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Marine chemical contaminants – support to the harmonization of MSFD D8 methodological standards

Matrices and threshold values/reference levels for relevant substances

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Contents

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Abstract

According to the Article 17(2) of the Marine Strategy Framework Directive (MSFD), Member States review and update their marine strategies every six years. This requires updates of the MSFD Articles 8, 9 and 10 by 2018.

The current report provides an overview of the substances, matrices and threshold values that Member States intend to use for the assessment of the Descriptor 8 in this MSFD reporting cycle. This compilation helps evaluate existing gaps as well as differences between Member States and so identify aspects that need further harmonization. It also helps understand which issues should be addressed to achieve consistency with the new MSFD Commission Decision (EU 2017/848).

The information has been gathered from the contributions of the MSFD Expert Network on Contaminants, an informal network established by the Joint Research Centre (JRC) to support the MSFD implementation. This work is part of a process to help regulators to assess relevant contaminants in their jurisdictional area, thus aiming at EU national authorities but also at Regional Sea Conventions in the shared marine regions.

1 Introduction

The Marine Strategy Framework Directive (MSFD, 2008/56/EC[1]) provides for regular updates of the marine strategies by EU Member States (MS) every six years. The article 17(2) requires reporting on articles 8 (initial assessment), 9 (determination of the Good Environmental Status) and 10 (establishment of targets) to be updated by 2018.

According to the revised MSFD Commission Decision (EU 2017/848[2]), MS have to consider the Priority Substances (PS) and River Basin Specific Pollutants (RBSP) already identified under the Water Framework Directive (WFD, 2000/60/EC[3]), and establish, through regional or subregional cooperation, a list of additional contaminants that may give rise to pollution effects. For each contaminant under criterion D8C1, MS shall express its concentration, the matrix used for monitoring (water, sediment, biota), whether the threshold values set have been achieved, and the proportion of contaminants assessed which have achieved the threshold values. For the contaminants already identified under the WFD, the threshold values should be the values set in accordance with that Directive. For contaminants measured in a matrix for which no value is set under the WFD, as well as for additional contaminants, the threshold values for a specified matrix should be established through regional or subregional cooperation.

The scope of this report and the associated process is the exchange of information on selected substances and related assessment parameters in order to work towards comparable MSFD Descriptor 8 assessments, aiming at equal levels of protection across European Seas.

During the first half of 2018, a list with the contaminants that MS planned to include in their 2018 MSFD D8 reporting was compiled in order to support harmonized reporting and facilitate data entry. This compilation allowed for the analysis of the consideration for MSFD D8 assessments of the WFD PS and RBSP, as well as the contaminants from the Regional Sea Conventions (RSC) lists and other additional contaminants (Tornero and Hanke, 2018).

The list of contaminants for 2018 MSFD D8 reporting was prepared with the MSFD Expert Network on Contaminants, an informal network established to support MS in MSFD implementation. Experts from 19 MS contributed to this activity: Belgium (BE)*, Bulgaria (BG), Croatia (HR), Cyprus (CY), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Ireland (IE), Italy (IT), Malta (MT), Netherlands (NL), Poland (PL), Romania (RO), Spain (ES), Sweden (SE), and United Kingdom (UK).

Besides the substances, experts were also asked to provide information on the matrices and threshold values/reference levels that MS intended to use for their 2018 MSFD D8 assessments. The current report gathers and analyses this information in order to evaluate existing gaps as well as the differences between MS and understand where efforts should be focused to improve consistency and cooperation.

It is important to highlight that MS prepared their MSFD monitoring programmes in 2014, before the publication of the new Commission Decision. Thus, there may be some disparity between a reporting based on this more recent document and a monitoring programme in place prior to its publication. This report focuses and reflects on the present MSFD

(1) Directive 2008/56/EC of the European parliament and of the council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive). http://eur-lex.europa.eu/LexUriServ/LexUriS-erv.do?uri=OJ:L:2008:164:0019:0040:EN:PDF

(2) Commission Decision (EU) 2017/848 of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017D0848&from=EN

(3) Directive 2000/60/EC of the European parliament and of the council of 23 October 2000 establishing a framework for Community action in the field of water policy. http://eurlex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC_1&format=PDF

* Belgium provided an extensive list of contaminants monitored in Belgium waters, but at the time of preparation of tis report, it was not possible yet to know if they will or not be included in the 2018 MSFD reporting.

reporting, but the substances monitored as well as the matrices and thresholds used might have been changed or updated in the current or planned monitoring programmes of the MS. Nevertheless, the results provided here turn out to be a good starting point to evaluate the current situation and help support the work on harmonization of methodological standards, as described in the new Commission Decision, also with a view to the next MSFD reporting cycle.

Furthermore, this report does not include information on the marine region or sub-region where monitoring is carried out for the selected substances. The assessment of the spatial coverage of the monitoring is out of the scope of this report but should be taken forward for future work of the MSFD Expert Network on Contaminants.

2 Thresholds values/reference levels

The standards and threshold values considered by MS for the assessment of contaminants under MSFD D8 are:

- **EU-wide Environmental Quality Standards (EQS)** laid down in part A of annex I to Directive 2008/105/EU[4] as amended by Directives 2008/105/EC[5] and 2013/39/EU[6]. The EQS is the concentration of a particular pollutant or group of pollutants in water, sediment or biota which should not be exceeded in order to protect human health and the environment. EQS are set as a maximum allowable concentration (MAC-EQS) or an annual average (AA-EQS), protecting aquatic organisms from acute and chronic effects, respectively. Water EQS are expressed as total concentrations in the whole water sample except in the case of cadmium, lead, mercury and nickel where the water EQS refer to the dissolved concentration, i.e. the dissolved phase of a water sample obtained by filtration through a 0.45 µm filter or any equivalent pre-treatment, or, where specifically indicated, to the bioavailable concentration. Additionally, EQS in biota have been set for some PS to protect against secondary poisoning or to protect human health. Depending on the bioaccumulation potential of the pollutant and the protection goal, EQS_{biota} concerns the concentration in either mussels or fish at trophic level 4 or 4.5. To account for differences in the lipid content of sampled biota measured concentrations of fat-soluble pollutants should be normalized to a lipid content of 5% for fish and 1% for mussels before comparison with the EQS_{biota} (European Commission, 2014).

- **Quality standards (QS) for sediment** derived within the EQS process and set to protect the benthic community considering exposure via sediment. For lipophilic pollutants, measured concentrations should be normalized with respect to the content of organic carbon in the sediment (TOC-normalization) to 5% before comparison with the QS.

- **Maximum levels for certain contaminants in foodstuffs** set in the Commission Regulation (EC) No 1881/2006[7] and amendments in order to prevent contaminated foodstuff from being placed on the market.

- **OSPAR Background Assessment Concentrations (BACs)** for testing whether measured concentrations are near background for naturally occurring substances and close to zero for man-made substances, the ultimate aim of the OSPAR Hazardous Substances Strategy. Mean concentrations significantly below the BACs are said to be near background (naturally occurring concentrations). OSPAR BACs in sediment are normalized to 2.5% organic carbon, except for Spain where BACs are not normalized. BACs do not consider ecotoxicological aspects, so the approach is different to the EQS derivation.

- **OSPAR Environmental Assessment Criteria (EACs)** for assessing the ecological significance of sediment and biota concentrations. The EACs values were set so that

(4) Directive 2008/105/EC of the European parliament and of the council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0105&from=en

(5) Directive 2008/105/EC of the European parliament and of the council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0105&from=EN

(6) Directive 2013/39/EU of the European parliament and of the council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013L0039&from=EN

(7) Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02006R1881-20150731&from=EN

hazardous substance concentrations in sediment and biota below the EACs should not cause chronic effects in sensitive marine species, including the most sensitive species, nor should concentrations present an unacceptable risk to the environment and its living resources. However, the risk of secondary poisoning is not always considered. OSPAR BACs and EACs are often used in tandem in a "traffic light" assessment approach.

- **Effects Range-Low (ERL)** values developed by the United States Environmental Protection Agency (US EPA) for assessing the ecological significance of sediment concentrations. ERL is the lower tenth percentile of the data set of concentrations in sediments, which were associated with biological effects. Adverse effects on organisms are rarely observed when concentrations fall below the ERL value.

- **National EQS**. MS are to establish national EQS according to the procedure described in the WFD guidance document no. 27 (European Commission, 2011 and 2018 revision). Alternatively, to water EQS, MS can also set sediment or biota EQS, as long as they provide at least the same level of protection.
  Besides the threshold values and assessment criteria agreed at EU or regional level, MS have also indicated some national standards used for the assessment of some contaminants:

  - Bulgaria: national EQS in water, which have been derived according to the WFD CIS guidance No. 27 (European Commission, 2011), and published in the Bulgarian Ordinance No. N-4 of 14/09/2012 on the characterization of surface waters.
  - Croatia: the basis for the 2018 MSFD reporting will most likely be the substances monitored in the scope of the coastal and transitional waters monitoring programmes (in 2015 and 2017), in compliance with the WFD. However, at the time of preparation of this report, no official decision has been made yet. Likewise, there is not yet a decision made regarding the sediment thresholds that will be used. In the previous GES assessment in 2012, the OSPAR sediment thresholds were applied, but it was agreed that those values were not applicable for the specific regional conditions. The sediment quality criteria from the Norwegian system for classification of sediments (Bakke et al., 2010), which are used to categorize sediment, were used for the purposes of the general assessment of the state of the environment in the scope of the WFD monitoring.
  - Denmark: national standards published in the national Executive Order (BEK, 2017). These standards have been derived according to the WFD CIS guidance No. 27 (European Commission, 2011). In Denmark, the basis for the reporting are the substances monitored in coastal and transitional waters, in compliance with the WFD. Assessment and reporting beyond the territorial waters is carried out for MSFD for four substances as they exceed threshold values within coastal and territorial waters (PFOS, PBDE, benzo(a)pyrene and mercury).
  - Estonia: national threshold values for water, biota and sediments, which can be considered as preliminary and mostly based on literature data (last update in 2015). When additional monitoring data are available, the WFD guidance is used to revise these thresholds accordingly, but it depends on the country specific measurement data for some of the substances.
  - Finland: national threshold value for mercury in fish (Maximum Permissible Addition (MPA) +EQS), which is also included in the Finish WFD legislation.
  - Germany: the basis for the current reporting of WFD PS and RBSP are the river basin management plans of 2015, which are based on the national Ordinance on Surface Waters (Oberflächengewässerverordnung, OGewV, 2011) implementing Directive 2008/105/EC. National threshold values for RBSP included in OGewV 2011 are mainly taken over from the Council directive

76/464 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community[8]. Meanwhile, some RBSP according to OGewV 2011 have become PS according to 2013/39/EU. Furthermore, there are some PS with an EQS different from the one laid down in 2013/39/EU. OGewV 2011 is superseded by the updated OGewV from 2016, which is implementing 2013/105/EU. The present monitoring is in accordance to OGewV 2016.

- Greece: an approximate sediment assessment is performed based on contaminant values in remote/reference areas and in sediment cores.
- Ireland: SI (Statutory Instrument) 272 of 2009 sets national standards in water for certain specific pollutants. This is amended by SI 386 of 2015 which gives effect to Directive 2013/39/EU and EQS established therein. Mandatory (water) and guidance values for certain parameters (primarily metals) have also been established in S.I. 268 of 2006 in accordance with the requirements of the Shellfish Directive (Dir 2006/113 subsequently subsumed into the WFD), although some of these have been superseded by later QS set in the aforementioned legislation.
- Italy: EQS in sediments set in compliance with the WFD in marine-coastal and transitional waters for some substances (Legislative Decree 172/2015). These values have been derived based on direct risks for the benthic communities, but also for human health through seafood consumption. The ecotoxicological criterion used as a reference, agreed with the National Scientific Institutes, was the TEL (Threshold Effect Level), the threshold value below which the adverse effects are expected to occur only rarely (Long and Mac Donald, 1998). For most substances, chemical and ecotoxicological data were collected along the Italian coast from 2001 to 2008.
- Malta: there is ongoing work on the development of additional EQS in sediment. In the interim report, Malta will either use trend analysis, EQS set by neighboring countries (as indicated in the Malta's monitoring factsheet for contaminants, 2015) as well as regional thresholds, in particular those set by the Barcelona Convention and the IMAP. These EQS are preliminary and subject to changes pending the outcome of the initial monitoring cycles.
- Poland: national standards for macrophytobenthic plants, which are calculated by multiplying the metal concentration ratio by the WFD AA EQSwater, according to the approach followed by Zalewska and Danowska (2017). There also national water standards for some contaminants, which are recommended by national legal regulation (Regulation of the Minister of the Environment of 21 July 2016).
- Romania: national water standard for copper, which is set in national legislation in compliance with WFD (Order of Minister of Environment and Water Management nr. 161 / 2006 approving the Normative for surface waters quality classification for establishing ecological status of water bodies).
- Spain: the environmental criteria for assessing sediments in Spain (BACs, ERL), which are not normalized (unlike the OSPAR BACs). BACs should be specific at regional/subregional level for contaminants that can have a natural origin (trace metals and PAHs), but these values are not established for many areas. Some specific BACs for Mediterranean mussels are also used in Spain depending on the available monitoring data (León et al., 2013).
- Sweden: national standards for sediment for some pollutants, which are derived on the basis of the WFD CIS guidance No. 27 (European Commission, 2011), and ecotoxicity data for sediment dwelling organisms.
- UK: EQS in water for specific pollutants (Water Framework Directive (Standards and Classification) Directions (England and Wales), 2015). These WFD

([8]) https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31976L0464&from=EN

substances are not analyzed every year as they are assessed on a risk-based approach.

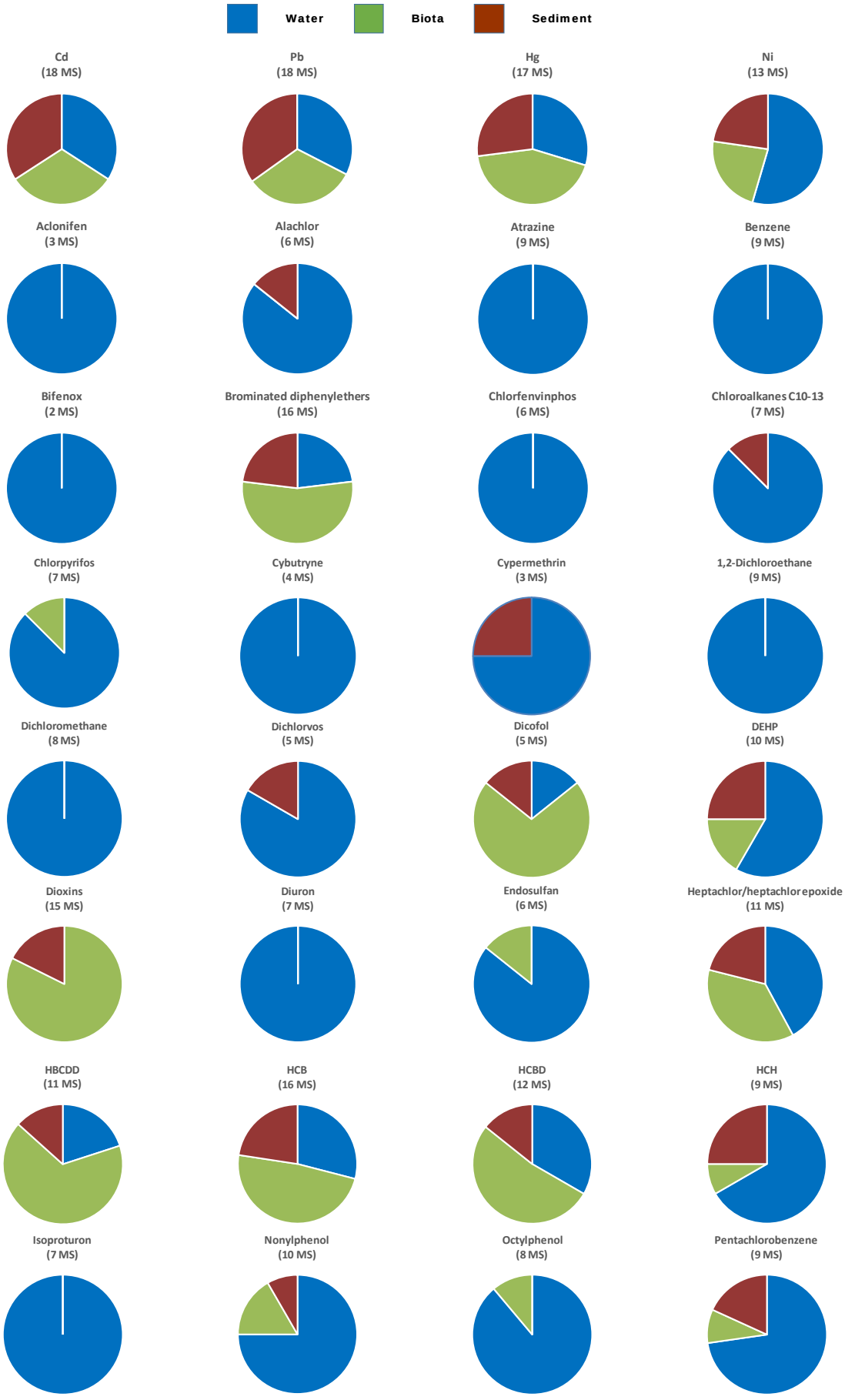
Moreover, it is important to highlight that some MS do not report compliance with a threshold value but provide integrated assessments across time (for trends) and space (from individual monitoring stations to the classified area) in order to reach a conclusion on the status of their marine waters.

3 Results

The Annex I presents the substances, matrices and threshold values considered by MS for use in the 2018 MSFD D8 reporting. This annex provides a quick overview of the information compiled and utilized for the overall comparisons and analyses. However, as explained above, current or planned monitoring programmes might include different substances, revised threshold values and matrices, which have not been used in the current reporting but will be used for further assessments.

WFD PS and certain other pollutants

— As seen in figure 1, water is the preferred matrix for most WFD PS, but biota is preferably used for those PS for which a WFD EQS_{biota} has been established. However, while this EQS is mostly used for compliance assessment of dicofol, dioxins and dioxin-like compounds, heptachlor and heptachlor epoxide, hexabromocyclododecanes (HBCDD), hexachlorobenzene (HCB), hexachlorobutadiene (HCBD), and perfluorooctane sulfonic acid and its derivatives (PFOS), there are discrepancies regarding its use for mercury (Hg), brominated diphenylethers (PBDE), benzo(a)pyrene and fluoranthene.


Water
Biota
Sediment
Cd
(18 MS)
Pb
(18 MS)
Hg
(17 MS)
Ni
(13 MS)
Aclonifen
(3 MS)
Alachlor
(6 MS)
Atrazine
(9 MS)
Benzene
(9 MS)
Bifenox
(2 MS)
Brominated diphenylethers
(16 MS)
Chlorfenvinphos
(6 MS)
Chloroalkanes C10-13
(7 MS)
Chlorpyrifos
(7 MS)
Cybutryne
(4 MS)
Cypermethrin
(3 MS)
1,2-Dichloroethane
(9 MS)
Dichloromethane
(8 MS)
Dichlorvos
(5 MS)
Dicofol
(5 MS)
DEHP
(10 MS)
Dioxins
(15 MS)
Diuron
(7 MS)
Endosulfan
(6 MS)
Heptachlor/heptachlor epoxide
(11 MS)
HBCDD
(11 MS)
HCB
(16 MS)
HCBD
(12 MS)
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Octylphenol
(8 MS)
Pentachlorobenzene
(9 MS)

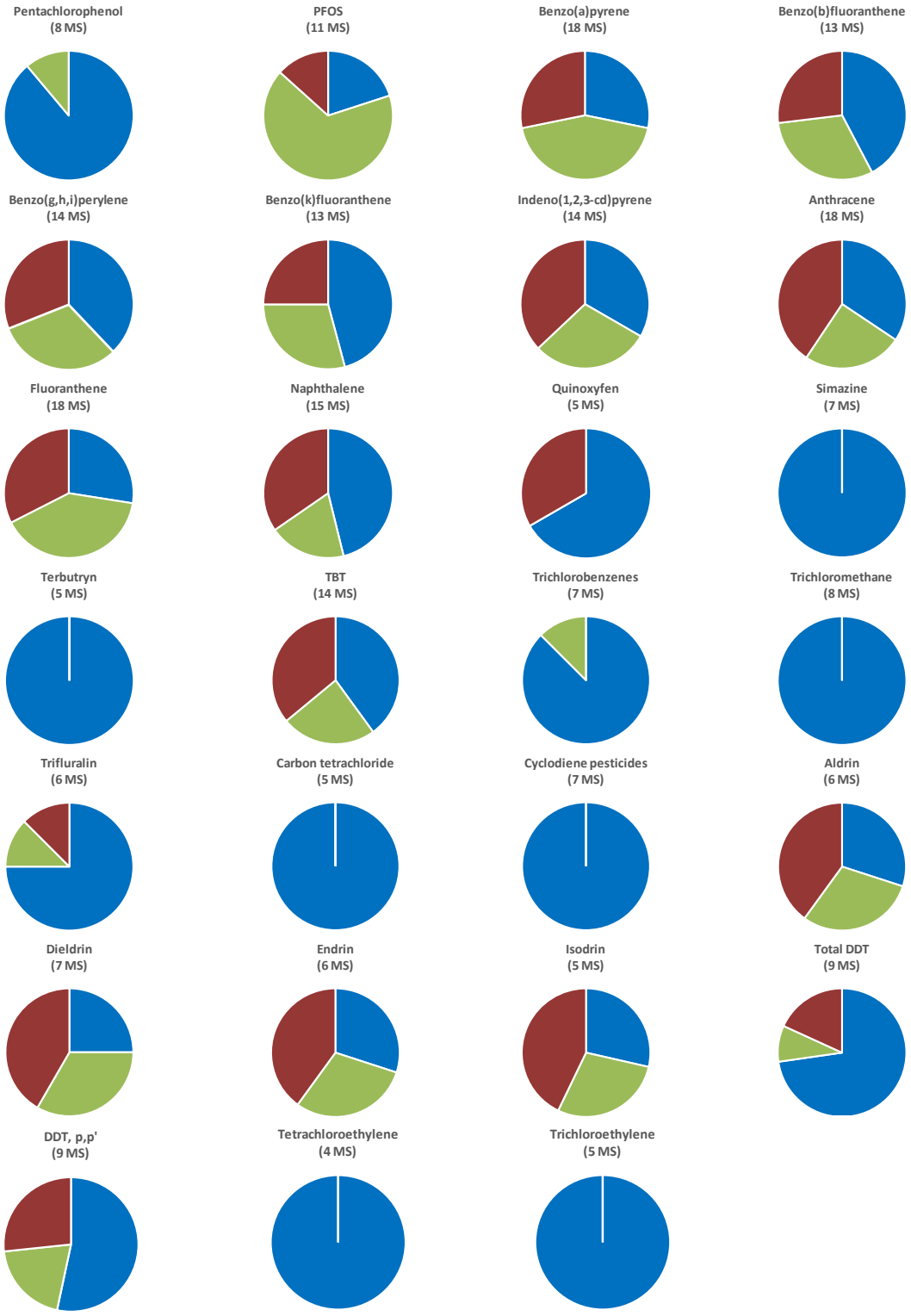

Figure 1. Matrices for WFD PS and certain other pollutants reported under MSFD D8 (*in brackets, number of MS reporting on the particular substance*)

Hg

Figure 2 shows the different Hg biota standards agreed at EU and regional level and figure 3 shows the biota standards used in the 2018 MSFD assessments by MS.

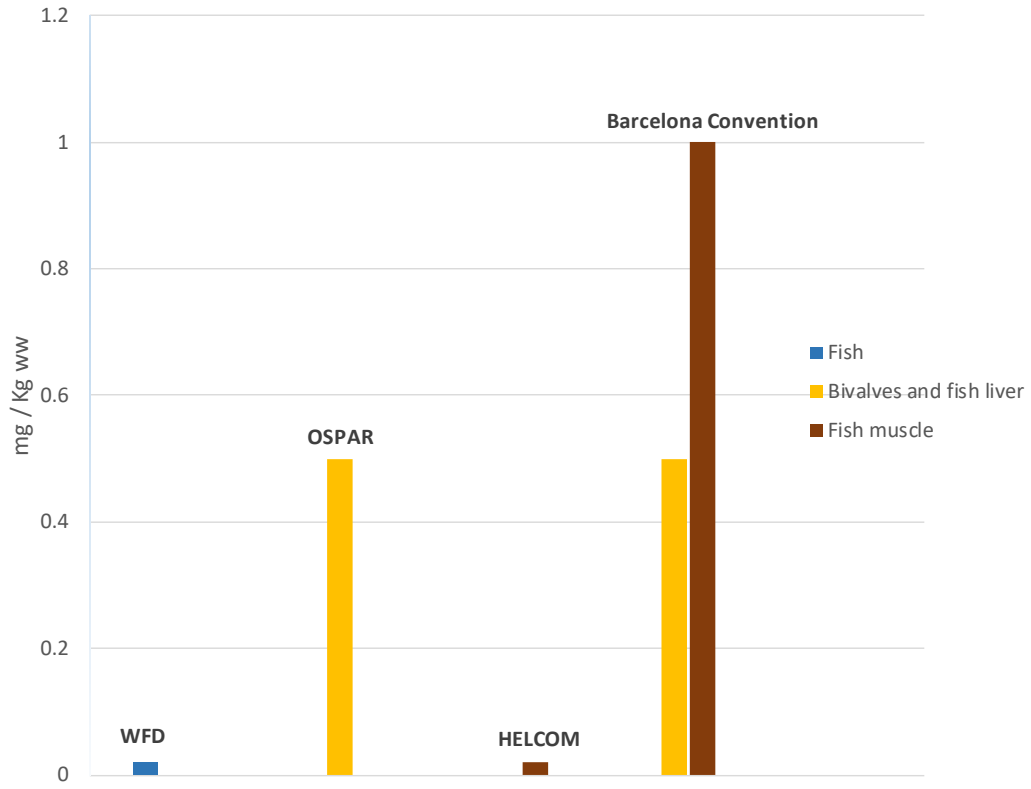

Figure 2. Threshold values agreed at EU and regional level for Hg biota assessment

The WFD EQS_{biota} is applied in the Baltic region, with the exception of Finland, where a different national standard has been set (EQS+background concentration).
In OSPAR, the WFD EQS_{biota} is judged as "not appropriate" for the marine environment (see comments for Hg in Annex I); hence, it is not agreed in the region (although some OSPAR countries like Germany and Netherlands use it). As an interim position, OSPAR has agreed to use the maximum level established in the food regulation as proxy EACs, even though there are concerns regarding its suitability for assessing environmental risks. Currently, OSPAR is working on the development of a distance to target approach (i.e. distance to Background Concentrations) to support Hg assessments.
The EC dietary limits have also been agreed within the Barcelona Convention, although some Mediterranean countries like Croatia, Malta and Italy use the WFD EQS_{biota} for their MSFD assessments.

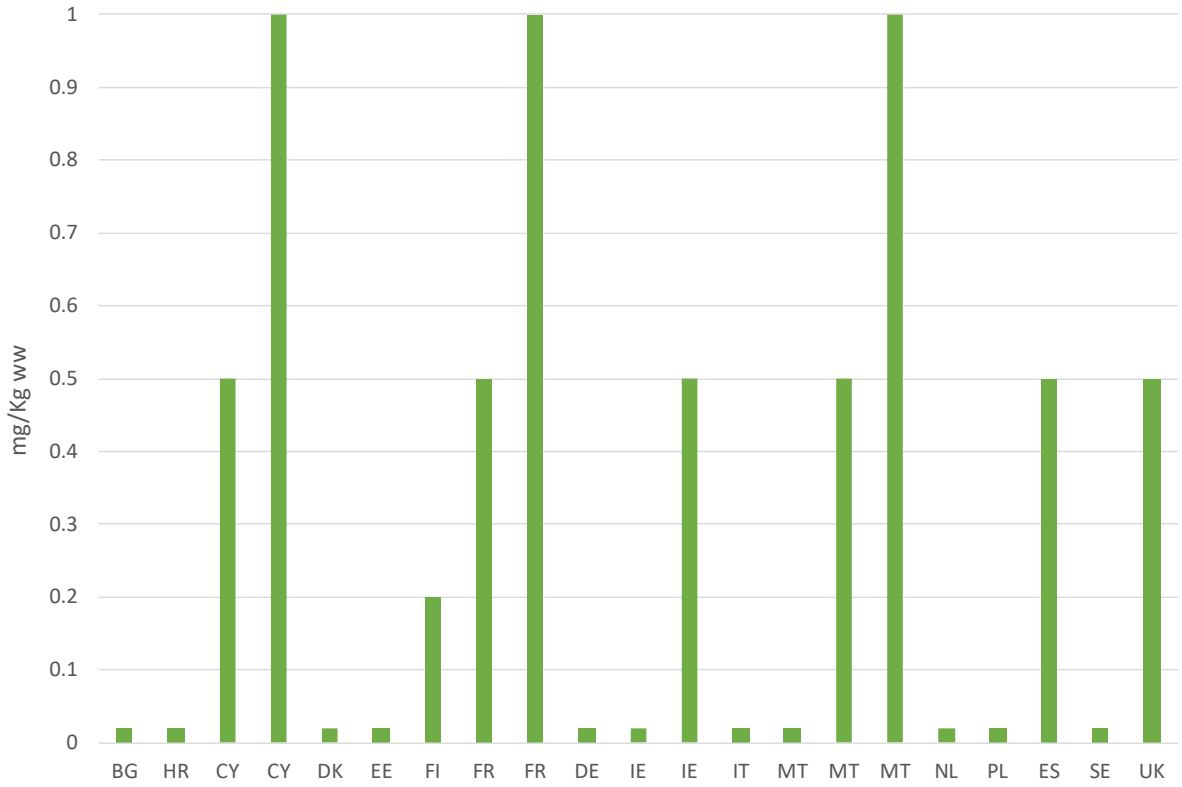

Figure 3. Threshold values used by MS for Hg assessments in biota

PBDE

The WFD EQS_{biota} set for PBDE is based on human health protection but it has not been endorsed by the European Food Safety Authority (EFSA). This threshold value is used by many MS for MSFD assessments.
The use of the WFD EQS_{biota} is agreed in HELCOM, although it is argued to be very low (analytically challenging and well below levels usually found in biota). The suitability of such a restrictive threshold value still needs further discussion in the Baltic area.
This EQS is not agreed within OSPAR, so most OSPAR countries measure PBDE concentrations in biota but do not assess them. There are recent discussions within OSPAR regarding the possible use of the Canadian Federal Environmental Quality Guidelines (FEQGs) for BDE-47 as proxy EACs.

Benzo(a)pyrene

The WFD EQS_{biota} for benzo(a)pyrene is based on the food safety level and refers to crustaceans and molluscs.
This EQS is agreed in HELCOM, but not in OSPAR (although MS like Ireland, France and Netherlands use it). There is an agreed OSPAR EAC, which is also used by many OSPAR countries and Romania. However, this EAC is much higher than the WFD EQS_{biota}. The driving goal and driving data of the approaches to derive these two standards are different, which have led to two very different values (Amara et al., 2017).

Fluoranthene

The WFD EQS_{biota} for fluoranthene is used by most MS. However, OSPAR countries like France, Spain and UK and also Romania apply instead the OSPAR EAC. The two values (EQS and EAC) are close despite the methodologies to derive them are different (Amara et al., 2017).

– Besides water, also biota and sediments are frequently used for the assessment of some WFD substances. These matrices are optional under the WFD and there are no EQS set at EU level, but there are some standards agreed within the RSC.

Cadmium (Cd) and lead (Pb)

For biota, the EC food standards are agreed as proxy EACs within OSPAR and the Barcelona Convention. While in OSPAR the shellfish dietary values are used as proxy EACs for all species, the standards set for both shellfish and fish are used in the Mediterranean countries. As mentioned above, these values can be regarded as not fully satisfactory in the context of an assessment addressing environmental risk (OSPAR, 2009) and OSPAR is working on the development of the distance to target approach to support assessments for these metals.
There are no agreed standards within the Black Sea Commission and Romania has also indicated the use of the EC food standards for MSFD assessments.
In HELCOM, biota is a secondary matrix and the secondary threshold values are the OSPAR BACs for mussels for Cd and the OSPAR BACs for fish liver and mussels for Pb. The use of BACs can be considered a more cautious approach compared to an EQS and the calculation of BACs for the HELCOM region has been suggested for future work. Nonetheless, HELCOM EU MS like Denmark, Estonia and Poland apply national standards, which differ from the values agreed regionally. In the case of Polish national standards, they have been set for other matrix (macrophytobenthic plants) with other bioaccumulation efficiency than specific to fish, so the values differ from those set for fish liver and mussel.

Regarding sediments, the US ERL are agreed as proxy EACs in OSPAR and the Barcelona Convention, as well as in Romania, while in HELCOM, sediment is a secondary matrix and the QS from the EQS dossiers are the secondary threshold values (HELCOM core indicator report- metals, 2018). National standards have been indicated by countries like Italy and Denmark, which differ considerably from the values agreed regionally.

The figures 4 and 5 show the different sediment standards used by MS for MSFD assessments of Cd and Pb, respectively. Moreover, some MS do not assess compliance with a threshold value, but trends (Cyprus and Netherlands) and Croatia may use the Norwegian sediment quality criteria to categorize the sediment (as done in their assessments of the state of the environment in the scope of the WFD).

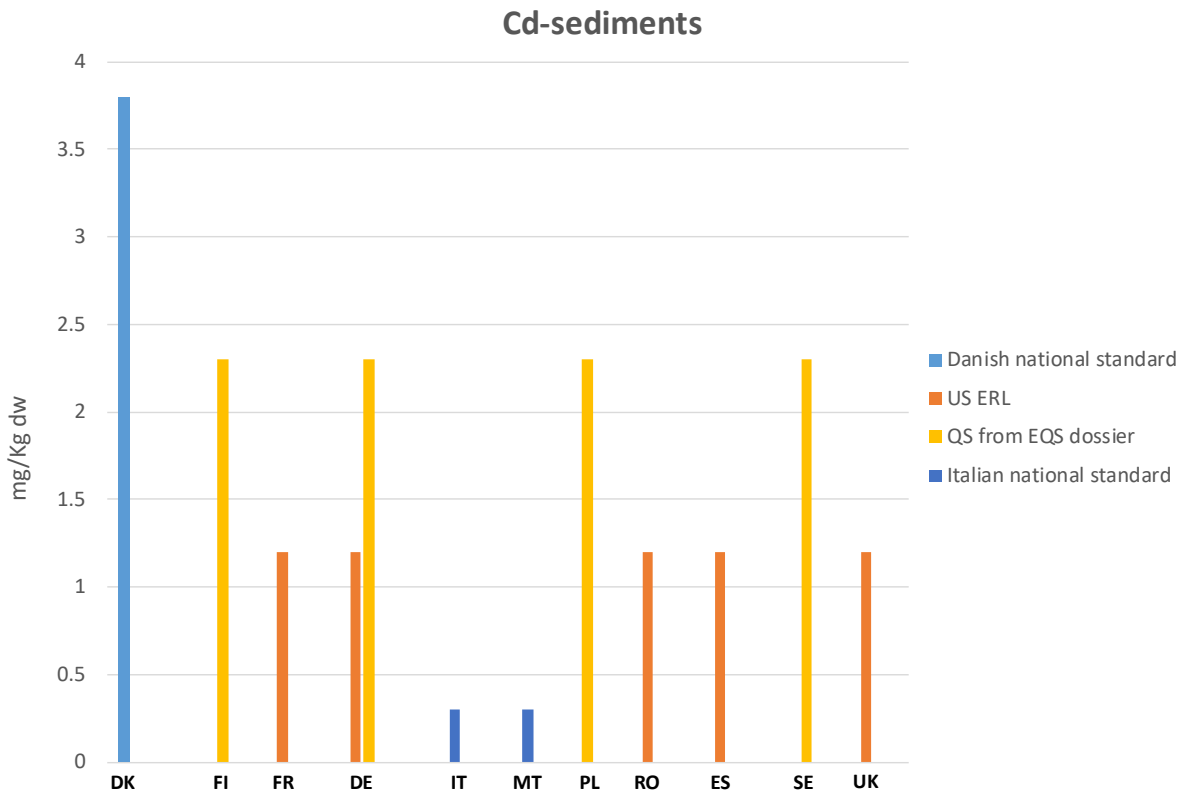

Figure 4. Threshold values used by MS for Cd assessments in sediments

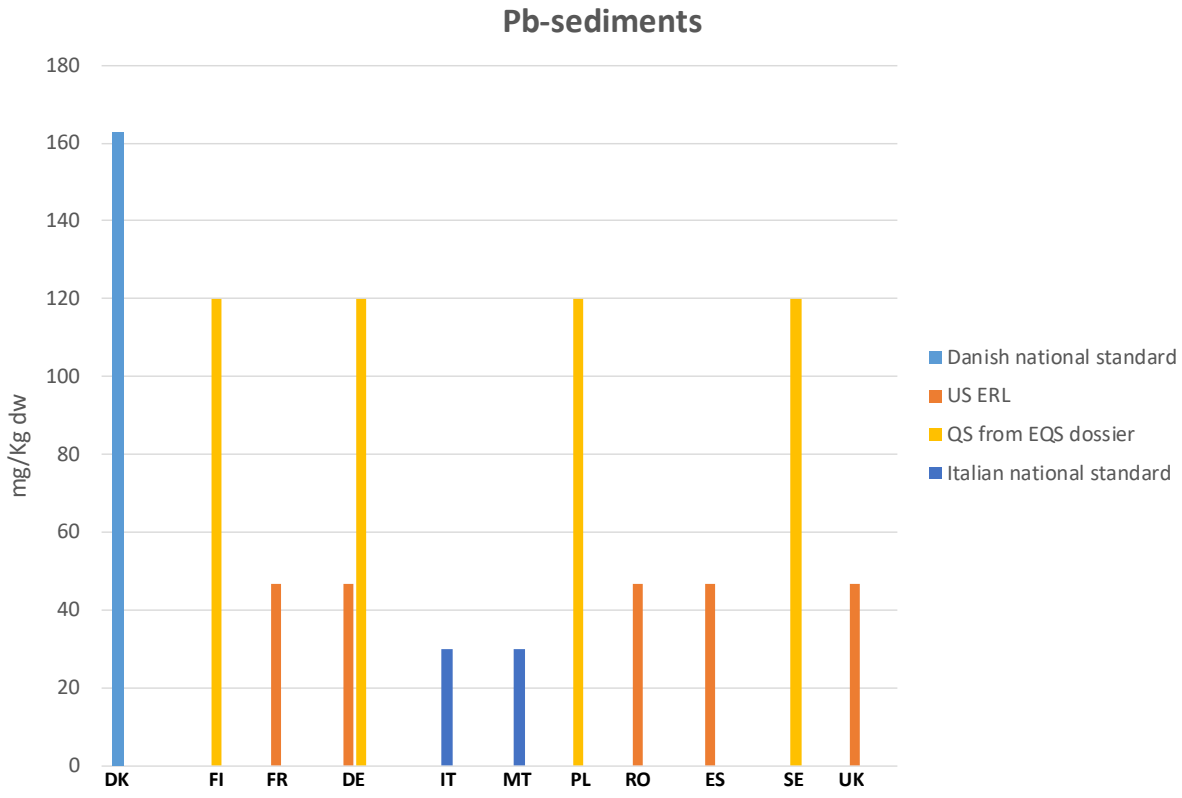

Figure 5. Threshold values used by MS for Pb assessments in sediments

Polyaromatic hydrocarbons (PAH)

PAHs are also usually monitored in sediment. For benzo(a)pyrene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, and naphthalene, in absence of EACs for sediments, OSPAR uses the US ERL as regional thresholds. These sediment quality guidelines are also used by Romania. Italy has developed national standards, which are significantly lower than the US ERL. The lack of agreed standards in other countries may lead to the non-inclusion of their sediment data in the MSFD assessments.

For anthracene, both OSPAR and HELCOM have agreed sediment assessment criteria (US ERL in OSPAR and QS from EQS dossiers in HELCOM). National standards have been indicated by Denmark (very different from the value agreed in HELCOM), Italy and Malta.

For fluoranthene, Italy and Malta have national standards and Poland and Sweden use the QS from EQS dossier, although this standard has not been agreed regionally in HELCOM.

The figures 6 and 7 show the threshold values used by MS for anthracene and fluoranthene, respectively.

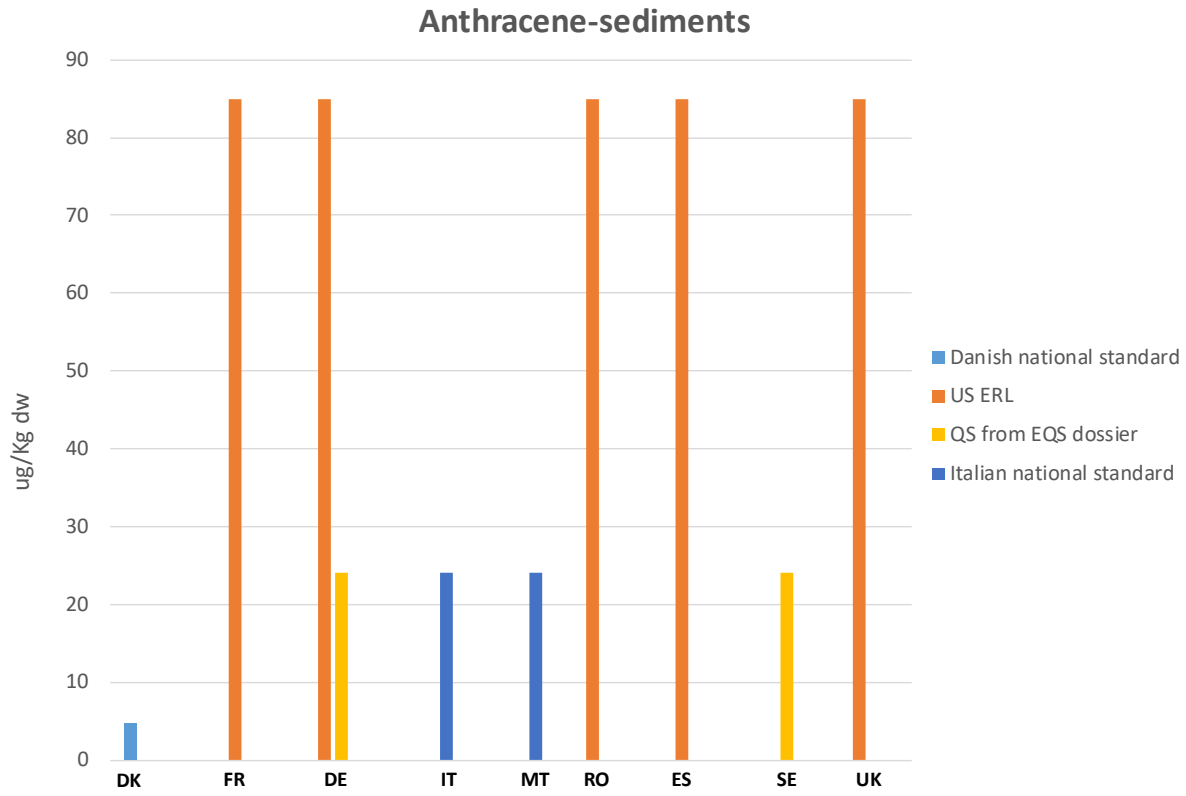

Figure 6. Threshold values used by MS for anthracene assessments in sediments

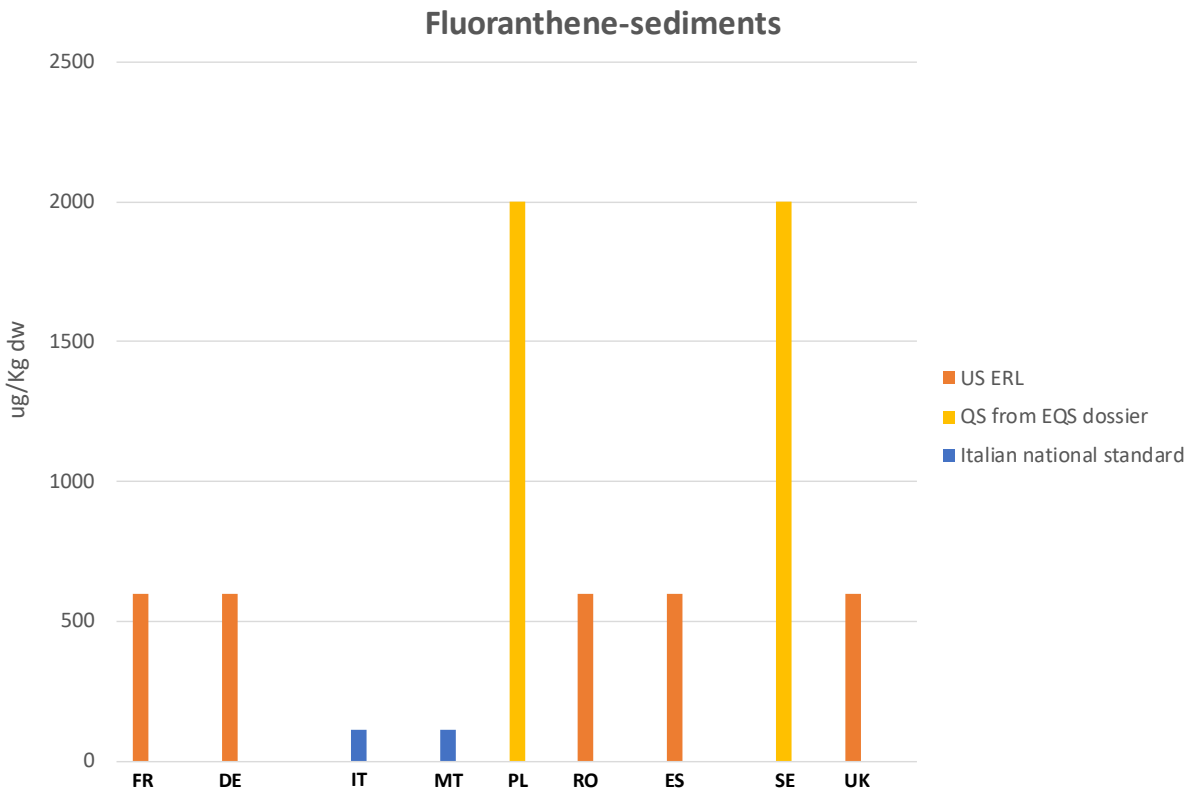

Figure 7. Threshold values used by MS for fluoranthene assessments in sediments

Tributyltin compounds (TBT)

TBT compounds are commonly monitored in sediments. In HELCOM, sediment is the primary matrix. Sweden has developed a quality standard based on ecotoxicity data on benthic organisms, which although not yet commonly agreed regionally, is used by most HELCOM countries (with the exception of Estonia, which uses a very much lower national standard). The use of this Swedish QS is also currently discussed within OSPAR, and there is a recent agreed proposal to trial it in the OSPAR's Coordinated Environmental Monitoring Programme (CEMP) roll-over assessment 2018/19.

In the Mediterranean, only Italy has indicated the availability of a national standard, which is based on the Threshold-Effects Level (TEL) criterion. Malta adopted this Italian standard as neighboring country, but it seems to be a mistake because the Italian standard is 5 µg/Kg dw and the EQS included in the Malta's monitoring factsheet is 55 µg/Kg dw.

WFD Watch list (WL)[9,10]

The WFD Watch List is a mechanism to provide monitoring information on the concentrations of substances that are suspected to be relevant contaminants. Only three MS have indicated the use of some of these WFD WL substances for 2018 MSFD reporting. One of these substances, diclofenac, is also a HELCOM pre-core test indicator and the proposed regional threshold values are the provisional EU-wide quality standards. However, this substance is considered for current MSFD assessments only by Poland and

([9]) Commission Implementing Decision (EU) 2015/495 of 20 March 2015 establishing a watch list of substances for Union-wide monitoring in the field of water policy pursuant to Directive 2008/105/EC of the European Parliament and of the Council. http://eur-lex.europa.eu/legalcontent/EN/TXT/PDF/?uri=CELEX:32015D0495&from=IT

([10]) Commission Implementing Decision (EU) 2018/840 of 5 June 2018 establishing a watch list of substances for Union-wide monitoring in the field of water policy pursuant to Directive 2008/105/EC of the European Parliament and of the Council and repealing Commission Implementing Decision (EU) 2015/495. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018D0840&from=EN

the threshold value indicated by this country corresponds to a previous standard (2011), and not to the most recent one (updated in 2017).

RSC chemical substances lists

While some monitoring can be expected for most of the substances of the RSC lists[11], these substances are basically disregarded for MSFD reporting: in most cases they are considered by only two MS and normally by ≤5 MS. The non-inclusion for MSFD purposes can be related to the lack of enough data, appropriate assessment criteria, or appropriate quantification methods.

The only exceptions are the metals chromium (Cr), copper (Cu) and zinc (Zn), which are frequently reported in water, and the non-dioxin PCBs and some PAHs (benz(a)anthracene, chrysene, phenanthrene, and pyrene), which are frequently reported in biota and sediments.

National standards have been provided for some of these compounds. The water standards vary significantly between countries (e.g. >100 fold deviation between minimum and maximum values for Zn; 10 fold for Cr and Cu). High variability is also found in other matrices and substances for which national thresholds have been indicated by at least two countries, such as selenium (Se), dibutylphthalate, dibutyltin ion, triphenyltin and tetrabutyltin.

Vorkamp and Sanderson (2016) analyzed the reasons for national EQS variability across Europe for selected RBSP. They concluded that the timing of the EQS derivation (i.e. before or after the publication of the WFD guidance) as well as the protection endpoint and assessment factor used, contributed to the variation. In this report, experts have provided some information (although scarce) on how the national EQS have been derived. The differences found here also seem to be related to the different derivation methods used by MS: based on literature data, old standards available before the WFD guidance publication, standards derived according the WFD guidance, or coming from other directives or frameworks.

Other contaminants

Contaminants other than WFD PS and RSC substances are barely included in 2018 MSFD reporting (they are often considered by only one or two MS), with the exception of arsenic, toluene and to a lesser extent xylene. The additional contaminants are mostly pesticides selected by MS as RBSP and are usually monitored in water.

As above, it is possible that monitoring of many of these compounds do exist, but that there are no sufficient data nor thresholds for their appropriate assessment in the marine environment. Moreover, national standards have been indicated by at least two MS for very few substances. The variations in the values are also usually very high (e.g. >100 fold divergence for di-ethyl phthalate and mecoprop; >10 fold for aluminium and thallium; >2 fold for arsenic, barium, free cyanide, toluene, and xylene). Similar threshold values have only been found for diazinon and ethylbenzene.

It is relevant to highlight that many of these substances (azinphos-ethyl, bentazone, barium, bisphenol A, chromium(VI), free cyanide, fenthion, malathion, mecoprop, mevinphos, omethoate, parathion, propiconazole, selenium, silver, toluene, and uranium) were in the list of highest ranked substances in the WFD prioritization exercises of 2012 and 2018, although not finally proposed for inclusion in the PS list (Carvalho et al., 2016).

([11]) RSC chemical lists (gathered together by Tornero and Hanke, 2018): Barcelona Convention (List of substances of concern under the LBS protocol and other chemicals monitored under the MEDPOL monitoring programme); Black Sea Commission (List of substances covered by the Black Sea Integrated Monitoring and Assessment Programme); HELCOM (HELCOM core indicators of the Baltic Sea Action Plan and List of substances of potential concern specified in HELCOM Recommendation 19/5 and annex I); OSPAR: (List of chemicals of priority Action, OSPAR List of substances of possible concern and other marine contaminants included in the OSPAR's Coordinated Environmental Monitoring Programme)

4 Conclusions and recommendations

Based on the findings of this report, along with insights of ongoing work and discussions within the RSC, several conclusions can be drawn. The accompanying recommendations should be considered and discussed within the MSFD Expert Network on Contaminants in order to prioritize further work items to help improve the assessment of contaminants under MSFD D8. Further discussions are also needed to clarify under which framework or platform these work items should be handled (e.g. at regional or subregional level, EU level etc.) in order to avoid potential double work.

Consideration of WFD PS for MSFD reporting

— All current WFD PS and certain other pollutants are included in the list of contaminants for 2018 MSFD reporting and are usually monitored in water and assessed using the established WFD EQS. However, they are not equally considered by all MS. For instance, several WFD PS (aclonifen, bifenox, cybutryne, cypermethrin, dichlorvos, dicofol, quinoxyfen, carbon tetrachloride, tetrachloroethylene, and trichloroethylene) are included in the current reporting by less than 5 MS.

Recommendation 1. To agree on the criteria for potential exclusion of certain WFD PS from MSFD assessments (as already proposed in Tornero and Hanke, 2018).

Spatial coverage of the monitoring

— As explained before, it is out of the scope of this report to assess the spatial coverage of the monitoring performed by MS, but this issue should be further considered in order to improve the consistency of the monitoring data. Yet, from the compiled information, it can be seen that the 2018 MSFD reporting is mainly based on the substances monitored in coastal and transitional waters in compliance with the WFD. For the open/deep sea environment, reporting is mainly based on the monitoring conducted under the RSC (namely HELCOM and OSPAR), but continues being a major challenge for MSFD D8 implementation in many MS.

Recommendation 2. To collect information on the marine region/subregion where monitoring is carried out for the selected substances in order to assess the spatial coverage of the monitoring as well as identify potential needs for specific approach or strategy for the open/deep sea.

Application of WFD EQS_{biota}

— Biota is the preferred matrix for the WFD substances for which a WFD EQS_{biota} has been established. However, these threshold values are not always deemed applicable to the marine environment and used by MS, as required by the new Commission Decision, and instead other assessment criteria agreed regionally and even at national level are applied by MS. The divergence in assessment approaches can lead to mixed messages and difficulties in MSFD D8 implementation. MS have already highlighted the need for consistency across EU policies (WFD and MSFD) and regional frameworks (RSC) and expressed their wish to work on solutions. In HELCOM, the contaminant data (adjusted for lipid content, but no normalized for trophic level) are compared to the EQS_{biota}. OSPAR (and the Barcelona Convention) have other agreed threshold values, but there are current proposals under discussion, such as the adoption of the EQS for Hg in fish and the $QS_{secondary\ poisoning}$ for other contaminants (PFOS, HCB, HBCDD, and dioxins) as potential threshold values to support the assessments and the evaluation on a parameter by parameter basis whether current OSPAR monitoring data are suitable to complete trophic level adjustment.

Recommendation 3. To agree on a practical procedure to apply EQS_{biota} in marine waters, where possible, in line with the new Commission Decision and to ensure consistency in assessments across WFD / MSFD / RSC.

This process should encompass several steps:

- To evaluate the current approaches proposed by the RSC, particularly HELCOM and OSPAR, and see if they can be applied at larger scale.

- To assess and discuss within the MSFD Expert Network on Contaminants potential actions to resolve the discrepancies between MS and RSC, e.g. to review the WFD CIS-guidance no. 32 on biota monitoring to see if it needs updating or clarifications with respect to MSFD.

- To engage in dialogue with the WG Chemicals of the WFD.

Threshold values in biota for Pb, Cd and PAH

— Cd, Pb, anthracene and fluoranthene are reported for MSFD by all MS, and frequently in a matrix (biota and/or sediments) for which there is no WFD EQS. In these cases, according to the new Commission Decision, threshold values should be established through regional or subregional cooperation. Some agreed regional standards do already exist, although they may not be entirely acceptable for environmental risk assessments (e.g. food standards for metals). Furthermore, national standards can differ considerably from those agreed regionally or be taken from a different marine region, which can introduce high uncertainty in the assessments.

Recommendation 4. To work on the development of appropriate, agreed standards for the assessment of Cd and Pb in biota.

Discussions about a potential EQS derivation process framed at the EU-level might be required and, therefore, also interactions with the WG Chemicals of the WFD (e.g. to review and amend the existing WFD substance dossiers with respect to the marine environment, if necessary).

Recommendation 5: To evaluate the availability and application of sediment standards for Cd, Pb and PAHs to understand their potential suitability and ensure consistency across MS in the shared marine regions.

Tributyltin threshold values

— TBT compounds are also frequently monitored in sediments. For this matrix, there are not yet standards agreed at EU or regional level and the two available national standards differ between each other by two orders of magnitude.

Recommendation 6: To follow progress of the proposals within HELCOM and OSPAR regarding the use of the Swedish Quality Standard for TBT in sediment and discuss the potential applicability of this standard for MSFD purposes.

WFD Watch List substances for marine assessments

— The substances of the WFD Watch List are basically not included in the 2018 MSFD reporting. Although they might not be regularly monitored in the marine environment, MS have had to collect and report data for these substances. For instance, diclofenac, as HELCOM pre-core indicator, has been identified as important for the Baltic Sea region and MSFD purposes (although it is only reported by Poland and the threshold indicated is different from the most recent value proposed in HELCOM). Recently, and with the Commission Implementing Decision (EU) 2018/840, the new EU WL of substances was defined and diclofenac (as well as macrolide antibiotics, 2,6-ditert-butyl-4-methylphenol, 2-ethylhexyl 4-methoxycinnamate, oxadiazon, and tri-allate) has been removed from it.

Recommendation 7: To collect and evaluate the availability of marine data for the WL substances in order to understand potential marine monitoring and threshold requirements.

This obviously entails a close follow-up on further developments and changes in the WFD WL.

Recommendation 8: To investigate the possibility of establishing a large scale exploratory monitoring approach (e.g. similar to the Watch List mechanism) for substances relevant for the marine environment.

Emerging contaminants

— The substances other than WFD PS that are included in 2018 MSFD reporting by most MS are essentially legacy pollutants and there is very little consideration of other pollutants for MSFD purposes. Many substances can be monitored as part of the WFD and/or marine monitoring, but they may not be included in the current MSFD reporting cycle due to, for instance, the absence of suitable threshold values or issues with achieving the required level of detection. Clearly, it is currently unfeasible to have agreed threshold values for all monitored substances, but there could be an agreed approach to select the most relevant contaminants and identify if thresholds can/should be set in the near future and for which matrix.

Recommendation 9: To work on the development of guidance for the selection of relevant contaminants for MSFD assessments (for both D8 and D9).

This requires a close collaboration with ongoing processes under RSC, relevant regulations (such as REACH) and with the scientific community and projects, including the exploration of new monitoring and analytical strategies (e.g. design of joint monitoring campaigns, foster marine investigative monitoring, improvements of new analytical methodologies like non-target screening techniques etc.).

Lack of marine concentration data

— Other contaminants (besides WFD PS and RSC substances) are usually reported in water as RBSP and by very few MS. These are mostly pesticides and metals/metalloids and many of them were highly ranked in the last WFD prioritization processes.

Recommendation 10: To collect and evaluate available marine concentration data for the substances highly ranked during the prioritization processes as well as possible analytical issues for their determination in order to understand their relevance for the marine environment.

Outcomes might have implications for the next update of the PS list, so it is strongly suggested to keep close communication with the WG Chemicals of the WFD on this issue.

National threshold values

— There are national thresholds provided for a number of substances. The methodologies used for their derivation should be equivalent and, therefore, lead to similar values. Conversely, the values differ considerably between MS.

Recommendation 11: To collate available national standards and compare the methodologies used for their derivation in order to understand the potential causes for the variability across MS.

This might require additional discussions regarding the possible need of different threshold depending on the assessed area (e.g. within or beyond 12 nautical miles).

Substance groups

— Finally, care must be taken with the assessment of groups of substances and the use of available standards for them. As an example, nonylphenols are WFD PS and the EQS is set for 4- nonylphenol (branched). However, some MS can compare the available threshold value with the concentrations of other nonylphenol compounds. Likewise, MS can use different congeners for the assessment of groups of substances like PBDE or PCB. This lack of consistency may hamper an overarching reliable assessment of these contaminants in marine waters.

Recommendation 12: To check the consideration of substance groups to ensure consistency with the available threshold values and comparable assessments across MS.

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List of abbreviations and definitions

BACs: Background Assessment Concentrations

Barcelona Convention: Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean

Black Sea Commission: Convention on the Protection of the Black Sea against Pollution

PBDE: Brominated diphenylethers

BSAP: Baltic Sea Action Plan

BSIMAP: Black Sea Integrated Monitoring and Assessment Programme

CAS: Chemical Abstracts Service

CEMP: OSPAR's Coordinated Environmental Monitoring Programme

dw: dry weight

EACs: Environmental Assessment Criteria

EQS: Environmental Quality Standards

GES: Good Environmental Status

HBCDD: Hexabromocyclododecanes

HCB: Hexachlorobenzene

HCBD: Hexachlorobutadiene

HELCOM: Convention on the Protection of the Marine Environment in the Baltic Sea

LBS Protocol: Protocol for the protection of the Mediterranean Sea from Land-Based Sources and Activities

MEDPOL: Marine pollution assessment and control

MPA: Maximum Permissible Addition

MS: Member States

MSFD: Marine Strategy Framework Directive

PAH: Polyaromatic hydrocarbons

PFOS: Perfluorooctane sulfonic acid and its derivatives

PS: Priority Substance

RBSP: River Basin Specific Pollutants

REACH: Registration, Evaluation, Authorisation and restriction of Chemicals

RSC: Regional Sea Convention

TBT: Tributyltin compounds

TEL: Threshold-Effects Level

US ERL: Effects Range Low sediment toxicological criteria developed by the United States Environmental Protection Agency

WFD Other Pollutants: Pollutants included in the Annex II of Directive 2013/39/EU and for which a European standard applies, but not in the priority substances list

WFD Watch list: New mechanism is to support the identification of priority substances for regulation under WFD

WFD: Water Framework Directive

ww: wet weight

List of figures

Annex I. Summary of matrices and threshold values for the assessment of contaminants under MSFD D8

- **WFD priority substances and certain other pollutants**

Cadmium and its compounds (7440-43-9)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x	x			x	x		x	x	x	x	x	x	x	x	x		x
Biota			x	x	x		x	x		x	x	x	x	x	x	x		x
Sediment		x	x	x		x	x	x			x	x	x	x	x	x	x	x
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.2 µg/l **EU WFD MAC-EQS** ≤0.45 (Class 1); 0.45 (Class 2); 0.6 (Class 3); 0.9 (Class 4); 1.5 (Class 5) µg/l	x	x			x	x		x	x	x	x	x	x	x	x	x		x
Biota																		
EU Reg. 1881/2006																		
1000 µg/kg ww bivalve molluscs							x	x		x	x	x			x	x		x
50 µg/kg ww muscle meat of fish 100 µg/kg ww muscle meat of fish			x				x				x	x			x	x		
OSPAR BAC 26 µg/kg ww fish liver														x		x		
OSPAR BAC 960 µg/kg dw mussel										x						x		
MED BAC 8 µg/kg dw fish												x				x		
National standard 160 µg/Kg ww				x	x													
National standard 33 mg/kg dw macrophytobenthic plants														x				
Trend							x			x			x					
Sediment																		
US ERL 1.2 mg/kg dw							x	x							x	x		x
QS from EQS dossiers 2.3 mg/kg dw						x		x						x			x	
BAC Spain 0.15 mg/kg dw												x				x		
National standard 0.3 mg/kg dw											x	x						
National standard 3.8 mg/kg dw				x														
Trend			x									x	x					

EU level		Regional level						
Water	**Biota**	**Water**	**Biota**			**Sediment**		
WFD To protect human health and the environment. Refers to dissolved concentrations. Values vary dependent upon the hardness of the water as specified in five class categories.	**Reg. 1881/2006** Maximum levels in fish and seafood to protect public health (might not be accurate for assessing environmental risk).	**HELCOM** Primary matrix (filtered or unfiltered), as the primary threshold value is WFD EQS. This is in conflict with HELCOM COMBINE, where biota and sediment are mostly used, and so there are little water data.	**Barcelona Convention** Food standards used as proxy values for EACs(converted to dw: 5000 µg/kg dw *mussel* 207 µg/kg dw *fish*). BACs in fish are preliminary data for the NW Mediterranean.	**HELCOM** Soft body tissue of mussel is a secondary matrix, and the secondary threshold is the OSPAR BACs in mussels. Long-term aim to calculate thresholds based on HELCOM data.	**OSPAR** Cd is monitored in fish liver, for which no food standard exists; shellfish food standards are used as proxy EACs for all species.	**Barcelona Convention** US ERL as proxy EACs.	**HELCOM** Bottom sediments is a secondary matrix, and the secondary threshold is the QS from EQS dossiers (5% aluminium normalisation). The QS applies to freshwater sediment since it is not yet available for marine sediment.	**OSPAR** US ERL as proxy EACs in all areas.

Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data.
Denmark: national standards derived according to the WFD CIS guidance No. 27 (European Commission, 2011), and published in the national Executive Order (BEK, 2017). Unclear if sediment monitoring will continue in future.
France: trends in bivalves.
Greece: monitoring in sediments will start in 2019.
Italy: sediment EQS for the protection of the benthic community based on the threshold effect level (TEL).
Malta: sediment EQS based on thresholds set by neighboring countries (Italy) (Malta's monitoring factsheet for contaminants, 2015).
Poland: national standard for macrophytobenthic plants according to Zalewska and Danowska (2017).

Lead and its compounds (7439-92-1)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x	x			x	x		x	x	x	x	x	x	x	x	x		x
Biota			x	x	x	x	x	x		x	x	x	x	x	x	x		x
Sediment		x	x	x		x	x	x	x		x	x	x	x	x	x	x	x
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 1.3 µg/l **EU WFD MAC-EQS** 14 µg/l	x	x			x	x		x*	x	x	x	x	x	x	x	x		x
Biota																		
EU Reg. 1881/2006																		
1500 µg/kg ww bivalve molluscs							x	x		x	x	x			x	x		x
300 µg/kg ww muscle meat of fish			x				x				x	x			x			
OSPAR BAC 26 µg/kg ww fish liver						x								x		x		
OSPAR BAC 1300 µg/kg dw mussel						x		x		x						x		
MED BAC 558 µg/kg dw fish												x						
National standard 1000 µg/Kg ww					x													
National standard 110 µg/Kg ww				x														
National standard 26 mg/kg dw macrophytobenthic plants														x				
Trend										x			x					
Sediment																		
US ERL 46.7 mg/kg dw							x	x							x	x		x
QS from EQS dossiers 120 mg/kg dw						x		x						x			x	
BAC Spain 30 mg/kg dw												x				x		
National standard 30 mg/kg dw											x	x						
National standard 163 mg/kg dw				x														
Trend			x									x	x					

EU level		Regional level						
Water	**Biota**	**Water**	**Biota**			**Sediment**		
WFD To protect human health and the environment. Refers to dissolved concentrations.	**Reg. 1881/2006** Maximum levels in fish and seafood to protect public health (might not be accurate for assessing environmental risk).	**HELCOM** Primary matrix (filtered or unfiltered), as the primary threshold value is the WFD EQS. This is in conflict with the HELCOM COMBINE monitoring program, where the most used matrix are biota and sediment. Therefore, there are very little data for Pb in water.	**Barcelona Convention** Food standards used as proxy values for EACs (converted to dw: 7500 µg/kg dw *mussel* 1245 µg/kg dw *fish*). BACs in fish are preliminary data for the NW Mediterranean.	**HELCOM** Fish liver and mussel soft body are secondary matrices, and the secondary threshold are the OSPAR BACs in fish liver and mussels. Long-term aim to calculate thresholds based on HELCOM data.	**OSPAR** Pb is monitored in fish liver, for which no food standard exists; the food standards for shellfish are used as proxy EACs for all species.	**Barcelona Convention** US ERL as proxy EACs.	**HELCOM** Bottom sediments is a secondary matrix, and the secondary threshold is the QS from EQS dossiers (5% aluminium normalisation).	**OSPAR** US ERL as proxy EACs in all areas.

Denmark: national standards derived according to the WFD CIS guidance No. 27 (European Commission, 2011), and published in the national Executive Order (BEK, 2017). Unclear if sediment monitoring will continue in future.
Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data.
France: trends in bivalves. ERL= 47 mg/kg dw.
Germany: reporting based on the 2015 river basin plans and *EQS in accordance to 2008/105/EU (7.2 µg/l).
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
Italy: sediment EQS for the protection of the benthic community based on the TEL.
Malta: sediment EQS based on thresholds set by neighboring countries (Italy) (Malta's monitoring factsheet for contaminants, 2015).
Poland: national standard for macrophytobenthic plants (Zalewska and Danowska, 2017).

Mercury and its compounds (7439-97-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x	x	x	x	x	x		x		x
Biota	x	x	x	x	x	x	x	x		x	x	x	x	x		x	x	x
Sediment		x	x				x	x			x	x	x	x		x		x
Threshold values /reference levels																		
Water																		
EU WFD MAC-EQS 0.07 µg/l	x				x			x*	x	x	x	x	x	x		x		x
Biota																		
EU WFD EQS$_{biota}$ 20 µg/kg ww fish	x	x		x	x			x		x**	x	x	x	x			x	
EU Reg. 1881/2006																		
500 µg/kg ww bivalve molluscs							x			x**		x				x		
1000 µg/kg ww muscle meat of fish			x				x					x						
500 µg/kg ww muscle meat of fish			x				x					x						x
OSPAR BAC 35 µg/kg ww fish liver																x		
OSPAR BAC 90 µg/kg dw mussel										x						x		
MED BAC 600 µg/kg dw fish												x						
National standard EQS+background (20+180 µg/kg ww)						x												
National standard 0.4 mg/kg dw macrophytobenthic plants														x				
Trend							x			x			x					
Sediment																		
US ERL 0.15 mg/kg dw							x	x								x		x
BAC Spain 0.045 mg/kg dw												x				x		
National standard 0.3 mg/kg dw											x	x						
Trend			x									x	x					

EU level			Regional level				
Water	**Biota**		**Biota**			**Sediment**	
WFD To protect human health and the environment. Refers to dissolved concentrations.	**WFD** Refers to fish. Based on secondary poisoning.	**Reg. 1881/2006** Maximum levels in fish and seafood to protect public health (might not be accurate for assessing environmental risk).	**Barcelona Convention** Maximum levels in fish and seafood used as proxy values for EACs (converted to dw: 2500 µg/kg dw *mussel* 4150 µg/kg dw *fish*). BACs in fish are preliminary data for the NW Mediterranean.	**HELCOM** Fish muscle is the primary matrix, and the primary threshold value is the WFD EQS$_{biota}$.	**OSPAR** Fish food standards (500 µg/kg ww) are used as proxy EACs for all species.	**Barcelona Convention** US ERL as proxy EACs.	**OSPAR** US ERL as proxy EACs in all areas.

In HELCOM, WFD EQS$_{biota}$ is applied. However, Finland uses background concentrations (Maximum Permissible Addition (MPA)+EQS) in fish, which is even included in its WFD legislation.
In OSPAR, the WFD EQS$_{biota}$ is not applied. Hg monitoring is carried out in fish and shellfish. A number of technical issues have been found in applying it to the marine environment (OSPAR, 2016):

- WFD EQS$_{biota}$ <BACs for fish
- The use of trophic magnification factor (TMF) and trophic level (TL) is not appropriate as it increases the uncertainty of the assessment to an unacceptable level
- There is also an unacceptably high uncertainty with recalculating data at TL=4, because it is a generalisation of existing ecosystems.

The Barcelona Convention uses the food standards as proxy EACs, but some Mediterranean MS use WFD EQS$_{biota}$.

Denmark: monitoring in sediments, but not used for MSFD assessments.
France: trends in bivalves.
Germany: reporting based on the 2015 river basin plans and *EQS in accordance to 2008/105/EU (0.05 µg/l).
Ireland: monitoring is in shellfish and WFD EQS$_{biota}$ refers to fish. **At present, it is unclear if, and how, to apply this EQS.
Italy: sediment EQS for the protection of the benthic community based on the TEL.
Malta: sediment EQS based on thresholds set by neighboring countries (Italy) (Malta's monitoring factsheet for contaminants, 2015).
Poland: national standard for macrophytobenthic plants (Zalewska and Danowska, 2017).
Romania: monitoring in biota and sediments will start in 2019.

Nickel and its compounds (7440-02-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x	x			x	x		x	x	x	x	x		x	x			x
Biota					x		x			x	x				x			
Sediment							x		x		x	x			x			
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 8.6 µg/l **EU WFD MAC-EQS** 34 µg/l	x	x			x	x		x*	x	x	x	x		x	x			x
Biota																		
National standard 730 µg/Kg ww					x													
National standard (MAC-QS S.I. 268/2006; quality shellfish waters) 5000 µg/Kg dw shellfish flesh										x								
Trend							x											
Sediment																		
US ERL 21 mg/kg dw							x								x			
National standard 30 mg/kg dw											x	x						

Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: monitoring in biota and sediments, but not used for MSFD assessments.
Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data.
France: trends in bivalves.
Germany: reporting based on the 2015 river basin plans and *EQS in accordance to 2008/105/EU (20 µg/l).
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
Italy: sediment EQS for the protection of the benthic community based on the TEL.
Malta: sediment EQS based on thresholds set by neighboring countries (Italy) (Malta's monitoring factsheet for contaminants, 2015).

Aclonifen (74070-46-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x							x				x		
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.012 µg/l **EU WFD MAC-EQS** 0.012 µg/l					x							x				x		

Croatia: monitoring in coastal water in 2019.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
France: monitoring in biota and sediments will start in 2019.
Ireland: monitoring in water, as part of 2016-2021 transitional and coastal waters monitoring, but not included in 2018 MSFD assessments.

Alachlor (15972-60-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x		x			x		x		
Biota																		
Sediment											x							
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.3 µg/l **EU WFD MAC-EQS** 0.7 µg/l					x			x	x		x			x		x		

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.

Atrazine (1912-24-9)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x	x	x			x		x		x
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.6 µg/l **EU WFD MAC-EQS** 2 µg/l	x				x			x	x	x	x			x		x		x

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: only monitoring in freshwater for WFD.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessments.

Benzene (71-43-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x				x	x	x	x		x		x		x
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 8 µg/l **EU WFD MAC-EQS** 50 µg/l	x				x				x	x	x	x		x		x		x

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessment) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessment.
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessment.

Bifenox (42576-02-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x							x						
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.0012 µg/l **EU WFD MAC-EQS** 0.004 µg/l					x							x						

Croatia: monitoring in coastal water in 2019.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
France: monitoring in biota and sediments will start in 2019.

Brominated diphenylethers (PBDE) (congener numbers 28, 47, 99, 100, 153 and 154)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water		x			x			x	x		x			x				
Biota	x	x		x	x	x	x	x		x	x		x	x		x	x	x
Sediment		x					x					x	x			x		x
Threshold values /reference levels																		
Water																		
EU WFD MAC-EQS 0.014 µg/l		x			x			x*	x		x			x				
Biota																		
EU WFD EQS$_{biota}$ 0.0085 µg/kg ww fish	x	x		x	x	x		x		x**	x			x			x	
Trend							x	x		x			x					x
Sediment																		
HELCOM 0.310 mg/kg dw																		
Trend												x	x					x

EU level		Regional level	
Water	**Biota**	**Biota**	**Sediment**
WFD To protect human health and the environment.	**WFD** Protection goal is human health via consumption of fishery products.	**HELCOM** Fish muscle is the primary matrix, and the primary threshold value is the WFD EQS$_{biota}$ (5% lipid normalization).	**HELCOM** Secondary threshold (5% organic carbon normalization). To be used when it is not possible to evaluate the environmental status using biota-monitoring It has been suggested by the working group on priority substances for the protection of the benthic community.

In HELCOM, the WFD EQS$_{biota}$ is used as a threshold value, but it is debated as being very low, and has not been endorsed by the European Food Safety Authority (EFSA). Thus, it is not clear if the value is in accordance with the food safety risk assessments (HELCOM core indicator report- PBDEs, 2018).There is also a sediment standard, but has not been indicated by any MS.

In OSPAR, PBDE concentrations are calculated in biota but not assessed because there are no OSPAR BACs or EACs. The EQS$_{biota}$ is set for fish at trophic level four and the normalisation process required for OSPAR contaminant data to trophic level four has not yet been agreed (OSPAR Intermediate assessment – PBDEs in fish and shellfish, 2017). The OSPAR Working Group on Monitoring and on Trends and Effects of Substances in the Marine Environment (MIME) is discussing the use of Canadian Federal Environmental Quality Guidelines (FEQGs)[12] (PBDE 47: 44 µg/kg ww food source) as EACs proxys and might be used in future MSFD assessments.

Germany: reporting based on the 2015 river basin plans and *EQS in accordance to 2008/105/EU (0.0002 µg/l).
Ireland: monitoring is in shellfish and WFD EQS$_{biota}$ refers to fish. **At present, it is unclear if, and how, to apply this EQS.
Netherlands: individual assessment of PBDE congeners, but congener 154 is not monitored.
France, Spain and UK assess these PBDE congeners individually and not use the WFD EQS.

The consideration by MS of PBDE congeners other than those included as WFD PS is showed later on in the document (under substances of the lists of chemicals of the Regional Sea Conventions).

Chlorfenvinphos (470-90-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x		x			x		x		
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.1 µg/l **EU WFD MAC-EQS** 0.3 µg/l					x			x	x		x			x		x		

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.
Italy: also monitoring in biota and sediment (partially), but not included in 2018 MSFD assessments.

([12]) https://www.canada.ca/en/health-canada/services/chemical-substances/fact-sheets/federal-environmental-quality-guidelines.html#a3

Chloroalkanes, C 10-13 (85535-84-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x					x		x		
Biota																		
Sediment		x										x						
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.4 µg/l **EU WFD MAC-EQS** 1.4 µg/l					x			x	x					x		x		
Sediment																		
Trend												x						

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.

Chlorpyrifos (2921-88-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x		x		x	x		x		
Biota					x													
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.03 µg/l **EU WFD MAC-EQS** 0.1 µg/l					x			x	x		x		x	x		x		
Biota																		
National standard 67 µg/Kg ww					x													

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: only monitoring in freshwater for WFD.
Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data.
France: monitoring in biota and sediments, but not included in 2018 assessments.
Italy: also monitoring in biota and sediment (partially), but not included in 2018 MSFD assessments.

Cybutryne (28159-98-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x							x	x			x		
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.0025 µg/l **EU WFD MAC-EQS** 0.016 µg/l					x							x	x			x		

Croatia: monitoring in water once after 2015 (not included in 2018 MSFD assessments).
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: only monitoring in freshwater for WFD.
France: monitoring in biota and sediments will start in 2019.
Ireland: monitoring in water, as part of 2016-2021 transitional and coastal waters monitoring, but not included in 2018 MSFD assessments. (some issues related to the limit of quantification).

Cypermethrin (sum of isomers α- + β- + ɑ- + z-cypermethrin) (52315-07-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x							x				x		
Biota																		
Sediment												x						
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.000008 µg/l **EU WFD MAC-EQS** 0.00006 µg/l					x							x				x		

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: only monitoring in freshwater for WFD.
France: monitoring in biota and sediments will start in 2019.
Ireland: monitoring in water, as part of 2016-2021 transitional and coastal waters monitoring, but not included in 2018 MSFD assessments. (some issues related to the limit of quantification).

1,2-dichloroethane (107-06-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x	x	x	x	x	x				x
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 10 µg/l					x			x	x	x	x	x	x	x				x

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessments.

Dichloromethane (75-09-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x	x	x	x	x	x				
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 20 µg/l					x			x	x	x	x	x	x	x				

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not reported for 2018 MSFD assessments.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.

Dichlorvos (62-73-7)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x			x	x	x					
Biota																		
Sediment											x							
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.00006 µg/l **EU WFD MAC-EQS** 0.00007 µg/l					x			x*			x	x	x					

Croatia: monitoring in coastal water in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
France: current monitoring in sediment, but not included in 2018 MSFD assessments. Monitoring in biota will start in 2019.
Germany: reporting based on the 2015 river basin plans and *EQS in accordance to 2008/105/EU (0.0006 µg/l).
Italy: also monitoring in sediment (partially), but not reported for 2018 MSFD assessments.

Dicofol (115-32-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water												x						
Biota	x	x										x	x	x				
Sediment												x						
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.000032 µg/l												x						
Biota																		
EU WFD EQS_{biota} 33 µg/kg ww fish	x	x										x	x	x				
Sediment																		
Trend												x						

WFD EQS_{biota} is based on secondary poisoning.

Croatia: monitoring in coastal water in 2021 or 2023. Sediment monitoring will start in 2019.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.

Di(2- ethylhexyl)- phthalate (DEHP) (117-81-7)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x	x	x			x				
Biota					x		x											
Sediment		x					x					x						
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 1.3 µg/l	x							x	x	x	x			x				
Biota																		
National standard 3200 µg/Kg ww					x													
Trend							x											
Sediment																		
Trend												x						

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: monitoring in sediments, but not included in 2018 MSFD assessments.
Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data.
Italy: also monitoring in biota and sediment (partially), but not included in 2018 MSFD assessments.

Dioxins and dioxin-like compounds (7 PCDDs + 10 PCDFs + 12 PCB-DLs)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water																		
Biota	x	x	x	x	x	x	x	x		x*		x	x	x		x	x	
Sediment		x									x	x						
Threshold values /reference levels																		
Biota																		
EU WFD EQS_{biota} 0.0065 µg/kg TEQ fish, crustaceans and molluscs	x	x	x	x	x	x	x	x		x*	x	x	x	x		x	x	
Sediment																		
National standard 0.002 µg/kg TEQ											x							
Trend												x						

EU level	Regional level
Biota	**Biota**
WFD Based on human health protection. In line with in line with section 5.3 of the Annex to Commission Regulation (EU) No 1259/2011 of 2 December 2011 amending Regulation (EC) No 1881/2006 as regards maximum levels for dioxins, dioxin-like PCBs and non-dioxin-like PCBs in foodstuffs (fish, crustaceans and molluscs).	**HELCOM** Primary substance for the core indicator 'PCBs, dioxins and furans' and the primary threshold value is the WFD EQS_{biota} (5% lipid normalization).

This PS refers to 7 polychlorinated dibenzo-p-dioxins (PCDDs), 10 polychlorinated dibenzofurans (PCDFs) and 12 dioxin-like polychlorinated biphenyls (PCB congeners 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169, and 189).

Cyprus: assessments in biota only refer to the dioxin-like PCB, but not to dioxins or furans.
France: current sediment monitoring only includes dioxin-like PCBs. Sediment monitoring of dioxins and furans will start in 2019.
Ireland: monitoring in biota (shellfish), but at present, the use for 2018 MSFD assessments cannot be confirmed.
Italy: assessments in sediments only refer to the dioxin-like PCB, but not to dioxins or furans. Sediment EQS for the protection of the benthic community based on the TEL. Also monitoring in biota (partially), but not included in 2018 MSFD assessments.
Some of those dioxin-like PCBs are also assessed separately:

PCB 105 (32598-14-4)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water											x							
Biota							x				x					x		
Sediment							x		x		x							
Threshold values /reference levels																		
Biota																		
OSPAR BAC 0.75 µg/kg dw mussels and oysters 0.08 µg/Kg ww fish							x									x		

PCB 118 (31508-00-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x			x				x			
Biota			x				x	x		x	x			x	x	x		x
Sediment							x	x	x		x		x		x			x
Threshold values /reference levels																		
Biota																		
OSPAR BAC 0.60 µg/Kg dw mussels and oysters 0.10 µg/Kg ww fish							x			x					x	x		
OSPAR EAC 25 µg/kg lw all biota							x	x		x				x		x		x
Trend							x											
Sediment																		
OSPAR EAC 0.6 µg/kg dw all assessment areas							x	x							x			x
Trend													x					

PCB 156 (38380-08-4)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water											x							
Biota							x				x					x		
Sediment							x		x		x							
Threshold values /reference levels																		
Biota																		
OSPAR BAC 0.60 µg/Kg dw mussels and oysters 0.08 µg/Kg ww fish																x		
Trend							x											

Denmark: monitoring of these PCB congeners in biota and sediments, but not assessed for MSFD due to the lack of thresholds.
Greece: monitoring of PCBs in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.

Diuron (330-54-1)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x		x	x		x	x		x		
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.2 µg/l **EU WFD MAC-EQS** 1.8 µg/l					x			x		x	x		x	x		x		

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Denmark: only monitoring in freshwater for WFD.
France: current monitoring in biota and sediment, but not reported for 2018 MSFD assessments.
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessments.

Endosulfan (115-29-7)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x			x		x	x		x		
Biota					x													
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.0005 µg/l **EU WFD MAC-EQS** 0.004 µg/l					x			x			x		x	x		x		
Biota																		
National standard 1000 µg/Kg ww					x													

Croatia: monitoring in water, but not included in 2018 MSFD assessments.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data.
France: monitoring in biota and sediment of individual congeners (α and β), but not included in 2018 MSFD assessments.
Ireland: monitoring in biota (shellfish), but at present, the use for 2018 MSFD assessments cannot be confirmed.

Heptachlor and heptachlor epoxide (76-44-8/1024-57-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x		x	x	x		x	x		
Biota	x	x			x							x	x	x	x			
Sediment		x							x			x			x			
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.00000001 µg/l **EU WFD MAC-EQS** 0.00003 µg/l					x				x		x	x	x		x	x		
Biota																		
EU WFD EQS$_{biota}$ 0.0067 µg/kg ww fish	x				x							x	x	x	x			
Sediment																		
Trend												x						

WFD EQS$_{biota}$ is based on human health protection via consumption of fishery products.

Croatia: monitoring in coastal water in 2021 or 2023.
Cyprus: monitoring in water and biota, but not included in 2018 MSFD assessments.
Denmark: monitoring in biota started in 2017, but not used for 2018 MSFD assessments. The planned threshold values when doing so will be the WFD EQS$_{biota}$.
France: monitoring in biota will start in 2019.
Germany: heptachlor and heptachlor epoxide are RBSP of the 2015 river management basin plans. They are assessed in water individually according to the German surface water Regulation for implementing 2008/105/EC (OGewV, 2011). For this reason, the German national standards (0.1 µg/l) are different from the EQS laid down in 2013/39/EU.
Greece: heptachlor and heptachlor epoxide are additionally reported individually.
Ireland: monitoring of heptachlor in biota (shellfish), but at present, the use for 2018 MSFD assessments cannot be confirmed.
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessments.
Romania: only heptachlor is monitored (in water, biota and sediments).

Hexabromocyclododecanes

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x							x				x		
Biota	x	x			x	x		x		x		x	x	x			x	
Sediment		x										x						
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.0008 µg/l **EU WFD MAC-EQS** 0.05 µg/l					x							x				x		
Biota																		
EU WFD EQS$_{biota}$ 167 µg/kg ww fish	x	x			x	x		x		x*		x	x	x			x	
Sediment																		
QS from EQS dossiers 170 µg/kg dw																		
Trend												x						

EU level		Regional level	
Water	**Biota**	**Biota**	**Sediment**
WFD To protect human health and the environment.	**WFD** Based on secondary poisoning.	**HELCOM** Fish is the primary matrix, as the primary threshold value is the WFD EQS$_{biota}$ (5% lipid normalisation).	**HELCOM** Sediment is a secondary matrix and the secondary threshold value is the QS from EQS dossiers (5% organic carbon normalization). To be used when it is not possible to evaluate the environmental status using biota-monitoring.

Croatia: monitoring in coastal water will start in 2019.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: monitoring in biota started in 2017, but not included in 2018 MSFD assessments. The planned threshold values when doing so will be the WFD EQS$_{biota}$.
France: current monitoring in biota and sediment, but not reported for 2018 MSFD assessments.
Ireland: monitoring is in shellfish and WFD EQS$_{biota}$ refers to fish. *At present, it is unclear if, and how, to apply this EQS. Also monitoring in water started, as part of 2016-2021 transitional and coastal waters monitoring, but not included in 2018 MSFD assessments.

Hexachlorobenzene (118-74-1)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x		x		x	x	x	x		
Biota	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	
Sediment		x					x		x		x	x			x	x		
Threshold values /reference levels																		
Water																		
EU WFD MAC-EQS 0.05 µg/l	x				x			x*	x		x		x	x	x	x		
Biota																		
EU WFD EQS$_{biota}$ 10 µg/kg ww fish	x	x		x	x	x		x		x**	x	x	x	x	x		x	
OSPAR BAC 0.63 µg/kg dw bivalves							x			x					x	x		
Sediment																		
US ERL 20 µg/kg dw							x								x	x		
BAC Spain 0.16 µg/kg dw																x		
National standard 0.4 µg/kg dw											x	x						
Trend												x						

EU level		Regional level	
Water	**Biota**	**Biota**	**Sediment**
WFD To protect human health and the environment.	**WFD** Protection goal is human health via consumption of fishery products.	**OSPAR** BACs in mussels and oysters.	**OSPAR** US ERL used as EACs.

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water and biota, but not included in 2018 MSFD assessments.
Germany: reporting based on the 2015 river basin plans and *EQS in accordance to 2008/105/EU (0.01 µg/l).
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
Ireland: **At present, it is unclear if, and how, to apply this EQS.
Italy: sediment EQS for the protection of the benthic community based on the TEL.
Malta: sediment EQS based on thresholds set by neighboring countries (Italy) (Malta's monitoring factsheet for contaminants, 2015).

Hexachlorobutadiene (87-68-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x		x		x	x		x		
Biota	x	x			x	x		x		x	x	x	x	x		x		
Sediment		x							x			x						
Threshold values /reference levels																		
Water																		
EU WFD MAC-EQS 0.6 µg/l					x			x*	x		x		x	x		x		
Biota																		
EU WFD EQS$_{biota}$ 55 µg/kg ww fish	x	x			x	x		x		x**	x	x	x	x		x		
Sediment																		
Trend												x						

WFD EQS$_{biota}$ is based on secondary poisoning.

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water and biota, but not included in 2018 MSFD assessments.
Germany: reporting based on the 2015 river basin plans and *EQS in accordance to 2008/105/EU (0.1 µg/l).
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
France: current monitoring in biota and sediment, but not reported for 2018 MSFD assessments.
Ireland: **At present, it is unclear if, and how, to apply this EQS.
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessments.

Hexachlorocyclohexane (mixture of isomers α-HCH, β-HCH, g-HCH, and d-HCH) (608-73-1)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x		x		x	x		x		x
Biota					x													
Sediment									x		x	x						
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.002 µg/l **EU WFD MAC-EQS** 0.02 µg/l					x			x	x		x		x	x		x		x
Biota																		
National standard 33 µg/kg ww					x													
Sediment																		
Trend												x						

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023. Also monitoring in sediments, but not included in 2018 MSFD assessments.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: monitoring in biota started in 2017, but not included in 2018 MSFD assessments.
Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data.
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.

The WFD EQS is set for the mixture of isomers, but some MS assess these isomers separately:

α-HCH (319-84-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water											x							
Biota							x				x					x		
Sediment							x				x	x				x		
Threshold values /reference levels																		
Biota																		
OSPAR BAC 0.64 µg/kg dw mussels and oysters							x									x		
Sediment																		
National standard 0.2 µg/kg dw											x	x						

Denmark: monitoring in biota, but not included in 2018 MSFD assessments.
Italy: sediment EQS for the protection of the benthic community based on the TEL.
Malta: sediment EQS based on thresholds set by neighboring countries (Italy) (Malta's monitoring factsheet for contaminants, 2015).

γ-HCH (lindane) (58-89-9)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water											x				x			
Biota							x			x	x				x	x		
Sediment							x				x				x	x		
Threshold values /reference levels																		
Biota																		
OSPAR EAC 1.45 µg/kg dw mussels and oysters							x			x					x	x		
OSPAR BAC 0.97 µg/kg dw mussels																x		
Sediments																		
US ERL 3 µg/kg dw							x								x	x		
BAC Spain 0.13 µg/kg dw																x		
National standard 0.2 µg/kg dw											x							

Cyprus: monitoring in biota of α-HCH, β-HCH and g-HCH, but not included in 2018 MSFD assessments.
Denmark: monitoring in biota, but not included in 2018 MSFD assessments.
France: also monitoring of β-HCH in biota and sediments and d-HCH in sediments. Monitoring of α-HCH and d-HCH in biota will start in 2019.
Italy: Italian sediment quality standard for the protection of the benthic community based on the TEL. Also monitoring of β-HCH (national standard=0.2 µg/kg dw) and d-HCH in biota and sediments, but not included in 2018 MSFD assessments.

Isoproturon (34123-59-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x		x		x	x		x		
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.03 µg/l **EU WFD MAC-EQS** 1 µg/l					x			x	x		x		x	x		x		

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: only monitoring in freshwater for WFD.
France: current monitoring in biota and sediment, but not reported for 2018 MSFD assessments.
Ireland: monitoring in water, as part of 2016-2021 transitional and coastal waters monitoring, but not included in 2018 MSFD assessments.
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessments.

Nonylphenol (25154-52-3), including 4-nonylphenol (104-40-5) and 4- nonylphenol (branched) (84852-15-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x	x	x		x	x		x		x
Biota					x		x											
Sediment							x											
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.3 µg/l **EU WFD MAC-EQS** 2 µg/l					x			x	x	x	x		x	x		x		x
Biota																		
National standard 10000 µg/Kg ww					x													
Trend							x											

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Denmark: monitoring in sediments, also including nonylphenoldiethoxylates and nonylphenolmonoethoxylates, but not included in 2018 MSFD assessments. The national standard is 2.5*foc mg/Kg dw (foc: fraction of organic matter).
Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data. It refers to both nonylphenol and 4- nonylphenol.
Italy: monitoring includes both 4- nonylphenol and 4- nonylphenol (branched).
Spain: monitoring refers to nonylphenol, 4- nonylphenol and 4- nonylphenol (branched).

Octylphenol (4-(1,1',3,3'-tetramethylbutyl)-phenol) (140-66-9)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x	x	x		x	x				
Biota					x													
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.01 µg/l	x				x			x	x	x			x	x				
Biota																		
National standard 10000 µg/Kg ww					x													

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Denmark: monitoring in sediments, but not included in 2018 MSFD assessments. The national standard is 3.93*foc mg/Kg dw (foc: fraction of organic matter).
Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.

Pentachlorobenzene (608-93-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x	x			x			x	x		x		x	x				
Biota					x													
Sediment		x										x						
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.0007 µg/l	x	x			x			x	x		x		x	x				
Biota																		
National standard 367 µg/Kg ww					x													
Sediment																		
Trend												x						

Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.
Italy: also monitoring in biota and sediment (partially), but not included in 2018 MSFD assessments.

Pentachlorophenol (87-86-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x		x		x	x		x		x
Biota					x													
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.4 µg/l **EU WFD MAC-EQS** 1 µg/l					x			x	x		x		x	x		x		x
Biota																		
National standard 1830 µg/Kg ww					x													

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.
Italy: also monitoring in biota and sediment (partially), but not included in 2018 MSFD assessments.

Perfluorooctane sulfonic acid and its derivatives (PFOS) (1763-23-1)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x							x				x		
Biota	x	x		x	x	x				x*		x	x	x			x	
Sediment		x										x						
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.00013 µg/l **EU WFD MAC-EQS** 7.2 µg/l					x							x				x		
Biota																		
EU WFD EQS_{biota} 9.1 µg/kg ww fish	x	x		x	x	x				x*		x	x	x			x	
Sediment																		
Trend												x						

EU level		Regional level
Water	**Biota**	**Biota**
WFD To protect human health and the environment. It is derived by using a bioconcentration factor and biomagnification factor for PFOS and represents the corresponding water concentration to the selected QS biota, secondary poisoning.	**WFD** Protection goal is human health via consumption of fishery products. It is the "critical QS" for derivation of an EQS.	**HELCOM** Fish muscle is the primary matrix, and the primary threshold value is the WFD EQS_{biota} (conversion from liver to muscle).

In HELCOM, WFD AA-EQS in water is used as an alternative (unfiltered ideally), secondary threshold value when it is not possible to evaluate an area using the primary EQS_{biota}. PFOS have been monitored in surface water by some HELCOM countries (e.g. Germany) and some differences in PFOS status have been found between biota and water. Such differences might be due to uncertainties in translation of biota QS into water QS. The translation involves assumptions of bioconcentration factors and biomagnification factors with a precautionary approach and may lead to a stricter QS value in water (HELCOM core indicator report - PFOS, 2018).
In OSPAR, there are no agreed assessment criteria currently.

Croatia: monitoring in coastal water will start in 2019.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
France: monitoring in biota, but not included in 2018 MSFD assessments. Monitoring in sediments will start in 2019.
Ireland: monitoring in water and shellfish, as part of 2016-2021 transitional and coastal waters monitoring. *At present, the matrix (biota and water?) and the evaluation criteria for 2018 MSFD assessments are still under discussion.

Polyaromatic hydrocarbons (PAH), including benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene

Benzo(a)pyrene (50-32-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x	x	x	x	x	x	x	x		
Biota	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
Sediment		x	x				x	x	x		x	x	x		x	x		x
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.00017 µg/l **EU WFD MAC-EQS** 0.027 µg/l	x				x			x*	x	x	x	x	x	x	x	x		
Biota																		
EU WFD EQS_{biota} 5 µg/kg ww crustaceans and molluscs	x	x		x	x	x	x	x		x	x	x	x	x		x	x	
EU Reg. 1881/2006 5 µg/kg ww bivalve molluscs (fresh)										x		x				x		
OSPAR EAC 600 µg/kg dw mussel and oyster								x		x					x	x		x
OSPAR BAC 1.4 µg/kg dw mussel and oyster										x						x		
MED BAC Spain 1.3 µg/kg dw mussel																x		
Trend							x											
Sediment																		
US ERL 430 µg/kg dw							x	x							x	x		x
BAC Spain 8.2 µg/kg dw																x		
National standard 30 µg/Kg dw			x								x	x						
Trend												x	x					

	EU level		Regional level		
Water	**Biota**		**Biota**		**Sediment**
WFD To protect human health and the environment.	**WFD** Based on human health protection. Refers to crustaceans and molluscs. For assessing chemical status, monitoring in fish is not appropriate.	**Reg. 1881/2006** Maximum levels to protect public health. Refer to smoked and fresh foodstuff. Only limits for unprocessed seafood should be used for MSFD purposes.	**HELCOM** Primary substance for PAH core indicator and the threshold value is the WFD EQS_{biota}.	**OSPAR** EACs derived for shellfish. PAHs are not routinely monitored in fish.	**OSPAR** US ERL as proxy EACs in all areas.

Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the EQS_{biota} or the corresponding AA- EQS in water.
In HELCOM, WFD EQS_{biota} is applied.
In OSPAR, WFD EQS_{biota} is not used, although MS like France, Ireland and Netherlands use it.

Croatia: monitoring in coastal water in 2015 and again in 2019.
Cyprus: measurements of total PAH in biota.
Denmark: also monitoring in sediments, but not included in 2018 MSFD assessments.
Germany: reporting based on the 2015 river basin plans and *EQS in accordance to 2008/105/EU (0.05 µg/l).
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
Italy: sediment EQS for the protection of the benthic community based on the TEL.
Malta: sediment EQS based on thresholds set by neighboring countries (Italy) (Malta's monitoring factsheet for contaminants, 2015).

Benzo(b)fluoranthene (205-99-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x	x	x	x	x	x	x	x		
Biota					x		x	x		x	x		x		x	x		
Sediment			x				x	x	x		x				x	x		
Threshold values /reference levels																		
Water																		
WFD AA EQS for benzo(a)pyrene 0.00017 µg/l **EU WFD MAC-EQS** 0,017 µg/l	x				x				x	x	x	x	x	x	x	x		
Biota																		
National standard 5 µg/Kg ww					x													
Trend							x			x			x					
Sediment																		
National standard 40 µg/Kg dw											x							

Benzo(g,h,i)perylene (191-24-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x	x	x	x	x	x	x	x		
Biota					x		x	x		x	x		x		x	x		x
Sediment			x				x	x	x		x		x		x	x		x
Threshold values /reference levels																		
Water																		
WFD AA EQS for benzo(a)pyrene 0.00017 µg/l **EU WFD MAC-EQS** 0.00082 µg/l	x				x			x	x	x	x	x	x	x	x	x		
Biota																		
OSPAR EAC 110 µg/kg dw mussel and oyster							x	x		x					x	x		x
OSPAR BAC 2.5 µg/kg dw mussel and oyster										x						x		
MED BAC Spain 1.3 µg/kg dw mussel																x		
Trend							x						x					
Sediment																		
US ERL 85 µg/kg dw							x	x							x	x		
BAC Spain 6.9 µg/kg dw																x		
National standard 55 µg/Kg dw											x							
Trendx													x					

Benzo(k)fluoranthene (207-08-9)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x	x	x	x	x	x	x	x		
Biota					x		x	x		x	x				x	x		
Sediment			x				x		x		x				x	x		
Threshold values /reference levels																		
Water																		
WFD AA EQS for benzo(a)pyrene 0.00017 µg/l **EU WFD MAC-EQS** 0.017 µg/l	x				x			x	x	x	x	x	x	x	x	x		
Biota																		
National standard 5 µg/Kg ww					x													
EAC Mussels (OSPAR 2009 background document) 260 µg/kg dw							x			x						x		
MED BAC Spain 1.8 µg/kg dw mussel																x		
Trend							x											
Sediment																		
National standard 20 µg/Kg dw											x							

Indeno(1,2,3-cd)pyrene (193-39-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x	x	x	x	x		x			
Biota					x		x	x		x	x				x	x		x
Sediment			x				x	x	x		x		x	x	x	x		x
Threshold values /reference levels																		
Water																		
WFD AA EQS for benz(a)pyrene 0.00017 µg/l	x				x					x		x						
Biota																		
OSPAR BAC 2.4 µg/kg dw mussel and oyster							x			x						x		x
MED BAC 2.9 µg/kg dw mussel							x											
MED BAC Spain 0.8 µg/kg dw mussel																x		
WFD EQS_{biota} for benzo(a)pyrene 5 µg/Kg ww					x													
Trend							x											
Sediment																		
US ERL 240 µg/kg dw							x	x						x	x	x		
BAC Spain 8.3 µg/kg dw																x		
National standard 70 µg/Kg dw											x							
Trend													x					

Croatia: monitoring in coastal waters in 2015. At present, it is not yet clear whether the data will be used or not for 2018 MSFD reporting.
Denmark: monitoring of these PAH compounds in biota and sediments, but not included in 2018 MSFD assessments due to the lack of thresholds.
Germany: reporting based on the 2015 river basin plans and EQS in accordance to 2008/105/EU (benzo(b)fluoranthene + benzo(k)fluor-anthene = 0,03 µg/l; benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene = 0,002 µg/l).

Anthracene (120-12-7)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x	x		x	x	x	x		x	x	x	x		
Biota				x	x		x	x		x					x	x		x
Sediment		x	x	x			x	x	x		x	x	x		x	x	x	x
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.1 µg/l **EU WFD MAC-EQS** 0.1 µg/l	x				x	x		x	x	x	x	x	x	x	x	x		
Biota																		
OSPAR EAC 290 µg/kg dw mussel and oyster							x	x		x					x	x		x
MED BAC Spain 4.1 µg/kg dw mussel																x		
National standard 9 µg/Kg ww fish muscle					x													
National standard 2400 µg/Kg ww				x														
Trend							x											
Sediment																		
QS from EQS dossier 24 µg/kg dw								x									x	
US ERL 85 µg/kg dw							x	x							x	x		x
BAC Spain 1.8 µg/kg dw																x		
National standard 24 µg/Kg dw											x	x*						
National standard 4.8 µg/Kg dw				x														
Trend												x	x					

EU level	Regional level	
Water	**Biota**	**Sediment**
WFD To protect human health and the environment.	**OSPAR** EACs derived for shellfish. PAHs are not routinely monitored in fish.	**HELCOM** Secondary substance for PAH core indicator and the secondary threshold value is the QS from EQS dossiers (5% organic carbon normalization). / **OSPAR** US ERL as proxy EACs in all areas.

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Denmark: national standards derived according to the WFD CIS guidance No. 27 (European Commission, 2011), and published in the national Executive Order (BEK, 2017).
Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data.
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
Italy: sediment EQS for the protection of the benthic community based on the TEL. Also monitoring in biota (partially), but not included in 2018 MSFD assessments.
Malta: sediment EQS based on thresholds set by neighboring countries (Italy) (Malta's monitoring factsheet for contaminants, 2015). ***However, the Italian standard is 24 µg/Kg dw, while the sediment standard indicated in the Malta's monitoring factsheet is 45 µg/Kg dw.**

Fluoranthene (206-44-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x	x	x	x	x	x	x	x		
Biota	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x
Sediment		x	x				x	x	x		x	x	x	x	x	x	x	x
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.0063 µg/l **EU WFD MAC-EQS** 0.12 µg/l	x				x			x*	x	x	x	x	x	x	x	x		
Biota																		
EU WFD EQS_{biota} 30 µg/kg ww crustaceans and molluscs	x	x		x	x	x		x		X**	x	x	x	x			x	
OSPAR EAC 110 µg/kg dw mussel and oyster							x	x		X**					x	x		x
OSPAR BAC 12.2 µg/kg dw mussel and oyster										x						x		
MED BAC Spain 6.8 µg/kg dw mussel																x		
Trend							x											
Sediment																		
QS from EQS dossier 2000 µg/kg dw														x			x	
US ERL 600 µg/kg dw							x	x							x	x		x
BAC Spain 14.4 µg/kg dw																x		
National standard 110 µg/Kg dw											x	x						
Trend												x	x					

EU level		Regional level		
Water	**Biota**	**Biota**		**Sediment**
WFD To protect human health and the environment.	**WFD** Based on human health protection, Refers to crustaceans and molluscs. For assessing chemical status, monitoring in fish is not appropriate.	**HELCOM** Secondary substance for PAH core indicator and the threshold value is the WFD EQS_{biota}.	**OSPAR** EACs derived for shellfish. PAHs are not routinely monitored in fish.	**OSPAR** US ERL as proxy EACs in all areas.

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Denmark: also monitoring in sediments, but as there is no threshold value, it is unclear if monitoring will continue.
Germany: reporting based on the 2015 river basin plans and *EQS in accordance to 2008/105/EU (0.1 µg/l).
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
Ireland: **At present, it is unclear if, and how, to apply this EQS. The likely stricter OSPAR EACs for molluscs (assuming 80% moisture) may be used.
Italy: sediment EQS for the protection of the benthic community based on the TEL.
Malta: sediment EQS based on thresholds set by neighboring countries (Italy) (Malta's monitoring factsheet for contaminants, 2015).

Naphthalene (91-20-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x	x		x	x	x	x	x	x	x	x	x		
Biota				x	x		x	x							x			
Sediment			x	x			x	x	x		x	x	x		x			
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 2 µg/l **EU WFD MAC-EQS** 130 µg/l	x					x		x*	x	x	x	x	x	x	x	x		
Biota																		
OSPAR EAC 340 µg/kg dw mussel and oyster							x	x							x			
National standard 12270 µg/Kg ww fish					x													
National standard 2400 µg/Kg ww				x														
Trend							x											
Sediment																		
US ERL 160 µg/kg dw							x	x							x			
National standard 35 µg/Kg dw											x	x						
National standard 138 µg/Kg dw				x														
Trend													x					

EU level	Regional level	
Water	**Biota**	**Sediment**
WFD To protect human health and the environment.	**OSPAR** EACs derived for shellfish. PAHs are not routinely monitored in fish.	**OSPAR** US ERL as proxy EACs in all areas.

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Denmark: national standards derived according to the WFD CIS guidance No. 27 (European Commission, 2011), and published in the national Executive Order (BEK, 2017).
Germany: reporting based on the 2015 river basin plans and *EQS in accordance to 2008/105/EU (1.2 µg/l).
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
Italy: sediment EQS for the protection of the benthic community based on the TEL. Also monitoring in biota (partially), but not included in 2018 MSFD assessments.
Malta: sediment EQS based on thresholds set by neighboring countries (Italy) (Malta's monitoring factsheet for contaminants, 2015).

Quinoxyfen (124495-18-7)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x							x	x			x		
Biota																		
Sediment		x										x						
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.015 µg/l **EU WFD MAC-EQS** 0.54 µg/l					x							x	x			x		
Sediment																		
Trend												x						

Croatia: monitoring in coastal water will start in 2019.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
France: monitoring in biota and sediment will start in 2019.
Ireland: monitoring in water, as part of 2016-2021 transitional and coastal waters monitoring, but not included in 2018 MSFD assessments.

Simazine (122-34-9)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x		x	x		x		x
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 1 µg/l **EU WFD MAC-EQS** 4 µg/l								x	x				x	x		x		x

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Estonia: monitoring in inland surface waters, as part of WFD assessment (not included in 2018 MSFD assessments).
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.
Ireland: monitoring in water, as part of 2016-2021 transitional and coastal waters monitoring, but not included in 2018 MSFD assessments.
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessments.

Terbutryn (886-50-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x						x	x	x			x		
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.0065 µg/l **EU WFD MAC-EQS** 0.034 µg/l					x						x	x	x			x		

Croatia: monitoring in water carried out once after 2015 (not included in 2018 MSFD assessments).
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: only monitoring in freshwater for WFD.
France: monitoring in sediment, but not included in 2018 MSFD assessments. Biota monitoring will start in 2019.
Ireland: monitoring in water, as part of 2016-2021 transitional and coastal waters monitoring, but not included in 2018 MSFD assessments.

Tributyltin compounds, including tributyltin-cation (36643-28-4)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x	x			x			x	x		x		x	x		x		x
Biota					x		x				x	x	x	x				
Sediment		x			x	x	x	x			x	x	x				x	
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0,0002 µg/l **EU WFD MAC-EQS** 0,0015 µg/l	x	x			x			x	x		x		x	x		x		x
Biota																		
QS from EQS dossier 15.2 µg/Kg ww fish muscle														x				
OSPAR EAC 12 µg/kg dw mussel							x						x					
National standard 230 µg/Kg ww					x													
Trend							x											
Sediment																		
HELCOM QS 1.6 µg/kg dw (5% TOC)						x		x									x	
National standard 0.02 µg/Kg dw					x													
National standard 5 µg/Kg dw											x	x*						
Trend												x	x					

EU level	Regional level		
Water	**Water**	**Biota**	**Sediment**
WFD To protect human health and the environment.	**HELCOM** The WFD EQS is a secondary threshold value for TBT. This is in conflict with the HELCOM COMBINE monitoring program, where the preferred matrix is biota and sediment. As a result, very little data is available for TBT in water.	**HELCOM** Soft body of mussels is a secondary matrix and the threshold value the OSPAR EACs (not yet commonly agreed and included as test threshold value).	**HELCOM** Primary matrix. There is a QS developed by Sweden based on ecotoxicity data for the sediment compartment, but it is not yet commonly agreed and included as test threshold value.

In OSPAR, monitoring focuses on TBT concentrations in sediment and the biological effects (imposex in gastropod molluscs) of organotin pollution. Thus, TBT differs from the indicators for other compounds, which are only defined as concentrations of the harmful compound in the animal's tissues. OSPAR BACs and EACs have been established for imposex measurement in a range of gastropods, but are not available for TBT in sediments (OSPAR Intermediate assessment – TBT, 2017).
In HELCOM, both TBT and imposex are core indicator.

Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Estonia: preliminary national threshold value for secondary matrices (biota and sediments), mostly based on literature data.
Ireland: periodic imposex studies to evaluate TBT pollution (most recent 2018). They may also include TBT in biota. Also monitoring in water, as part of 2016-2021 transitional and coastal waters monitoring, but not included in 2018 MSFD assessments.
Italy: sediment EQS for the protection of the benthic community based on the TEL.
Malta: sediment EQS based on thresholds set by neighboring countries (Italy) (Malta's monitoring factsheet for contaminants, 2015). ***However, the Italian standard is 5 µg/Kg dw, while the sediment standard indicated in the Malta's monitoring factsheet is 55 µg/Kg dw.**
Spain: some data in sediments, but there is no routine monitoring.
Sweden: QS value derived on the basis of WFD CIS guidance No. 27 (European Commission, 2011), and ecotoxicity data for sediment dwelling organisms.

Trichlorobenzenes (all isomers) (12002-48-1)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x	x	x		x	x				
Biota					x													
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.4 µg/l					x			x	x	x			x	x				
Biota																		
National standard 4000 µg/kg ww					x													

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Estonia: preliminary national threshold value for secondary matrix (biota), mostly based on literature data.
France: monitoring in biota and sediment of individual isomers (1,2,3-TCB,1,2,4-TCB and 1,3,5-TCB), but not included in MSFD assessments.
Italy: also monitoring of individual isomers: 1,2,3-TCB (sediments), 1,2,4-TCB (biota and sediments). Monitoring in biota and sediments not included in 2018 MSFD assessments.

Trichloromethane (67-66-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x		x	x	x	x				x
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 2.5 µg/l					x			x	x		x	x	x	x				x

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: only monitoring in freshwater for WFD.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.

Trifluralin (1582-09-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x		x		x	x				
Biota					x													
Sediment					x													
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.03 µg/l					x			x	x		x		x	x				
Biota																		
National standard 6700 µg/kg ww					x													
Sediment																		
National standard 3140 µg/Kg dw benthos and sediment					x													

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Estonia: preliminary national threshold value for secondary matrix (biota and sediments), mostly based on literature data.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.
Italy: also monitoring in biota and sediment (partially), but not included in 2018 MSFD assessments.

Carbon tetrachloride (56-23-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x				x		x		x	x				
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 12 µg/l					x				x		x		x	x				

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.

Total cyclodiene pesticides (aldrin + dieldrin + endrin + isodrin)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x		x		x	x				x
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS Σ = 0,005 µg/l					x			x			x		x	x				x

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Greece: monitoring in water, but not included in 2018 MSFD assessments.

The WFD EQS refers to the sum aldrin + dieldrin + endrin + isodrin, but some MS assess these compounds separately:

Aldrin (309-00-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x					x		x			
Biota									x						x	x		
Sediment									x		x				x	x		
Threshold values /reference levels																		
Water																		
National standard for marine waters AA EQS 0.005 µg/l													x					
Sediment																		
National standard 0.2 µg/Kg dw											x							

Dieldrin (60-57-1)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x					x		x			
Biota							x		x						x	x		
Sediment							x		x		x				x	x		
Threshold values /reference levels																		
Water																		
National standard for marine waters AA EQS 0.005 µg/l													x					
Biota																		
OSPAR EAC[13] 5 µg/Kg dw							x									x		
Sediments																		
US ERL[14] 0.02 µg/kg dw							x								x	x		
BAC Spain 0.19 µg/Kg dw																x		
National standard 0.2 µg/Kg dw											x							

Endrin (72-20-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x					x		x			
Biota									x						x	x		
Sediment									x		x				x	x		
Threshold values /reference levels																		
Water																		
National standard for marine waters AA EQS 0.005 µg/l													x					

Isodrin (465-73-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x					x					
Biota									x							x		
Sediment									x		x					x		
Threshold values /reference levels																		
Water																		
National standard for marine waters AA EQS 0.005 µg/l													x					

Croatia: monitoring in coastal waters in 2015. At present, it is not yet clear whether the data will be used or not for 2018 MSFD reporting.
Cyprus: monitoring of aldrin, dieldrin and endrin in biota, but not included in 2018 MSFD assessments.
France: monitoring of all these cyclodiene pesticides in biota and sediments, but only dieldrin is included in 2018 MSFD assessments.
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
Italy: sediment EQS for the protection of the benthic community based on the TEL. Also monitoring in biota, but not included in 2018 MSFD assessments.

([13]) Provisional EACs as determined at the Workshop on Ecotoxicological Assessment Criteria for biota in Berlin in 1995 (OSPAR, 2004)
([14]) OSPAR first used an ERL=2 µg/kg dw. There was an error of a factor 100 when comparing to MacDonald et al. (1996) and therefore, the ERL was corrected to 0.02 µg/kg dw

Total DDT (DDT, p,p' + DDT, o,p' + DDE, p,p' + DDD, p,p')

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x		x		x	x				x
Biota										x*								
Sediment									x		x							
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0,025 µg/l	x				x			x	x		x		x	x				x

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
Ireland: *DDT and metabolites are monitored in shellfish, but at present, it is unclear if, and how, this will be included in 2018 MSFD assessments.

Some MS assess the isomers separately:

- Cyprus: DDD, p,p', DDT, p,p' and DDT, o,p' in biota, but not included in MSFD assessments.
- Denmark: these four isomers in biota, but not included in MSFD assessments.
- Finland: DDT, p,p', DDE, p,p' and DDD p,p' in biota (long-term trend).
- France: these four isomers in sediment and DDT, p,p', DDE, p,p' and DDD p,p' also in biota.
- Romania: DDT, p,p', DDE, p,p' and DDD p,p' in water, biota and sediments.
- Spain: DDT, p,p', DDE, p,p' and DDD p,p' in biota and sediments.

For DDE, p,p' there is a BAC in biota (0.63 µg/kg dw mussels and oysters), which is used in OSPAR as the assessment criterion. For sediments, there are the US ERL (2.2 µg/kg dw) and BAC Spain (0.09 µg/kg dw).

Other DDT isomers not included in the WFD EQS:

- Estonia: o,p'-DDD and o,p'-DDE in water.
- France: o,p'-DDE in sediments.
- Denmark: o,p'-DDE in biota.
- Italy: o,p'-DDD and o,p'-DDE in water, biota and sediments, but not included in 2018 MSFD assessments.

DDT, p,p' (50-29-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x			x	x		x		x	x	x			
Biota											x				x	x		
Sediment									x		x				x	x		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 0.01 µg/l	x				x				x				x	x	x			

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
Denmark: monitoring in biota, but not included in 2018 MSFD assessments due to the lack of threshold.
France: monitoring in biota and sediments, but not included in 2018 MSFD assessments. The US ERL sediments (1 µg/kg dw) might be used in the future.
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.

Tetrachloroethylene (127-18-4)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water									x		x		x	x				
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 10 µg/l									x		x		x	x				

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
France: current monitoring in sediment, but not included in 2018 MSFD assessments.
Ireland: monitoring in water, as part of 2016-2021 transitional and coastal waters monitoring, but not included in 2018 MSFD assessments.
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessments.

Trichloroethylene (79-01-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x				x		x		x	x				
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
EU WFD AA-EQS 10 µg/l					x				x				x	x				

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in 2021 or 2023.
Cyprus: monitoring in water for WFD, but not included in 2018 MSFD assessments.
France: current monitoring in biota and sediment, but not included in 2018 MSFD assessments.
Ireland: monitoring in water, as part of 2016-2021 transitional and coastal waters monitoring, but not included in 2018 MSFD assessments.
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessments.

- **WFD Watch list (WL)**

CAS number	Name of the substance (or group of substances)	1st WL	2nd WL	MS
57-63-6	17-Alpha-ethinylestradiol (EE2)	x	x	NL (water)
50-28-2	17-Beta-estradiol (E2)	x	x	NL (water)
53-16-7	Estrone (E1)	x	x	NL (water)
	Macrolide antibiotics: Erythromycin (114-07-8), Clarithromycin (81103-11-9), Azithromycin (83905-01-5)	x		NL (water)
2032-65-7	Methiocarb	x	x	
	Neonicotinoids: Imidacloprid (105827-78-9/138261-41-3), Thiacloprid (111988-49-9), Thiamethoxam (153719-23-4), Clothianidin (210880-92-5), Acetamiprid (135410-20-7/160430-64-8)	x	x	IT (acetamiprid in water and sediments) NL (water)
139968-49-3	Metaflumizone		x	NL (water)
26787-78-0	Amoxicillin		x	NL (water)
85721-33-1	Ciprofloxacin		x	NL (water)
15307-86-5	Diclofenac	x		PL (water)
128-37-0	2,6-Ditert-butyl-4-methylphenol	x		
5466-77-3	2-Ethylhexyl 4-methoxycinnamate	x		
	Oxadiazon	x		
2303-17-5	Tri-allate	x		

Even though MS might carry out coastal monitoring of the WL substances, only three MS have indicated the use of some of them for MSFD purposes.

The threshold value for diclofenac indicated by Poland is 0.01 µg/l, which corresponds to the provisional AA-EQS in saltwater proposed in the EQS dossier of 2011. The diclofenac dossier has been updated and the newly proposed, but still provisional, QS values are 0.005 µg/l (AA-QS in marine waters) and 0.007 µg/l (secondary poisoning) (EQS datasheet diclofenac, 2017).

In HELCOM, diclofenac is a pre-core test indicator and the proposed threshold values are the most recent provisional EU QS. However, as the issue is of an emerging nature, it is proposed that the threshold value would initially be evaluated as a trend. Diclofenac is currently not included in the regular environmental monitoring of any HELCOM Contracting Party, though EU MS have been obliged to monitor this substance and report collated data due to its inclusion on the first WL (HELCOM pre-core indicator report – diclofenac, 2018). Although there are some marine data available for pharmaceuticals in the Baltic Sea, including those of the WL (BSEP, 2017), these substances are not considered by EU MS for 2018 MSFD reporting.

- **RSC chemical substances lists**

Chromium and its compounds (7440-47-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x				x	x	x	x	x	x	x			
Biota							x			x					x			
Sediment							x	x	x		x				x			
Threshold values /reference levels																		
Water																		
National standard **EU WFD AA-EQS (Cr VI)** 0.6 µg/l **EU WFD MAC-EQS (Cr VI)** 32 µg/l	x									x			x					
National standard (RBSP) 5 µg/l					x													
National standard 50 µg/l (Cr) 20 µg/l (Cr VI)														x				
Biota																		
Trend							x											
National standard (S.I. 268/2006; quality shellfish waters) 6 mg/Kg dw shellfish flesh										x								
Sediment																		
US ERL 81 mg/kg dw							x								x			
National standard (RBSP) 640 mg/kg dw								x										
National standard 50 mg/kg dw (Cr) 2 mg/kg dw (Cr VI)											x							

Chromium is considered in the LBS protocol of the Barcelona Convention and it is optional in the BSIMAP of the Black Sea Commission.
Water standards refer to the dissolved phase.

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Germany: threshold value for RBSP included in OGewV (2011).
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
Ireland: total chromium is measured in water, and further speciation is required if concentrations are above the EQS for chromium VI.
Italy: sediment EQS for the protection of the benthic community based on the TEL. Also monitoring in biota, but not included in 2018 MSFD assessments.
Malta: monitoring in water as part of the WFD ecological status (RBSP), but not for MSFD purposes.

Cobalt and its compounds (7440-48-4)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water											x		x	x				
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 50 µg/l														x				
National standard MAC EQS 0.21 µg/l													x					

Cobalt is optional in the BSIMAP of the Black Sea Commission.

Croatia: monitoring in coastal water in 2015 (not included in 2018 MSFD assessments) and again in the following 6-year monitoring cycle (2021 or 2023).
France: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessments.

Copper and its compounds (7440-50-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x	x			x				x	x		x	x	x	x			x
Biota							x			x					x			
Sediment							x	x	x						x		x	
Threshold values /reference levels																		
Water																		
National standard 5 µg/l	x	x								x								
National standard (RBSP) 15 µg/l					x													
National standard 50 µg/l														x				
National standard 30 µg/l															x			
National standard AA EQS 1.1 µg/l													x					
National standard 3.76 µg/l dissolved, where DOC≤1mg 3.76 + (2.677x ((DOC/2) –0.5)) µg/l dissolved, where DOC>1mg/l																		x
Biota																		
OSPAR BAC 6 mg/kg dw mussels and oysters							x			x								
National standard (S.I. 268/2006; quality shellfish waters) 400 mg/Kg dw shellfish flesh										x								
Trend							x											
Sediment																		
US ERL 34 mg/kg dw							x								x			
National standard (RBSP) 160 mg/kg dw								x										
National standard 52 mg/kg dw																	x	

Copper is considered in the LBS protocol of the Barcelona Convention and it is mandatory in the BSIMAP of the Black Sea Commission.
Water standards refer to the dissolved phase.

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011). Monitoring in biota will start in 2019.
Croatia: monitoring in water once after 2015.
Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments due to the lack of threshold.
Germany: threshold value for RBSP included in OGewV (2011).
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.
Malta: water monitoring as part of the WFD ecological status (RBSP), but not for MSFD purposes.
Romania: national standard for water is based on old national legislation (from 2006).
Sweden: national standard for sediment is an added risk value, i.e. if exceeded then natural background level should be considered in the assessment. The value has been derived on the basis of the WFD CIS guidance No. 27 (European Commission, 2011), and ecotoxicity data for sediment dwelling organisms.
UK: standards set out in Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015). DOC means the annual mean concentration of dissolved organic carbon in mg/l.

Zinc and its compounds (7440-66-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x				x	x		x	x	x				x
Biota							x			x								
Sediment							x	x	x									
Threshold values /reference levels																		
Water																		
National standard 40 µg/l	x									x								
National standard (RBSP) 10 µg/l					x													
National standard marine waters AA EQS 3 µg/l													x					
National standard 1000 µg/l														x				
National standard 6.8 dissolved plus Ambient Background Concentration (µg/l)																		x
Biota																		
National standard (S.I. 268/2006; quality shellfish waters) 4000 mg/Kg dw shellfish flesh										x*								
Trend							x											
Sediment																		
US ERL 150 mg/kg dw							x											
National standard (RBSP) 800 mg/kg dw								x										

Zinc is considered in the LBS protocol of the Barcelona Convention and it is optional in the BSIMAP of the Black Sea Commission.
Water standards refer to the dissolved phase.

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Croatia: monitoring in water once after 2015 (not included in 2018 MSFD assessments).
Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Germany: threshold value for RBSP included in OGewV (2011).
Greece: monitoring in sediments will start in 2019. No current regular monitoring, but some results from measurements in the framework of various national projects. Approximate assessment based on contaminant values in remote/reference areas and in sediment cores.
Ireland: *At present, it is unclear if the indicated standard will be used for 2018 MSFD assessments.
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.
Malta: monitoring in water as part of the WFD ecological status (RBSP), but not for MSFD purposes.
UK: standards set out in Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015). For saltwater, an Ambient Background Concentration=1.1 µg/l is recommended.

Selenium and its compounds (7782-49-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x					x	x				
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 3 µg/l								x										
National standard MAC EQS 2.6 µg/l													x					
National standard (RBSP) 20 µg/l														x				

Selenium is a HELCOM substance of potential concern. Few MS provide assessments for this substance (and only two HELCOM contracting parties).
Water standards refer to the dissolved phase.

France: some available data in sediments, but not included in 2018 MSFD assessments.
Germany: threshold value for RBSP included in OGewV (2011).
Italy: monitoring in water and sediment (partially), but not included in 2018 MSFD assessments.

Brominated diphenylethers (PBDE)

PBDE is an OSPAR common indicator. As explained above, PBDE concentrations are calculated, but not assessed because there are no OSPAR assessment criteria, although there are current discussions on this regard. For each PBDE congener measured at each monitoring site, the time series of concentration measurements is assessed for temporal trends.
As also said before, the WFD establishes the EQS for the sum of congeners 28, 47, 99, 100, 153, and 154. Other BDE congeners considered by MS include:

- Congeners 66, 85, 183 and 209 in Denmark and Finland (biota) and Germany (biota and sediments).
- Congeners 175, 197 and 203 in Denmark (biota).
- Congeners 118, 138 and 180 in Netherlands (biota and sediments).
- Congeners 85 and 183 in Spain (biota and sediments).
- Congener 183 in France (biota).
- Congener 209 in France and UK (sediments); France biota monitoring will start in 2019.

Chlordane (57-74-9)

Chlordane is considered in the LBS protocol of the Barcelona Convention and is a substance of possible concern in OSPAR and HELCOM.

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.003 µg/l water.
Denmark: monitoring in biota, but not included in 2018 MSFD assessments.

Chlorobenzene (108-90-7)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x			x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 1 µg/l								x										

Chlorobenzene is considered in the LBS protocol of the Barcelona Convention, but only two MS consider it for 2018 MSFD reporting.

Germany: threshold value for RBSP included in OGewV (2011).

3,4-Dichloroaniline (95-76-1)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water									x		x							
Biota																		
Sediment																		

3,4-Dichloroaniline is an OSPAR substance of possible concern, but only two MS consider it for 2018 MSFD reporting (none of them OSPAR contracting party). There are no assessment criteria or threshold values.

Dibutylphthalate (84-74-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x													
Biota					x													
Sediment																		
Threshold values /reference levels																		
Water																		
National standard AA-EQS 10 µg/l	x																	
National standard 1.3 µg/l					x													
Biota																		
National standard 3200 µg/Kg ww					x													

Dibutylphthalate is a substance of possible concern in OSPAR and HELCOM, but only two MS consider it for 2018 MSFD reporting (none of them OSPAR contracting party).

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Denmark: monitoring in sediments, but not included in 2018 MSFD assessments.
Estonia: preliminary national threshold value, mostly based on literature data.

2,4,5-T (93-76-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water									x		x							
Biota																		
Sediment																		

2,4,5-T is a HELCOM substance of potential concern, but only two MS consider it for 2018 MSFD reporting (none of them HELCOM contracting party). There are no assessment criteria or threshold values.

Greece: monitoring during 2012-2015, but in all cases concentrations were below detection limits.

2,4,5-Trichlorophenol (95-95-4)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x						x							
Biota					x													
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.4 µg/l					x													
Biota																		
National standard 1830 µg/Kg ww					x													

2,4,5-Trichlorophenol is an OSPAR substance of possible concern, but only two MS consider it for 2018 MSFD reporting (none of them OSPAR contracting party).

Estonia: preliminary national threshold value, mostly based on literature data.

Petroleum hydrocarbons

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x									x	x			
Biota																		
Sediment												x			x			
Threshold values /reference levels																		
Water																		
"Without a visible film on the surface of the water and odourless"	x																	
National standard (RBSP) 100 µg/l					x													
National standard (mineral oil) 200 µg/l														x	x			

Petroleum hydrocarbons is mandatory in the BSIMAP of the Black Sea Commission.

Estonia: preliminary national threshold value, mostly based on literature data.

Phenol (108-95-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x				x		x							x
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 7 µg/l					x													
National standard Long term (mean) 7.7 µg/l Short term (95 percentile) 46 µg/l																		x

Phenol is optional in the BSIMAP of the Black Sea Commission.

Estonia: preliminary national threshold value, mostly based on literature data.
Greece: monitoring during 2012-2015, but in all cases concentrations were below detection limits.
UK: standards set out in Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015).

Dibutyltin ion (14488-53-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x					x					
Biota					x													
Sediment					x	x		x					x					
Threshold values /reference levels																		
Water																		
National standard 0,0002 µg/l					x													
National standard (RBSP) 0.01 µg/l								x										
National standard AA EQS 0.09 µg/l MAC EQS 0.21 µg/l													x					
Biota																		
National standard 230 µg/Kg ww					x													
Sediment																		
National standard 0.02 µg/Kg dw					x													
National standard (RBSP) 0.1 mg/kg dw								x										
Trend													x					

DBT ion is a HELCOM core indicator and an OSPAR substance for priority action.

Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Estonia: preliminary national threshold values, mostly based on literature data.
France: monitoring in biota, but not included in 2018 MSFD assessments. Sediment monitoring will start in 2019.
Germany: threshold value for RBSP included in OGewV (2011).
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.

Monobutyltin ion (78763-54-9)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x													
Biota					x													
Sediment					x	x		x					x					
Threshold values /reference levels																		
Water																		
National standard 0,0002 µg/l					x													
Biota																		
National standard 230 µg/Kg ww					x													
Sediment																		
National standard 0.02 µg/Kg dw					x													
Trend													x					

MBT ion is a HELCOM core indicator and an OSPAR substance for priority action.

Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Estonia: preliminary national threshold values, mostly based on literature data.
France: monitoring in biota and sediment, but not included in 2018 MSFD assessments.
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.

Tetrabutyltin (1461-25-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x										
Biota					x													
Sediment					x			x										
Threshold values /reference levels																		
Water																		
National standard 0,0002 µg/l					x													
National standard (RBSP) 0.001 µg/l								x										
Biota																		
National standard 230 µg/Kg ww					x													
Sediment																		
National standard 0.02 µg/Kg dw					x													
National standard (RBSP) 0.04 mg/Kg dw								x										

Tetrabutyltin is an OSPAR substance for priority action, but only two MS consider it for 2018 MSFD reporting.

Estonia: preliminary national threshold values, mostly based on literature data.
Germany: threshold value for RBSP included in OGewV (2011).

Triphenyltin and compounds

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x			x		x					
Biota					x													
Sediment					x	x		x										
Threshold values /reference levels																		
Water																		
National standard 0,0002 µg/l					x													
National standard 0.0005 µg/l								x										
National standard AA EQS 0.00023 µg/l MAC EQS 0.47 µg/l													x					
Biota																		
National standard 230 µg/Kg ww					x													
Sediment																		
National standard 0.02 µg/Kg dw					x			x										

Triphenyltin is a HELCOM core indicator and an OSPAR substance for priority action.

Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Estonia: preliminary national threshold values, mostly based on literature data.
Germany: threshold value for RBSP included in OGewV (2011).
France: monitoring in sediment, but not included in 2018 MSFD assessments.

Non-dioxin like PCB (sum of 6 PCB: 28, 52, 101, 138, 153 and 180)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x										
Biota			x		x	x		x		x		x	x	x			x	
Sediment								x			x		x					
Threshold values /reference levels																		
Water																		
Trend					x													
Biota																		
EC 1881/2006 and 1259/2011 75 µg/Kg ww fish muscle			x		x	x		x		x		x		x			x	

In HELCOM, the sum of PCB 28, 52, 101, 138, 153 and 180 is a core indicator and biota the primary matrix. The threshold value for that sum is derived from the food safety directive (75 µg/Kg ww foodstuff; 5% lipid normalization). Other congeners in current monitoring programmes might be included in the assessments when suitable boundary values become available.
In OSPAR, those PCB congeners, as well as PCB 118, are indicators of wider PCB contamination and Contracting Parties are required to monitor them on a mandatory basis. The ERL sediments for ∑ICES7CBs is 11.5 µg/kg dw.

Italy: also monitoring in water and biota, but not included in 2018 MSFD assessments.
Spain: available data for ∑ICES7PCBs (28,52,101,118,138,153,180) in sediments, but from 2012 assessments.

MS can assess these PCB congeners individually and not as a sum:

PCB 28 (7012-37-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x							x	x						x			
Biota							x	x		x			x		x	x		x
Sediment							x	x	x		x		x		x			x
Threshold values /reference levels																		
Water																		
National standard (RBSP) 0.0005 µg/l	x							x										
Biota																		
OSPAR BAC 0.75 µg/Kg dw mussels and oysters 0.10 µg/Kg ww fish										x						x		
OSPAR EAC 67 µg/Kg lw all biota							x	x		x			x			x		x
OSPAR EAC 3.2 µg/Kg dw mussels and oysters															x			
Trend							x											
Sediment																		
OSPAR EAC 1.7 µg/Kg dw all areas							x	x					x		x			x

PCB 52 (35693-99-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x							x	x						x			
Biota							x	x		x			x		x	x		x
Sediment							x	x	x		x		x		x			x
Threshold values /reference levels																		
Water																		
National standard (RBSP) 0.0005 µg/l	x							x										
Biota																		
OSPAR BAC 0.75 µg/Kg dw mussels and oysters 0.08 µg/Kg ww fish										x						x		
OSPAR EAC 108 µg/Kg lw all biota							x	x		x			x			x		x
OSPAR EAC 5.4 µg/Kg dw mussels and oysters															x			
Trend							x											
Sediment																		
OSPAR EAC 2.7 µg/Kg dw all areas							x	x					x		x			x

PCB 101 (37680-73-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x							x	x						x			
Biota							x	x		x			x		x	x		x
Sediment							x	x	x		x		x		x			x
Threshold values /reference levels																		
Water																		
National standard (RBSP) 0.0005 µg/l	x							x										
Biota																		
OSPAR BAC 0.70 µg/Kg dw mussels and oysters 0.08 µg/Kg ww fish										x						x		
OSPAR EAC 121 µg/Kg lw all biota							x	x		x			x			x		x
OSPAR EAC 6 µg/Kg dw mussels and oysters															x			
Trend							x											
Sediment																		
OSPAR EAC 3.0 µg/Kg dw all areas							x	x					x		x			x

PCB 138 (35065-28-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x							x	x						x			
Biota							x	x		x			x		x	x		x
Sediment							x	x	x		x		x		x			x
Threshold values /reference levels																		
Water																		
National standard (RBSP) 0.0005 µg/l	x							x										
Biota																		
OSPAR BAC 0.60 µg/Kg dw mussels and oysters 0.09 µg/Kg ww fish										x						x		
OSPAR EAC 317 µg/Kg lw all biota							x	x		x			x			x		x
OSPAR EAC 15.8 µg/Kg dw mussels and oysters															x			
Trend							x											
Sediment																		
OSPAR EAC 7.9 µg/Kg dw all areas							x	x					x		x			x

PCB 153 (35065-28-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x							x	x						x			
Biota							x	x		x			x		x	x		x
Sediment							x	x	x		x		x		x			x
Threshold values /reference levels																		
Water																		
National standard (RBSP) 0.0005 µg/l	x							x										
Biota																		
OSPAR BAC 0.60 µg/Kg dw mussels and oysters 0.10 µg/Kg ww fish																x		
OSPAR EAC 1585 µg/Kg lw all biota							x	x		x			x			x		x
OSPAR EAC 80 µg/Kg dw mussels and oysters															x			
Trend							x											
Sediment																		
OSPAR EAC 40 µg/Kg dw all areas							x	x					x		x			x

PCB 180 (35065-29-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x							x	x						x			
Biota							x	x		x			x		x	x		x
Sediment							x	x	x		x		x		x			x
Threshold values /reference levels																		
Water																		
National standard (RBSP) 0.0005 µg/l	x							x										
Biota																		
OSPAR BAC 0.60 µg/Kg dw mussels and oysters 0.11 µg/Kg ww fish										x						x		
OSPAR EAC 469 µg/Kg lw all biota							x	x		x			x			x		x
OSPAR EAC 24 µg/Kg dw mussels and oysters															x			
Trend							x											
Sediment																		
OSPAR EAC 12 µg/Kg dw all areas							x	x					x		x			x

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Denmark: monitoring in biota, but not included in 2018 MSFD assessments due to the lack of thresholds.
Germany: threshold value for RBSP included in OGewV (2011). Used alternatively if sediment data are missing.
Ireland: monitoring in sediment, but the data unlikely to be included in 2018 MSFD assessments.
Netherlands: these congeners are monitored in biota and sediments according to OSPAR reporting.

Other PCB congeners are also assessed in different MS:

- Denmark: PCB 31, 44, 49, 105, 118, 128, 149, 151, 156, 170, 187, all in biota.
- France: PCB 31 in biota and sediments; monitoring of PCB 47 in sediments will start in 2019.
- Greece: PCB 170 and 194.
- Italy: PCB 99, 110, 149, 151, 170, 183, and 187 in water and sediments. Moreover, assessment of the sum of PCB 28, 52, 77, 81, 101,118, 126, 128, 138, 153, 156, 169, and 180. The national threshold value for this sum is 8 µg/Kg dw sediments.

PAHs

Besides the PAHs considered as PS under the WFD, other PAHS are included in the OSPAR lists:

Acenaphthene (83-32-9)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x								x	x					x			
Biota										x					x			
Sediment									x						x			
Threshold values /reference levels																		
Water																		
National standard AA EQS 3,8 µg/l MAC EQS 50 µg/l	x																	

Acenaphthene is an OSPAR substance of possible concern.

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
France: monitoring in sediments, but not included in 2018 MSFD assessments. Biota monitoring will start in 2019.
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.

Benz(a)anthracene (56-55-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x								x	x			x		x			
Biota							x	x		x			x		x	x		x
Sediment							x	x	x				x		x	x		x
Threshold values /reference levels																		
Water																		
National standard AA EQS 0.01 µg/l	x																	
National standard AA EQS 0.00027 µg/l MAC EQS 0.012 µg/l													x					
Biota																		
OSPAR BAC 2.5 µg/Kg dw mussels and oysters								x		x						x		
MED BAC Spain 1.3 µg/kg dw mussel																x		
OSPAR EAC 80 µg/Kg dw mussels and oysters							x	x		x			x		x	x		x
National standard 3 µg/Kg ww mussels													x					
Trend							x											
Sediment																		
US ERL 261 µg/Kg dw all areas							x	x					x		x	x		x
BAC Spain 7.1 µg/Kg dw																x		

Benz(a)anthracene is an OSPAR common indicator and concentrations reported in sediment and shellfish is included in the OSPAR CEMP.

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.

Benzo[e]pyrene (192-97-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water									x									
Biota																x		
Sediment									x							x		

Benzo[e]pyrene is an OSPAR substance of possible concern.

Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
France: monitoring stopped in 2007.
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.

Chrysene (218-01-9)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x								x	x			x		x			
Biota							x	x		x			x		x	x		x
Sediment							x	x	x						x	x		x
Threshold values /reference levels																		
Water																		
National standard AA EQS 0.02 µg/l	x																	
National standard AA EQS 0.0014 µg/l MAC EQS 0.008 µg/l													x					
Biota																		
OSPAR BAC 8.1 µg/Kg dw mussels and oysters							x	x		x						x		x
MED BAC 2.4 µg/Kg dw							x									x		
National standard 30 µg/Kg ww mussels													x					
Sediment																		
US ERL 384 µg/Kg dw all areas							x	x							x	x		x
BAC Spain 8.0 µg/Kg dw																x		

Chrysene is an OSPAR common indicator and concentrations reported in sediment and shellfish is included in the OSPAR CEMP. OSPAR BACs includes triphenylene.

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.

Dibenzo(a,h)anthracene (53-70-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x								x						x			
Biota															x	x		
Sediment									x						x	x		
Threshold values /reference levels																		
Water																		
National standard AA EQS 0.02 µg/l	x																	

Dibenzo(a,h)anthracene is an OSPAR substance of possible concern.

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
France: current monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.

Dibenzothiophene (132-65-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water									x									
Biota																		
Sediment									x									x
Threshold values /reference levels																		
Sediment																		
US ERL 190 µg/Kg dw all areas																		

Dibenzothiophene is an OSPAR substance of possible concern.

Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
France: monitoring stopped in 2007.

Phenanthrene (85-01-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x							x	x	x			x		x			
Biota							x	x		x			x		x	x		x
Sediment							x	x	x				x		x	x		x
Threshold values /reference levels																		
Water																		
National standard AA EQS 1.3 µg/l	x																	
National standard (RBSP) 0.5 µg/l								x										
National standard AA EQS 1.1 µg/l MAC EQS 6.7 µg/l													x					
Biota																		
OSPAR BAC 11 µg/Kg dw mussels and oysters								x		x			x			x		
MED BAC Spain 24.3 µg/kg dw mussel																x		
OSPAR EAC 1700 µg/Kg dw mussels and oysters							x	x		x			x		x	x		x
Trend							x											
Sediment																		
US ERL 240 µg/Kg dw all areas							x	x					x		x	x		x
BAC Spain 7.3 µg/Kg dw																x		

Phenanthrene is an OSPAR common indicator and concentrations reported in sediment and shellfish is included in the OSPAR CEMP.

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.

Perylene (198-55-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water									x		x							
Biota																		
Sediment									x		x							

Perylene is an OSPAR substance of possible concern.

Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.

Pyrene (129-00-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x								x	x					x			
Biota							x	x		x			x		x	x		x
Sediment							x	x	x				x		x	x		x
Threshold values /reference levels																		
Water																		
National standard AA EQS 0.012 µg/l	x																	
Biota																		
OSPAR BAC 9.0 µg/Kg dw mussels and oysters								x		x			x			x		
MED BAC Spain 6.1 µg/kg dw mussel																x		
OSPAR EAC 100 µg/Kg dw mussels and oysters							x	x		x			x		x	x		x
Trend							x											
Sediment																		
US ERL 665 µg/Kg dw all areas							x	x					x		x	x		x
BAC Spain 11.3 µg/Kg dw																x		

Pyrene is an OSPAR common indicator and concentrations reported in sediment and shellfish is included in the OSPAR CEMP.

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.

PAH metabolites in fish bile

PAH metabolites in fish bile may become an OSPAR common indicator. Main metabolite in fish bile is 1-hydroxypyrene (CAS 5315-79-7), which is also a HELCOM core indicator, with a threshold value in biota of 483 ng/l fish bile.
Other metabolites include 1-hydroxyphenanthrene (CAS 2433-56-9), 4-hydroxyphenanthrene (CAS 7651-86-7), 9-hydroxyphenanthrene (CAS 484-17-3), 3-hydroxybenzo(a)pyrene, and 1-hydroxypyrene equivalent.
PAH metabolites in fish bile are reported by Poland, Spain and UK.
France: monitoring started in 2016, but not included in 2018 MSFD assessments. Data will be used in next reporting cycle.
Germany: not included in 2018 MSFD assessments, but some results are provided as information basis.

Cesium-137

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x	x		x						x			x	
Biota			x		x	x		x						x			x	
Sediment																		
Threshold values /reference levels																		
Water																		
HELCOM Pre-Chernobyl level 15 Bq/m3					x	x		x						x			x	
Biota																		
HELCOM Pre-Chernobyl level 2.5 Bq/kg herring 2.9 Bq/kg flounder					x	x											x	
National standard North Sea 0.159 Bq/kg ww fish								x										
National standard 15 Bq/kg dw plants														x				

Cs-137 is a HELCOM core indicator and water and biota are primary matrices.
Cs-137 is optional in the BSIMAP of the Black Sea Commission.

France: monitoring stopped.
Poland: national standard for macrophytobenthic plants (Zalewska and Danowska, 2017).

Other substances of the RSC lists

Other contaminants included in the RSC list are considered by only one MS:

CAS number	Substance	RSC	MS	Matrix	Threshold value
67-72-1	Hexachloroethane	OSPAR list of substances of possible concern	DE	Water	National standard (RBSP): water 10 µg/l.
41999-84-2	1,4-Dichloro-2,5-bis(dichloromethyl)benzene	OSPAR list of substances of possible concern	EE	Water biota	Analogy - group indicator pentachlorobenzene: water 0.0007µg/l; biota 367 µg/kg ww; sediment 400 µg/kg dw.
42074-68-0	1-Chloro-2-(chlorodiphenylmethyl)benzene	OSPAR list of substances of possible concern	EE	Water	Analogy - group indicator pentachlorobenzene: water 0.0007µg/l; biota 367 µg/kg ww; sediment 400 µg/kg dw.
375-72-4	1,1,2,2,3,3,4,4,4-nonafluorobutane-1-sulphonyl fluoride	OSPAR list of substances of possible concern	EE	Water biota	Analogy - group indicator PFOS: water 0.00013 µg/l; HELCOM biota 9.1 µg/kg ww fish muscle.
335-67-1	Pentadecafluorooctanoic acid (PFOA)	HELCOM priority hazardous substance	EE	Water biota	Analogy - group indicator PFOS: water 0.00013 µg/l; HELCOM biota 9.1 µg/kg ww fish muscle.
85-68-7	Benzyl butyl phthalate (BBP)	OSPAR list of substances of possible concern	EE	Water biota	Analogy - group indicator DEHP: water 1.3 µg/l; biota 3200 µg/kg ww; sediment 100000 µg/kg dw.
84-69-5	Diisobutyl phthalate (DIBP)	OSPAR list of substances of possible concern	EE	Water biota	Analogy - group indicator DEHP: water 1.3 µg/l; biota 3200 µg/kg ww; sediment 100000 µg/kg dw.
27554-26-3	Diisooctyl phthalate (DIOP)	OSPAR list of substances of possible concern	EE	Water biota	Analogy - group indicator DEHP: water 1.3 µg/l; biota 3200 µg/kg ww; sediment 100000 µg/kg dw.
117-84-0	Di-n-octyl phthalate (DNOP)	OSPAR list of substances of possible concern	EE	Water biota	Analogy - group indicator DEHP: water 1.3 µg/l; biota 3200 µg/kg ww; sediment 100000 µg/kg dw.

Denmark: monitoring of BBP and DNOP in sediments and PFOA in biota, but not included in 2018 MSFD assessments.
Estonia: threshold values are those EQS established for the chemical analogous priority substance (in this case pentachlorobenzene, PFOS and DEHP). The priority substance is considered as a group indicator and the same threshold value is used for all substances belonging to the same chemical group.
Germany: threshold value for RBSP included in OGewV (2011).

- **Other contaminants of the list for 2018 MSFD D8 reporting**

Metals and metalloids

Aluminium and its compounds (7429-90-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x													x				
Biota																		
Sediment		x																
Threshold values /reference levels																		
Water																		
National standard AA EQS 10 µg/l MAC EQS 25 µg/l	x																	
National standard 400 µg/l														x				

There are no existing statutory EQS for aluminium. The UK Technical Advisory Group on the Water Framework Directive was unable to recommend proposals, and identified this substance as candidates for EQS development (UKTAG, 2012).

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011). Monitoring in biota and sediments will start in 2019.
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.

Antimony (7440-36-0)

Only reported by Poland. National threshold value: 2 µg/l water.
France: monitoring stopped.
Italy: monitoring in water and sediment, but not included in 2018 MSFD assessments.

Arsenic and its compounds (7440-38-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x				x					x	x		x	x				x
Biota							x			x						x		
Sediment							x	x			x	x				x		
Threshold values /reference levels																		
Water																		
National standard 10 µg/l	x				x													
National standard (SI 272/2009) **EU WFD AA-EQS** 20 µg/l										x								
National standard AA EQS 0.6 µg/l MAC EQS 1.1 µg/l													x					
National standard 50 µg/l														x				
National standard Long term (mean) 25 µg/l																		x
Biota																		
Trend							x											
Sediment																		
National standard (RBSP) 40 mg/kg dw								x										
National standard 12 mg/kg dw											x							
US ERL 8.2 mg/kg dw																x		

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments.
Germany: threshold value for RBSP included in OGewV (2011).
Ireland: monitoring in shellfish for the identification of spatial patterns and potential elevated concentrations, which would be a warning sign.
Italy: sediment EQS for the protection of the benthic community based on the TEL. Also monitoring in biota, but not included in 2018 MSFD assessments.
UK: the standard refers to the dissolved fraction of a water sample obtained by filtration through a 0.45µm filter or any equivalent pre-treatment. Standard set out in Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015).

Barium (7440-39-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x									x	x			
Biota																		
Sediment															x			
Threshold values /reference levels																		
Water																		
National standard (RBSP) 100 µg/l					x													
National standard 50 µg/l														x	x			

Italy: monitoring in water and sediment (partially), but not included in 2018 MSFD assessments.
Malta: monitoring in water as part of the WFD ecological status (RBSP), but not for MSFD purposes.
Romania: measurements in water and sediments for specific Environmental Impact Assessment (EIA) studies (occasionally).

Boron (7440-42-8)

Only reported by Poland. National threshold value: 2000 µg/l water.
Italy: monitoring in water and sediment (partially), but not included in 2018 MSFD assessments.
Malta: monitoring in water as part of the WFD ecological status (RBSP), but not for MSFD purposes.

Beryllium (7440-41-7)

Only reported by Poland. National threshold value: 0.8 µg/l water.
Italy: monitoring in water and sediment (partially), but not included in 2018 MSFD assessments.
Malta: monitoring in water as part of the WFD ecological status (RBSP), but not for MSFD purposes.

Iron and its compounds (7439-89-6)

Only reported by Bulgaria. National EQS water (AA EQS 50 µg/l) derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Italy: monitoring in water, biota and sediment (partially), but not included in 2018 MSFD assessments.

Manganese and its compounds (7439-96-5)

Italy: monitoring in water and sediment (partially), but not included in 2018 MSFD assessments.
Malta: monitoring in water as part of the WFD ecological status (RBSP), but not for MSFD purposes.

Molybdenum and its compounds (7439-98-7)

Only reported by Poland. National threshold value: 40 µg/l water.
France: monitoring in sediments, but not included in 2018 MSFD reporting.

Silver (7440-22-4)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water										x			x	x				
Biota										x								
Sediment																		
Threshold values /reference levels																		
Water																		
National standard AA-EQS 0.081 µg/l dissolved MAC-EQS 0.081 µg/l dissolved													x					
National standard (RBSP) 5 µg/l														x				
Biota																		
National standard (S.I. 268/2006; quality shellfish waters) 6 mg/Kg dw shellfish flesh										x*								

Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments. National standard for sediments: 13 mg/Kg dw.
Ireland: *the appropriateness of the biota standard from the shellfish waters directive is still under discussion. At present, its use for 2018 MSFD assessments cannot be confirmed.

Thallium (7440-28-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x					x	x				
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 0.2 µg/l								x										
National standard MAC EQS 0.34 µg/l													x					
National standard 2 µg/l														x				

Germany: threshold value for RBSP included in OGewV (2011).

Titanium (7440-32-6)

Only reported by Poland. National threshold value: 40 µg/l water.

Vanadium and its compounds (7440-62-2)

Only reported by Poland. National threshold value: 50 µg/l water.
Italy: monitoring in water, biota and sediment, but not included in 2018 MSFD assessments.

Pesticides

Ametryn (834-12-8)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.5 µg/l water.

Azinphos-ethyl (2642-71-9)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x		x					
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 0.01 µg/l								x										
National standard AA EQS 0.00011 µg/l MAC EQS 0.0011 µg/l													x					

Germany: threshold value for RBSP included in OGewV (2011).
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessments.

Azinphos-methyl (86-50-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x		x					
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 0.01 µg/l								x										
National standard AA EQS 0.0013 µg/l MAC EQS 0.0028 µg/l													x					

Germany: threshold value for RBSP included in OGewV (2011).
Italy: also monitoring in sediment (partially), but not included in 2018 MSFD assessments.

Bentazone (25057-89-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x		x					
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 0.1 µg/l								x										
National standard AA EQS 7.3 µg/l MAC EQS 45 µg/l													x					

Denmark: Only monitoring in freshwater for WFD.
Germany: threshold value for RBSP included in OGewV (2011).

Bromacil (314-40-9)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.6 µg/l water.

Bromoxynil (1689-84-5)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.5 µg/l water.

Chloridazon (1698-60-8)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.1 µg/l water.
Italy: monitoring in water, but not included in 2018 MSFD assessments.

Chlorotoluron (15545-48-9)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.4 µg/l water.

Clopyralid (1702-17-6)

Only reported by Estonia. Measured as part of the pesticide monitoring programme. The threshold value for each single pesticide component is 0.1 µg/l water.

Coumaphos (56-72-4)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x									
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 0.07 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).
Italy: monitoring in water, but not included in 2018 MSFD assessments.

2,4-dichlorophenoxyacetic acid, 2-4 D (94-75-7)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x		x	x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.1 µg/l					x			x										

Estonia: pesticide of the Estonian monitoring programme.
Germany: threshold value for RBSP included in OGewV (2011).

Demeton (8065-48-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.1 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).

Demeton-S-methyl (919-86-8)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.1 µg/l water.
Italy: monitoring in water and sediments (partially), but not included in 2018 MSFD assessments.

Demeton-S-methylsulfon (17040-19-6)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.1 µg/l water.
Italy: monitoring in water and sediments (partially), but not included in 2018 MSFD assessments.

Diazinon (333-41-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x										x
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.01 µg/l								x										
National standard Long term (mean) 0.01 µg/l Short term (95 percentile) 0.26 µg/l																		x

Germany: national threshold value for RBSP included in OGewV (2011).
Italy: monitoring in water and sediments (partially), but not included in 2018 MSFD assessments.
UK: standard set out in Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015).

Dicamba (1918-00-9)

Italy: monitoring in water, but not included in 2018 MSFD assessments.

Dichlobenil (1194-65-6)

Italy: monitoring in water, but not included in 2018 MSFD assessments.

Dichlorprop (2,4-DP) (120-36-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x					x					
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 0.1 µg/l								x										
National standard AA EQS 0.13 µg/l MAC EQS 0.76 µg/l													x					

Germany: national threshold value for RBSP included in OGewV (2011).

Diflufenican (83164-33-4)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.009 µg/l water.

Dimethoate (60-51-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x		x		x					
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.1 µg/l					x			x										
National standard AA EQS 0.07 µg/l MAC EQS 0.76 µg/l													x					

Germany: threshold value for RBSP included in OGewV (2011).
Italy: also monitoring in sediments (partially), but not included in 2018 MSFD assessments.

Disulfoton (298-04-4)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x									
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.004 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).
Italy: monitoring in water and sediments (partially), but not included in 2018 MSFD assessments.

Endosulfan sulfate (1031-07-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x						x							x
Biota					x													
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.0005 µg/l					x													
Biota																		
National standard 1000 µg/kg ww					x													

Estonia: preliminary national threshold values, mostly based on literature data.
France: monitoring in biota and sediment, but not included in 2018 MSFD assessments.
Italy: also monitoring in sediments (partially), but not included in 2018 MSFD assessments.

Epoxiconazole (133855-98-8)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.2 µg/l water.

Ethoprophos (13194-48-4)

Only reported by Italy in water and sediments.

Etrimfos (38260-54-7)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.004 µg/l water.

Fenitrothion (122-14-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.009 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).
Italy: also monitoring in sediments (partially), but not included in 2018 MSFD assessments.

Fenthion (55-38-9)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.004 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).
Italy: also monitoring in sediments (partially), but not included in 2018 MSFD assessments.

Hexazinone (51235-04-2)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.07 µg/l water.

Linuron (330-55-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x	x	x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.1 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).
Italy: also monitoring in sediments (partially), but not included in 2018 MSFD assessments.

Malathion (121-75-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.02 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).
Italy: also monitoring in sediments (partially), but not included in 2018 MSFD assessments.

MCPA (94-74-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x	x	x		x					
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.1 µg/l								x										
National standard AA EQS 0.14 µg/l MAC EQS 1.5 µg/l													x					

Germany: threshold value for RBSP included in OGewV (2011).

Mecoprop (7085-19-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x	x	x		x					x
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.1 µg/l								x										
National standard AA EQS 1.8 µg/l MAC EQS 16 µg/l													x					
National standard Long term (mean) 18 µg/l Short term (95 percentile) 187 µg/l																		x

Germany: threshold value for RBSP included in OGewV (2011).
UK: standard set out in Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015).

Metamitron (41394-05-2)

Italy: monitoring in water, but not included in 2018 MSFD assessments.

Metazachlor (67129-08-2)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.4 µg/l water.

Methabenzthiazuron (18691-97-9)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 2 µg/l water.

Methamidophos (10265-92-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.1 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).
Italy: also monitoring in sediments (partially), but not included in 2018 MSFD assessments.

Metolachlor (51218-45-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x			x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.2 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).
Italy: also monitoring in sediments (partially), but not included in 2018 MSFD assessments.

Metribuzin (21087-64-9)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x			x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.2 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).

Mevinphos (7786-34-7)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x		x					
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.0002 µg/l								x										
National standard AA EQS 0.000017 µg/l MAC EQS 0.0017 µg/l													x					

Germany: threshold value for RBSP included in OGewV (2011).
Italy: also monitoring in sediments (partially), but not included in 2018 MSFD assessments.chlorotha

Monolinuron (1746-81-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x									
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.1 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).
Italy: monitoring in water and sediments (partially), but not included in 2018 MSFD assessments.

Omethoate (1113-02-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.1 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).

Oxydemeton-methyl (301-12-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water									x		x							
Biota																		
Sediment																		

Parathion (56-38-2)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.005 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).
Italy: also monitoring in sediments (partially), but not included in 2018 MSFD assessments.

Parathion-methyl (298-00-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x									
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.02 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).

Phoxim (14816-18-3)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.008 µg/l water.

Pirimicarb (23103-98-2)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.09 µg/l water.
Italy: monitoring in water and sediments (partially), but not included in 2018 MSFD assessments.

Picolinafen (137641-05-5)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.007 µg/l water.

Prometryn (7287-19-6)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.5 µg/l water.
Italy: monitoring in water and sediments (partially), but not included in 2018 MSFD assessments.

Propanil (709-98-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x									
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.1 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).

Propiconazole (60207-90-1)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 1 µg/l water.
Italy: monitoring in water and sediments (partially), but not included in 2018 MSFD assessments.

Tebuconazole (107534-96-3)

Only reported by Italy in water and sediments.

Terbuthylazine (5915-41-3)

Only reported by Italy in water and sediments.

Triazophos (24017-47-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x				x					
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.03 µg/l								x										
National standard AA EQS 0.0001 µg/l MAC EQS 0.002 µg/l													x					

Germany: threshold value for RBSP included in OGewV (2011).
Italy: monitoring in water and sediments (partially), but not included in 2018 MSFD assessments.

Trichlorfon (52-68-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x									
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 0.002 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).

Solvents

Toluene (108-88-3)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x			x	x	x	x							x
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard AA EQS 50 µg/l					x													
National standard 10 µg/l								x		x								
National standard Long term (mean) 74 µg/l Short term (95 percentile) 370 µg/l																		x

Germany: threshold value for RBSP included in OGewV (2011).
UK: standard set out in Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015).

1,1,1-Trichloroethane (71-55-6)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 10 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).

1,1,2-Trichloroethane (79-00-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water									x		x							
Biota																		
Sediment																		

Xylene (1330-20-7)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water					x				x	x	x		x					
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard AA EQS 15 µg/l MAC EQS 30 µg/l																		
National standard (RBSP) 5 µg/l					x													
National standard AA EQS 1.7 µg/l MAC EQS 49 µg/l													x					

This substance refers to the mixed isomers o, m, and p-xylenes.

Some MS assess the isomers separately:

- Estonia: national standard (RBSP) 5 µg/l for each isomer.
- Germany: threshold value for RBSP included in OGewV (2011) 10 µg/l for each isomer.
- Greece
- Italy

Chlorinated phenols

2-Chlorophenol (95-57-8), 3-Chlorophenol (108-43-0), 4-Chlorophenol (106-48-9), 2,4-Dichlorophenol (120-83-2), 2,3,4,6-Tetrachlorophenol (58-90-2), 2,3,4-Trichlorophenol (15950-66-0), 2,3,5-Trichlorophenol (933-78-8), 2,3,6-Trichlorophenol (933-75-5), and 2,4,6-Trichlorophenol (88-06-2)

- Estonia monitors these compounds in water and biota. The threshold value used is the EQS established for the chemical analogous priority substance, i.e. pentachlorophenol: water 0.4 µg/l; biota 1830 µg/kg ww; sediment 119 µg/kg dw.
- Italy monitors in water: 2-Chlorophenol, 3-Chlorophenol, 4-Chlorophenol, 2,4-Dichlorophenol, and 2,4,6-Trichlorophenol.

Chlorinated toluenes

2-Chlorotoluene (95-49-8), 3-Chlorotoluene(108-41-8) and 4-Chlorotoluene (106-43-4)

Only reported by Italy in water.

Chlorinated benzenes

1,2-Dichlorobenzene (95-50-1)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 10 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).

1,3-Dichlorobenzene (541-73-1)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 10 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).

1,4-Dichlorobenzene (106-46-7)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x		x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 10 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).

1,2,4,5-Tetrachlorobenzene (95-94-3)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 1 µg/l water.

Per and polyfluoroalkyl substances (PFASs)

Perfluorobutanesulfonate (45187-15-3)

Only reported by Estonia in water and biota. The threshold values used is the EQS established for the chemical analogous priority substance, i.e. PFOS: water 0.00013 µg/l; HELCOM biota 9.1 µg/kg ww fish muscle.

Perfluorobutyric acid (375-22-4)

Only reported by Estonia in water and biota. Threshold values are the EQS established for the chemical analogous priority substance, i.e. PFOS (0.00013 µg/l and 9.1 µg/kg ww fish muscle).
France: monitoring in biota, but not included in 2018 MSFD assessments.

Phthalates

Di-ethyl phthalate (84-66-2), Bis(2-methoxyethyl) phthalate (117-82-8), Dihexyl phthalate (84-75-3), Diisodecyl phthalate (26761-40-0), Diisononyl phthalate (28553-12-0), Diisopentyl phthalate (605-50-5), Dimethyl phthalate (131-11-3), and Dipentyl phthalate (131-18-0)

Only reported by Estonia in water and biota. The threshold value used is the EQS established for the chemical analogous priority substance, i.e. DEHP: water 1.3 µg/l; biota 3200 µg/kg ww.

PAHs

Acenaphtylene (208-96-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x								x						x			
Biota															x			
Sediment									x						x			
Threshold values /reference levels																		
Water																		
National standard AA EQS 0.128 µg/l	x																	

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
Denmark: monitoring in biota and sediments, but not included in 2018 MSFD assessments, due to the lack of thresholds.
France: monitoring in sediments, but not included in 2018 MSFD assessments. Biota monitoring will start in 2019.
Italy: monitoring in water, biota and sediments (partially), but not included in 2018 MSFD assessments.

Fluorene (86-73-7)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water	x								x						x			
Biota															x			
Sediment									x						x			
Threshold values /reference levels																		
Water																		
National standard AA EQS 2.5 µg/l	x																	

Bulgaria: EQS water derived according to the WFD CIS guidance No. 27 (European Commission, 2011).
France: monitoring in sediments, but not included in 2018 MSFD assessments. Biota monitoring will start in 2019.
Italy: monitoring in water, biota and sediments (partially), but not included in 2018 MSFD assessments.

Organotin compounds

Dioctyltin (15231-44-4)

Only reported by Estonia in water, biota and sediments. The threshold value used is the EQS established for the chemical analogous priority substance, i.e. TBT: water 0.0002 µg/l; biota 230 µg/kg ww; sediment 0.02 µg/kg dw.

Radionuclides

Potassium-40

Only reported by Cyprus in biota.

Uranium (7440-61-1)

Only reported by Bulgaria.

Other chemical substances

2-Amino-4-chlorophenol (95-85-2)

Only reported by Estonia in water. The threshold value used is the EQS established for the chemical analogous priority substance, i.e. pentachlorophenol: water 0.4 µg/l; biota 1830 µg/kg ww; sediment 119 µg/kg dw.

Aniline (62-53-3)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 0.8 µg/l water.

4-Chloroaniline (106-47-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water									x		x		x					
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard AA EQS 0.057 µg/l MAC EQS 0.12 µg/l													x					

3-Methylphenol (62-53-3), 4-Methyl-phenol (106-44-5), m-/p-Cresol (15831-10-4), 2,4-Dimethylphenol (105-67-9), 2,6-Dimethylphenol (576-26-1), and 3,5-Dimethylphenol (108-68-9)

Only reported by Estonia. National threshold value (RBSP): 7 µg/l water.

Free cyanide (57-12-5)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x	x					x				
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 10 µg/l								x										
National standard 50 µg/l														x				

Germany: threshold value for RBSP included in OGewV (2011).

1,2-Dichloroethene (540-59-0)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x			x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 10 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).

Ethylbenzene (100-41-4)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water								x			x							
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard 10 µg/l								x										

Germany: threshold value for RBSP included in OGewV (2011).

Fluoride (16984-48-8)

Matrix	BG	HR	CY	DK	EE	FI	FR	DE	EL	IE	IT	MT	NL	PL	RO	ES	SE	UK
Water												x		x				
Biota																		
Sediment																		
Threshold values /reference levels																		
Water																		
National standard (RBSP) 1500 µg/l														x				

Formaldehyde (50-00-0)

Only reported by Poland. National threshold value: 50 µg/l water.

Phenol index

It is an analytical convention. It represents a group of aromatic compounds, which under the specific reaction conditions form coloured condensation products. The analytical result is expressed in terms of phenol concentration.
Only reported by Poland. National threshold value: 0.01 mg/l water, according to the Regulation of the Minister of the Environment of 21 July 2016.

Resorcinol (108-46-3)

Only reported by Estonia. National threshold value (RBSP): 10 µg/l water.

Styrene (100-42-5)

Only reported by Italy in water.

Tri-n-butyl phosphate (126-73-8)

Only reported by Germany. National threshold value for RBSP included in OGewV (2011): 10 µg/l water.

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