoring subprogramme and have an impact on this descriptor (PRES.1, PRES.3, ACT.1 and ACT.5) are linked to this programme. Additionally, the subprogramme of operative indicators of Descriptor 10 is included. The monitoring subprogrammes integrated within the BM programme are the following:

BM. Marine litter Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
BM.1. Litter in beaches	BM-Pla	MAGRAMA	All marine subdivision: 116, 126	N	All
BM.2. Floating litter	BM-Flo	IEO / MAGRAMA	All marine subdivisions: 129	S	All
BM.3. Litter on the seafloor	BM-Fon	IEO / MAGRAMA	All marine subdivisions: 129 205	S	All
BM.4. Microparticles in water	BM-Micro	IEO / MAGRAMA	--	S	All

BM. Marine litter Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
BM.5. Microparticles in sediments	BM-Mic	IEO / MAGRAMA	--	S	All
BM.6. Microparticles in beaches	BM-Micplaya	MAGRAMA	--	S	All
BM.7. Additional data			All marine subdivisions: 126, 129, 315	Standardised methodologies and appropriate continuity and coverage is required in order to make them useful	All
AV.5 Additional data	BM-Bio	Several	LEBA, ESAL, CAN: 166 NOR, SUD, LEBA, ESAL: 167 LEBA: 074, 080, 082 CAN: 007l	Beached bird monitoring and standardisation of information in bird recovery centres.	All
MT.5. Cetacean and reptile strandings	BM-Bio	Autonomous Regions / MAGRAMA	Integrable: NOR: 102, 141 , SUD:123 ESAL: 123 LEBA: 065, 065bis, 067, 123	Investments must be made in coordination, protocols and standardisation	All
PRES.1. Inputs from rivers*	--	MAGRAMA / Autonomous Region	--	S	All
PRES.3. Occasional polluting sources**	PRES.3-5 PRES.3-2	MAGRAMA / Autonomous Region	--	S	All

BM. Marine litter Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
ACT.1. Fisheries (***)	ACT 1.1	MAGRAMA / Autonomous Region	NOR:001,182-184,285-310 SUD:002, 264,265, 270-72, 273, 274, 275,276,277-279, 280-283,284 ESAL: 003, 264, 266, 270- 272, 275, 277,280, 284 LEBA:003, 159, 264, 266, 267, 268, 270-272, 275, 277, 280, 284 CAN:004,241, All marine subdivisions: 005	Yes	All
ACT.5. Navigation	ACT.5-1	MFOM / MAGRAMA	LEBA: 061	Yes, an analysis of the marine traffic in all the marine subdivisions is required.	All
OP. Subprogrammes of Operative indicators	OP2, OP8, OP11, OP12, OP16	MAGRAMA	--	Yes	All

Table 25. Subprogrammes that can be integrated in the BM programme

* Where PRES.1 is described, given the existing limitations existing at present, gathering information in the short term on the quantities/volumes of litter that reach the sea through the rivers will not be possible, although this is an aspect that will need to be developed in the coming years.

** Likewise, the capacity to collect information on quantities/volumes of litter that reach the sea through direct discharges is also very limited or non-existent, although it is known that it is a source of relevant marine litter, in particular those small-sized items that the standard treatment systems of sewage treatment plants cannot properly manage.

(***) All existing programmes related to ACT-1 are included, although some of the programmes included in this subprogramme are not directly related to the aspect of marine litter.

3.3.14. RS programmes: Underwater noise (Descriptor 11)

The monitoring subprogrammes included within the RS monitoring programme are the following:

RS. Underwater noise. Subprogrammes	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
RS.1. Temporal and spatial distribution of low and high-frequency impulse noise.	RS-Imp	MAGRAMA / MINETUR	--	Y It is a new-design monitoring programme	All
RS.2. Continuous low-frequency noise	RS-Amb	MAGRAMA	--	Y It is a new-design monitoring programme	All
ACT.5. Navigation	ACT.5-1	MFOM / MAGRAMA	LEBA: 061	Y An analysis of the marine traffic in all the marine subdivisions is required.	All
ACT.8. Hydrocarbon exploration and exploitation activities	ACT.8-1 ACT.8-4	MINETUR	229	Y	All
OP. Subprogrammes of Operative indicators	OP2, OP8, OP11, OP12, OP16	MAGRAMA	--	Yes	All

Table 26. Subprogrammes that can be integrated in the RS programme

3.3.15. Subprogrammes associated to pressures and human activities

The subprogrammes on pressure (PRES) and human activities (ACT), given their transversal nature, do not belong to a single programme, but are included in all those programmes where they provide useful information to assess the corresponding descriptor. The monitoring subprogrammes integrated within the PRES programme are the following:

Subprogrammes on pressures	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
PRES.1. Inputs from rivers	PRES.1-1 PRES.1-2 ICOM-P-3 ICOM-P-4	MAGRAMA / Autonomous Region	NOR, SUD: 014 ESAL, LEBA: 228 NOR, SUD, ESAL, LEBA: 224	N	NOR, SUD, ESAL, LEBA

Subprogrammes on pressures	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
PRES.2. Atmospheric depositions	ICOM-P-3 ICOM-P-4	AEMET / EMEP Centres	NOR, SUD, ESAL, LEBA: 234	The Canarian subdivision is not currently covered	NOR, SUD, ESAL, LEBA
PRES.3. Occasional polluting sources	PRES.3-5 ICOM-P-3 ICOM-P-4 PRES.3-4 PRES.3-1 PRES.3-2 PRES.3-3 PRES.3-6	MAGRAMA / CCAA / CSN	LEBA: 172-174, 190, 226,227 All marine subdivisions: 193	Yes, what is related to desalination plants and thermal discharges	All / LEBA for PRES.3-6 indicator

Table 27. Subprogrammes that can be integrated in the PRES programme

The monitoring subprogrammes integrated within the ACT programme are the following:

Subprogrammes on Human Activities	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
ACT.1. Fisheries	ACT 1.1 ACT.1-2 ACT.1-3	MAGRAMA / Autonomous Region	NOR:001,182-184,285-310 SUD:002, 264,265, 270-72, 273, 274, 275,276,277-279, 280-283, 284 ESAL: 003, 264, 266, 270- 272, 275, 277, 280, 284 LEBA:003, 159, 264, 266, 267, 268, 270-72, 275, 277, 280, 284 CAN:004,241, All marine subdivisions: 005	Yes	All
ACT.2. Cable and pipe laying and artificial reefs	ACT.2-1 ACT.2-2	Autonomous Region / MAGRAMA	--	Yes	All

Subprogrammes on Human Activities	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
ACT.3. Aquaculture	ACT.3-1 ACT.3-2	Autonomous Region / MAGRAMA	All marine subdivisions: 231	Yes, there is only aggregated information on the activity	All
ACT.4. Port activities	ICOM-P-1 ICOM-P-2 ICOM-P-4 ACT.4-1 ACT.4-2 ACT.4-3	MAGRAMA / State Ports / MFOM	All marine subdivisions: 230	Yes, sealed surface, surface affected by the discharge of drainage materials and issues related to infrastructures are new parameters to be collected.	All
ACT.5. Navigation	ACT.5-1 ACT.5-2 ACT.5-3	MFOM / MAGRAMA	LEBA: 061	Yes, all the stated parameters for all the marine subdivisions	All
ACT.6. Recreational activities	ACT.6-1 ACT.6-2 ACT.6-3 ACT.6-4 ACT.6-5	Autonomous Region / MAGRAMA	--	--	All
ACT.7. Coastal defence activities	ICOM-P-1 ICOM-P-2 ACT.7-1 ACT.7-2 ACT.7-3	MAGRAMA	LEBA: 060 SUD, ESAL: 096, 097, 098, 100	Yes, some the parameters for all the marine subdivisions	All

Subprogrammes on Human Activities	Indicators: (Doc VI.1)	Competent authority	Existing programmes (code, Doc VI.2)	Additional needs (Y/N)	Marine subdivisions where it is applied
ACT.8. Hydrocarbon exploration and exploitation activities	ICOM-P-2 ACT.8-1 ACT.8-2 ACT.8-3 ACT.8-4	MINETUR	229	Yes	All

Table 28. Subprogrammes that can be integrated in the ACT programme

3.4. Coordination with the competent authorities and other stakeholders

The monitoring programmes have been designed on a collaborative basis from the beginning, along with all the stakeholders, especially autonomous and state administrations with competences or activities related to the monitoring of the marine environment.

The main forms of coordination and cooperation were the following:

- Technical meetings: throughout the process meetings were held with the Agency for Consumer Affairs, Food Safety and Nutrition (MSSSI) (for D.9); the Directorate General for Fisheries Management (MAPAMA) (for D9); technicians of the Autonomous Regions responsible for hygiene in fish production (D9); technicians of the Autonomous Regions responsible for monitoring the WFD (D5, D7, D8); Directorate General for Fisheries Resources and Aquaculture (MAPAMA); Ports of the State (MFOM); the Directorate General for the Merchant Navy (MFOM); the Directorate General for Water (MAGRAMA); the Working Group on Marine Flora and Fauna (belonging to the Flora and Fauna Committee); the Directorate General for Fishery Resources and Aquaculture (MAPAMA); the Directorate General for Energy Policy and Mines (MINETUR); the Nuclear Safety Council; NGOs working in the marine environment.

- Discussion and participation within the scope of professional associations: the monitoring programmes proposal was presented before the Interministerial Commission for Marine Strategies in 2014. After holding this event, some technical questions to be discussed in-depth were identified and so several meetings (some of those stated above) were held for these purposes.

  During the public consultation phase, the five Monitoring Committees of the EEMM were established and, as part of these meetings, a second discussion on the set of the proposals, between MAGRAMA and the Autonomous Regions, took place.

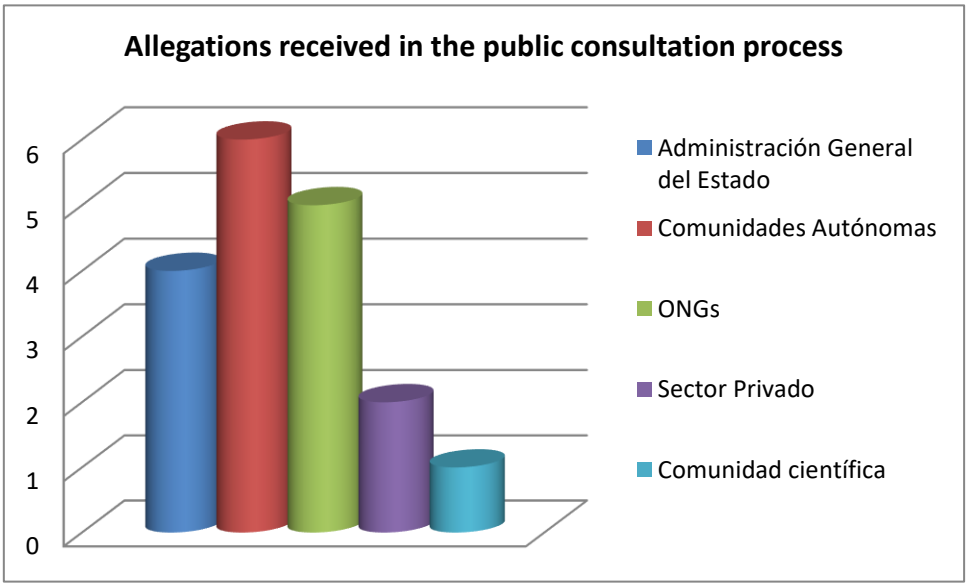
- Participation of the scientific community**:** the Spanish group of Marine Strategies, comprised of the MAPAMA, the Spanish Institute of Oceanography (IEO) and the Centre of Studies for Ports and Coasts of the CEDEX, organised several workshops and meetings with experts and scientists regarding the monitoring for descriptors involving biodiversity, cetaceans, monitoring of traditional or recreational fishing, marine angiosperms and non-indigenous species.

- Key questions for coordination: after the discussion process, a number of needs were highlighted in relation to optimising the existing resources, the convenience of

improving pooling processes on data and information generated by different administrations, environmental associations or voluntary work movements, and a set of themes, which would require the development of proposals on common and standardised protocols that may ensure that the data collection is homogeneous by the different agents, was identified. Similarly, several elements with great potential were also identified, such as information resources in the marine environment (e.g. Environmental Surveillance Programmes)

3.5. Public Consultation Process

Documents regarding proposals of monitoring programmes were subject to public consultation on the website of the Ministry[8]. A total of 18 allegations were received, which were analysed, answered and integrated to the greatest possible extent into the final versions of the monitoring programmes.



General State Administration
Autonomous Regions
NGOs
Private sector
Scientific community

[8] http://www.magrama.gob.es/es/costas/participacion-publica/Programas-seguimiento-EM.aspx

4. IMPLEMENTATION OF THE MONITORING PROGRAMMES

Many of these programmes and subprogrammes of the Marine Strategies are supported by existing programmes derived from other obligations. Therefore, ensuring the continuity of these programmes is fundamental, and they must be duly completed where incomplete.

On the other hand, implementing the new programmes is equally necessary. This implementation will be gradual and many of them will be implemented through co-funding solutions such as LIFE funds, the European Maritime and Fisheries Fund (EMFF), the FEDER funds and the Horizon 2020 Programme (focused on promoting and exploring new technologies, innovation, etc.).

ANNEX. LIST OF THE INDICATORS OF THE MONITORING PROGRAMMES WITH THE ENVIRONMENTAL TARGETS OF THE MARINE STRATEGIES, FIRST CYCLE (2012-2018)

In order to guide the process of achieving Good Environmental Status in the marine environment, and considering the initial assessment of the situation of the marine environment, a series of environmental targets and associated indicators were set[9] for different marine subdivisions. These environmental targets are coherent and compatible with those established at national, regional and international level for the same waters, without forgetting the crossborder characteristics and impacts. In Spain, the environmental targets of the 5 marine subdivisions were approved by Agreement of the Council of Ministers[10], linking all the Ministerial Departments involved in the protection of the marine environment.

This Agreement of the Council of Ministers established, for each one of the environmental targets, one or several associated indicators.

Article 11 of Law 41/2010 establishes that monitoring programmes on marine strategies must refer to the environmental targets established by virtue of Article 10. For this reason, in addition to the initially-proposed indicators, others considered important in order to meet the requirements of the Directive have been included.

The table below shows the set of environmental targets established for each descriptor (or groups of descriptors), and how these targets will be assessed by one or more indicators of the monitoring programmes.

[9] Environmental target*:* is the qualitative or quantitative expression of the desired state of the different components of marine waters, as well as the pressures and impacts thereof.

Biodiversity descriptors (1, 4 and 6)

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
A.1.1	Reducing pressure over habitats	Surface (or any appropriate indicator) of biogenic habitats and/or protected habitats potentially affected by human activities and their trends	Habitat area affected significantly by human activities	*HB-ÁreaAfec*	PRESSURE
			Physical damage to habitats (*In process*)	*HB-Daño*	
			Habitat loss area (*In process*)	*HB-PerdHab*	
			Extracted sediment	*ICOMP-P-1*	
			Sealed bottom	*ICOMP-P-2*	
			Fishing effort	*ACT.1-1*	
			Areas of mollusc production and red coral fishing	*ACT.1-3*	
			Cable and pipe laying	*ACT.2-1*	
			Number, position and surface occupied by artificial reefs	*ACT.2-2*	
			Location of aquaculture facilities	*ACT.3-2*	
			Discharge of drainage materials to the sea	*ACT.4-1*	
			Mooring impact	*ACT.5-2*	
			Authorised drownings or as a consequence of navigation accidents	*ACT.5-3*	
			Marinas and berths	*ACT.6-1*	
			Hydrocarbon exploration boreholes	*ACT.8-1*	

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
A.1.4	Reducing mortality of species at the top of the food chain	Mortality of the populations of groups of species at the top of the food chain	Elasmobranch by-catch	*PC-Bycatch*	STATUS/ PRESSURE
			Trends in the amount and composition of litter ingested by marine animals (birds)	*BM-Bio*	
			Population demographic characteristics(birds and mammals)	AV-*Dem*/*MT-dem*	
			Fishing effort	*ACT.1-1*	
			Fishing mortality (F)	*EC-F*	PRESSURE/ IMPACT
			Spawning stock biomass (SSB)	*EC-SSB*	STATUS
			Biomass index	*EC-Biomasa*	STATUS
			Catch / Biomass ratio	*EC-Captura*	PRESSURE/ IMPACT
			Proportion of fish larger than the mean size of first sexual maturation	*EC-Grande*	STATUS
			Size at first sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation	*EC-Talla*	STATUS
			Mean maximum length across all species found in research vessel surveys	*PC/EC-MML*	STATUS
			95% percentile of fish length observed in research vessels surveys	*PC/EC-P95*	STATUS
A.1.5	Preventing impacts in food webs due to the cultivation of	Existence of control programmes	Existence of control programmes	*OP 23*	OPERATIVE

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
	marine species				
A.1.6 CAN:A.1.9	Regulating exploitation of deep-water elasmobranchs	Catches of these species	1. Demersal elasmobranch by-catch	*PC-Bycatch*	PRESSURE
A.1.7 CAN:A.1.10	Coordinating monitoring programmes on strandings and accidental bycatch	Existence of the coordination system	Existence of the coordination system for monitoring programmes of strandings and accidental bycatch	*OP-1*	OPERATIVE
A.1.8 CAN:A.1.11	Developing initiatives on species recovering and habitat restoration	Conservation status of habitats and species	Multimetric indices	*HB-MMI*	STATUS
			Composition of typical species	*HB-TSC*	
			Species richness	*HB-Riq*	
			Diversity	*HB-Div*	
			Quantifying the structural species	*HB-Est*	
			Abundance of opportunistic organisms in grasslands of angiosperms	*HB-Op*	
			Indicator of demographic characteristics of grasslands of *Posidonia oceanica*	*HB-DemP*	
			Indicator of environmental conditions of grasslands of marine angiosperms	*HB-CondAmbP*	
			WFD benthic invertebrates	*HB-DMAInv1*	
				HB-DMAInv2	
				HB-DMAInv3	
			WFD angiosperms	*HB-DMAAngio*	

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
			WFD macroalgae	*HB-DMAMac1*	
				HB-DMAMac2	
				HB-DMAMac3	
			Maximum mean size of fish and elasmobranchs	*PC-MML*	
			Proportion of big fish	*RT-LFI*	
			95% percentile of the fish size distribution	*EC/PC-P95*	
			Conservation status of fish UICN	*EC/PC-CSF*	
DM.CAN A.1.6	Establishing control programmes of those species or functional groups whose proliferation evidence an alteration of local food webs	Existence of control programmes	Existence of control programmes on *Diadema antillarum*	*OP-23*	OPERATIVE
DM.CAN A.1.7	Reducing or preventing the increase of populations of the *Diadema aff. antillarum* sea urchin	Distribution and extension of the *Diadema aff. Antillarum* sea urchin. DM.CAN	Area occupied by the habitat	*HB-PerdÁrea*	PRESSURE
A.2.1	Fostering the Spanish Network of Marine Protected Areas (Red de Áreas Marinas Protegidas de España)	Percentage of the marine subdivision included in the Spanish Network of Marine Protected Areas	Percentage of the marine subdivision included in the Natura 2000 Network	*OP-3*	OPERATIVE

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	Environmental target	Associated indicator	Proposed indicators	Code indicator	Type of indicator
		Percentage of biogenic habitats, protected habitats and other ones identified in the initial assessment, like those of special interest included in the Spanish Network of Marine Protected Areas in the subdivision Existence and application of management plans	Percentage of spaces of the Natura 2000 Network with management plans approved and being applied.	*OP-4*	OPERATIVE
A.2.2	Completing the marine Natura 2000 network	Percentage of the marine subdivision included in the Natura 2000 Network Percentage of spaces of the Natura 2000 Network with management plans approved and being applied.	Ecosystem structure (Biodiversity)	*AV-Est*	STATUS
			Percentage of the marine subdivision included in the Natura 2000 Network	*OP-5*	OPERATIVE
			Percentage of spaces of the Natura 2000 Network with management plans approved and being applied.	*OP-6*	OPERATIVE
(excepting CAN) A.3.1	Maintaining fish size distribution stable	Trends of 95% percentile of the size distribution	Maximum mean size of fish and demersal elasmobranchs	*EC/PC-MML*	STATUS
			Proportion of large fish	*RT-LFI*	
			95% percentile of the fish size distribution	*EC/PC-P95*	
(excepting CAN) A.3.2	Maintaining the CSF under 1	CSF	Conservation status of fish UICN	*PC-CSF*	STATUS
A.3.3 (excepting	Maintaining the species distribution range	Uncertainty range	Distribution range and pattern of the populations (birds, mammals and fish)	*AV-Dist/MT-Dist/*	STATUS

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
CAN)				*PC-Rango,PC-Pat*	
A.3.4 (CAN:A.3.1)	Maintaining positive or stable trends in populations of key species and apex predators	Trends on populations of those species used as assessment elements	Abundance/weight of populations of characteristic demersal species	*PC-Abu*	STATUS
			populations size (birds and mammals)	*AV-Tam/MT-Tam*	
			Abundance of key feeding groups (birds)	*AV/RT-Abu*	
			Conservation status of fish UICN	*PC-CSF*	
			Proportion of large fish	*RT-LFI*	
			Mean maximum length across all species found in research vessel surveys	*EC/PC-MML*	
			95% percentile of the fish size distribution	*EC/PC-P95*	
A.3.5 (CAN:A.3.2)	Maintaining positive or stable trends in the distribution of biogenic, protected and singular habitats	Trends in the habitat distribution area	Habitat loss area	*HB-ÁreaPerd*	STATUS
			Area percentage occupied by biogenic substrate	*HB-Bio*	
			Geographic range	*HB-RangGeo*	
			Bathymetric range	*HB-RangBat*	
A.3.6 (CAN:A.3.3)	Maintaining the condition parameters of benthic communities within those values guaranteeing their durability	Indicators used for assessing the status or condition of the benthic community or of their characteristic or key species, and their long-term trends in habitats selected for their monitoring.	Multimetric indices	*HB-MMI*	STATUS
			Composition of typical species	*HB-TSC*	
			Species richness	*HB-Riq*	
			Diversity	*HB-Div*	
			Quantifying the structural species	*HB-Est*	

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	Environmental target	Associated indicator	Proposed indicators	Code indicator	Type of indicator
			Abundance of opportunistic organism in grasslands of angiosperms	*HB-Op*	
			Indicator of demographic characteristics of grasslands of *Posidonia oceanica*	*HB-DemP*	
			Indicator of environmental conditions of grasslands of marine angiosperms	*HB-CondAmbP*	
			WFD angiosperms	*HB-DMAAngio*	
			WFD benthic invertebrates	*HB-DMAInv1*	
				HB-DMAInv2	
				HB-DMAInv3	
			WFD macroalgae	*HB-DMAMac1*	
				HB-DMAMac2	
				HB-DMAMac3	
C.1.1	Maintaining the lists of endangered species and their assessment updated	Reviews of the catalogues of endangered species	Reviews of the catalogues of endangered species	*OP-9*	OPERATIVE
C.1.2	Fostering international cooperation in the study of wide-distribution species	Number of international initiatives	Number of international initiatives	*OP-10*	OPERATIVE
C.1.5	Developing management plans for marine recreational activities	Existence of management plans for activities and/or uses	Existence of management plans for activities and/or uses	*OP-13*	OPERATIVE

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
C.1.6	Guaranteeing that fishing stocks are properly managed	Management results Percentage of analysed stocks Percentage of stocks within safe biological limits Percentage of stocks in maximum sustainable yield	Mortality due to fishing	*EC-F*	PRESSURE-STATUS
			Catches / Biomass ratio	*EC-Captura*	
			Spawning stock biomass	*EC-SSB*	
			Biomass index	*EC-Biomasa*	
			Average maximum length of all species from data of campaigns	*EC/PC-MML*	
			95th percentile of the fish size distribution	*EC/PC-P95*	
			Size of first sexual maturation evidencing the extent of undesirable genetic effects of exploitation	*EC-talla*	
C.2.1	Ensuring that the surface affected by physical alterations is reduced	Surface affected by permanent physical alterations caused by human activities	Sealed bottom	*ICOMP-P-2*	PRESSURE
			Sand contributions in beaches	*ACT.7-1*	
			Coastal defence facilities	*ACT.7-3*	
			Proportion of artificial coast	*ACT.7-2*	
C.2.2	Ensuring that localised physical alterations do not affect habitats	Impact on habitats	Habitat area affected significantly by human activities	*HB-AreaAfec*	STATUS
			Physical damage to habitats	*HB-Daño*	
			Habitat loss area	*HB-PerdHab*	
			Fishing effort	*ACT.1-1*	
C.2.3	Adopting mitigation measures in those coast sections affected	Conservation status of habitats	Multimetric indices	*HB-MMI*	STATUS
			Composition of typical species *(In process)*	*HB-TSC*	

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	Environmental target	Associated indicator	Proposed indicators	Code indicator	Type of indicator
	by physical alterations		Species richness	*HB-Riq*	
			Diversity	*HB-Div*	
			Quantifying the structural species	*HB-Est*	
			Indicator of demographic characteristics of grasslands of *Posidonia oceanica*	*HB-DemP*	
			Indicator of environmental conditions of grasslands of marine angiosperms	*HB-CondAmbP*	
			WFD benthic invertebrates	*HB-DMAInv1*	
				HB-DMAInv2	
				HB-DMAInv3	
			WFD macroalgae	*HB-DMAMac1*	
				HB-DMAMac2	
				HB-DMAMac3	
			WFD angiosperms	*HB-DMAangio*	
C.3.2	Expanding knowledge on seafloors	Proportion of the surface of the studied subdivision	Proportion of the surface of the studied subdivision	*OP-17*	OPERATIVE
C.3.3	Expanding knowledge on coastal habitats	Proportion of studied coastal habitats	Proportion of studied coastal habitats	*OP-18*	OPERATIVE
C.3.4 (excepting CAN)	Expanding knowledge on deep-water habitats	Proportion of studied deep habitats	Proportion of studied deep habitats	*OP-18*	OPERATIVE

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
Marine subdivision CAN C.3.4	Enhancing the quality of the information obtained regarding the recreational and professional fishing and shellfish activity	Availability of useful information for assessments	Availability of useful information for the assessments of recreational or professional fishing and shellfish activity	*OP-19*	OPERATIVE
C.3.5	Expanding knowledge on the effect of human activities over habitats	Number of scientific studies and projects on the effect of human activities over habitats	Number of scientific studies and projects on these matters	*OP-8*	OPERATIVE
C.3.8	Expanding knowledge on food webs	Existence of appropriate indicators for assessing food webs	Phytoplankton production	*RT-Fito*	STATUS
			Change in the trophic guilds of predatory species	*RT-MTI*	
			Proportion of large fish	*RT-LFI*	
			Changes in indices of functional groups of plankton (life forms)	*HP/RT Lifeform*	
			Biomass, composition of species and spatial distribution of zooplankton	*RT-Zoo*	
			Abundance of key feeding groups (birds)	*AV/RT-Abu*	
C.3.9	Fostering a national monitoring system of the oceanic variability and a warning system	Existence of the national system for the monitoring of hydrographic variability and oceanic hydrodynamics and warning system and a massive and extreme event register	Existence of the national system for the monitoring of hydrographic variability and oceanic hydrodynamics	*OP-21*	OPERATIVE
Other status indicators			Plankton diversity indices	*HP-Bio*	STATUS

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	Environmental target	Associated indicator	Proposed indicators	Code indicator	Type of indicator
Other activity indicators			Recreational fishing licenses	*LAW 6-2*	PRESSURE
			Recreational divers	*LAW 6-3*	
			Number of authorised cetacean watching companies	*LAW .6-4*	
			Number of watching trips in a specific period	*LAW .6-5*	

Table 29. Relation between environmental targets and associated indicators for biodiversity descriptors, with the indicators of the monitoring programmes of the marine strategies, first cycle (2012-2018)

Descriptor of invasive non-indigenous species (D2)

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
A.1.2	Minimising the introduction of non-indigenous species	Number of course of action on roads and vectors of introduction and translocation	Number of measures for action on roads and vectors	*OP-24*	OPERATIVE
A.1.3	Eradicate non-indigenous species	Number of invasive species and surface object of eradicating or declining abundance actions	Number of eradicating actions	*OP-25*	OPERATIVE
A.1.5	Preventing impacts in food webs due to the cultivation of marine species	Existence of control programmes	Existence of control programmes	*OP-23*	OPERATIVE
C.3.6	Expanding knowledge on invasive species	Number of performed studies	Number of performed studies	*OP-8*	OPERATIVE
		Percentage of the marine subdivision area covered by regular programmes on detection and quantification of non-indigenous species	Percentage of the area of the marine subdivision under regular detection programmes	*OP-20*	OPERATIVE
-	*Other status indicators:*		NIS Impacts	*EAI-imp*	STATUS/ IMPACT
			Trends in abundance, temporal frequency and spatial distribution of non-indigenous species	*EAI-tend*	
			NIS/ native ratio	*EAI-ratio*	
			New introduction rate	*EAI-tasa*	

Table 30. Relation between environmental targets and associated indicators for invasive non-indigenous species, with the indicators of the monitoring programmes of the marine strategies, first cycle (2012-2018)

Descriptor of commercially exploited species (D3)

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
A.3.1 (excepting CAN)	Maintaining the fish size distribution stable	Trends of 95th percentile of the size distribution	Maximum mean size of fish and demersal elasmobranchs	*EC/PC-MML*	STATUS
			Proportion of large fish	*RT-LFI*	
			95% percentile of the fish size distribution	*EC/PC-P95*	
A.3.4 CAN:A.3.1	Maintaining positive or stable trends in populations of key species and apex predators	Trends on populations of those species used as assessment elements	Proportion of fish larger than the mean size of first sexual maturation	*EC-grande*	PRESSURE-STATUS
			Spawning stock biomass	*EC-SSB*	
			Fishing mortality	*EC-F*	
			Catches / Biomass ratio	*EC-captura*	
			95% percentile of the fish size distribution	*EC/PC-P95*	
			Biomass index	*EC-biomasa*	
			Mean maximum length across all species found in research vessel surveys	*EC/PC-MML*	
			Size at first sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation	*EC-talla*	
C.1.6	Guaranteeing that fishing stocks are properly managed	Management results Percentage of analysed stocks Percentage of stocks within safe	Proportion of fish larger than the mean size of the first sexual maturation	*EC-grande*	PRESSURE-STATUS
			Biomass index	*EC-biomasa*	

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
		biological limits Percentage of stocks in maximum sustainable yield	Spawning stock biomass	*EC-SSB*	
			Mean maximum length of all species from data of campaigns	*EC/PC-MML*	
			95%percentile of the fish size distribution	*EC/PC-P95*	
			Fishing mortality	*EC-F*	
			Catches/ Biomass ratio	*EC-captura*	
			Size at first sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation	*EC-talla*	
Marine subdivision CAN C.3.4	Enhancing the quality of the information obtained regarding the recreational and professional fishing and shellfish activity	Availability of useful information for assessments	Availability of useful information for the assessments of recreational or professional fishing and shellfish activity	*OP-19*	OPERATIVE
C.3.7	Having available information on fishing stocks in order to assess them	Number of stocks included in the following marine strategy assessments	Proportion of fish larger than the mean size of first sexual maturation	*EC-grande*	PRESSURE-STATUS
			Spawning stock biomass	*EC-SSB*	
			Biomass index	*EC-biomasa*	
			Mean maximum length across all species found in research vessel surveys	*EC/PC-MML*	
			95% percentile of the fish size distribution	*EC/PC-P95*	
			Fishing Mortality	*EC-F*	
			Catches / Biomass ratio	*EC-captura*	

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	Environmental target	Associated indicator	Proposed indicators	Code indicator	Type of indicator
			Size at first sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation	*EC-talla*	
-	*Other pressure indicators:*		Aquaculture production	*LAW .3-1*	PRESSURE
			Fishing effort	*LAW .1-1*	
			Amounts of harvested shellfish / other invertebrates, algae and red coral	*LAW .1-2*	
			Areas of mollusc production and red coral fishing	*LAW .1-3*	

Table 31. Relation between environmental targets and associated indicators for commercially exploited species, with the indicators of the monitoring programmes of the marine strategies, first cycle (2012-2018)

Descriptor of eutrophication (D5)

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
B.1.1	Reducing volumes of non-properly-treated discharges	Volume of non-properly-treated direct and indirect discharges	Volume of non-properly-treated direct discharges	*PRES.3-2*	PRESSURE
B.1.3 NOR, ESAL	Reducing the growing trend of nutrient concentration	Nutrient concentration Nutrient levels	Inorganic nutrients in the water column and Nutrient molar ratios	*EUT-Nutri* *and* *EUT-ratio*	STATUS
B.1.3.SUD	Not exceeding the assessment nutrient values established by the OSPAR Convention in the identified areas				
B.1.3 LEBA, CAN	Not exceeding basis nutrient values more often than expected				
B.1.4: NOR, ESAL	Reaching or maintaining a good/very good nutrient status according to the WFD and not exceeding basis levels more often than expected for the rest of the scope				
B.1.4. LEBA	Not exceeding basis chlorophyll values more often than expected	Chlorophyll a levels	Concentration of chlorophyll a in the water column	*EUT-cloro*	
B.3.1	Fostering studies on the impact of atmospheric deposition	Studies on the effects of atmospheric deposition	Studies on the effects of atmospheric deposition	*OP-8*	OPERATIVE

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	Environmental target	Associated indicator	Proposed indicators	Code indicator	Type of indicator
-	*Other pressure indicators*		Nutrients loads provided	*ICOM-P-3*	PRESSURE
			Organic matter loads provided	*PRES.3-4*	
			Land-sea discharges (localisation)	*PRES.3-5*	
	Other activity indicators		Aquaculture production	*LAW .3-1*	
			Location of the facilities	*LAW .3-2*	
-	*Other status indicators*		water column transparency	*EUT-trans*	STATUS
			Abundance of diatoms and flagellates	*EUT-fito*	
			Red tide	*EUT-roja*	
			Oxygen concentration	*EUT-O2*	
			Organic matter in the water column	*EUT-mor*	

Table 32. Relation between environmental targets and associated indicators for eutrophication, with the indicators of the monitoring programmes of the marine strategies, first cycle (2012-2018)

Descriptor of permanent alterations of the hydrographic conditions (D7)

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
C.2.1	Ensuring that the surface affected by permanent physical alterations is reduced	Surface affected by permanent physical alterations caused by human activities	Extension of areas affected by infrastructures localised in effluents.	*AH- areaInfr*	PRESSURE
			Sealed bottom	*ICOM-P-2*	
			Sand contributions in beaches	*LAW .7-1*	
			Proportion of artificial coast	*LAW .7-2*	
			Coastal defence facilities	*LAW .7-3*	
			Harbour facilities	*LAW .4-3*	
C.2.2	Ensuring that localised and permanent physical alterations do not affect habitats	Impact on habitats	Extension of habitats affected by altered infrastructures and/or effluents	*HB-AreaAfec*	STATUS
			Changes in habitats due to alterations in the hydrographic conditions.	*AH- cambHab*	
C.2.3	Adopting mitigation measures in those coast sections affected by permanent physical alterations	Conservation status of habitats	Multimetric indices	*HB-MMI*	STATUS
			Composition of typical species	*HB-TSC*	
			Species richness	*HB-riq*	
			Diversity	*HB-div*	
			Quantifying the structural species	*HB-est*	
			WFD angiosperms	*HB-DMAAngio*	

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
			Indicator of demographic characteristics of grasslands of *P. oceanica*	*HB-DemP*	
			Indicator of environmental conditions of grasslands of marine angiosperms	*HB-CondAmbP*	
			WFD benthic invertebrates	*HB-DMAinv1*	
				HB-DMAinv2	
				HB-DMAinv3	
			WFD macroalgae	*HB-DMAmac1*	
				HB-DMAmac2	
				HB-DMAmac3	
C.2.4	Guaranteeing that the environmental impact studies consider hydrographic conditions	Percentage of environmental impact studies on projects affecting the marine environment that include alterations in the hydrographic conditions	Percentage of environmental impact studies on projects affecting the marine environment that include alterations in the hydrographic conditions	*OP-14*	OPERATIVE
(excepting CAN) C.2.5	Promoting to take into account in marine ecosystems depending on river mouths when establishing ecological flows	Percentage of hydrologic plans that consider marine ecosystems when establishing ecological flows	Percentage of hydrologic plans that consider marine ecosystems when establishing ecological flows	*OP-15*	OPERATIVE
C.3.9	Fostering a national monitoring system of the oceanic hydrographic and hydrodynamic variability and establishing an objective warning	Existence of the national system for the monitoring of hydrographic variability and oceanic hydrodynamics	Existence of the national system for the monitoring of hydrographic variability and oceanic hydrodynamics	*OP-21*	OPERATIVE

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
	system				
	Other status indicators		Variability and trends in hydrography and/or large-scale circulation	*AH-VarGE*	STATUS
-	*Other pressure indicators*		Reduction of natural inputs of hydrographic watersheds due to consumptive uses	*PRES.1-1*	PRESSURE
			Average storage in reservoirs in hydrographic watersheds	*PRES.1-2*	
			Thermal discharges	*PRES.3-1*	
			Waste water from desalination plants	*PRES.3-3*	
			Land-sea discharges (localisation)	*PRES.3-5*	

Table 33. Relation between environmental targets and associated indicators for permanent alterations of the hydrographic conditions, with the indicators of the monitoring programmes of the marine strategies, first cycle (2012-2018)

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Descriptor of contaminants and their effects (D8)

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
B.1.1	Reducing volumes of non-properly-treated discharges	Volume of non-properly-treated direct and indirect discharges	Volume of non-properly-treated direct discharges	*PRES.3-2*	PRESSURE
B.1.2	Reducing the frequency of non-properly-treated discharges from vessels and platforms	Frequency of non-properly-treated discharges from ships and platforms	Significant acute pollution events	*CONT-agu*	PRESSURE
B.2.1	Not exceeding contaminants levels established for biota and trends must be decreasing or stables if they are close to the basal level	Contaminant levels and trends in biota	Hexachlorobutadiene concentration in marine biota	*CONT-HCBD-B*	STATUS
			Metal concentration in biota (Hg, Cd, Pb)	*CONT-met-b*	
			PAH concentration in biota	*CONT-PAH-b*	
			PCB concentration in biota	*CONT-PCB-b*	
			PBDE concentration in biota	*CONT-PBDE-b*	
			Concentration of lindane and its isomers, DDT and its metabolites, hexachlorobenzene, dieldrin, endrin, isodrin, aldrin in biota.	*CONT-PO-b*	
B.2.2 NOR, SUD, LEBA,ESAL	Maintaining decreasing or stable trends of contaminants in sediments	Contaminants levels and trends in sediments	Metal concentration in sediments (Hg, Cd, Pb)	*CONT-met-s*	STATUS
			PAH concentration in sediment	*CONT-PAH-s*	
			PCB concentration in sediment	*CONT-PCB-s*	
			Organotin compound concentration in sediments	*CONT-OE-s*	

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
			PBDE concentration in sediment	*CONT-PBDE-s*	
			Concentration of lindane and its isomers, DDT and its metabolites, hexachlorobenzene, dieldrin, endrin, isodrin, aldrin in sediment.	*CONT-PO-s*	
B.2.3 NOR, SUD, LEBA, ESAL B.2.2 CAN	Not exceeding biological levels of response to pollution in indicator organisms and they must maintain their basal response ranges or get closer to this range over time	Levels and trends of biological responses	Neurotoxic effects: Inhibition of the acetilcholinesterase enzyme activity	*CONT-AChE*	STATUS
			Concentration of metallothioneins: indicator of exposure to biologically-active concentrations of heavy metals.	*CONT-MT*	
			Stress on stress: biomarker of general stress in mussels	*CONT-SoS*	
			Stability of the lysosomal membrane	*CONT-LMS*	
			Frequency of micronuclei	*CONT-mn*	
			EROD	*CONT-EROD*	
			Metabolite concentration of PAHs in fish bile	*CONT-mb*	
			Imposex	*CONT-imp*	
			Intersex in fish	*CONT-inter*	
			Larval growth of sea urchins	*CONT-cl*	
			Growing potential	*CONT-SFG*	
B.2.4 NOR, SUD, LEBA, ESAL B.2.3 CAN	Minimising impact and magnitude of significant acute pollution events	Existence of risk analysis processes	Existence of risk analysis processes	*OP-7*	OPERATIVE

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
B.3.2	Expanding knowledge on pollution and its effects	Number of studies and projects on pollution	Number of studies and projects on pollution	*OP-8*	OPERATIVE
C.3.5	Expanding knowledge on the effect of human activities over habitats	Number of scientific studies and projects on the effect of human activities over habitats	Number of scientific studies and projects on the effect of human activities over habitats	*OP-8*	OPERATIVE
-	*Other status indicators*		Radioactivity in the marine environment	*CONTradmedio*	STATUS
			Microbiological pollution in bathing waters	*CONT-micro*	
	Other pressure indicators		Provided loads of polluting substances	*ICOM-P-4*	PRESSURE
			Land-sea discharges (localisation)	*PRES.3-5*	
			Radioactivity in effluents	*PRES.3-6*	
	Other activity indicators		Aquaculture production	*LAW .3-1*	
			Location of the facilities	*LAW .3-2*	
			Loading/unloading potential contaminants	*LAW .4-2*	
			National navigation per types of vessels	*LAW .5-1*	
			Hydrocarbon exploration boreholes	*LAW .8-1*	
			Amount of extracted hydrocarbons	*LAW .8-2*	
			Injected gas to be stocked.	**LAW .8-3**	

Table 34. Relation between environmental targets and associated indicators for contaminants and their effects, with the indicators of the monitoring programmes of the marine strategies, first cycle (2012-2018)

Descriptor of contaminants in fish and other seafood (D9)

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
B.2.5 CAN: B.2.4	Contaminants do not exceed the maximum level permitted for human consumption	Contaminants levels in established species	Contaminant actual levels	*CP-niv*	STATUS
			Pathogens in mollusc meat	*CP-pat*	
			Frequency of regulatory levels being exceed	*CP-Frec*	
			number of contaminants which have exceeded maximum regulatory levels	*CP-num*	
C.3.10	Ensuring traceability of fishing products	Percentage of fishing products in point of first or second-hand sale from known origin	Percentage of fishing products in first or second sale from known origin	*OP-22*	OPERATIVE

Table 35. Relation between environmental targets and associated indicators for contaminants in fish and other seafood, with the indicators of the monitoring programmes of the marine strategies, first cycle (2012-2018)

Descriptor of marine litter (D10)

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
B.1.5: NOR,LEBA,ESAL B.1.4: SUD,CAN	Reducing the amount of generated litter	Amount of marine litter in coasts and/or in the continental shelf	Litter in beaches	*BM-pla*	STATUS
			Litter on the seafloor	*BM-fon*	
			Microparticles in sediments	*BM-mic*	
			Plastic microparticles in beaches	*BM-micplaya*	
B.1.6: NOR,LEBA,ESAL B.1.5: SUD,CAN	Reducing the total number of visible objects in the coastline in 2020	Moving average of the number of visible littering objects, with an interval of 5 years	Litter in beaches	*BM-pla*	STATUS
B.1.7: NOR,LEBA,ESAL B.1.6: SUD	Reducing the surface of the shelf affected by fishing litter as of 2012 levels	Proportion of samplings grids with presence of litter	Litter on the seafloor	*BM-fon*	STATUS
B.1.8: NOR,LEBA,ESAL B.1.7: SUD	Reducing and not increasing litter amounts derived from fishing in the shelf as of 2012 reference levels	Littering density	Litter on the seafloor	*BM-fon*	STATUS
B.1.9: NOR B.1.8: SUD	Reducing and not increasing litter amounts derived from fishing in beaches as of 2012 reference levels	Number of items / 100 m of beach	Litter on beaches	*BM-pla*	STATUS
B.3.3	Expanding knowledge on characteristics and impacts of	Number of studies and projects on marine litter	Number of studies and projects on marine litter	*OP-8*	OPERATIVE

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
	marine litter				
C.3.5	Expanding knowledge on the effect of human activities over habitats	Number of scientific studies and projects on the effect of human activities on habitats	Number of scientific studies and projects on the effect of human activities over habitats	*OP-8*	OPERATIVE
-	*Other activity indicators*		Fishing effort	*LAW .1-1*	PRESSURE
			National navigation per types of vessels	*LAW .5-1*	
	Other status indicators		Floating litter	*BM-flo*	STATUS
			Microparticles in water	*BM-micro*	
	Other impact indicator		Impact of litter in marine biota	*BM-bio*	IMPACT

Table 36. Relation between environmental targets and associated indicators for marine litter, with the indicators of the monitoring programmes of the marine strategies, first cycle (2012-2018)

Descriptor of underwater noise (D11)

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
B.1.10 NOR B.1.9: SUD, LEBA and ESAL B.1.6:CAN	Ensuring that noise levels have no impact	_	Impulse noise	*RS-imp*	PRESSURE
		_	Environmental noise	*RS-amb*	PRESSURE
		Registered cases of noise impact on the marine biodiversity	–	–	–
B.3.4	Expanding knowledge on submarine noise	_	Impulse noise	*RS-imp*	PRESSURE
		_	Environmental noise	*RS-amb*	PRESSURE
		Number of studies and projects on submarine noise	Number of studies and projects on submarine noise	*OP-8*	OPERATIVE
	Other activity indicators		National navigation per types of vessels	*LAW .7-1*	PRESSURE
			Hydrocarbon exploration boreholes	*LAW .8-1*	
			Amount of extracted hydrocarbons	*LAW .8-2*	
			Injected gas to be stocked.	*LAW .8-3*	
			Seismic acquisition	*LAW .8-4*	

Table 37. Relation between environmental targets and associated indicators for submarine noise, with the indicators of the monitoring programmes of the marine strategies, first cycle (2012-2018)

Transversal targets affecting all the descriptors

Agreement of the Council of Ministers on environmental targets			Monitoring programme of the marine strategies		
Target Code	**Environmental target**	**Associated indicator**	**Proposed indicators**	**Code indicator**	**Type of indicator**
A.1.9 CAN:A.1.12	Ensuring an appropriate surveillance of the marine environment	Existence of surveillance systems	Existence of surveillance systems	*OP-2*	OPERATIVE
C.1.3	Ensuring the social participation in the marine strategy	Number of initiatives on social participation and assessment of their results	Number of initiatives on social participation and assessment of their results	*OP-11*	OPERATIVE
C.1.4	Achieving an appropriate coordination among administrators, institutions and sectors related to the marine environment	Number of coordination initiatives, projects and coordination	Number of coordination initiatives, projects and coordination	*OP-12*	OPERATIVE
C.3.1	Improving the access to the information available on the marine environment	Access and quality level of the information available on the marine environment	Access and quality level of the information available on the marine environment	*OP-16*	OPERATIVE

Table 38. Relation between environmental targets and transversal associated indicators with the indicators of the monitoring programmes of the marine strategies, first cycle (2012-2018)