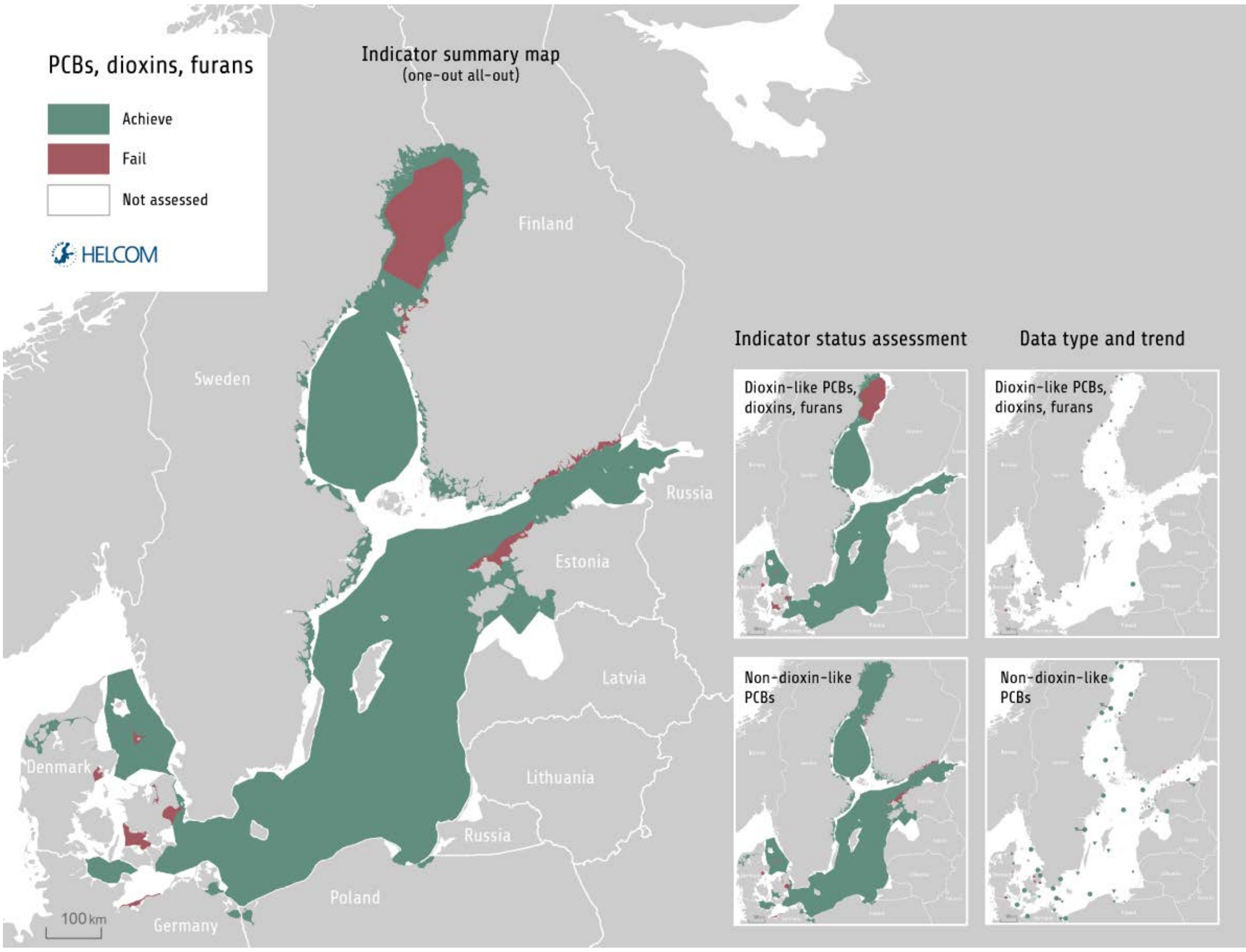
HELCOM INDICATORS

HELCOM core indicator report
July 2018

Polychlorinated biphenyls (PCBs), dioxins and furans

Key Message

This core indicator evaluates the status of the marine environment based on concentrations of dioxin and dioxin like compounds in Baltic Sea fish, crustacean and molluscs as well as on concentrations of non-dioxin like PCB in Baltic Sea fish. Good status is achieved when the concentrations of PCBs, dioxins and furans are below the threshold values. The current evaluation is based on data up to 2016 to evaluate the assessment period 2011-2016.



Key message figure 1. Status assessment results based evaluation of the indicator 'PCBs, dioxins and furans'. One-Out-All-Out (OOAO) method (main figure), dioxin-like PCBs, dioxins and furans in biota (upper insert) and non-dioxin-like PCBs in biota (lower insert). The assessment is carried out using Scale 4 HELCOM assessment units (defined in the HELCOM Monitoring and Assessment Strategy Annex 4). **Click here to access interactive maps at the HELCOM Map and Data Service: PCBs, dioxin and furan.**

Good status was achieved in the majority of coastal and open sea areas. PCBs as well as dioxins and furans were responsible when the overall good status was not achieved. However, there are areas where dioxins and furans data are absent, or of low abundance and often short time series (i.e. initial data) and thus extended monitoring is required to enable an improved status evaluation in the entire Baltic Sea. A good example of this is the fail status in the One-Out-All-Out (OOAO) method map (Key figure message 1) that is driven by the status of dioxin-like PCBs, dioxins and furans, the assessment if which is based on limited data availability and a precautionary 'initial' data handling approach (see assessment protocol and Results figure 2. Time series of PCB levels in biota show decreasing concentrations at some stations, e.g. in the Bornholm Basin, the Eastern Gotland Basin and the Bothnian Bay. However, most of the stations show no significant trends. The confidence of the indicator assessment is **moderate**. The indicator is applicable in the waters of all countries bordering the Baltic Sea.

Relevance of the core indicator

PCBs are synthetic chemicals which do not occur naturally in the environment. Due to their properties, PCBs have been used in a wide variety of applications and manufacturing processes, especially as plasticizers, insulators and flame-retardants. They are widely distributed in the environment through, for example, inappropriate handling of waste material or leakage from transformers, condensers and hydraulic systems. Long-term effects of PCBs include increased risk of cancer, infections, reduced cognitive function accompanied by adverse behavioural effects, as well as giving birth to infants of lower than normal birth weight (Carpenter 1998, Carpenter 2006). There are also indications that PCBs are associated with reproductive disorders in marine top predators.

Dioxins (PCDD/Fs) were never produced intentionally, but they are minor impurities in several chlorinated chemicals (e.g., PCBs, chlorophenols, hexachlorophene, etc.) and are formed in several industrial processes and from most combustion processes, such as municipal waste incineration and small-scale burning under poorly controlled conditions. The most relevant toxic effects of PCDD/Fs are developmental toxicity, carcinogenity and immunotoxicity.

Policy relevance of the core indicator

	BSAP Segment and Objectives	MSFD Descriptors and Criteria
Primary link	Concentrations of hazardous substances close to natural levels	D8 Concentrations of contaminants - D8C1 Within coastal and territorial and beyond territorial waters, the concentrations of contaminants do not exceed the threshold values
Secondary link	Fish safe to eat	D9 Contaminants in fish and other seafood - D9C1 The level of contaminants in edible tissues (muscle, liver, roe, flesh or other soft parts as appropriate) of seafood (including fish, crustaceans, molluscs, echinoderms, seaweed and other marine plants) caught or harvested in the wild does not exceed the threshold.
Other relevant legislation: EU Water Framework Directive; EU Priority Substances Directive (2013/39/EU)		

Cite this indicator

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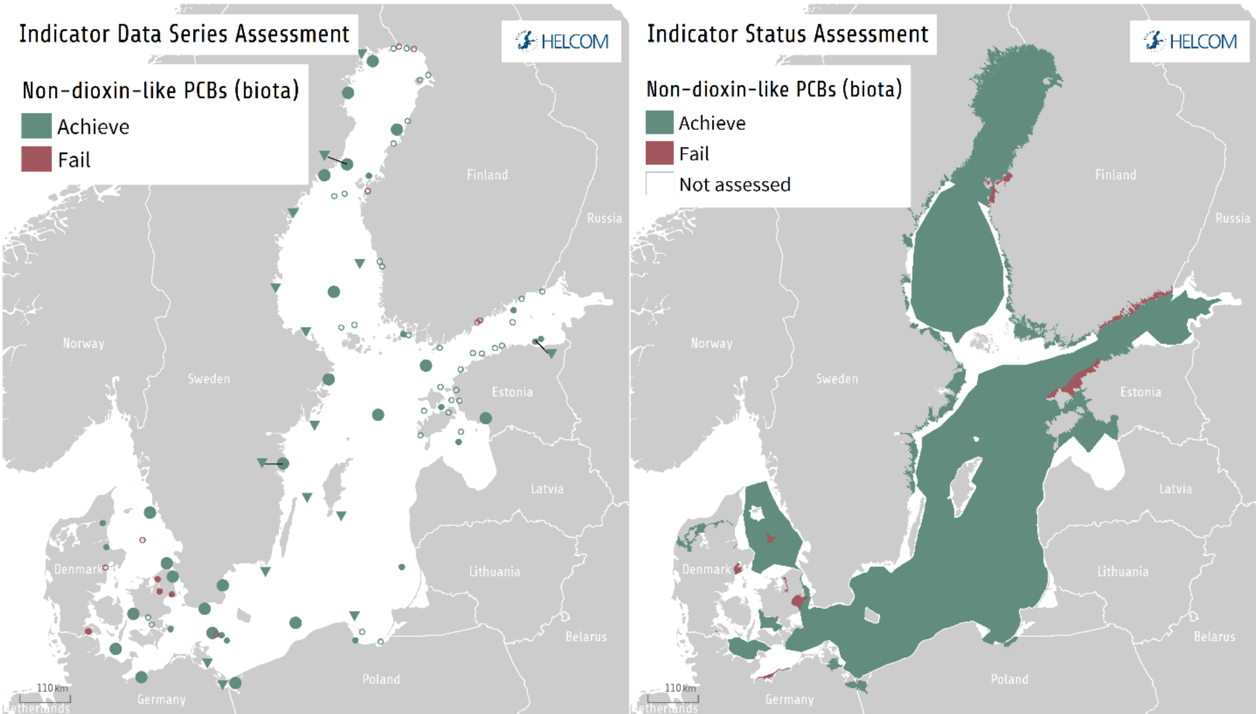
Polychlorinated biphenyls PCBs, dioxin and furan HELCOM core indicator 2018 (pdf)

Results and Confidence

Non-dioxin like PCBs

Good status was achieved in terms of concentrations of non-dioxin like PCB (Sum of 6 CB: 28, 52, 101, 138, 153 and 180, see Good Environmental status table 1) in fish in most evaluated assessment units during the period 2011-2016, as the average concentrations were below the threshold value of 75 µg/kg wet weight (ww) in fish muscle (or 75 ng/g ww) (Results figure 1). At some stations, especially along the coast in the Bothnian Bay (< 3 years data), the Arkona Basin, Gulf of Finland (< 3 years data), Kattegat and in the Quark (< 3 years data), good status was not achieved. The concentrations of PCB showed no trend or were based on too few years of monitoring to do a trend assessment.

The results are based on PCB concentrations in different fish species, but also different matrices, i.e. muscle and liver (Results figure 1). To reduce the variability between different matrices, the threshold value is adapted to differences in lipid content of different matrices.



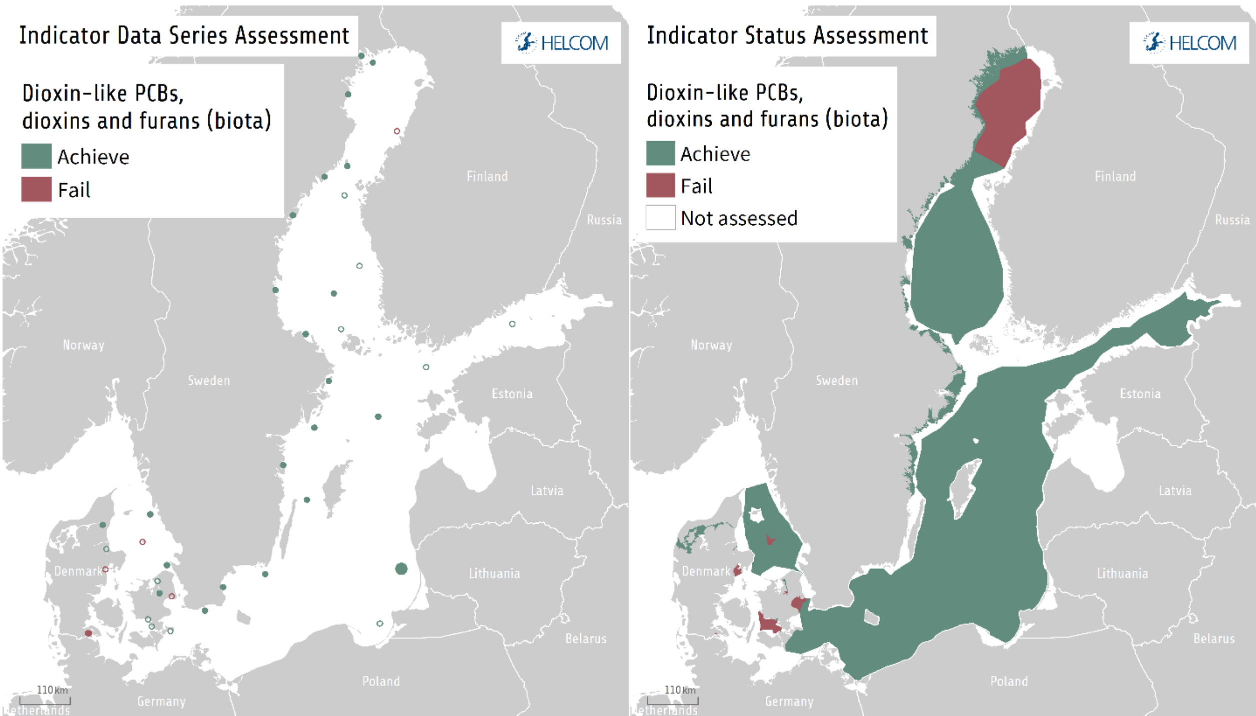
Results figure 1. Spatial variation of the non-dioxin like PCBs (Sum of 6 PCB) sampling stations in biota (flounder, common dab, herring, cod, European perch, European sprat and eelpout) (left) and status assessment in biota (right). Green colour indicates that the upper 95 % confidence interval for non-dioxin like PCBs concentration is below the threshold value (i.e. good status). Small open circles indicate a status assessment based on only 1-2 years of data (initial data), small filled circles indicate that data is not suitable to assess a trend (treated with initial methodology), large filled circles that no detectable concentration trends can be identified during the whole monitoring period (full data), and the filled arrow indicate that there is a statistically defined upward or downward trend during the monitoring period. **Click here to access interactive maps at the HELCOM Map and Data Service: [PCBs, dioxin and furan].**

Dioxins, furans and dl-PCBs:

Good status was achieved in terms of concentrations of dioxins and furans in fish in most of the evaluated assessment units during the period 2011-2016, as the average concentrations were below the threshold value of 0.0065 TEQ/kg ww (fish muscle, crustaceans or molluscs) (Results figure 2).

At some stations in the Bothnian Bay (< 3 years data), the Arkona Basin (< 3 years data), Great Belt and Kattegat (< 3 years data) good status was not achieved. The concentration of dioxins and furans showed no trend or were based on too few years of monitoring to do a trend assessment.

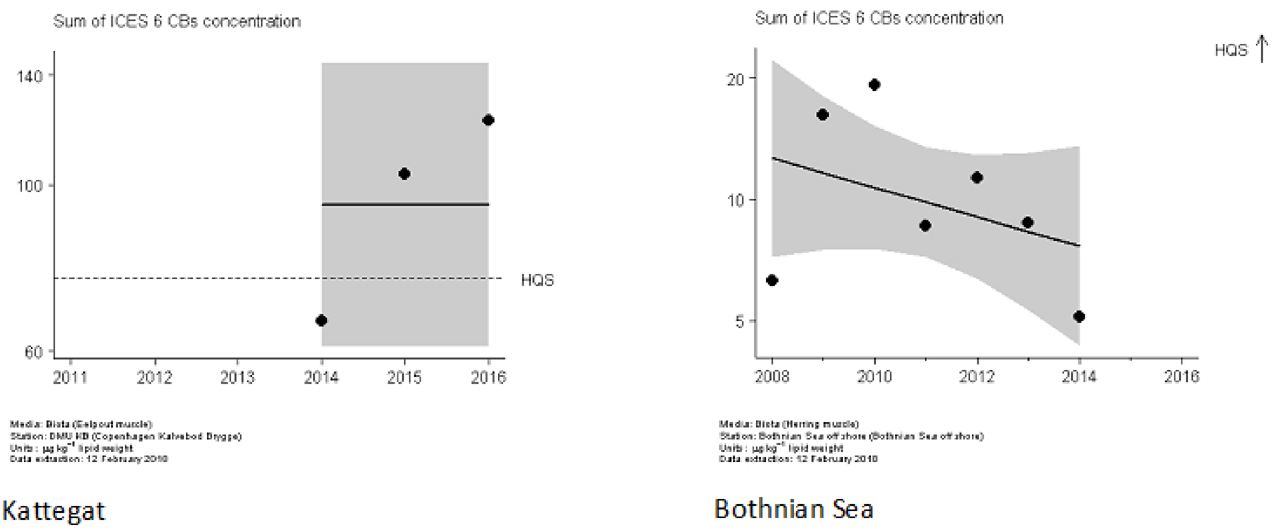
The results are based on dioxin and furan concentrations is acquired from different fish species (Results figure 2) and in some cases different matricies (liver and muscle), which lead to an extra variability in the results due to species/matricies differences. However, to reduce the variability between different species/matrices, the threshold value is adapted to differences in lipid content of different species/matrices.



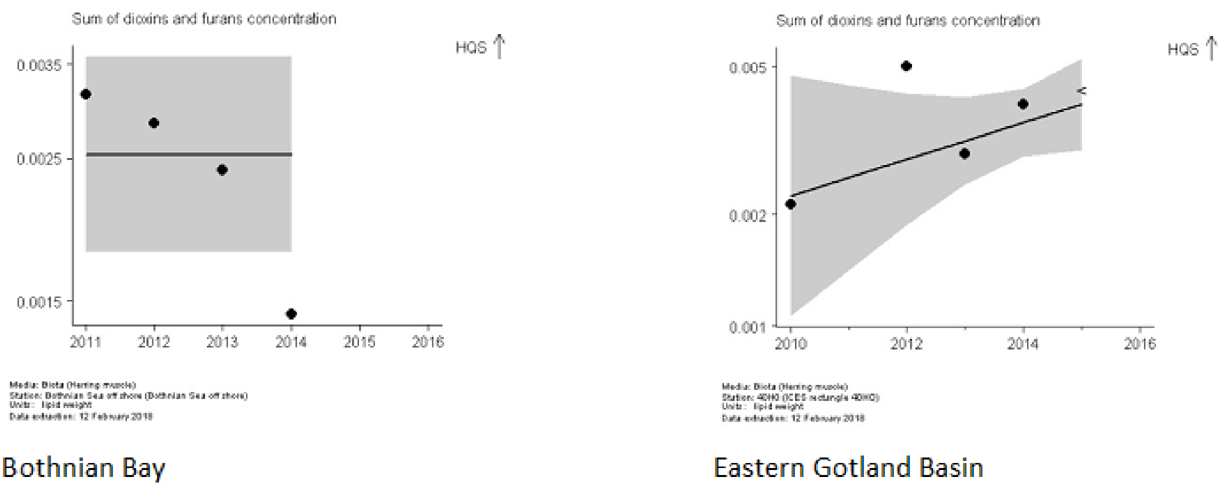
Results figure 2. Spatial variation of dioxin and furan sampling stations in biota (European perch, European sprat, flounder, herring and eelpout) (left) and status assessment by assessment unit (right). Green colour indicates that the upper 95 % confidence interval for non-dioxin like PCBs concentration is below the threshold value (i.e. good status). Small open circles indicate a status assessment based on only 1-2 years of data (initial data), small filled circles indicate that data is not suitable to assess a trend (treated with initial methodology), large filled circles that no detectable concentration trends can be identified during the whole monitoring period (full data), and the filled arrow indicate that there is a statistically defined upward or downward trend during the monitoring period. **Click here to access interactive maps at the HELCOM Map and Data Service: PCBs, dioxin and furan.**

Evaluation of temporal trends

Non dioxin-like PCBs: The data from biota monitoring stations show decreasing or no significant trend for PCBs. Results figure 3 shows examples of different trends at stations in the Baltic Sea. Monitoring data for dioxins and furans are only available in ICES database since 2010, and in all cases these show no significant trend (Results figure 4 shows examples). Furthermore, some dioxin data are not sufficient for trend assessment to be made (i.e. less than 3 years of data) and are therefore only shown as status assessment data and treated with the precautionary ‘initial’ data approach (see assessment protocol).



Results figure 3. Temporal trend of the sum of 6 PCBs concentration (ng/g wet weight) in herring and eelpout muscle from the Kattegat and the Bothnian Sea (HQS – threshold level (Human-health Quality Standard), grey colour- confidence level 95% range (see Assessment protocol)).



Results figure 4. Temporal trend of the Sum of dioxins and furans concentration (ng/g wet weight) in herring muscle from the Bothnian Bay and the Eastern Gotland Basin (HQS – threshold level (Human-health Quality Standard), grey colour- confidence level 95% range (see Assessment protocol)).

Confidence of the indicator status evaluation

The overall confidence of the assessment is **moderate**.

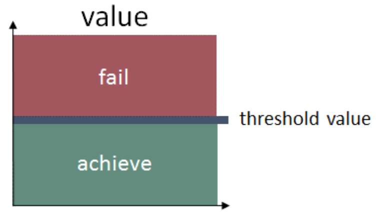
The geographical resolution of the current dataset for the coverage of the whole Baltic Sea is high, mainly due to measurements of non-dioxin like PCBs, even so dioxin and furan data were assessed in Denmark, Sweden, Lithuania and Finland so far. No detailed geographical studies to investigate the variability in dioxin and furan concentrations across the whole region have yet been carried out.

It should also be noted that the majority of the monitoring stations are selected as reference stations and potential local problems with PCBs, dioxins and furans may occur in areas not included in the current monitoring programmes.

The confidence of the threshold for the Sum of 6 PCBs is low as this value is derived from the food safety directive and no environmental quality standard is available. Thus, the overall confidence is moderate.

Thresholds and Status evaluation

The core indicator evaluates whether an area reflects good status by comparing the concentration to a threshold value which should not be exceeded (Thresholds figure 1).



Thresholds figure 1. Schematic representation of the threshold value which indicates good status when the measured concentration is below the threshold value.

Thresholds table 1. Threshold value for the core indicator 'PCBs, dioxins and furans'. The secondary threshold value for the dl-PCB CB-118 is not yet fully agreed in HELCOM and therefore not used in the assessment and marked *.

	Primary threshold value	**reference**	***Secondary threshold value****	***reference***
Dioxin and dioxin-like compounds	Sum of PCDDs, PCDFs, dl-PCBs 0.0065 TEQ/kg ww fish, crustaceans or molluscs	EQS biota human health 2013/39/EU	*CB-118 24 µg/kg lw fish liver or muscle*	*EAC*
Non-dioxin like PCBs	sum of congeners (28, 52, 101, 138, 153, 180) 75 µg/kg ww fish muscle	EC 1881/2006 and 1259/2011		

The threshold value is defined based on Ecological Quality Standards (EQS) derived for the purposes of the EU Water Framework Directive, and where EQS values are not available on Environmental Assessment Criteria (EAC) values developed in the OSPAR framework.

The threshold value is matrix sensitive, and only applicable if the concentrations are measured in the appropriate matrix. For historical reasons, the Contracting Parties around the Baltic Sea have differing monitoring strategies. As a pragmatic approach, a threshold value is defined in this indicator (based on 2013/39/EU GES boundary), however if suitable monitoring data is not available in a region the secondary threshold value can be used for the evaluation.

The threshold value for PCB is defined for the Sum of 6 congeners (non-dioxin like) (Good Environmental status Table 1). Other congeners included in current monitoring programmes can be included when suitable boundary values become available. For dioxins, the threshold value is defined as the EQS-value for human consumption. However, this EQS value stems from the foodstuff legislation and is derived taking into consideration information beyond the environmental parameters, such as typical levels of contaminants in different foodstuff. The aim of the target value is to identify and prevent contaminated foodstuff from being placed on the market. Thus, the foodstuff threshold values do not cover all combinations of matrices and contaminants relevant for an environmental assessment of the marine environment. Because of this, a full equivalence between EQSs based on foodstuff threshold values and EQS based on toxicological evaluations should not be expected.

The EU directive on environmental quality standards (2008/105/EC and 2013/39/EU), Article 3, states that also long-term temporal trends should be assessed for substances that accumulate in sediment and/or biota.

Assessment Protocol

The data may require transformation into the relevant unit and base for the threshold value which is µg kg^{-1} wet weight. Ideally, the data should be expressed in the same matrix which for the purposes of the indicator evaluation ought to be whole body concentrations in fish at a trophic level of 4.5 with a lipid content of 5%.

The majority of the dioxin, furan and PCB data reported is analysed in muscle tissue. However, the EC Guidance Document No 32 (European Commission 2014) suggests that the assumption can be made that fat soluble compounds would be evenly distributed in the lipid within the whole organism. With this assumption, a whole body concentration would be possible to calculate from any analysed organ as long as the lipid content in the sample is known/ analysed. To harmonize the evaluation across the entire Baltic Sea region, it is recommended to calculate the concentrations into corresponding values to a fish with a general fat content of 5%.

Data is to be normalised to lipid content according to the following equation, where $Conc_{norm, lipid}$ is lipid normalised concentration, $Conc_{measurement}$ is the original value expressed in wet weight (ww) and lipid $content_{sample}$ is the actual lipid content of the sample:

$Conc_{norm, lipid} = Conc_{measurement} x0.05 / lipid\ content_{sample.}$

In case information on lipid content is absent in the data, general fat content values derived in regional studies for the sampled matrix can be applied.

For this evaluation no adjustment for trophic level has been done but is something that needs to be considered in future assessments according to recommendations below.

The EC guidance document (European Commission 2014) recommends making recalculations so the concentrations are standardized to a fish at a trophic level of 4.5 for marine ecosystems to standardise for the biomagnification effect.

Statistical evaluation

The assessment protocol is structured in three main parts, 1) changes in log concentrations over time are modelled, 2) check for compliance against threshold value and evidence for temporal change of contaminant concentration per station and 3) a spatial aggregation of status per assessment unit.

It should be noted that the assessment protocol makes the assumption that monitoring data stems from the same monitoring stations during consecutive years. The stations used by the protocol are defined in the ICES Station Dictionary. Stations with similar station name are grouped together, but it is also possible to define a group of stations with different names to be defined as the same station in the Station Dictionary. Usually a station is defined in the Station Dictionary with coordinates and a valid box around these coordinates, but coordinates outside of the box will only give a warning when reporting the data, and are not used in the actual data extraction.

Overview

Time series of contaminant concentrations are assessed in three stages:

1. The concentrations are log transformed and changes in the log concentrations over time are modelled using linear mixed models. The type of temporal change that is considered depends on the number of years of data:
    1. 1-2 years: no model is fitted because there are insufficient data
    2. 3-4 years: concentrations are assumed to be stable over time and the mean log concentration is estimated
    3. 5-6 years: a linear trend in log concentration is fitted
    4. 7+ years: more complex (smooth) patterns of change over time are modelled
2. The fitted models are used to assess status against available threshold value and evidence of temporal change in contaminant levels in the last twenty years
3. The fitted models are also used for spatial aggregation to assess status against available threshold value and evidence of temporal change in contaminant levels on a scale 4 level HELCOM assessment unit.

These stages are described in more detail in the link below. There is also information on how the methodology is adapted when there are 'less-than' measurements, i.e. some concentrations are reported as below the detection limit, and missing uncertainties, i.e. the analytical variability associated with some of the concentration measurements was not reported.

Assessment methodology for contaminants in biota, sediment and water

All initial data is handled in a highly precautionary manner to further ensure that the risk of false positives is minimalised. For all initial data the 95% confidence limit on the mean concentration, based on the uncertainty seen in longer time series throughout the HELCOM area, is used. Applying a precautionary approach, the 90% quantile (psi value, Ψ) of the uncertainty estimates in the longer time series from the entire HELCOM region are used. The same approach is used for time series with three or more years of data, but which are dominated by less-than values (i.e. no parametric model can be fitted). The mean concentration in the last monitoring year (meanLY) is obtained by: restricting the time series to the period 2011-2016 (the last six monitoring years), calculating the median log concentration in each year (treating 'less-than' values as if they were above the limit of detection), calculating the mean of the median log concentrations, and then back-transforming (by exponentiating) to the concentration scale. The upper one-sided 95% confidence limit (clLY) is then given by: exp(meanLY + qnorm(0.95) * Ψ / sqrt(n)), where n is the number of years with data in the period 2011-2016 (HELCOM 2018).

Assessment units

PCBs, dioxin and furan are considered relevant substances to evaluate in the entire Baltic Sea area. Concentrations may be higher in the coastal areas compared to the offshore areas, and therefore the indicator is evaluated on HELCOM assessment unit scale 4.

The assessment units are defined in the HELCOM Monitoring and Assessment Strategy Annex 4.

Relevance of the Indicator

Hazardous substances assessment

The status of the Baltic Sea marine environment in terms of contamination by hazardous substances is assessed using several core indicators. Each indicator focuses on one important aspect of the complex issue. In addition to providing an indicator-based evaluation of the status of the Baltic Sea in terms of concentrations of PCBs, dioxins and furans in the marine environment, this indicator along with the other hazardous substances core indicators is used to develop an overall assessment of contamination status.

Policy relevance

The ”ICES 7” non-dioxin like PCBs (non-dl-PCBs) and dioxin like PCBs (dl-PCBs) , i.e. congeners CB-28, CB-52, CB-101, CB-118, CB-138, CB-153 and CB-180, are listed as mandatory contaminants that should be analysed and reported within both HELCOM and OSPAR, and are classed as priority POPs under the Stockholm Convention. In the proposed revised guidelines for OSPARCOM (1996) the congeners CB-105 and CB-156 are added to this list. Non-dioxin like PCBs are not included in the Water Framework Directive (WFD) priority substance lists, but they are included in the Marine Strategy Framework Directive (MSFD).

The Helsinki Convention (1974, 1992) has recommended special bans and restrictions on transport, trade, handling, use and disposal of PCBs. The Ministerial Declaration from 1998, within HELCOM and the 1995 Declaration of the Fourth international conference of the protection of the North Sea called for measures against toxic, persistent, bioaccumulating substances like PCBs to cease their inputs to the environment completely by the year 2020.

Dioxins and furans (PCDD/Fs) are included in several international agreements, of which the Stockholm Convention and the Convention on Long Range Transboundary Air are among the most important for the control and reduction of sources to the environment. World health organization (WHO) and Food and Agriculture Organization of the United Nations (FAO) have jointly established a maximum tolerable human intake level of dioxins via food, and within the EU there are limit values for dioxins in food and feed stuff (EC 2006). Several other EU legislations regulate dioxins, e.g. the plan for integrated pollution prevention and control (IPPC 2010/75/EC) and directives on waste incineration (EC, 2000, 2008). The EU has also adopted a Community Strategy for dioxins, furans and PCBs (EC 2001). PCDD/Fs are currently not included in the Water Framework Directive but are on the list of substances to be revised for adoption in the near future. HELCOM has listed PCDD/Fs and dl-PCBs as prioritized hazardous substances of specific concern for the Baltic Sea (HELCOM 2010), like OSPAR on the List of Chemicals for Priority Action (OSPAR 2010b).

Under the Stockholm Convention, releases of unintentionally produced by-products listed in Annex C4, including dioxins and dl-PCBs, are subject to continuous minimization with the ultimate goal of elimination where feasible. The main tool for this is a National Action Plan which should cover the source inventories and release estimates as well as plans for release reductions. At the EU level, a Strategy for dioxins and PCBs was adopted in 2001. The Strategy includes actions in the area of feed and food contamination and actions related to the environment, including release reduction. Over the past decade, important legislation has been adopted to reduce the emissions of PCDD/Fs, in particular in the areas of waste incineration and integrated pollution prevention and control. Releases of POPs, including dioxins, from industrial installations have been regulated by the IPPC Directive and the Waste Incineration Directive, the former requiring Member States to establish permit conditions based on the Best Available Techniques (BAT) for a wide variety of industry sectors, and the latter setting maximum permissible limit values for PCDD/F emissions to air and water from waste incineration. Currently these releases of these substances are regulated by the Directive on industrial emissions (IED, 2010/75/EU). The proper and timely implementation and enforcement of the IED remains a key priority in order to ensure the necessary reduction of emissions from major industrial sources. However, at present or in the near future, non-industrial sources are likely to exceed those from industrial ones (Quass et al. 2004).

Role of PCBs, dioxins and furans in the ecosystem

Polychlorinated biphenyls (PCBs) and PCDD/Fs (dioxins and furans) are persistent organic pollutants (POPs) that can cause severe, long-term impacts on wildlife, ecosystems and human health. The substance groups are characterized by low water solubility and low vapour pressure. Due to their persistent and hydrophobic properties, the substances accumulate in sediments and organisms in the aquatic environment. In the environment, dioxins can undergo photolysis, however, they are generally very resistant to chemical and biological degradation.

Polychlorinated biphenyls (PCBs) consist of two linked benzene rings with chlorine atoms substituted for one or more hydrogen atoms. Theoretically, 209 congeners are possible, but only around 130 are found in commercial mixtures. Some PCBs are called dioxin-like (dl-PCBs) because they have a co-planar structure very similar to that of dioxins and have dioxin-like effects (i.e. four non-ortho substituted PCBs: CB-77, CB-81, CB-126, CB-169, IUPAC and eight mono-ortho substituted: CB-105, CB-118, CB-156, CB-157, CB-167, CB-114, CB-123, CB-189, IUPAC) (Burreau et al. 2006).

The name ’dioxin’ refers to polychlorinated dibenzo-*p*-dioxin (PCDD) and dibenzofuran (PCDF) compounds, i.e. two benzene rings with one (furans) or two (dioxins) oxygen bridges and substituted with 1–8 chlorine atoms. Of the 210 possible congeners, the 17 compounds (10 furans, 7 dioxins) substituted in positions 2, 3, 7 and 8 are considered to be of highest toxicological importance.

The non-dl-PCBs included in this core indicator report are essentially the 7 PCB congeners (with exception for CB-118 that is included in the dioxin like-PCBs) that have been monitored since the beginning of the HELCOM and OSPARCOM monitoring programmes. These PCBs are carefully selected mainly by ICES working groups due to their relatively uncomplicated identification and quantification in gas chromatograms and as they usually contribute a very high proportion of the total PCB content in environmental samples. These are the ‘ICES 7’: CB-28, CB-52, CB-101, CB-118, CB-138, CB-153 and CB-180.

Long-term effects of PCBs from human and laboratory mammal studies include increased risk of cancer, infections, reduced cognitive function accompanied by adverse behavioural effects, as well as giving birth to infants of lower than normal birth weight (Carpenter 1998, Carpenter 2006). There are also indications that PCBs are associated with reproductive disorders in marine top predators. PCBs are also assumed, together with p,p’-DDE, to cause eggshell thinning and reduced number of offspring in white-tailed eagles and uterine leioymas in grey seal in the Baltic Sea (Helander et al 2002, Bäcklin et al. 2010).

The most relevant toxic effects of PCDD/Fs are developmental toxicity, carcinogenity and immunotoxicity. The sensitivity of various species to the toxic effects of PCDD/Fs varies significantly. 2,3,7,8-TCDD is the most toxic and well-studied congener and is used as a reference for all other related chemicals. Each of the 17 relevant congeners is assigned a toxic equivalency factor (TEF), where 2,3,7,8-TCDD equals 1 (Van den Berg et al., 1998; Van den Berg et al., 2006). Dioxin concentrations are commonly reported as toxic or TCDD equivalents (TEQ), which is the sum of the individual congener concentrations multiplied with its specific TEF.

Human pressures linked to the indicator

	General	MSFD Annex III, Table 2a
Strong link		Substances, litter and energy - Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) – diffuse sources, point sources, atmospheric deposition, acute events
Weak link		

PCBs are synthetic chemicals and do not occur naturally in the environment. Due to their properties, PCBs have been used in a wide variety of applications and manufacturing processes, especially as plasticizers, insulators and flame-retardants. They are widely distributed in the environment through, for example, inappropriate handling of waste material or leakage from transformers, condensers and hydraulic systems. According to some estimates, the total global production of PCBs from 1930 until the bans that were implemented in most countries by the 1980s had already been in the order of 1.5 million tons.

Dioxins (PCDD/Fs) were never produced intentionally, but they are minor impurities in several chlorinated chemicals (e.g., PCBs, chlorophenols, hexachlorophene, etc.), and are formed in several industrial processes and from most combustion processes, such as municipal waste incineration and small-scale burning under poorly controlled conditions. Formerly, pulp bleaching using chlorine gas was an important source of PCDD/Fs.

Numerous recent reports and papers have shown differences in PCDD/F and dl-PCB concentrations in Baltic herring, sprat and salmon between the Baltic Sea basins (e.g., Bignert et al. 2017; Karl et al. 2010). Higher concentrations have been detected in the northern basins where dioxin and dl-PCB levels in herring exceed established maximum limit concentrations for human consumption. Regional variation within a sub-basin has been found in the Swedish coastal region of the Bothnian Sea (Bignert et al. 2007), where the concentrations are higher than in other Swedish areas (Bignert et al. 2017). Since the atmospheric deposition pattern (lowest in the north) is different compared to the patterns detected in the concentrations in fish (generally highest in the north), other factors or sources than atmospheric deposition are thus likely to be involved. The reasons remain unclear, but higher historical PCDD/F discharges from point sources in the northern basins have been suggested. In general, the contribution from the dl-PCBs to the TEQ is substantial and seems to increase the further south in the Baltic region the samples are collected.

Monitoring Requirements

Monitoring methodology

Monitoring of PCBs, dioxins and furans in the Contracting Parties of HELCOM is described on a general level in the **HELCOM Monitoring Manual in the sub-programme Concentration of Contaminants.**

Specific monitoring guidelines have previously been documented in the HELCOM COMBINE manual, and are currently under review with the aim of being updated and included in the **HELCOM Monitoring Manual**.

Current monitoring

The monitoring activities relevant to the indicator that are currently carried out by HELCOM Contracting Parties are described in the **HELCOM Monitoring Manual**

Sub-programme: monitoring concepts table for biota

The monitoring of temporal trends of PCBs is considered adequate in the Baltic Sea. There are no big gaps in the monitoring programme of PCBs. The monitoring of PCBs focuses on the seven classical “ICES 7” congeners: CB-28, CB-52, CB-101, CB-118, CB-138, CB-153 and CB-180. The time series stations use highly mobile sample species (herring, cod, common dab, eelpout, European sprat, European perch and flounder) which makes the network of time series stations as geographically representative for HELCOM sub-basins and coastal areas.

Monitoring of temporal trends of dioxin and furan is carried out by a few countries only.

Description of optimal monitoring

Monitoring stations for dioxins and furans seem to be lacking from the Åland Sea, Bay of Mecklenburg, Gulf of Riga, Kiel Bay and the Sound and increasing the spatial coverage of the monitoring program would allow for higher confidence evaluations from a scientific point of view. For temporal trend monitoring an annual sampling is required to detect trends more adequate than if sampling is only performed every second or third year. The present lack of monitoring stations and data for PCDD/Fs might also be a result of the high analytical costs which are contradicting the scientific demands.

Therefore, time series of dioxin and furan concentrations in fish are missing or too short to enable evaluation for several sub-basins in the Baltic Sea region.

Data and updating

Access and use

The data and resulting data products (tables, figures and maps) available on the indicator web page can be used freely given that the source is cited. The indicator should be cited as following:

HELCOM (2018) PCBs, dioxins and furans. HELCOM core indicator report. Online. [Date Viewed], [Web link].

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Metadata

Result: PCBs, dioxins and furans

Data: PCB, dioxin and furan data

Data are extracted from the HELCOM COMBINE database, hosted by ICES. The COMBINE data stem from regular environmental monitoring programmes of the coastal countries.

Contributors and references

Contributors

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Archive

This version of the HELCOM core indicator report was published in July 2018:

Polychlorinated biphenyls PCBs, dioxin and furan HELCOM core indicator 2018 (pdf)

Earlier versions of this indicator are available at:

HOLAS II component - core indicator report – web-based version July 2017 (pdf)

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