EEA/NSV/10/002 – ETC/ICM

European Topic Centre
Inland, coastal, marine waters

Hazardous Substances in European waters

Analysis of the data on hazardous substances in groundwater, rivers, transitional, coastal and marine waters reported to the European Environment Agency from 1998–2010

ETC/ICM Technical Report 1/2013

Vít Kodeš, Birger Bjerkeng, Miroslav Fanta, Norman Green, Joergen Noerrevang Jensen, Marko Kovačič, Anita Künitzer, Sissel Ranneklev, Silvie Semerádová

The European Topic Centre on Inland, Coastal and Marine waters (ETC/ICM) is a consortium of European institutes under contract to the European Environment Agency: BGR, CENIA, CMCC, Deltares, DHI, Ecologic, HCMR, ICES, IFREMER, IMARES, Indra, INGV, IWRS, JNCC, NERC-CEH, NIVA, NTUA, SAHFOS, SYKE, SZIU, TC Vode, and UBA.

Cover photo: ICPER (International Commission for the Protection of the Elbe River) water quality monitoring site on the Elbe river downstream of the Pardubice industrial area in the Czech Republic
© Vít Kodeš, CENIA, Česká informační agentura životního prostředí, Czech Republic

Layout/editing: Eva Hasíková, Miluše Rollerová, and Shane Hume

Legal notice:

The report is based on data delivered by EEA member and collaborating countries via SoE-WISE reporting. Countries comments to the draft Technical Report during the consultation in February - March 2012 and March - April 2013 have been included as far as possible. Where data are available, it has been dealt with, and is presented, to the best of our knowledge. Nevertheless inconsistencies and errors cannot be ruled out.

Copyright notice:

ISBN 978-80-85087-15-4

Author affiliation:

Vít Kodeš, Silvie Semerádová, Miroskav Fanta, Anita Künitzer, CENIA, Česká informační agentura životního prostředí, Czech Republic
Birger Bjerkeng, Norman Green, Sissel Ranneklev, NIVA, Norway
Marko Kovačič, TC Vode, Slovenia
Joergen Noerrevang Jensen, ICES, Denmark

EEA Project Manager:

Bo Jacobsen, European Environment Agency, Denmark

European Topic Centre on Inland, Coastal and Marine Waters
CENIA, česká informační agentura životního prostředí
Vršovická 1442/65
100 10 Prague 10
Czech Republic
Tel: +420 267 225 338
Web: water.eionet.europa.eu

Contents

0 Executive summary

This ETC/ICM Technical Report is a complementary report to the European Environment Agency (EEA) Report No. 8/2011 – Hazardous Substances in Europe's Fresh and Marine Water (http://www.eea.europa.eu/publications/hazardous-substances-in-europes-fresh). This is the first attempt to compile the SoE data on selected hazardous substances ever written.

The report provides a systematic summary presentation of the data giving a quick overview of the state and availability of hazardous substances State of Environment (SoE) data, occurrence, concentrations levels and trends over time as well as "traffic light indicators" at country level by comparisons with quality standards, where applicable. These overviews are considered useful for a compact display of the thousands of data records for each substance, but should not be seen as an assessment of the situation between the reporting countries.

After a comprehensive clean-up of the database, considerable numbers of river water samples reported from the countries were discarded from further data processing, due to lack of essential supplementary data not submitted in a correct way. Issues related to limit of detection (LOD) or limit of quantification (LOQ) are the main cause for exclusion of data and consequently, the provision of these data may significantly improve the data coverage.

The State of Environment (SoE) groundwater data show that mainly triazine pesticides and their metabolites (atrazine, desethylatrazine), heavy metals and metalloids (lead, arsenic) are the hazardous substances most frequently occurring and exceeding drinking water standards. In general for rivers, concentrations of cadmium, nickel, mercury, lead, and PAH-compounds reported as the sum of benzo(g,h,i)-perylene and indeno(1,2,3-cd)-pyrene were among the compounds that exceeded environmental quality standards (EQS) in most countries. For biota from transitional and coastal waters, high concentration levels are particularly seen for DDT and PCBs i.e. persistent substances with high bioaccumulation potential.

It is the aim that compilations such as this Technical Report, presenting data on hazardous substances in water, may contribute to the European knowledge base on this important topic and enhance the use of these data by a number of different stakeholders.

The next issue of this report will cover the new period 2002–2011, including lake data. The quality of the hazardous substances data will be improved due to the on-going thorough quality assurance/quality control (QA/QC) procedures within State of Environment (SoE) data reported to the European Environment Agency and communication with respective national reference centers (NRCs) from member countries. The chapter 5 of this report provides a general overview of the comments provided by countries and respective responses of the European Topic Centre on inland, coastal and marine waters (ETC/ICM) to these comments.

1 Introduction

Hazardous substances occur in the freshwater and marine environment. The effects they have on the environment and their potential risk to human health and socio-economics are considered serious and therefore considerable efforts have been channeled to combat their emissions as well as to the political, management and scientific segments of society. The reason for concern has been the proven and potential hazard that some chemicals have on humans and the environment due to their toxic, bio-accumulative and persistent characteristics. There are a lot of possible pathways for water ecosystem contamination not only at hot spots directly linked to particular human activities, the substances are also found at locations away from point-sources. Considerable efforts have been made to establish and maintain monitoring programmes to assess the level, trends and effects of hazardous substances in water ecosystems throughout Europe via the Water Framework Directive (2000/60/EC) implementation for example. However, there has been a lack of reliable and consistent information for many hazardous substances at pan-European level. State of Environment (SoE) hazardous substances data have not been previously used for an assessment in the form of indicators of the current status of the chemical pollution of Europe’s waters except for some pesticides for the agri-environmental indicator (IRENA). This fact also influenced the whole assessment, many data quality issues were discovered during the processing of the SoE data.

The groundwater and river data are solely based on SoE data and reflect the current status of the SoE dataflow and the resulting ETC/ICM database on hazardous substances. The marine chapter is partly based on SoE data, partly on Marine Conventions’ (OSPAR and HELCOM) data. Lake data were for the time being excluded from the compilation due to data quality issues. These data will be published in the next issue of the report. Similarly, a lot of the river data were excluded from the assessment due to data quality issues. The limits of quantification (LOQ) differ among countries. This is very crucial for comparison of the results, especially for groundwater. As a matter of fact, some countries using low LOQs are somehow "penalized", compared to other countries with higher LOQs. This is due to the fact that these countries with low LOQs have a higher percentage of positive samples and are consequently indicating a more frequent occurrence of hazardous substances in each of these respective countries. On the other hand the countries should aim at applying chemical analytical methods with lower LOQ, ideally equal or below a value of 30 % of the relevant environmental quality as required by the 90/2009/EC Directive to ensure comparable assessment throughout Europe.

SoE data collection for the EEA has been supported by the ETC/ICM within the Eionet network. Reported national datasets are stored in working databases managed by the ETC/ICM. The SoE data are processed (quality assurance/quality control, aggregation into annual averages per station) by the ETC/ICM and exported in aggregated form into Waterbase[1] available at:

[1] http://www.eea.europa.eu/data-and-maps/data/waterbase-transitional-coastal-and-marine-waters-8
http://www.eea.europa.eu/data-and-maps/data/waterbase-rivers-8
http://www.eea.europa.eu/data-and-maps/data/waterbase-groundwater-8

http://www.eea.europa.eu/themes/water/dc#tab-datasets. The SoE data reported to the EEA do not fully represent all of the national data to this topic, but they should provide a representative overview of the water quality in each member country of the European Environment Agency. The aim of the report is to provide information on the status of the ETC/ICM hazardous substances database, SoE data availability and the occurrence of hazardous substances throughout Europe including spatial and temporal changes. This report is planned to be a periodical Technical Report updated every second year. The feedback and suggestions for the improvement of this report by NRCs is highly desirable to assure better quality of the next issue of this report that will cover the 10 year period of 2002-2011. An overview of country review comments to this report is given in the chapter 5. The next issue will take all remaining comments into account which could not be included into this report.

2 Methodology

2.1 Groundwater

For the assessment of hazardous substances concentrations in groundwater a dataset from data reported via the Water Information System for Europe – State of Environment (WISE-SoE, also called EIONET-Water) reporting to the EEA[2] and stored in the ETC/ICM working database was used. The dataset is highly heterogeneous with uneven spatial and temporal coverage and is currently not directly supporting any EEA thematic indicator. Data from the 1999-2009 period were used for hazardous substances assessment. The majority of concentration data were reported as "total" and just some data (mainly for metals) as "dissolved" concentrations depending on the country and even the year. Both forms of reported concentrations have been considered equal and combined into one set for relevant substances in this report in order to get a more consistent picture. Even though considering just dissolved fractions of metals would be the most appropriate approach, due to the state of the data described above, it would lead to the elimination of the majority of the data from the processing. All the groundwater data presented in this report were handled in the same manner i.e. concentrations below limit of detection/quantification (LOD/LOQ) were replaced by half of the corresponding LOD/LOQ, with an exception for statistics of maximum concentrations and the statistics of positive/negative findings.

The countries have been chosen as the spatial assessment units instead of groundwater bodies, since the European groundwater body GIS reference layers became available just recently. This newly completed GIS dataset can enable in future a more disaggregated display of the reported data, however simple visualisation of groundwater horizons may give a problem. Since the assessment should provide comparable information throughout Europe, the common ground of the Directive 98/83/EC on the quality of water intended for human consumption quality standards (hereinafter referred to as drinking water (DW) standards, which for pesticides correspond to the groundwater quality standards pursuant to the Directive 2006/118/EC on the protection of groundwater against pollution and deterioration (GWD), has been chosen. For naturally occurring pollutants (e.g. metals) in groundwater it would be advisable to refer to the groundwater threshold values which are the national groundwater quality standards. The natural background values might vary due to varying geological characteristics and the exceeding of drinking water standards does not always mean anthropogenic influence. In many cases it is not feasible to improve groundwater quality due to natural circumstances. This is one of the reasons why threshold values were introduced. Additionally, threshold values also consider the receptors and uses that might be affected and causing risk in groundwater bodies, therefore threshold values for synthetic substances have been established in the EU Member States as well. The issue of various threshold values used throughout the EU Member states for the Water Framework Directive (WFD) chemical status assessment might be solved in case that all Member States provide corresponding threshold values established pursuant to the Groundwater Directive (GWD) in each Member State to the ETC/ICM for consecutive use for the next version of the Technical Report. This approach is not possible for the assessment for EEA

[2] Reporting obligation for: Groundwater quality (EWN-3) (http://rod.eionet.europa.eu/obligations/30)

member countries outside the EU that have not established threshold values anyway. From this perspective the use of drinking water standards seems to be the most feasible solution.

A hazardous substance "traffic light" indicator has been developed for groundwater based on groundwater quality standards set out by the Directive 2006/118/EC on the protection of groundwater against pollution and deterioration and drinking water standards set by Directive 98/83/EC on the quality of water intended for human consumption and occurrence in groundwater. Both directives have a common standard for pesticides of 0.1 µg/l, the drinking water standards also apply to the other hazardous substances, see Table 2.1.1. The majority of selected hazardous substances are considered extraneous; hence their natural concentration should be below the limit of detection/quantification (this only partly applies for heavy metals). Since groundwater dynamics are very slow, monitored concentrations are "naturally" averaged, thus the measured concentration of each hazardous substance is classified into three classes (below LOD/LOQ, above LOD/LOQ and still below or equal to the drinking water standard, above the drinking water standard). Substance with a concentration above the drinking water standard ("red light") is a substance representing a possible threat for European groundwaters. Substances with a concentration above LOQ but still not exceeding the drinking water standard are given a "yellow" light, indicating groundwater anthropogenically impacted by the occurrence of hazardous substances. Substances with a concentration below LOD/LOQ are given a "green light". The number of stations and percentage of stations exceeding the drinking water standards were used to distinguish the countries with a less dense SoE monitoring network (less than or equal to 10 stations) or countries with a scarce exceedance of the drinking water standards (less than or equal to 5% of all stations with a concentration above the drinking water standard) from the other countries in the indicator maps.

The selection of substances for the groundwater assessment has been done taking into account spatial and temporal coverage of available data within the ETC/ICM database, relevancy of substances for groundwater and EU legislation. Pre-selection of hazardous substances was based on EU legislation requirements e.g. the 2000/60/EC Directive (WFD), the 2006/118/EC Directive (Groundwater Directive) and the 98/83/EC Directive (Drinking Water Directive). Additionally selected substances with sufficient spatial (number of countries) and temporal (time series) availability of data and with relevancy for groundwater (occurrence, environmental properties) have been added to the resulting list of so called "preferred substances". Those preferred substances should be preferentially reported to the EEA via WISE-SoE dataflow by all EEA member countries in order to improve the quality of preferred substances data for the next issue of this Technical Report.

Table 2.1.1. Drinking water standards pursuant to the Directive 98/83/EC used for the assessment

Substance	CAS	Limit	Unit
1,1,2,2-tetrachloroethene	127-18-4	10*	µg/l
1,1,2-trichloroethene	79-01-6	10*	µg/l
1,2-dichloroethane	107-06-2	3	µg/l
2,4-D	94-75-7	0.1	µg/l
Alachlor	15972-60-8	0.1	µg/l
Arsenic	7440-38-2	10	µg/l
Atrazine	1912-24-9	0.1	µg/l
Bentazone	25057-89-0	0.1	µg/l
Benzene	71-43-2	1	µg/l
Benzo(a)pyrene	50-32-8	0.01	µg/l

Substance	CAS	Limit	Unit
Cadmium	7440-43-9	5	µg/l
DDD, p,p'	72-54-8	0.1	µg/l
DDT, p,p'	50-29-3	0.1	µg/l
Desethylatrazine	6190-65-4	0.1	µg/l
Desisopropylatrazine	1007-28-9	0.1	µg/l
Dieldrin	60-57-1	0.03	µg/l
Diuron	330-54-1	0.1	µg/l
gamma-HCH (Lindane)	58-89-9	0.1	µg/l
Chlorpyrifos	2921-88-2	0.1	µg/l
Isoproturon	34123-59-6	0.1	µg/l
Lead	7439-92-1	10	µg/l
Linuron	330-55-2	0.1	µg/l
MCPA	94-74-6	0.1	µg/l
Mecoprop	7085-19-0	0.1	µg/l
Mercury	7439-97-6	1	µg/l
Nickel	7440-02-0	20	µg/l
Prometryn	7287-19-6	0.1	µg/l
Propazine	139-40-2	0.1	µg/l
Simazine	122-34-9	0.1	µg/l
Terbuthylazine	5915-41-3	0.1	µg/l
Trifluralin	1582-09-8	0.1	µg/l

* Drinking water standard for Sum of 1,1,2,2,-tetrachloroethene and 1,1,2-trichloroethene

2.2 Marine environment

There is a large number of potentially hazardous substances, but to date, only a few where data are available with sufficient geographical and temporal coverage to warrant a pan-European assessment. Therefore, the EEA pan-European assessment of the state of hazardous substances in marine organisms is based on the assessment of seven substances (cadmium, lead, mercury (total), the pesticides DDT (using pp'DDE as a representative of DDT) and lindane (γ-HCH), hexachlorobenzene (HCB), and PCBs (using chlorinated biphenyls CB28, CB52, CB101, CB118, CB138, CB153, and CB180 as representatives)) that form the core set of indicators for EEA (CSI040). All except PCB are included in the Water Framework Directive lists of the 'environmental quality standards' or EQS-directive – commonly referred to as the EQSD (2008/105/EC) concerning hazardous substances. The assessment is solely based on the EEA MAR001 indicators. Data from the 1998-2010 period were used for hazardous substances assessment.

General trend assessments for the main regions are based on a tally of significant upward and downward trends for the contaminant and region in question (OSPAR, 2009). A significant dominance of time series trends in one direction is taken as indicating a regional trend in that direction.

Symbol colour (Table 2.2.1) shows the classification of recent concentration levels into Low, Moderate and High, based on comparing the upper 95% confidence limit of the estimated geometric mean for recent years with limits provided in Table 2.2.2. The selection of limits is currently being reassessed. For a series with less than 5 years of data, the mean is taken over all yearly medians, for a longer series the mean is the fitted trend value at the most recent year of the time series. Using the upper confidence limit means that the classification has a built-in bias against giving too good a classification; a short time series with a large between-year variation may get a worse classification than if a percentile level of observed concentrations was used. Symbol shape indicates four categories of trend assessment: Too little data, Not significant, Up or Down. Assessment of level and trend require at least 3 and 5 years of data, respectively, and including data from 2006 or later. In trend assessments, only data from the last 10 years were used. Symbols are placed at station positions without any geographical aggregation, so stations close to each other will overlap: Moderate may hide Low, and High may hide Low and Moderate stations.

Table 2.2.1 Map symbol description indicating Low, Moderate and High classes of concentrations, combined with four categories of time trend assessment

Time trend assessment (requires at least 5 years of data)	Classification of recent level (requires at least 3 years of data)		
	Low (green)	Moderate (yellow)	High (red)
Too few data (circle)			
Not significant (square)			
Decrease (arrow down)			
Increase (arrow up)			

Table 2.2.2 Limit concentrations used for the classification of recent concentration levels in figures and maps: Low/High concentration limits for spatial assessment which delimits the classes Low, Moderate and High. EU foodstuff limits are highlighted in a grey shade. Except for EU legislation, the limits have no legal application. All values are expressed in units of µg/kg and on a dry weight (D), wet weight (W) or a fat weight (L) basis. Many values are derived from OSPAR Background Assessment Concentration (BAC) or Eco-toxicological Assessment Criteria (EAC). NB: these concentrations are under development.

Note: * indicates where limits have been revised (cf. EEA 2003). Limits for lindane in fish have also been added.

Name and tissue	Latin name	Low/High limits	µg/kg	basis	Reference	Comment
CADMIUM						
Mussels	Mytilus sp.[1]	Low	960	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	5000	D	EU 2006	Foodstuffs limit for "bivalve molluscs", Regulation (EC) No. 1881/2006, conversion assuming 20% wet weight (cf. OSPAR CEMP assessment manual 2008, Table 2.1)
Atlantic cod, liver	Gadus morhua	Low	26	W	OSPAR 2008	BAC limit

Name and tissue	Latin name	Low/High limits	µg/kg	basis	Reference	Comment
Atlantic cod, liver	Gadus morhua	High	1000	W	EU 2006	Foodstuffs limit for "bivalve molluscs", Regulation (EC) No. 1881/2006
Herring, muscle	Clupea harengus	Low	26	W	OSPAR 2008	BAC limit
Herring, muscle	Clupea harengus	High	1000	W	EU 2006	Foodstuffs limit for "bivalve molluscs", Regulation (EC) No. 1881/2006
MERCURY						
Mussels	Mytilus sp.[1]	Low	90	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	2500	D	EU 2006	Foodstuffs limit for "fisheries products", Regulation (EC) No. 1881/2006, conversion assuming 20% wet weight (cf. OSPAR CEMP assessment manual 2008, Table 2.1)
Atlantic cod, muscle	Gadus morhua	Low	35	W	OSPAR 2008	BAC limit
Atlantic cod, muscle	Gadus morhua	High	500	W	EU 2006	Foodstuffs limit for "meat of fish molluscs", Regulation (EC) No. 1881/2006
Herring, muscle	Clupea harengus	Low	35	W	OSPAR 2008	BAC limit
Herring, muscle	Clupea harengus	High	500	W	EU 2006	Foodstuffs limit for "meat of fish molluscs", Regulation (EC) No. 1881/2006
LEAD						
Mussels	Mytilus sp.[1]	Low	1300	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	7500	D	EU 2006	Foodstuffs limit for "bivalve molluscs", Regulation (EC) No. 1881/2006, conversion assuming 20% wet weight (cf. OSPAR CEMP assessment manual 2008, Table 2.1)
Atlantic cod, liver	Gadus morhua	Low	26	W	OSPAR 2008	BAC limit
Atlantic cod, liver	Gadus morhua	High	1500	W	EU 2006	Foodstuffs limit for "bivalve molluscs", Regulation (EC) No. 1881/2006
Herring, muscle	Clupea harengus	Low	26	W	OSPAR 2008	BAC limit
Herring, muscle	Clupea harengus	High	1500	W	EU 2006	Foodstuffs limit for "bivalve molluscs", Regulation (EC) No. 1881/2006
HCB						
Mussels	Mytilus sp.[1]	Low	0.63	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	6.3	D		Taken as 10 times "Low" (or approximately the median of High:Low ratio for CBs in mussel, which is 8.6)
Atlantic cod, liver	Gadus morhua	Low	0.18	L	OSPAR 2008	BAC limit times 2 (OSPAR [2])

Name and tissue	Latin name	Low/High limits	µg/kg	basis	Reference	Comment
Atlantic cod, liver	Gadus morhua	High	135	L		Taken as 750 times "Low" (median of High:Low ratio for CBs in cod)
Herring, muscle	Clupea harengus	Low	1.8	L	OSPAR 2008	BAC [2] limit times 20 (OSPAR [2])
Herring, muscle	Clupea harengus	High	135	L		Taken as the same for cod, in pattern with CBs EAC's
LINDANE						
Mussels	Mytilus sp.[1]	Low	0.97	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	1.45	D	OSPAR 2008	EAC limit
Atlantic cod, liver	Gadus morhua	Low	0.29	L		Taken as 1/750 times "High" (median of Low:High ratio for CBs in cod)
Atlantic cod, liver	Gadus morhua	High	220	L		Taken as the same for herring
Herring, muscle	Clupea harengus	Low	2.9	L		Taken as 10 times value for cod, as
Herring, muscle	Clupea harengus	High	220	L	OSPAR 2008	Taken as OSPAR EAC (2008) = 11 * 20 (to convert wet weight to lipid weight – (OSPAR [2]) = 220 ppb l.w.
PCB (CB 28)						
Mussels	Mytilus sp.[1]	Low	0.75	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	3.2	D	OSPAR 2008	EAC limit
Atlantic cod, liver	Gadus morhua	Low	0.2	W	OSPAR 2008	BAC limit times 2 (OSPAR [2])
Atlantic cod, liver	Gadus morhua	High	64	L	OSPAR 2008	EAC limit
Herring, muscle	Clupea harengus	Low	2	W	OSPAR 2008	BAC limit times 20 (OSPAR [2])
Herring, muscle	Clupea harengus	High	64	L	OSPAR 2008	EAC limit
PCB (CB 52)						
Mussels	Mytilus sp.[1]	Low	0.75	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	5.4	D	OSPAR 2008	EAC limit
Atlantic cod, liver	Gadus morhua	Low	0.16	W	OSPAR 2008	BAC limit times 2 (OSPAR [2])
Atlantic cod, liver	Gadus morhua	High	108	L	OSPAR 2008	EAC limit
Herring, muscle	Clupea harengus	Low	1.6	W	OSPAR 2008	BAC limit times 20 (OSPAR [2])
Herring, muscle	Clupea harengus	High	108	L	OSPAR 2008	EAC limit
PCB (CB 101)						
Mussels	Mytilus sp.[1]	Low	0.7	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	6	D	OSPAR 2008	EAC limit
Atlantic cod, liver	Gadus morhua	Low	0.16	W	OSPAR 2008	BAC limit times 2 (OSPAR [2])
Atlantic cod, liver	Gadus morhua	High	120	L	OSPAR 2008	EAC limit

Name and tissue	Latin name	Low/High limits	µg/kg	basis	Reference	Comment
Herring, muscle	Clupea harengus	Low	1.6	W	OSPAR 2008	BAC limit times 20 (OSPAR [2])
Herring, muscle	Clupea harengus	High	120	L	OSPAR 2008	EAC limit
PCB (CB 118)						
Mussels	Mytilus sp.[1]	Low	0.6	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	1.2	D	OSPAR 2008	EAC limit
Atlantic cod, liver	Gadus morhua	Low	0.2	W	OSPAR 2008	BAC limit times 2 (OSPAR [2])
Atlantic cod, liver	Gadus morhua	High	24	L	OSPAR 2008	EAC limit
Herring, muscle	Clupea harengus	Low	2	W	OSPAR 2008	BAC limit times 20 (OSPAR [2])
Herring, muscle	Clupea harengus	High	24	L	OSPAR 2008	EAC limit
PCB (CB 138)						
Mussels	Mytilus sp.[1]	Low	0.6	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	15.8	D	OSPAR 2008	EAC limit
Atlantic cod, liver	Gadus morhua	Low	0.18	W	OSPAR 2008	BAC limit times 2 (OSPAR [2])
Atlantic cod, liver	Gadus morhua	High	316	L	OSPAR 2008	EAC limit
Herring, muscle	Clupea harengus	Low	1.8	W	OSPAR 2008	BAC limit times 20 (OSPAR [2])
Herring, muscle	Clupea harengus	High	316	L	OSPAR 2008	EAC limit
PCB (CB 153)						
Mussels	Mytilus sp.[1]	Low	0.6	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	80	D	OSPAR 2008	EAC limit
Atlantic cod, liver	Gadus morhua	Low	0.2	W	OSPAR 2008	BAC limit times 2 (OSPAR [2])
Atlantic cod, liver	Gadus morhua	High	1600	L	OSPAR 2008	EAC limit
Herring, muscle	Clupea harengus	Low	2	W	OSPAR 2008	BAC limit times 20 (OSPAR [2])
Herring, muscle	Clupea harengus	High	1600	L	OSPAR 2008	EAC limit
PCB (CB 180)						
Mussels	Mytilus sp.[1]	Low	0.6	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	24	D	OSPAR 2008	EAC limit
Atlantic cod, liver	Gadus morhua	Low	0.22	W	OSPAR 2008	BAC limit times 2 (OSPAR [2])
Atlantic cod, liver	Gadus morhua	High	480	L	OSPAR 2008	EAC limit
Herring, muscle	Clupea harengus	Low	2.2	W	OSPAR 2008	BAC limit times 20 (OSPAR [2])
Herring, muscle	Clupea harengus	High	480	L	OSPAR 2008	EAC limit

Name and tissue	Latin name	Low/High limits	µg/kg	basis	Reference	Comment
DDE (as DDT representative)						
Mussels	Mytilus sp.[1]	Low	0.63	D	OSPAR 2008	BAC limit
Mussels	Mytilus sp.	High	6.3	D		Taken as 10 times "Low"
Atlantic cod, liver	Gadus morhua	Low	0.2	L	OSPAR 2008	BAC limit times 2 (OSPAR [2])
Atlantic cod, liver	Gadus morhua	High	150	L		Taken as 750 times "Low" (median of High:Low ratio for CBs)
Herring, muscle	Clupea harengus	Low	2	L	OSPAR 2008	BAC limit times 20 (OSPAR [2])
Herring, muscle	Clupea harengus	High	150	L		Taken as the same for cod, in pattern with CB's EACs

[1] Blue mussel (Mytilus edulis) for the north-east Atlantic, Mediterranean mussel (M. galloprovincialis) for the Mediterranean and Black Sea.

[2] Used in the OSPAR statistical assessment (R.Fryer (Marine Lab., UK) pers. comm.)

2.3 Rivers

A selection of hazardous substances for the river assessment with coherent environmental quality standards (EQS) as annual average concentrations (AA) was performed according to Annex I of the Directive 2008/105/EC, the so called EQS directive (Table 2.3.1). The assessment draws upon data reported to the EEA from the National Monitoring Programs via WISE-SoE (Eionet-Water). Data for the period 1999-2009 were chosen for long term analysis, while data from 2008-2009 were used for figures on the current status.

Table 2.3.1. Environmental quality standards (EQS) as annual average concentrations (AA) for surface freshwater pursuant to the Directive 2008/105/EC.

No.	Name of substance	CAS number	AA-EQS (µg/l)
(1)	Alachlor	15972-60-8	0.3
(2)	Anthracene	120-12-7	0.1
(3)	Atrazine	1912-24-9	0.6
(4)	Benzene	71-43-2	10
(6)	Cadmium and its compounds (depending on water hardness classes)	7440-43-9	≤ 0.08(Class1) 0.08(Class2) 0.09(Class3) 0.15(Class4) 0.25(Class5)
(8)	Chlorfenvinphos	470-90-6	0.1
(9)	Chlorpyrifos	2921-88-2	0.03
(9a)	Aldrin Dieldrin Endrin Isodrin	309-00-2 60-57-1 72-20-8 465-73-6	Σ=0.01
(9b)	DDT total	not applicable	0.025
	DDT, p,p'	50-29-3	0.01

No.	Name of substance	CAS number	AA-EQS (µg/l)
(10)	1,2-Dichloroethane	107-06-2	10
(11)	Dichloromethane	75-09-2	20
(12)	Di(2-ethylhexyl)-phthalate (DEHP)	117-81-7	1.3
(13)	Diuron	330-54-1	0.2
(14)	Endosulfan	115-29-7	0.005
(15)	Fluoranthene	206-44-0	0.1
(16)	Hexachlorobenzene (HCB)	118-74-1	0.01(9)
(17)	Hexachlorobutadiene (HCBD)	87-68-3	0.1(9)
(18)	Hexachlorocyclohexane	608-73-1	0.02
(19)	Isoproturon	34123-59-6	0.3
(20)	Lead and its compounds	7439-92-1	7.2
(21)	Mercury and its compounds	7439-97-6	0.05(9)
(22)	Naphthalene	91-20-3	2.4
(23)	Nickel and its compounds	7440-02-0	20
(24)	Nonylphenol (4-Nonylphenol)	104-40-5	0.3
(25)	Octylphenol (4-(1,1′,3,3′-tetramethylbutyl)-phenol)	140-66-9	0.1
(26)	Pentachlorobenzene	608-93-5	0.007
(27)	Pentachlorophenol	87-86-5	0.4
(28)	Polyaromatic hydrocarbons (PAH)	not applicable	not applicable
	Benzo(a)pyrene	50-32-8	0.05
	Benzo(b)fluoranthene	205-99-2	Σ=0.03
	Benzo(k)fluoranthene	207-08-9	
	Benzo(g,h,i)-perylene	191-24-2	Σ=0.002
	Indeno(1,2,3-cd)-pyrene	193-39-5	
(29)	Simazine	122-34-9	1
29a)	Tetrachloroethylene (1,1,2,2-tetrachloroethene)	127-18-4	10
(30)	Tributyltin compounds (Tributyltin-cation)	36643-28-4	0.0002
(31)	Trichlorobenzenes	12002-48-1	0.4
(32)	Trichloromethane	67-66-3	2.5
(33)	Trifluralin	1582-09-8	0.03

A hazardous substance “traffic light” indicator was developed for rivers, based on Environmental quality standards (EQS) provided from Directive 2008/105/EC (Table 2.3.1). The average concentration of each hazardous substance is divided by the EQS and hence creating an indicator with a trigger value of 1. A substance with an indicator equaling or larger than 1 (“red light”) is a substance posing a possible problem in European surface waters. Substances with an indicator between 0.8 and 1 are given a “yellow” light indicating a substance close to the EQS values. Substances with an indicator below 0.8 are given a “green light”.

It should be noted that whilst the respective EQS’s that originate from the Priority Substances Directive have been used in this assessment, the analysed data do not arise from Water framework Directive (WFD) reporting, but the EEA’s WISE-SoE reporting, as mentioned previously.

River data quality issues and data processing

The quality of data reported from the countries varied, and during compilation of the data it was discovered that a substantial amount of data had been incorrectly submitted or essential information was missing. In order to reduce the uncertainty and improve the quality assurance, a considerable amount of river data was excluded in the assessment. Both LOD (limit of detection) and LOQ (limit of quantification) are often not reported at all or values were set at zero. Reported LOD or LOQ above EQS were also excluded, in order to remove uncertainties related to analytical concerns, and to make it visible that countries should aim at applying chemical analytical methods with lower LOD or LOQ, ideally equal or below a value of 30 % of the relevant environmental quality as required by the 2009/90//EC Directive (QA/QC Directive).

An overview of how the data and individual compounds were treated is given below.

Units

Data from the EEA member and cooperating countries had been reported as µg/l, mg/l and ng/l, according to the data dictionary. During the processing of data it was discovered that a considerable amount of data reported as mg/l or ng/l was most likely erroneous, due to incorrect units. In order to reduce the uncertainty, this data was excluded, and constituted to 1.7% of the data reported.

Data processing rules

- Data from 1999-2009 included.
- Records with concentration = 0 were excluded.
- Records with LOD, LOQ = 0 or missing were excluded
- Records with LOD, LOQ > EQS were excluded
- Data used for table depicting maximum concentrations below LOD or LOQ, were flagged with [or <, respectively.
- For calculation of mean concentrations, reported concentrations flagged with [or <, were divided by ½, according to Directive 2009/90/EC, Article 5, paragraph 1.
- Number of samples = number of all measurements
- Number of samples below LOD or LOQ = number of samples flagged with [or <.
- When both LOD and LOQ were provided, LOQ was used in the calculations
- Substances used for sum calculations (Σ):
    - Benzo(b)fluoranthene, Benzo(k)fluoranthene
    - Benzo(g,h,i)perylene, Indeno(1,2,3-cd)pyrene
    - Aldrin, Endrin, Dieldrin, Isodrin
    - DDD-p,p', DDE-p,p', DDT-o,p', DDT-p,p'
    - Alpha-HCH, Beta-HCH, Delta-HCH, Epsilon-HCH, Gamma-HCH (Lindane)
- Sum calculations were performed according to the Directive 2009/90/EC, Article 5, paragraph 3 requirements.

Issues regarding metals

According to the Directive 2008/105/EC, Part B, paragraph 3, EQS for metals (Hg, Ni, Cd, and Pb) refers to the dissolved concentration, i.e. the dissolved phase of a water sample obtained after filtration through a 0.45 µm filter or any equivalent pre-treatment. Some, but few countries had reported metal data on dissolved fraction. In the assessment a separation between data reported as dissolved metal and "all other" fractions is given, to elucidate this issue.

For Cd and its compounds the EQS values vary depending on the hardness of the water as specified in five class categories. Few of the countries have reported hardness of the water concurrently with Cd concentrations. Due to missing hardness data, the EQS of 0.15 µg/l corresponding to a water hardness of 100 to < 200 mg/l of $CaCO_3$ was selected for all reported data assessment.

Overview of excluded data

An overview of data excluded with respect to substance, country and reason is given in Table 2.3.2 and Table 2.3.3. A substantial amount of data was excluded due to deficiency in reported coordinates, and issues related to LOD and LOQ. All together in 40 % of the countries, 50 % or less of their data were omitted from the assessment.

Table 2.3.2 Number of samples excluded per substance due to missing coordinates, LOD, LOQ given value 0 or not reported, and LOD,LOQ > EQS

Substance	Not excluded	Excluded	Coordinates missing	LOD,LOQ = 0 or empty	LOD,LOQ > EQS
1,1,2,2-tetrachloroethene	4208	725	35	688	2
1,2-dichloroethane	4246	1178	183	918	77
4-Nonylphenol	1025	195	122	73	
Alachlor	5494	1084	316	765	3
Anthracene	3594	827	164	595	68
Atrazine	6164	2527	338	2121	68
Benzene	4363	1004	179	818	7
Benzo(a)pyrene	3876	888	53	811	24
Cadmium	4893	8845	342	4149	4354
Cadmium dissolved	272	29			29
Chlorfenvinphos	4316	515	171	298	46
Chlorpyrifos	4335	706	54	200	452
DDT,p,p'	3767	1745	61	1287	397
Di(2-ethylhexyl) phthalate (DEHP)	2354	492	1	142	349
Dichloromethane	3899	935	78	844	13
Diuron	4718	1301	208	1060	33
Endosulfan	715	1272	3		1269
Fluoranthene	3856	1042	146	821	75
Hexachlorobenzene (HCB)	4158	1780	190	738	852
Hexachlorobutadiene (HCBD)	3299	1645	146	603	896
Isoproturon	4527	1040	165	859	16
Lead	8273	5312	499	4533	280
Lead dissolved	560	1			1
Mercury	4697	5589	192	2572	2825
Mercury dissolved	253	9			9
Naphthalene	3353	811	91	554	166
Nickel	8070	5296	567	4411	318

Substance	Not excluded	Excluded	Coordinates missing	LOD,LOQ = 0 or empty	LOD,LOQ > EQS
Nickel dissolved	520	2		1	1
Para-tert-octylphenol	2056	282	122	74	86
Pentachlorobenzene	2143	1481	121	116	1244
Pentachlorophenol	3802	995	140	724	131
Simazine	5930	1981	308	1609	64
Σ Cyclodienes	4179	1320	238		1082
DDT Total	3880	365	80		285
HCH	4360	1035	222		813
ΣBenzo(b)fluoranthene, Benzo(k)fluoranthene	3512	184	49		135
ΣBenzo(g,h,i)perylene, Indeno(1,2,3-cd)pyrene	640	3128	11		3117
Tributyltin cation	175	528		7	521
Trichloromethane	4136	1122	45	892	185
Trifluralin	4444	1347	194	691	462

Table 2.3.3 Number of samples excluded per country due to missing coordinates, LOD, LOQ given value 0 or not reported, and LOD, LOQ > EQS.

Country	Not excluded	Excluded total	Coordinates missing	LOD,LOQ = 0 or empty	LOD,LOQ > EQS	% excluded
AT	1926	4512		4473	39	70
BA	547	298		122	176	35
BE	3341	2421	59	1966	396	42
BG	496	460	5	282	173	48
CH	66	0				0
CY	892	516	304		212	37
CZ	2539	1125	181	873	71	31
DE	5276	9909		9531	378	65
EE	398	52			52	12
ES	814	1289			1289	61
FI	957	1182		1101	81	55
FR	86684	13825		4662	9163	14
GB	4800	2114		1454	660	31
GR	133	671		667	4	83
HR	1456	254		251	3	15
HU	1123	2556	319	2237		69
IE	1663	2476	2340	24	112	60
IS	9	1	1			10
IT	19303	9188	1859		7329	32
LT	1001	1844		1654	190	65

Country	Not excluded	Excluded total	Coordinates missing	LOD,LOQ = 0 or empty	LOD,LOQ > EQS	% excluded
LU	136	23			23	14
LV	292	758	319	303	136	72
MK	11	528		365	163	98
NL	921	122		121	1	12
NO	893	21	21			2
PL	1746	228	172	56		12
PT	222	135		2	133	38
RO	339	480		423	57	59
RS	2965	10			10	0
SE	886	1570	258	1312		64
SI	708	1643		1643		70
SK	1555	612		452	160	28
XK	137	1			1	1

3 Overview of available SoE data, temporal and spatial coverage

This chapter shortly describes the status of the data available to the European Environment Agency (EEA) through the agreed reporting of State of Environment (SoE) data. The ETC/ICM data managers do all the data processing in working databases including importing, quality assurance/quality control (QA/QC), aggregation, querying and the exporting of data. Than the data get exported to the EEA‘s Waterbase and quality flagged. Due to practical reasons the data for this report were prepared in working databases, although the SoE data in rivers and groundwater are published in the EEA’s Waterbase (quality assured and aggregated data per station and year for rivers or per groundwater body and per year for groundwater). SoE datasets are not temporally and spatially homogenous: there are gaps in the time series, the countries report various sets of hazardous substances data, with various limits of detection (LOD) or quantification (LOQ) that change over time and LOD/LOQ may differ by up to three orders of magnitude depending on the reporting country. Some very extreme values were discovered in working databases during the processing of the data for this report additionally to the issues described in the previous chapter. The feedback from countries regarding this report should help to clean up the databases and improve the report significantly.

3.1 Groundwater

There are more than 2 000 000 reported values for selected hazardous substances (see Table 3.1.1 for the list of substances) in more than 6 000 groundwater stations for the 1999-2009 period available in the SoE database. Generally speaking the most complete datasets are available for metals, followed by pesticides. The number of reported values significantly increased over the 1999-2009 period. Recently the SoE databases were updated with a considerable amount of data, predominantly for recent years.

Table 3.1.1 Temporal availability of SoE groundwater data for selected hazardous substances in the 1999-2009 period

Substance	No. of years	Period
1,1,1-trichloroethane	11	1999-2009
1,1,2,2-tetrachloroethene	11	1999-2009
1,1,2-trichloroethene	11	1999-2009
1,2-dichloroethane	11	1999-2009
2,4-D	5	2005-2009
4-nonylphenol	9	2001-2009
Alachlor	5	2005-2009
Aldrin	5	2005-2009
Alpha-Endosulfan	5	2005-2009
Alpha-HCH	5	2005-2009
Anthracene	11	1999-2009
Arsenic	11	1999-2009
Atrazine	5	2005-2009
Bentazone	5	2005-2009
Benzene	11	1999-2009
Benzo(a)pyrene	11	1999-2009
Benzo(b)fluoranthene	11	1999-2009
Benzo(g,h,i)perylene	11	1999-2009
Benzo(k)fluoranthene	11	1999-2009

Table 3.1.1 continued

Substance	No. of years	Period
Beta-HCH	5	2005-2009
Cadmium	11	1999-2009
Copper	11	1999-2009
DDD, p,p'	5	2005-2009
DDE, p,p'	5	2005-2009
DDT, o,p'	5	2005-2009
DDT, p,p'	5	2005-2009
Desethylatrazine	5	2005-2009
Desisopropylatrazine	5	2005-2009
Di (2-ethylhexyl) phthalate (DEHP)	6	2004-2009
Dieldrin	5	2005-2009
Dichloromethane	11	1999-2009
Diuron	5	2005-2009
Endrin	5	2005-2009
Fluoranthene	11	1999-2009
Gamma-HCH (Lindane)	5	2005-2009
Hexachlorobenzene (HCB)	5	2005-2009
Hexachlorobutadiene (HCBD)	10	2000-2009
Chlorfenvinphos	5	2005-2009
Chloroalkanes C10-13	5	2005-2009
Chlorpyrifos	5	2005-2009
Chromium	11	1999-2009
Indeno(1,2,3-cd)pyrene	11	1999-2009
Isodrin	5	2005-2009
Isoproturon	5	2005-2009
Lead	11	1999-2009
Linuron	5	2005-2009
MCPA	5	2005-2009
Mecoprop	5	2005-2009
Mercury	11	1999-2009
Naphthalene	11	1999-2009
Nickel	11	1999-2009
Para-tert-octylphenol	4	2006-2009
Pentachlorobenzene	8	2001-2009
Pentachlorophenol	11	1999-2009
Prometryn	5	2005-2009
Propazine	5	2005-2009
Simazine	5	2005-2009
Terbuthylazine	5	2005-2009
Tetrachloromethane	11	1999-2009
Trifluralin	5	2005-2009
Trichloromethane	11	1999-2009
Zinc	11	1999-2009

Table 3.1.2 No. of years with available groundwater data for countries within the 1999-2009 period

Substance	AL	AT	BA	BE	BG	CY	CZ	DE	DK	EE	FR	GB	HR	CH	IE	IS	IT	LT	LU	LV	PL	PT	RS	SE	SI	SK
1,1,1-trichloroethane				4				4	11		4	10	1	10	8										4	2
1,1,2,2-tetrachloroethene				4	4	2	2		11		4	10		10	8					1					4	4
1,1,2-trichloroethene				4	4	2	2		11		4	10		10	8					1					4	3
1,2-Dichloroethane		11		11			7	4	1		7	10	1		8	6				1					7	8
2,4-D				4	2		2	4	9		4	4			3										5	2
4-nonylphenol											5	4														2
Alachlor		11		7	2	2	8	1	1		6		1									1			11	3
Aldrin		8	1	7	11		7	1			7	10	1					1					3		8	3
Alpha-Endosulfan			1		7		7	1			7	10						1				3			7	
Alpha-HCH					10		2	3			4	1	1					1					3		5	
Anthracene				10			7	1			7	10	1		1	6										3
Arsenic				2	2	2	2	2	11	2	3	10	1		11					2	3				5	3
Atrazine		11		11	11	2	9	9	11		8	10	1	10	4		1	1				1	3		11	11
Bentazone		11		4			2	4	11		4	10			3										4	1
Benzene				11			7	4	11		7	10	1	10	8	6									7	8
Benzo(a)pyrene				11			7	4			7	10	1		1	6			3							8
Benzo(b)fluoranthene				11			7	4			7	8	1			6			3							3
Benzo(g,h,i)perylene				11			7	4			7	10	1			6			3							3
Benzo(k)fluoranthene				11			7	4			7	10	1			6			3							3
Beta-HCH					9		2	3			4	1	1					1					3		5	
Cadmium		11	2	11	8	2	7	7	10	2	7	10	1	10	11	6		1		2	6		3	2	11	7
Copper	1	11	3	11	8	3	7	5	10		7	10	1	10	11	6		1		1	6		3	2	11	8
DDD, p,p'					8		2				4	4	1										2		5	
DDE, p,p'				5	11		7				7	10	1												5	1
DDT, o,p'					11		7	1			7	10											3		4	
DDT, p,p'				1	11		7	1			7	9	1		4								3		5	3
Desethylatrazine		11		4	2		2	4	11		8	8		7											8	2
Desisopropylatrazine				4	2		2	4	11		4	8		7											8	1
Di (2-ethylhexyl) phthalate (DEHP)							2		6		4	4														3
Dieldrin			1	7	11		7	1			7	10	1		5			1					3		8	3
Dichloromethane		2					7	7	1		6	10	1			6									7	3
Diuron		11		11	1		6	6	9		8	10		5	3										7	1
Endrin			1	7	11		7	1			7	10	1					1					3		5	3
Fluoranthene				11			7	4			7	10	1			6			3							8
Gamma-HCH (Lindane)		8		11	11		9	7			7	10	1		4			1				3	3		5	11
Hexachlorobenzene (HCB)				4	9		9	1			7	10	1					1				3	3		4	11
Hexachlorobutadiene (HCBD)				6			7	2			7	10	1												7	2
Chlorfenvinphos				11	1	2		1			7	10	1					1				1			7	1
Chloroalkanes C10-13							2				5															
Chlorpyrifos					2	2	8	2	1		6	9	1					1							1	3
Chromium	1		3	2	2	2	2	2	7		3	10	1		11					1	3			2	6	3
Indeno(1,2,3-cd)pyrene				11	1		7	2			7	10	1			6			3							3
Isodrin					9		7	1			7	10	1													2
Isoproturon		11		11			8	7	9		8	10		5	3										7	3
Lead	1	11	2	11	8	2	7	4	10	2	7	10	1	10	11	6		1		2	6		3	2	11	8
Linuron		11		11			6	4	3		7	10													7	
MCPA				4			2	4	9		4	10			3										8	3
Mecoprop				4			2	4	11		4	10			3										2	
Mercury		11	2	11	2	2	7	4	5	2	7	10	1	7	5	6				1	2		1		11	8
Naphthalene				9			7		11		6	10	1		1	6										3
Nickel	1	11	2	11	8	3	7	7	11		7	10	1	10	11	6				1	6		3	2	11	8
Para-tert-octylphenol											4	3														3
Pentachlorobenzene							7				7	3														3
Pentachlorophenol				11			4	2	11		6	10	1												1	8
Prometryn				4	9		2	4			4	10						1							8	2
Propazine				4	11	2		4			4	10		5				1					3		8	
Simazine		11		11	11	2	8	9	11		7	10	1	10	1			1				1	3		11	11
Terbuthylazine				4	2		2	4	9		4			10											8	2
Tetrachloromethane				4	1		2	3	11		4	10	1	10											1	3
Trifluralin				11	2	2	8	3			7	10						1							7	3
Trichloromethane				11			7	7	11		7	10	1	10		6				1					4	4
Zinc	1	11	3	11	8	1	7	7	10		7	10	1	7	11	6		1		1	6		3	2	11	8

Table 3.1.3 No. of years with available groundwater data for countries within the 2008-2009 period

Substance	AL	AT	BA	BE	BG	CY	CZ	DE	DK	EE	FR	GB	HR	CH	IE	IS	LV	PL	RS	SE	SI	SK
1,1,1-trichloroethane				2				2	2		2	2	1	2	1						2	2
1,1,2,2-tetrachloroethene				2	2	2	2		2		2	2		2	1		1				2	2
1,1,2-trichloroethene				2	2	2	2		2		2	2		2	1		1				2	2
1,2-Dichloroethane		2		2			2	2			2	2	1		1	2	1				2	2
2,4-D				2	2		2	2			2	2			2						1	2
4-nonylphenol											1											1
Alachlor		2		2	2	2	2				2		1								2	2
Aldrin				2	2		2	1			2	2	1						1		2	2
Alpha-Endosulfan					2		2	1			2	2									2	
Alpha-HCH					2		2	2			2	1	1						1		1	
Anthracene				2			2				2	2	1		1	2						2
Arsenic				2	2	2	2	2	2	2	2	2	1		2		2	2			2	2
Atrazine		2		2	2	2	2	1	2		2	2	1	2	2				1		2	2
Bentazone		2		2			2	2	2		2	2			2						2	1
Benzene				2			2	2	2		2	2	1	2	1	2					2	2
Benzo(a)pyrene				2			2	2			2	2	1		1	2						2
Benzo(b)fluoranthene				2			2	2			2	2	1			2						2
Benzo(g,h,i)perylene				2			2	2			2	2	1			2						2
Benzo(k)fluoranthene				2			2	2			2	2	1			2						2
Beta-HCH					2		2	2			2	1	1						1		1	
Cadmium		2	1	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2
Copper	1	2	1	2	2	2	2	2	2		2	2	1	2	2	2	1	2	2	2	2	2
DDD, p,p'					2		2				2	2	1						1		1	
DDE, p,p'					2		2				2	2	1								1	
DDT, o,p'					2		2	1			2	2							1		2	
DDT, p,p'				1	2		2	1			2	2	1		1				1		1	2
Desethylatrazine		2		2			2	2	2		2	2		2							2	2
Desisopropylatrazine				2			2	2	2		2	2		2							2	1
Di (2-ethylhexyl) phthalate (DEHP)							2		2		2	2										2
Dieldrin				2	2		2	1			2	2	1		2				1		2	2
Dichloromethane		2					2	2			2	2	1			2					2	2
Diuron		2		2	1		2	1			2	2		2	2						2	1
Endrin				2	2		2	1			2	2	1						1		1	2
Fluoranthene				2			2	2			2	2	1			2						2
Gamma-HCH (Lindane)				2	2		2	2			2	2	1		2				1		1	2
Hexachlorobenzene (HCB)				2	2		2	1			2	2	1						1			2
Hexachlorobutadiene (HCBD)				2			2	2			2	2	1								2	2
Chlorfenvinphos				2	1	2					2	2	1								2	1
Chloroalkanes C10-13							2				2											
Chlorpyrifos					2	2	2	1			2	2	1								1	2
Chromium	1		2	2	2	2	2	2			2	2	1		2		1	2		2	2	2
Indeno(1,2,3-cd)pyrene				2	1		2	2			2	2	1			2						2
Isodrin					2		2	1			2	2	1									2
Isoproturon		2		2			2	2			2	2		2	2						2	2
Lead	1	2	2	2	2	2	2	1	2	2	2	2	1	2	2	2	2	2	2	2	2	2
Linuron		2		2			2	2			2	2									2	
MCPA				2			2	2			2	2			2						2	2
Mecoprop				2			2	2	2		2	2			2						1	
Mercury		2	1	2	2	2	2	2		2	2	2	1		2	2	1	2			2	2
Naphthalene				2			2		2		2	2	1		1	2						2
Nickel	1	2	1	2	2	2	2	2	2		2	2	1	2	2	2	1	2	2	2	2	2
Para-tert-octylphenol											2	2										2
Pentachlorobenzene							2				2											2
Pentachlorophenol				2			2	2	2		2	2	1									2
Prometryn				2	1		2	2			2	2									2	2
Propazine				2	2	2		2			2	2		2					1		2	
Simazine		2		2	2	2	2	2	2		2	2	1	2	1				1		2	2
Terbuthylazine				2			2	2			2			2							2	2
Tetrachloromethane				2	1		2	1	2		2	2	1	2							1	2
Trifluralin				2	2	2	2	2			2	2									2	2
Trichloromethane				2			2	2	2		2	2	1	2		2	1				1	2
Zinc	1	2	2	2	2		2	2	2		2	2	1	1	2	2	1	2	2	2	2	2

Table 3.1.4 Available groundwater samples within the 1999-2009 period

Substance	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**Total**
1,1,1-trichloroethane	186	591	402	615	885	1034	2221	4063	4855	5283	4676	**24811**
1,1,2,2-tetrachloroethene	186	610	409	669	891	1045	2203	4001	5169	6656	6090	**27929**
1,1,2-trichloroethene	186	612	409	670	888	1044	2215	4063	5052	6681	6094	**27914**
1,2-dichloroethane	2062	1393	1119	1514	2319	4125	4521	5159	5944	6382	5956	**40494**
2,4-D	361	365	426	486	396	334	454	2820	4821	6080	6302	**22845**
4-nonylphenol			4	5	4	45	310	246	203	775	79	**1671**
Alachlor	2041	1963	1993	2362	2330	3584	4192	5150	6070	6456	7105	**43246**
Aldrin	1357	681	490	748	1873	4724	3414	4911	6426	6610	6889	**38123**
Alpha-Endosulfan		135	137	127	1216	2188	3104	3840	5554	5635	6169	**28105**
Alpha-HCH	2	14	32	44	48	61	10	1834	3453	5066	5721	**16285**
Anthracene	248	265	20	49	455	725	1655	2015	2850	4430	4277	**16989**
Arsenic	390	866	761	1562	1658	2083	2506	3169	7586	9927	8896	**39404**
Atrazine	2753	3752	3041	3210	5227	6154	7868	9866	10716	10915	10545	**74047**
Bentazone	1789	1072	1030	1173	1200	3829	2381	6111	7566	8690	8541	**43382**
Benzene	338	751	409	642	1797	2054	3457	4299	5289	5908	5275	**30219**
Benzo(a)pyrene	259	518	130	173	1035	1311	2599	2579	3855	4671	4633	**21763**
Benzo(b)fluoranthene	258	270	12	27	810	885	1798	1800	3317	3913	3645	**16735**
Benzo(g,h,i)perylene	256	522	129	140	973	1290	2570	2547	3855	4667	4239	**21188**
Benzo(k)fluoranthene	256	523	131	146	981	1289	2576	2549	3853	4661	4241	**21206**
Beta-HCH	2	1	25	44	48	48	9	1842	2881	4144	4680	**13724**
Cadmium	2170	2126	1937	2999	5095	6872	8605	8397	13695	13545	12924	**78365**
Copper	2161	2129	1939	3350	5466	7124	8888	8935	13775	14090	13006	**80863**
DDD, p,p'	2	1	12	40	10	10	10	2704	3351	5347	5130	**16617**
DDE, p,p'	1226	465	305	551	1027	3991	2719	4283	4841	5691	6054	**31153**
DDT, o,p'	11	130	118	116	788	1861	2381	3798	4622	5762	6059	**25646**
DDT, p,p'	13	42	29	109	542	955	1448	3529	4990	5908	5297	**22862**
Desethylatrazine	2397	2946	2381	2484	3256	4257	6242	8286	8303	9417	9930	**59899**
Desisopropylatrazine	353	377	426	486	467	1201	2281	6241	7581	8374	9281	**37068**
Di (2-ethylhexyl) phthalate (DEHP)						3	6	445	795	1906	2205	**5360**
Dieldrin	3	392	300	368	1643	2539	2895	4388	6503	6982	6779	**32792**
Dichloromethane	1892	1025	1017	1223	1652	3476	2588	2669	3556	3828	3316	**26242**
Diuron	1957	1923	823	1040	2943	5879	5751	7434	9003	9333	9363	**55449**
Endrin	5	132	155	193	1019	1930	2398	4007	4930	5690	6004	**26463**
Fluoranthene	259	523	131	192	1013	1304	2597	2535	3825	4659	4245	**21283**
Gamma-HCH (Lindane)	1728	1243	849	1115	2020	4851	4199	5237	7165	7825	7332	**43564**
Hexachlorobenzene (HCB)	1390	528	618	813	1034	4192	2956	3230	6327	6374	6488	**33950**
Hexachlorobutadiene (HCBD)		242	107	94	775	1676	2597	2263	4136	4861	4318	**21069**
Chlorfenvinphos	200	723	251	268	1159	1723	3277	4897	5589	6048	6275	**30410**
Chloroalkanes C10-13							310	246	1	1577	1853	**3987**
Chlorpyrifos	4		4	303	361	1763	3645	5002	6145	6599	7169	**30995**
Chromium	278	992	752	1603	1698	2954	4429	5883	9839	12153	10849	**51430**
Indeno(1,2,3-cd)pyrene	258	522	126	139	968	1288	2564	2532	3837	4660	4241	**21135**
Isodrin		129	117	98	1011	1902	2321	3384	4228	5168	5608	**23966**
Isoproturon	1953	1927	810	1274	3348	6036	5861	7446	9120	9785	9337	**56897**
Lead	2161	2126	1938	3348	5075	6870	8551	8713	13643	13219	12569	**78213**
Linuron	1641	979	420	594	1773	5010	4187	6110	7958	8272	8261	**45205**
MCPA	361	699	583	730	736	1620	1972	5246	6919	8067	7676	**34609**
Mecoprop	359	704	552	650	736	1651	1972	5664	6888	8604	8246	**36026**
Mercury	1534	1489	1032	1502	2537	5013	4563	3935	7619	7859	7181	**44264**
Naphthalene	171	242	207	187	729	1199	1870	3849	4238	4573	4268	**21533**
Nickel	2162	2139	1946	3353	5142	6993	8860	9307	14424	14200	13398	**81924**
Para-tert-octylphenol								246	298	1654	913	**3111**
Pentachlorobenzene			4		314	782	1345	826	2237	4242	4813	**14563**
Pentachlorophenol	476	656	427	513	786	469	1635	1691	3650	2373	3506	**16182**
Prometryn	3	234	199	299	350	998	1643	5058	5609	6227	7196	**27816**
Propazine	12	265	201	302	436	1123	1780	5928	7239	7615	6980	**31881**
Simazine	2721	3144	2677	3212	5165	6054	7869	9857	10008	10502	10512	**71721**
Terbuthylazine	361	368	432	565	399	432	657	4080	5220	6353	7041	**25908**
Tetrachloromethane	186	584	361	633	837	977	2150	3918	4763	6189	5256	**25854**
Trifluralin	312	737	254	535	1755	2548	3117	4483	6373	6860	7005	**33979**
Trichloromethane	513	883	485	755	2279	2644	4060	4661	5834	6506	5671	**34291**
Zinc	2168	2148	1959	3458	5570	7248	9084	9795	14537	14324	13041	**83332**
Total	**46331**	**50818**	**37993**	**53900**	**96948**	**157270**	**196346**	**274002**	**372929**	**420771**	**410649**	**2117957**

Table 3.1.5 Available groundwater samples for countries within the 1999-2009 period

Substance	AL	AT	BA	BE	BG	CY	CZ	DE	DK	EE	FR	GB	HR	CH	IE	IS	IT	LT	LU	LV	PL	PT	RS	SE	SI	SK
1,1,1-trichloroethane				795				843	1556		5480	13904	38	728	744										398	325
1,1,2,2-tetrachloroethene				817	146	307	2160		1556		6133	14408		735	744					11					398	514
1,1,2-trichloroethene				822	146	307	2160		1557		6131	14540		725	744					11					398	373
1,2-dichloroethane		N/A		1539			4981	148	2		6397	13091	36		744	9				11					674	656
2,4-D				1106	69		2160	300	3226		13532	698			1332										145	277
4-nonylphenol											1562	18														91
Alachlor		N/A		1301	69	226	5257	6	1		17157		32									3			829	526
Aldrin		N/A	33	1319	352		4981	22			16691	8568	54					10					200		370	204
Alpha-Endosulfan			33		66		4979	22			15342	6983						10				72			598	
Alpha-HCH					327		2160	87			13346	88	10					10					200		57	
Anthracene				1436			4981	1			6067	3159	8		392	9										936
Arsenic				996	243	325	2160	1061	3467	85	6868	16970	40		4022					98	341				191	2537
Atrazine		N/A		2648	390	226	5523	2896	4452		20075	15953	44	683	1406		97	10				3	200		828	768
Bentazone		N/A		1576			2160	1242	4452		13612	11939			1376										284	152
Benzene				1557			4981	59	1500		5354	14443	2	576	740	9									519	479
Benzo(a)pyrene				2808			4981	56			7768	4613	8		392	9			15							1113
Benzo(b)fluoranthene				2812			4981	57			7768	149	8			9			15							936
Benzo(g,h,i)perylene				2808			4981	57			7768	4606	8			9			15							936
Benzo(k)fluoranthene				2810			4981	57			7768	4622	8			9			15							936
Beta-HCH					285		2160	87			10835	88	2					10					200		57	
Cadmium		N/A	52	2202	543	317	5255	3364	6543	90	8000	32905	96	549	4052	12		24		98	483		169	24	862	3434
Copper	19	N/A	171	2225	662	356	5255	2578	6547		8748	34917	108	568	4037	12		23		24	483		168	24	862	3774
DDD, p,p'					197		2160				11390	2674	10										129		57	
DDE, p,p'				752	385		4818				12981	7116	10												57	48
DDT, o,p'					351		4818	22			12955	7050											200		250	
DDT, p,p'				314	373		4818	22			12185	3407	10		1256								200		57	220
Desethylatrazine		N/A		1629	3		2160	1531	4452		20011	10792		538											518	420
Desisopropylatrazine				1608	3		1951	1424	4444		15535	10794		537											518	254
Di (2-ethylhexyl) phthalate (DEHP)							1235		704		3170	99														152
Dieldrin			33	1317	326		4981	22			15207	8651	49		1422			10					200		370	204
Dichloromethane		N/A					4981	1501	4		5996	376	32			9									674	466
Diuron		N/A		2638	5		4706	2595	3262		19838	14529		506	1382										326	254
Endrin			33	1296	320		4981	22			12200	7018	49					10					200		130	204
Fluoranthene				2830			4981	57			7728	4542	8			9			15							1113
Gamma-HCH (Lindane)		N/A		1802	630		5360	1224			18684	8240	10		1399			10				72	200		130	484
Hexachlorobenzene (HCB)		N/A		789	231		5360	22			14537	7022	2					10				72	200		34	352
Hexachlorobutadiene (HCBD)				402			4494	6			8414	6751	2												675	325
Chlorfenvinphos				2011	5	226		6			14058	13253	32					10				3			709	97
Chloroalkanes C10-13							1235				2752															
Chlorpyrifos					77	224	5257	28	4		13669	11407	32					10							83	204
Chromium	20		124	996	54	325	2160	1013	1350		5135	32908	96		3992					24	341			24	331	2537
Indeno(1,2,3-cd)pyrene				2805	1		4981	31			7768	4581	8			9			15							936
Isodrin					142		4981	22			11817	6823	4													177
Isoproturon		N/A		2606			5256	3043	3275		19834	14508		506	1383										557	526
Lead	20	N/A	17	2219	591	321	5255	1654	6545	90	7152	34911	96	558	4039	12		22		98	483		169	24	862	3774
Linuron		N/A		2395			4706	310	143		17257	14433													557	
MCPA				1097			2160	300	3268		13636	12064			1380										401	303
Mecoprop				1002			2160	1242	4452		12881	12769			1380										140	
Mercury		N/A	52	1961	192	322	5256	411	338	90	5569	12506	96	435	2735	12				23	299		35		862	3774
Naphthalene				893			4954		1501		5935	6911	2		392	9										936
Nickel	20	N/A	53	2227	550	385	5256	3403	6674		9503	34620	96	559	3960	12				24	483		169	24	830	3774
Para-tert-octylphenol											2911	42														158
Pentachlorobenzene							4913				9439	7														204
Pentachlorophenol				1862			2147	31	2650		3703	5348	32												2	407
Prometryn				1245	171		2160	166			9516	13610						10							518	420
Propazine				1482	355	226		1262			13456	13866		506				10					200		518	
Simazine		N/A		2645	388	226	5257	3177	4420		19384	15750	40	625	154			10				3	200		829	768
Terbuthylazine				1585	25		2160	1530	3332		15713			625											518	420
Tetrachloromethane				805	6		2160	131	1555		5497	14481	38	728											80	373
Trifluralin				2162	77	226	5257	110			16655	8430						10							709	204
Trichloromethane				1536			4981	1855	2915		7206	14214	9	728		9				11					353	474
Zinc	20	N/A	157	2238	714	109	5256	3880	6586		8951	35963	96	577	4195	12		23		24	445		127	24	862	3770

Note: Number of samples is not known for Austria. Contrary to the WISE-SoE dataset definition, Austrian data were reported as stations' annual averages without a specification of how many samples had been used for the annual average calculations and how many samples had been found below and above the LOD/LOQ.

Table 3.1.6 Available groundwater stations with data within the 1999-2009 period

Substance	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1,1,1-trichloroethane	184	483	336	478	697	802	1786	2982	3447	3128	3069
1,1,2,2-tetrachloroethene	184	489	339	529	699	806	1772	2890	3530	3761	3769
1,1,2-trichloroethene	184	489	339	529	699	806	1787	2929	3392	3781	3768
1,2-dichloroethane	698	566	427	670	1268	1732	2691	3218	4260	3757	3826
2,4-D	333	347	400	422	371	293	411	1297	1826	2194	2354
4-nonylphenol			4	5	4	45	134	108	203	188	60
Alachlor	652	644	675	959	941	1185	1364	1836	2746	2810	3005
Aldrin	650	390	337	467	1264	2161	1652	2432	2949	3051	2956
Alpha-Endosulfan		78	84	91	806	1230	1519	2048	2648	2689	2698
Alpha-HCH	1	12	30	35	47	54	10	808	1427	1990	2082
Anthracene	42	60	15	39	349	332	989	1190	1869	1879	2141
Arsenic	390	651	612	996	1137	1230	1729	1625	4167	4775	4761
Atrazine	1136	1658	1651	1707	2835	3049	4144	5093	5743	5561	5572
Bentazone	974	747	708	779	845	2107	1814	3570	3892	4289	4224
Benzene	216	529	346	533	1283	1348	2368	2929	3689	3294	3232
Benzo(a)pyrene	53	220	83	138	654	795	1507	1391	2182	2010	2281
Benzo(b)fluoranthene	53	60	12	25	469	420	769	802	1795	1524	1566
Benzo(g,h,i)perylene	53	225	82	108	599	774	1478	1359	2181	2008	2073
Benzo(k)fluoranthene	53	225	84	111	600	773	1483	1361	2180	2005	2073
Beta-HCH	1	1	23	35	47	44	9	814	1139	1667	1801
Cadmium	1083	1132	1038	1552	2770	3171	4230	4180	6847	6201	6469
Copper	1084	1133	1039	1728	2933	3370	4313	3972	6722	6192	6256
DDD, p,p'	1	1	10	31	10	10	10	1532	1732	2508	1864
DDE, p,p'	519	211	165	304	581	1704	1467	2231	2379	2696	2635
DDT, o,p'	11	86	78	100	467	1165	1365	2140	2382	2760	2644
DDT, p,p'	12	42	27	99	251	421	568	1931	2382	2724	1987
Desethylatrazine	983	1196	1039	1057	1460	2017	3076	4487	4734	5240	5190
Desisopropylatrazine	328	350	400	422	442	1071	1817	3850	4104	4469	4575
Di (2-ethylhexyl) phthalate (DEHP)						3	6	299	385	681	1103
Dieldrin	2	286	249	309	1153	1538	1532	2330	2962	3146	3017
Dichloromethane	650	385	366	454	884	1236	1037	1216	2534	1928	1932
Diuron	1031	1019	634	770	1715	2949	3311	4034	4281	4226	4628
Endrin	4	80	112	137	683	1198	1370	2198	2531	2792	2760
Fluoranthene	53	225	84	157	646	794	1504	1381	2180	2010	2074
Gamma-HCH (Lindane)	828	669	678	810	1360	2284	2146	2706	3216	3530	3244
Hexachlorobenzene (HCB)	684	259	455	547	699	1822	1590	1963	2974	2976	2767
Hexachlorobutadiene (HCBD)		168	66	79	544	1008	1444	1458	2360	2397	2175
Chlorfenvinphos	41	397	211	251	611	1123	1798	2822	2910	3052	2971
Chloroalkanes C10-13							134	108	1	384	809
Chlorpyrifos	4		4	303	361	1149	1988	2988	3265	3420	3480
Chromium	272	718	573	970	1147	1611	2562	2713	4776	5031	4925
Indeno(1,2,3-cd)pyrene	52	225	81	108	594	773	1472	1352	2176	2006	2073
Isodrin		77	76	83	677	1186	1318	1942	2237	2541	2583
Isoproturon	1033	1020	621	1016	2071	3026	3345	4036	4398	4608	4622
Lead	1084	1132	1039	1727	2701	3168	4178	3899	6691	5701	6154
Linuron	775	513	256	360	823	2223	2181	3039	3820	3906	3988
MCPA	333	615	548	656	700	1462	1684	3058	3271	3679	3493
Mecoprop	332	618	517	616	700	1488	1684	3358	3580	4194	3938
Mercury	748	859	558	779	1381	2407	2341	2234	4587	4325	4066
Naphthalene	170	196	173	167	589	717	1174	2581	2933	2227	2177
Nickel	1083	1137	1037	1733	2787	3274	4290	4359	6958	6333	6507
Para-tert-octylphenol								108	247	441	334
Pentachlorobenzene			4		310	314	565	400	1034	1659	1776
Pentachlorophenol	375	433	402	481	632	378	1072	1132	2057	1442	2095
Prometryn	2	188	186	249	340	879	1327	2829	2929	3398	3529
Propazine	11	206	187	252	426	916	1357	3450	3690	3753	3323
Simazine	1107	1456	1287	1708	2819	3024	4144	5096	5592	5648	5565
Terbuthylazine	333	348	401	450	374	387	506	2002	2130	2585	2785
Tetrachloromethane	184	462	303	493	664	758	1747	2890	3352	3477	3246
Trifluralin	65	413	207	516	1086	1481	1527	2234	2913	3184	3067
Trichloromethane	237	526	324	484	1440	1576	2718	3197	3941	3593	3491
Zinc	1091	1155	1049	1756	2971	3473	4402	4459	7077	6261	6218

Table 3.1.7 Available groundwater stations with data for countries within the 1999-2009 period

Substances	AL	AT	BA	BE	BG	CY	CZ	DE	DK	EE	FR	GB	HR	CH	IE	IS	IT	LT	LU	LV	PL	PT	RS	SE	SI	SK
1,1,1-trichloroethane				163				237	215		1163	1971	17	35	208										47	103
1,1,2,2-tetrachloroethene				163	68	83	613		215		1204	2008		35	208					11					47	141
1,1,2-trichloroethene				163	68	83	613		215		1204	2042		35	208					11					47	103
1,2-dichloroethane		695		163			613	51	2		1127	1963	15		208	2				11					47	141
2,4-D				126	36		613	119	417		1350	123			136										42	99
4-nonylphenol											191	5														60
Alachlor		695		95	34	80	613	6	1		1460		14									3			47	170
Aldrin		666	33	99	66		613	22			1379	1049	22					9					68		47	68
Alpha-Endosulfan			33		23		613	22			1265	981						9				9			47	
Alpha-HCH					58		613	50			1364	47	5					9					68		23	
Anthracene				142			613	1			679	534	4		208	2										219
Arsenic				218	86	83	613	444	483	78	1602	1621	18		211					74	112				47	434
Atrazine		695		217	68	80	613	544	467		1539	2064	18	35	142		97	9				3	68		47	170
Bentazone		679		216			613	319	467		1337	1748			142										47	99
Benzene				163			613	7	241		1002	1977	1	35	208	2									47	117
Benzo(a)pyrene				216			613	7			930	714	4		208	2			5							219
Benzo(b)fluoranthene				216			613	7			930	29	4			2			5							219
Benzo(g,h,i)perylene				216			613	7			930	713	4			2			5							219
Benzo(k)fluoranthene				216			613	7			930	718	4			2			5							219
Beta-HCH					52		613	50			1056	47	1					9					68		23	
Cadmium		693	20	218	83	83	613	445	483	78	1623	2475	29	34	211	3		24		74	112		63	16	47	434
Copper	10	693	33	218	111	83	613	431	483		1576	2646	29	35	211	3		23		24	112		63	16	47	434
DDD, p,p'					59		613				1186	775	5										63		23	
DDE, p,p'				90	66		613				1184	1021	5												23	48
DDT, o,p'					60		613	22			1185	1005											68		47	
DDT, p,p'				87	66		613	22			1156	838	5		141								68		23	68
Desethylatrazine		695		240	2		613	382	467		1537	1828		35											47	170
Desisopropylatrazine				236	2		613	382	467		1495	1835		35											47	170
Di (2-ethylhexyl) phthalate (DEHP)							613		213		389	16														59
Dieldrin			33	98	67		613	22			1245	1068	21		142			9					68		47	68
Dichloromethane		695					613	207	2		1124	47	14			2									47	141
Diuron		668		217	5		613	460	467		1538	1924		35	142										47	170
Endrin			33	95	67		613	22			1067	982	21					9					68		42	68
Fluoranthene				216			613	7			929	711	4			2			5							219
Gamma-HCH (Lindane)		666		142	95		613	238			1511	1061	5		142			9				9	68		42	68
Hexachlorobenzene (HCB)		666		121	43		613	22			1479	982	1					9				9	68		11	68
Hexachlorobutadiene (HCBD)				80			613	5			977	962	1												47	103
Chlorfenvinphos				95	5	80		6			1069	1907	14					9				3			47	68
Chloroalkanes C10-13							613				375															
Chlorpyrifos					38	79	613	22	4		1077	1958	14					9							41	68
Chromium	10		39	218	20	83	613	431	466		1556	2597	29		211					24	112			16	47	434
Indeno(1,2,3-cd)pyrene				216	1		613	6			930	707	4			2			5							219
Isodrin					25		613	22			1034	964	2													68
Isoproturon		668		217			613	461	467		1537	1917		35	142										47	170
Lead	10	693	13	218	91	83	613	382	483	78	1577	2646	29	35	211	3		22		74	112		63	16	47	434
Linuron		668		215			613	118	84		1460	1920													47	
MCPA				125			613	119	467		1353	1754			142										47	99
Mecoprop				91			613	318	467		1218	1786			142										37	
Mercury		693	20	218	72	83	613	162	139	78	1575	1439	29	35	211	3				23	112		34		47	434
Naphthalene				121			613		241		677	1703	1		208	2										219
Nickel	10	693	20	218	85	83	613	446	483		1627	2636	29	35	211	3				24	112		63	16	47	434
Para-tert-octylphenol											379	8														60
Pentachlorobenzene							613				1129	4														68
Pentachlorophenol				125			613	22	384		648	860	14												2	73
Prometryn				95	47		613	56			1011	1981						9							47	170
Propazine				215	67	80		343			1366	1997		35				9					68		47	
Simazine		695		217	67	80	613	544	467		1537	2065	17	35	85			9				3	68		47	170
Terbuthylazine				215	21		613	382	467		1537			35											47	170
Tetrachloromethane				163	6		613	51	215		1163	2050	17	35											40	103
Trifluralin				125	38	80	613	53			1358	1052						9							47	68
Trichloromethane				163			613	288	224		1141	1989	2	35		2				11					40	141
Zinc	10	693	46	219	147	109	613	469	483		1581	2723	29	32	211	3		23		24	112		63	16	47	434

3.2 Marine environment

For general regional assessments, stations are assigned to the main regions of the North East Atlantic, Baltic Sea and Mediterranean, using only station coordinates. All biota stations with sufficient data for assessment are in coastal areas. The Baltic Sea has poor geographical coverage due to lack of defined assessment limits for commonly monitored species and tissues; most of the data used in assessments are from Kiel Bay and the Danish Belts. In the Mediterranean only the north-western part is covered, and only data for mussels are included in the assessment, because assessment limits for Mediterranean fish have not been established. An overview of data availability is provided in Table 3.2.1. Note that for the marine environment data was selected from the period 1998-2010 compared to the period 1999-2009 selected for freshwater assessment.

Table 3.2.1 Data availability for assessment of hazardous substances in marine biota for 1998-2010 period

Data Provider	Number of time series per determinant						
	Cadmium	**Mercury**	**Lead**	**DDT (DDE, p,p')**	**HCB**	**Gamma HCH**	**PCB**
Belgium	3	4	3	4	4	4	4
Croatia	19	18	19	15		19	
Denmark	31	37	31	35	37	37	37
Estonia		3					
Finland		6					
France	80	80	80	75		74	77
Iceland	12	12	12	12	12	12	12
Ireland	24	24	18	15	15	15	15
Italy		55	55	39	25		52
Netherlands	2	5	2	2	5	2	5
Norway	40	48	39	48	48	48	48
Poland	2	5	2	2	2	2	2
Spain	30	30	30	28	13	29	30
Sweden		6		2	2	2	2
United Kingdom	72	88	69	3			85
Total	315	421	360	280	163	244	369

3.3 Rivers

The number of samples and monitoring stations has increased substantially from 1999 to 2009. Reported data on pesticides and metals were most abundant, and the data stretches back for the longest amount of time, more or less continuously from 1999. Measurements of the selected hazardous substances in rivers have been conducted in several of the countries, but as shown in the following tables, high variations between the countries in the numbers of substances reported, length of time the monitoring has been performed, and numbers of stations included are depicted. France is by far the country that has submitted the most extensive set of data. A temporal availability of river SoE data for selected hazardous substances in the 1999-2009 period is shown in Tables 3.3.1 to 3.3.6. Numbers of years, substances reported and periods are given. Monitoring data for heavy metals, pesticides, and some industrial substances (HCBD and pentachlorophenol) have been reported over the longest period (11 years), while some substances have recently been included in the monitoring programmes.

Table 3.3.1 Temporal availability of SoE river data for selected hazardous substances in the 1999-2009 period.

Substance	No. of years	Period
1,1,2,2-tetrachloroethene	9	2001-2009
1,2-dichloroethane	8	1999-2009
4-nonylphenol	4	2006-2009
Alachlor	11	1999-2009
Anthracene	6	2004-2009
Atrazine	11	1999-2009
Benzene	7	1999-2009
Benzo(a)pyrene	9	2001-2009
Cadmium	11	1999-2009
Cadmium dissolved	2	2008-2009
Chlorfenvinphos	9	2001-2009
Chlorpyrifos	8	2001-2009
DDT total	7	2003-2009
DDT, p,p'	5	2005-2009
Di (2-ethylhexyl) phthalate (DEHP)	4	2006-2009
Dichloromethane	5	2005-2009
Diuron	8	1999-2009
Endosulfan	4	2006-2009
Fluoranthene	9	2001-2009
Hexachlorobenzene (HCB)	11	1999-2009
Hexachlorobutadiene (HCBD)	7	1999-2009
Isoproturon	7	2003-2009
Lead	11	1999-2009
Lead dissolved	2	2008-2009
Mercury	11	1999-2009
Mercury dissolved	2	2008-2009
Naphthalene	6	2004-2009
Nickel	11	1999-2009
Nickel dissolved	2	2008-2009
Para-tert-octylphenol	4	2006-2009
Pentachlorobenzene	4	2006-2009
Pentachlorophenol	6	2004-2009
Simazine	11	1999-2009
Tributyltin cation	4	2005-2009
Trichloromethane	5	2005-2009
Trifluralin	8	2002-2009
Σ Benzo(b)fluoranthene, Benzo(k)fluoranthene	9	2001-2009
Σ Benzo(g,h,i)perylene, Indeno(1,2,3-cd)pyrene	9	2001-2009
Σ Cyclodienes	10	1999-2009
Σ Hexachlorocyclohexane (HCH)	7	2003-2009

Table 3.3.2 No. of years with available river data for countries within the 1999-2009 period

Substance	AL	AT	BA	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR	HU	IE	IS	IT	LI	LT	LU	LV	ME	MK	MT	NL	NO	PL	PT	RO	RS	SE	SI	SK	TR	XK
1,1,2,2-Tetrachloroethene	0	0	0	1	0	0	1	0	4	0	0	1	0	4	4	0	0	0	0	0	9	0	4	1	0	0	0	0	2	0	1	0	0	0	0	0	2	0	0
1,2-dichloroethane	0	1	0	4	0	0	4	3	4	0	0	1	0	4	4	0	1	0	2	0	6	0	0	3	0	0	0	0	2	0	2	0	0	0	0	0	3	0	0
4-nonylphenol	0	0	0	4	0	0	0	0	0	0	0	0	4	4	1	0	0	0	3	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0
Alachlor	0	3	1	4	0	0	11	3	0	0	0	1	3	4	0	0	1	0	3	0	9	0	0	3	0	0	0	0	2	0	2	1	1	1	3	4	2	0	0
Anthracene	0	0	3	4	0	0	0	0	4	0	0	0	2	4	1	1	1	0	3	0	5	0	4	2	2	0	0	0	2	0	2	1	1	0	0	1	3	0	0
Atrazine	0	3	3	4	0	0	9	3	3	0	0	0	3	4	3	1	4	2	3	0	9	0	4	3	0	0	0	0	2	0	2	1	1	4	3	4	2	0	0
Benzene	0	0	1	4	0	0	4	3	3	0	0	1	0	4	4	1	1	1	2	0	4	0	4	3	1	0	0	0	2	0	2	1	0	0	0	2	2	0	0
Benzo(a)pyrene	0	0	3	4	0	0	2	3	3	0	0	1	2	4	1	0	1	0	1	0	9	0	4	1	2	0	0	0	2	0	2	2	1	3	0	0	3	0	0
Cadmium	0	4	4	3	3	11	6	3	3	0	10	0	4	4	4	0	4	2	2	1	9	0	4	0	4	0	1	0	2	5	2	3	3	2	3	4	2	0	0
Cadmium dissolved	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1	0	1
Chlorfenvinphos	0	0	2	1	0	0	2	0	0	0	0	0	3	4	1	0	1	0	3	0	9	0	0	2	0	0	0	0	2	0	2	1	0	1	3	4	3	0	0
Chlorpyrifos	0	0	0	4	0	0	2	3	0	0	0	0	3	4	0	0	1	0	0	0	8	0	0	1	0	0	0	0	2	0	1	0	0	1	3	1	4	0	0
DDT Total	0	0	1	3	0	0	2	3	0	0	0	0	2	4	0	0	4	2	0	0	6	0	3	0	3	0	0	0	2	0	2	0	0	4	0	1	2	0	0
DDT, p,p'	0	0	1	3	0	0	2	3	3	0	0	0	2	4	1	0	4	2	0	0	4	0	4	0	3	0	0	0	2	0	2	0	1	4	0	1	1	0	0
Di (2-ethylhexyl) phthalate (DEHP)	0	0	2	1	0	0	0	0	0	0	0	0	4	4	3	0	0	0	1	0	1	0	1	3	0	0	0	0	2	0	2	0	0	0	0	1	3	0	0
Dichloromethane	0	0	1	4	0	0	2	0	3	0	0	1	0	4	4	0	1	0	2	0	3	0	4	3	0	0	0	0	2	0	2	0	0	0	0	3	2	0	0
Diuron	0	0	2	4	0	0	4	3	3	0	0	1	3	4	3	1	1	0	3	0	5	0	1	2	0	0	0	0	2	0	2	0	0	1	3	2	2	0	0
Endosulfan	0	0	0	4	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	3	0	4	1	0	0	0	0	1	0	2	0	0	0	0	0	2	0	0
Fluoranthene	0	0	3	4	0	0	0	3	3	0	0	0	2	4	1	1	1	0	3	0	9	0	4	3	2	0	0	0	2	0	2	1	1	3	0	1	3	0	0
Hexachlorobenzene (HCB)	0	0	0	4	0	0	7	3	3	0	0	0	0	4	1	0	1	0	3	0	3	0	4	1	2	0	0	0	2	0	2	0	1	4	0	4	2	0	0
Hexachlorobutadiene (HCBD)	0	0	0	4	0	0	3	3	3	0	0	0	2	4	1	0	1	0	3	0	3	0	1	3	0	0	0	0	2	0	2	0	0	0	0	4	2	0	0
Isoproturon	0	0	1	4	0	0	3	3	3	0	0	1	3	4	3	1	1	0	3	0	3	0	1	1	0	0	0	0	2	0	1	0	0	1	4	2	1	0	0
Lead	0	4	4	4	5	11	7	3	0	0	10	0	4	4	4	0	4	2	2	1	10	0	4	0	4	0	0	0	2	5	1	3	3	2	3	4	2	0	0
Lead dissolved	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2	0	0	1	0	1
Mercury	0	4	3	4	0	4	0	3	3	0	7	0	4	4	4	0	1	2	1	1	7	0	4	0	1	0	0	0	2	4	2	2	3	1	2	4	3	0	0
Mercury dissolved	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
Naphthalene	0	0	1	1	0	0	1	0	3	0	0	0	2	4	3	1	1	0	2	0	5	0	0	0	1	0	0	0	2	0	1	1	1	0	0	0	2	0	0
Nickel	0	4	4	4	5	3	6	3	0	0	3	0	4	4	4	0	4	2	2	0	10	0	4	0	4	0	1	0	2	5	2	1	3	2	3	4	3	0	0
Nickel dissolved	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2	0	0	0	0	1
Para-tert-octylphenol	0	0	0	4	0	0	0	0	0	0	0	0	3	4	2	0	0	0	3	0	1	0	1	1	0	0	0	0	2	0	1	0	0	0	0	1	1	0	0
Pentachlorobenzene	0	0	0	4	0	0	0	0	0	0	0	0	1	4	0	0	1	0	3	0	2	0	1	0	0	0	0	0	2	0	2	0	1	0	0	1	1	0	0
Pentachlorophenol	0	0	2	4	0	0	0	0	3	0	0	1	0	4	1	0	1	0	3	0	4	0	1	3	0	0	0	0	2	0	2	1	0	1	0	3	2	0	0
Simazine	0	3	1	4	0	0	9	3	3	0	0	0	3	4	1	0	1	0	3	0	9	0	4	3	0	0	0	0	2	0	2	0	0	4	3	4	2	0	0
Tributyltin cation	0	0	0	0	0	0	0	0	3	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichloromethane	0	1	1	4	0	0	2	0	3	0	0	0	0	4	4	0	1	0	0	0	3	0	4	1	1	0	0	0	2	0	2	0	0	0	0	0	3	0	0
Trifluralin	0	0	0	4	0	0	2	3	3	0	0	0	3	4	1	1	0	0	2	0	8	0	0	1	0	0	0	0	2	0	2	0	0	1	3	4	2	0	0
Σ Benzo(b)fluoranthene, Benzo(k)fluoranthene	0	0	2	4	0	0	2	3	0	0	0	0	2	4	1	0	1	0	1	0	9	0	3	1	1	0	0	0	2	0	1	0	0	2	0	0	2	0	0
Σ Benzo(g,h,i)perylene, Indeno(1,2,3-cd)pyrene	0	0	1	4	0	0	1	3	0	0	0	0	0	3	0	0	1	0	0	0	9	0	0	0	0	0	0	0	2	0	2	0	0	2	0	1	2	0	0
Σ Cyclodienes	0	0	1	4	1	0	8	3	0	0	0	0	0	4	1	0	4	1	3	0	4	0	3	0	2	0	0	0	2	0	2	0	0	4	0	4	1	0	0
Σ HCH	0	0	1	4	0	0	2	3	0	0	0	0	2	4	1	0	4	2	3	0	7	0	3	1	2	0	0	0	2	4	0	0	0	4	4	2	2	0	0

Table 3.3.3 No. of years with available river data for countries within the 2008-2009 period

Substance	AL	AT	BA	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR	HU	IE	IS	IT	LI	LT	LU	LV	ME	MK	MT	NL	NO	PL	PT	RO	RS	SE	SI	SK	TR	XK
1,1,2,2-Tetrachloroethene	0	0	0	1	0	0	1	0	2	0	0	1	0	2	2	0	0	0	0	0	2	0	2	1	0	0	0	0	2	0	1	0	0	0	0	0	1	0	0
1,2-dichloroethane	0	0	0	2	0	0	2	1	2	0	0	1	0	2	2	0	1	0	1	0	2	0	0	2	0	0	0	0	2	0	2	0	0	0	0	0	1	0	0
4-nonylphenol	0	0	0	2	0	0	0	0	0	0	0	0	2	2	1	0	0	0	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Alachlor	0	1	1	2	0	0	2	1	0	0	0	1	2	2	0	0	1	0	2	0	2	0	0	2	0	0	0	0	2	0	2	1	1	1	2	2	1	0	0
Anthracene	0	0	2	2	0	0	0	0	2	0	0	0	1	2	1	1	1	0	2	0	2	0	2	1	1	0	0	0	2	0	2	1	1	0	0	1	1	0	0
Atrazine	0	1	2	2	0	0	2	1	1	0	0	0	2	2	2	1	2	0	2	0	2	0	2	2	0	0	0	0	2	0	2	1	1	2	2	2	0	0	0
Benzene	0	0	0	2	0	0	2	1	1	0	0	1	0	2	2	1	1	0	1	0	2	0	2	2	1	0	0	0	2	0	2	1	0	0	0	1	0	0	0
Benzo(a)pyrene	0	0	2	2	0	0	2	1	1	0	0	1	1	2	1	0	1	0	1	0	2	0	2	0	1	0	0	0	2	0	2	1	1	1	0	0	1	0	0
Cadmium	0	2	2	2	0	2	2	1	1	0	1	0	2	2	2	0	2	0	1	1	2	0	2	0	2	0	1	0	2	1	1	2	2	2	2	2	0	0	0
Cadmium dissolved	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1	0	1
Chlorfenvinphos	0	0	1	1	0	0	2	0	0	0	0	0	2	2	1	0	1	0	2	0	2	0	0	2	0	0	0	0	2	0	2	1	0	1	2	2	1	0	0
Chlorpyrifos	0	0	0	2	0	0	2	1	0	0	0	0	2	2	0	0	1	0	0	0	2	0	0	1	0	0	0	0	2	0	1	0	0	1	2	1	2	0	0
DDT Total	0	0	0	1	0	0	2	1	0	0	0	0	1	2	0	0	2	0	0	0	1	0	1	0	2	0	0	0	2	0	2	0	0	2	0	1	0	0	0
DDT, p,p'	0	0	0	1	0	0	2	1	1	0	0	0	1	2	1	0	2	0	0	0	2	0	2	0	2	0	0	0	2	0	2	0	1	2	0	1	0	0	0
Di (2-ethylhexyl) phthalate (DEHP)	0	0	1	1	0	0	0	0	0	0	0	0	2	2	2	0	0	0	1	0	1	0	1	2	0	0	0	0	2	0	2	0	0	0	0	1	1	0	0
Dichloromethane	0	0	1	2	0	0	2	0	1	0	0	1	0	2	2	0	1	0	1	0	2	0	2	2	0	0	0	0	2	0	2	0	0	0	0	1	1	0	0
Diuron	0	0	1	2	0	0	1	1	1	0	0	1	2	2	2	1	1	0	2	0	2	0	1	1	0	0	0	0	2	0	2	0	0	1	2	1	0	0	0
Endosulfan	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	2	0	2	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0
Fluoranthene	0	0	2	2	0	0	0	1	1	0	0	0	1	2	1	1	1	0	2	0	2	0	2	2	1	0	0	0	2	0	2	1	1	1	0	0	1	0	0
Hexachlorobenzene (HCB)	0	0	0	2	0	0	1	1	1	0	0	0	0	2	1	0	1	0	2	0	2	0	2	1	2	0	0	0	2	0	2	0	1	2	0	2	0	0	0
Hexachlorobutadiene (HCBD)	0	0	0	2	0	0	1	1	1	0	0	0	1	2	1	0	1	0	2	0	2	0	1	2	0	0	0	0	2	0	2	0	0	0	0	2	0	0	0
Isoproturon	0	0	1	2	0	0	1	1	1	0	0	1	2	2	2	1	1	0	2	0	2	0	1	1	0	0	0	0	2	0	1	0	0	1	2	1	0	0	0
Lead	0	2	2	2	2	2	2	1	0	0	1	0	2	2	2	0	2	0	1	1	2	0	2	0	2	0	0	0	2	1	1	2	2	2	2	2	0	0	0
Lead dissolved	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2	0	0	1	0	1
Mercury	0	2	1	2	0	0	0	1	1	0	0	0	2	2	2	0	1	0	1	1	2	0	2	0	0	0	0	0	2	0	1	1	2	1	1	2	1	0	0
Mercury dissolved	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
Naphthalene	0	0	1	1	0	0	1	0	1	0	0	0	1	2	2	1	1	0	1	0	2	0	0	0	0	0	0	0	2	0	1	1	1	0	0	0	0	0	0
Nickel	0	2	2	2	2	0	2	1	0	0	1	0	2	2	2	0	2	0	1	0	2	0	2	0	2	0	1	0	2	1	1	0	2	2	2	2	1	0	0
Nickel dissolved	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2	0	0	0	0	1
Para-tert-octylphenol	0	0	0	2	0	0	0	0	0	0	0	0	2	2	2	0	0	0	2	0	1	0	1	1	0	0	0	0	2	0	1	0	0	0	0	1	1	0	0
Pentachlorobenzene	0	0	0	2	0	0	0	0	0	0	0	0	1	2	0	0	1	0	2	0	1	0	1	0	0	0	0	0	2	0	2	0	1	0	0	1	0	0	0
Pentachlorophenol	0	0	1	2	0	0	0	0	1	0	0	1	0	2	1	0	1	0	2	0	2	0	1	2	0	0	0	0	2	0	2	1	0	1	0	1	1	0	0
Simazine	0	1	0	2	0	0	2	1	1	0	0	0	2	2	1	0	1	0	2	0	2	0	2	2	0	0	0	0	2	0	2	0	0	2	2	2	0	0	0
Tributyltin cation	0	0	0	0	0	0	0	0	1	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichloromethane	0	0	0	2	0	0	2	0	1	0	0	0	0	2	2	0	1	0	0	0	2	0	2	1	1	0	0	0	2	0	2	0	0	0	0	0	1	0	0
Trifluralin	0	0	0	2	0	0	2	1	1	0	0	0	2	2	1	1	0	0	1	0	2	0	0	1	0	0	0	0	2	0	2	0	0	1	2	2	0	0	0
Σ Benzo(b)fluoranthene, Benzo(k)fluoranthene	0	0	2	2	0	0	2	1	0	0	0	0	1	2	1	0	1	0	1	0	2	0	1	0	0	0	0	0	2	0	1	0	0	1	0	0	0	0	0
Σ Benzo(g,h,i)perylene, Indeno(1,2,3-cd)pyrene	0	0	1	2	0	0	1	1	0	0	0	0	0	2	0	0	1	0	0	0	2	0	0	0	0	0	0	0	2	0	2	0	0	1	0	0	0	0	0
Σ Cyclodienes	0	0	1	2	1	0	2	1	0	0	0	0	0	2	1	0	2	0	2	0	2	0	1	0	2	0	0	0	2	0	2	0	0	2	0	2	0	0	0
Σ HCH	0	0	1	2	0	0	2	1	0	0	0	0	1	2	1	0	2	0	2	0	2	0	1	0	1	0	0	0	2	0	0	0	0	2	2	2	0	0	0

Table 3.3.4 Available river samples within the 1999-2009 period

Substance	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Sum
1,1,2,2-tetrachloroethene			28	120	162	141	1260	4343	15483	6603	14878	**43018**
1,2-Dichloroethane	17	5				5	1025	4398	15735	7300	14616	**43101**
4-Nonylphenol								288	714	1578	7278	**9858**
Alachlor	19	7	36	100	104	108	119	7879	16169	10294	17445	**52280**
Anthracene						2	321	2269	13308	6477	15672	**38049**
Atrazine	19	7	36	101	105	104	1221	9828	17137	10370	18478	**57406**
Benzene	17	5					891	4220	15333	7060	16018	**43544**
Benzo(a)pyrene			1	12	10	14	336	2961	13775	6626	15530	**39265**
Cadmium	115	118	65	264	248	467	2076	8941	10347	11151	14359	**48151**
Cadmium dissolved										676	1829	**2505**
Chlorfenvinphos			29	95	97	99	93	3770	12976	8118	15973	**41250**
Chlorpyrifos			4		1	33	52	4190	15403	8771	15010	**43464**
DDT total					4	132	156	13344	46466	20489	40823	**121414**
DDT, p,p'							549	4279	12904	6238	11753	**35723**
Di (2-ethylhexyl) phthalate (DEHP)								1100	5038	4780	10529	**21447**
Dichloromethane							984	4210	13566	6217	15138	**40115**
Diuron	7				7	5	1018	5535	13943	7816	17689	**46020**
Endosulfan								479	2100	3453	823	**6855**
Fluoranthene			1	12	10	10	328	3087	13788	6571	14960	**38767**
Hexachlorobenzene (HCB)	20	7	7	5	7	5	436	4491	11780	7776	16286	**40820**
Hexachlorobutadiene (HCBD)	17	5					674	3329	8331	6806	15486	**34648**
Isoproturon					7	5	946	5119	13758	7694	17566	**45095**
Lead	118	148	123	608	654	843	1011	10760	27119	16496	19821	**77701**
Lead dissolved										682	4648	**5330**
Mercury	46	25	4	56	75	330	1449	7793	14378	12870	9766	**46792**
Mercury dissolved										605	1952	**2557**
Naphthalene						2	567	1958	12808	5339	15327	**36001**
Nickel	94	79	84	583	721	988	1036	10556	26952	16934	19537	**77564**
Nickel dissolved										660	4015	**4675**
Para-tert-octylphenol								2230	5955	2264	9031	**19480**
Pentachlorobenzene								606	3395	4756	13270	**22027**
Pentachlorophenol						2	319	3347	11889	5549	16358	**37464**
Simazine	19	7	36	106	110	110	1215	9288	16424	10194	18290	**55799**
Tributyltin cation							59	126		47	1381	**1613**
Trifluralin				1	1	33	405	5016	15562	8085	15518	**44621**
Σ Benzo(b)fluoranthene and Benzo(k)fluoranthene			2	24	20	20	16	4931	27401	12170	27367	**71951**
Σ Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene			2	23	20	16	16	1140	2203	2374	3929	**9723**
Σ Cyclodienes	60	21	21	15	21	15	14673	45678	29135	62292		**151931**
Σ Hexachlorocyclohexane (HCH)					1	72	85	14823	44912	27445	17603	**104941**

Table 3.3.5 Available river samples for countries within the 1999-2009 period

Substance	AL	AT	BA	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR	HU	IE	IS	IT	LI	LT	LU	LV	ME	MK	MT	NL	NO	PL	PT	RO	RS	SE	SI	SK	TR	XK
1,1,2,2-Tetrachloroethene	0	0	0	512	0	0	57	0	3449	0	0	491	0	28336	493	0	0	0	0	0	7934	0	651	18	0	0	0	0	288	0	185	0	0	0	0	0	604	0	0
1,2-dichloroethane	0	48	0	1422	0	0	84	1416	3184	0	0	491	0	27952	638	0	260	0	659	0	5624	0	0	39	0	0	0	0	287	0	236	0	0	0	0	0	761	0	0
4-nonylphenol	0	0	0	1329	0	0	0	0	0	0	0	0	172	6764	22	0	0	0	702	0	102	0	15	0	0	0	0	0	0	0	0	0	0	0	0	12	740	0	0
Alachlor	0	2889	6	1338	0	0	179	1269	0	0	0	191	147	35542	0	0	258	0	702	0	7910	0	0	39	0	0	0	0	354	0	60	74	6	146	56	332	782	0	0
Anthracene	0	0	37	1126	0	0	0	0	2692	0	0	0	75	29144	34	21	217	0	702	0	1975	0	631	21	41	0	0	0	379	0	448	22	22	0	0	24	438	0	0
Atrazine	0	2931	97	1325	0	0	164	1245	3817	0	0	0	147	34782	115	7	623	971	702	0	7964	0	259	39	0	0	0	0	354	0	99	80	28	891	56	332	378	0	0
Benzene	0	0	12	1444	0	0	84	1416	2998	0	0	491	0	27658	757	20	223	554	659	0	5267	0	652	39	24	0	0	0	285	0	357	6	0	0	0	214	384	0	0
Benzo(a)pyrene	0	0	27	1009	0	0	25	1287	1822	0	0	299	74	28714	288	0	217	0	672	0	2146	0	632	3	41	0	0	0	379	0	660	92	10	73	0	0	795	0	0
Cadmium	0	2883	396	740	59	300	166	1579	5348	0	469	0	2103	9580	10052	0	962	1192	869	12	3843	0	671	0	192	0	118	0	445	1324	516	92	210	254	2875	507	394	0	0
Cadmium dissolved	0	0	0	0	0	0	0	0	1480	0	0	0	0	0	44	0	0	0	0	0	0	0	0	0	0	0	0	0	227	0	0	0	37	602	0	0	41	0	74
Chlorfenvinphos	0	0	17	181	0	0	78	0	0	0	0	0	147	34735	55	0	258	0	702	0	3989	0	0	36	0	0	0	0	326	0	38	3	0	142	56	332	155	0	0
Chlorpyrifos	0	0	0	1210	0	0	78	1117	0	0	0	0	115	34190	0	0	257	0	0	0	5387	0	0	18	0	0	0	0	326	0	37	0	0	146	56	40	487	0	0
DDT Total	0	0	36	723	0	0	361	3654	0	0	0	0	220	1E+05	0	0	2524	1054	0	0	2106	0	199	0	172	0	0	0	1504	0	531	0	0	2674	0	16	###	0	0
DDT, p,p'	0	0	12	723	0	0	105	1232	1710	0	0	0	55	27774	304	0	904	425	0	0	621	0	239	0	51	0	0	0	379	0	226	0	40	892	0	4	27	0	0
Di (2-ethylhexyl) phthalate (DEHP)	0	0	6	252	0	0	0	0	0	0	0	0	217	18173	480	0	0	0	672	0	348	0	15	39	0	0	0	0	339	0	55	0	0	0	0	36	815	0	0
Dichloromethane	0	0	6	1410	0	0	60	0	3176	0	0	313	0	27962	502	0	256	0	654	0	3675	0	649	39	0	0	0	0	288	0	161	0	0	0	0	234	730	0	0
Diuron	0	0	18	1262	0	0	40	556	3530	0	0	119	130	34961	124	18	218	0	702	0	3156	0	40	21	0	0	0	0	276	0	54	0	0	122	56	222	395	0	0
Endosulfan	0	0	0	882	0	0	0	0	0	0	0	0	0	4557	0	0	336	0	0	0	294	0	226	3	0	0	0	0	1	0	183	0	0	0	0	0	373	0	0
Fluoranthene	0	0	35	1038	0	0	0	1286	1870	0	0	0	75	28346	266	21	217	0	702	0	2109	0	631	27	41	0	0	0	378	0	665	54	22	73	0	210	701	0	0
Hexachlorobenzene (HCB)	0	0	0	904	0	0	110	1185	1825	0	0	0	0	30137	183	0	263	0	702	0	3123	0	245	18	48	0	0	0	379	0	176	0	12	891	0	234	385	0	0
Hexachlorobutadiene (HCBD)	0	0	0	903	0	0	49	1344	1946	0	0	0	87	23658	183	0	255	0	577	0	4449	0	16	33	0	0	0	0	379	0	170	0	0	0	0	238	361	0	0
Isoproturon	0	0	6	1263	0	0	33	586	3476	0	0	123	143	34640	132	17	218	0	702	0	2618	0	40	18	0	0	0	0	275	0	22	0	0	122	65	222	374	0	0
Lead	0	2669	338	1785	1044	311	161	1709	0	0	458	0	2100	27676	9786	0	962	1223	915	12	18579	0	366	0	322	0	0	0	432	1324	491	222	730	257	2874	508	447	0	0
Lead dissolved	0	95	0	0	0	0	0	0	1671	0	0	0	0	0	1088	0	349	0	0	0	193	0	0	0	0	0	0	0	227	0	0	0	116	1149	0	0	366	0	76
Mercury	0	2398	90	1002	0	71	0	1604	4145	0	288	0	1292	16672	4317	0	118	1196	866	12	7683	0	678	0	13	0	0	0	387	1109	254	29	29	195	1212	613	519	0	0
Mercury dissolved	0	12	0	0	0	0	0	0	1023	0	0	0	0	0	762	0	0	0	0	0	0	0	0	0	0	0	0	0	155	0	0	0	0	605	0	0	0	0	0
Naphthalene	0	0	12	167	0	0	32	0	2491	0	0	0	75	28717	45	20	217	0	659	0	2434	0	0	0	4	0	0	0	378	0	301	24	34	0	0	0	391	0	0
Nickel	0	2669	361	1858	801	188	166	1802	0	0	24	0	2099	27596	10086	0	954	1167	915	0	19022	0	366	0	314	0	12	0	445	1329	555	3	718	253	2875	508	478	0	0
Nickel dissolved	0	0	0	0	0	0	0	0	1654	0	0	0	0	0	936	0	349	0	0	0	190	0	0	0	0	0	0	0	226	0	0	0	120	1123	0	0	0	0	77
Para-tert-octylphenol	0	0	0	1293	0	0	0	0	0	0	0	0	160	16773	27	0	0	0	702	0	102	0	15	18	0	0	0	0	299	0	20	0	0	0	0	12	59	0	0
Pentachlorobenzene	0	0	0	904	0	0	0	0	0	0	0	0	60	19533	0	0	220	0	702	0	11	0	37	0	0	0	0	0	379	0	147	0	18	0	0	4	12	0	0
Pentachlorophenol	0	0	18	1327	0	0	0	0	1195	0	0	300	0	30772	237	0	241	0	702	0	1508	0	143	39	0	0	0	0	299	0	156	3	0	96	0	260	168	0	0
Simazine	0	2931	12	1338	0	0	162	1245	3811	0	0	0	147	34776	108	0	252	0	702	0	7905	0	259	39	0	0	0	0	354	0	95	0	0	891	56	332	384	0	0
Tributyltin cation	0	0	0	0	0	0	0	0	282	0	0	0	0	1330	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichloromethane	0	48	12	1432	0	0	62	0	3503	0	0	0	0	27985	514	0	277	0	0	0	7159	0	651	18	6	0	0	0	288	0	344	0	0	0	0	0	788	0	0
Trifluralin	0	0	0	955	0	0	78	1154	1661	0	0	0	115	33814	92	13	0	0	30	0	5352	0	0	6	0	0	0	0	351	0	60	0	0	147	56	332	405	0	0
Σ Benzo(b)fluoranthene, Benzo(k)fluoranthene	0	0	40	2004	0	0	50	2574	0	0	0	0	150	57960	40	0	434	0	1344	0	4130	0	977	6	8	0	0	0	756	0	561	0	0	144	0	0	773	0	0
Σ Benzo(g,h,i)perylene, Indeno(1,2,3-cd)pyrene	0	0	11	1816	0	0	30	1772	0	0	0	0	0	2696	0	0	434	0	0	0	398	0	0	0	0	0	0	0	756	0	712	0	0	144	0	210	744	0	0
Σ Cyclodienes	0	0	6	3616	92	0	468	4636	0	0	0	0	0	1E+05	1063	0	1872	1013	2808	0	8623	0	633	0	120	0	0	0	1475	0	980	0	0	2820	0	278	100	0	0
Σ HCH	0	0	2	2347	0	0	210	3238	0	0	0	0	211	83502	355	0	1207	538	1434	0	6777	0	199	3	9	0	0	0	1512	157	0	0	0	2674	119	24	423	0	0

Table 3.3.6 Available river stations with data within the 1999-2009 period

Substance	AL	AT	BA	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR	HU	IE	IS	IT	LI	LT	LU	LV	ME	MK	MT	NL	NO	PL	PT	RO	RS	SE	SI	SK	TR	XK
1,1,2,2-Tetrachloroethene	0	0	0	43	0	0	14	0	161	0	0	143	0	1446	39	0	0	0	0	0	481	0	16	3	0	0	0	0	12	0	30	0	0	0	0	0	32	0	0
1,2-dichloroethane	0	4	0	42	0	0	15	53	150	0	0	143	0	1437	59	0	25	0	61	0	453	0	0	3	0	0	0	0	12	0	48	0	0	0	0	0	36	0	0
4-nonylphenol	0	0	0	43	0	0	0	0	0	0	0	0	10	601	11	0	0	0	60	0	34	0	9	0	0	0	0	0	0	0	0	0	0	0	0	1	43	0	0
Alachlor	0	284	6	45	0	0	19	50	0	0	0	35	9	1478	0	0	28	0	60	0	483	0	0	3	0	0	0	0	14	0	21	15	3	62	2	20	35	0	0
Anthracene	0	0	22	44	0	0	0	0	120	0	0	0	7	1435	12	20	23	0	60	0	166	0	14	3	7	0	0	0	15	0	87	14	2	0	0	2	37	0	0
Atrazine	0	284	19	44	0	0	19	47	164	0	0	0	9	1478	22	7	27	135	60	0	501	0	15	3	0	0	0	0	14	0	32	16	4	69	2	20	34	0	0
Benzene	0	0	12	43	0	0	15	53	150	0	0	143	0	1437	107	19	23	81	61	0	323	0	16	3	4	0	0	0	12	0	69	3	0	0	0	19	33	0	0
Benzo(a)pyrene	0	0	12	35	0	0	9	50	110	0	0	40	7	1437	34	0	23	0	56	0	168	0	14	3	7	0	0	0	15	0	112	19	1	27	0	0	39	0	0
Cadmium	0	254	47	49	11	6	19	56	197	0	29	0	48	732	261	0	40	147	75	3	321	0	19	0	29	0	10	0	15	46	78	13	37	22	88	21	37	0	0
Cadmium dissolved	0	0	0	0	0	0	0	0	117	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	7	73	0	0	3	0	45
Chlorfenvinphos	0	0	17	14	0	0	12	0	0	0	0	0	9	1478	13	0	28	0	60	0	323	0	0	3	0	0	0	0	13	0	17	2	0	62	2	20	12	0	0
Chlorpyrifos	0	0	0	45	0	0	12	49	0	0	0	0	9	1478	0	0	28	0	0	0	349	0	0	3	0	0	0	0	13	0	16	0	0	62	2	8	37	0	0
DDT Total	0	0	12	29	0	0	14	51	0	0	0	0	8	1209	0	0	41	88	0	0	157	0	15	0	14	0	0	0	15	0	57	0	0	69	0	1	35	0	0
DDT, p,p'	0	0	12	29	0	0	14	51	96	0	0	0	8	1209	34	0	41	77	0	0	127	0	15	0	14	0	0	0	15	0	40	0	7	69	0	1	11	0	0
Di (2-ethylhexyl) phthalate (DEHP)	0	0	6	35	0	0	0	0	0	0	0	0	10	1160	65	0	0	0	56	0	110	0	8	3	0	0	0	0	14	0	18	0	0	0	0	3	40	0	0
Dichloromethane	0	0	6	42	0	0	14	0	163	0	0	125	0	1436	28	0	24	0	60	0	222	0	16	3	0	0	0	0	12	0	41	0	0	0	0	20	33	0	0
Diuron	0	0	17	40	0	0	11	30	166	0	0	24	9	1478	44	17	24	0	60	0	254	0	10	3	0	0	0	0	10	0	22	0	0	60	2	19	34	0	0
Endosulfan	0	0	0	43	0	0	0	0	0	0	0	0	0	448	0	0	34	0	0	0	21	0	14	3	0	0	0	0	1	0	30	0	0	0	0	0	32	0	0
Fluoranthene	0	0	17	38	0	0	0	50	115	0	0	0	7	1437	23	20	23	0	60	0	185	0	14	3	7	0	0	0	15	0	106	15	2	27	0	19	37	0	0
Hexachlorobenzene (HCB)	0	0	0	43	0	0	14	50	106	0	0	0	0	1401	30	0	24	0	60	0	250	0	15	3	14	0	0	0	15	0	45	0	1	69	0	19	35	0	0
Hexachlorobutadiene (HCBD)	0	0	0	43	0	0	12	52	116	0	0	0	8	1437	30	0	24	0	44	0	281	0	9	3	0	0	0	0	15	0	43	0	0	0	0	20	34	0	0
Isoproturon	0	0	6	40	0	0	11	34	166	0	0	28	9	1478	45	17	24	0	60	0	185	0	10	3	0	0	0	0	10	0	14	0	0	60	2	19	32	0	0
Lead	0	256	47	59	107	6	19	56	0	0	28	0	48	1443	260	0	40	141	78	3	1012	0	19	0	34	0	0	0	15	46	76	47	68	22	88	21	40	0	0
Lead dissolved	0	7	0	0	0	0	0	0	131	0	0	0	0	0	109	0	30	0	0	0	34	0	0	0	0	0	0	0	14	0	0	0	14	73	0	0	30	0	46
Mercury	0	235	20	36	0	3	0	55	158	0	25	0	32	1146	273	0	33	147	73	3	648	0	19	0	3	0	0	0	15	46	43	8	14	22	67	21	37	0	0
Mercury dissolved	0	1	0	0	0	0	0	0	80	0	0	0	0	0	91	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	73	0	0	0	0	0
Naphthalene	0	0	4	14	0	0	8	0	135	0	0	0	7	1437	15	20	23	0	61	0	191	0	0	0	1	0	0	0	15	0	43	15	3	0	0	0	37	0	0
Nickel	0	256	46	59	89	4	19	60	0	0	8	0	49	1437	259	0	40	140	78	0	1019	0	19	0	33	0	1	0	15	46	83	1	68	22	88	21	38	0	0
Nickel dissolved	0	0	0	0	0	0	0	0	130	0	0	0	0	0	108	0	30	0	0	0	33	0	0	0	0	0	0	0	14	0	0	0	14	73	0	0	0	0	46
Para-tert-octylphenol	0	0	0	40	0	0	0	0	0	0	0	0	9	1049	13	0	0	0	60	0	34	0	9	3	0	0	0	0	13	0	13	0	0	0	0	1	5	0	0
Pentachlorobenzene	0	0	0	43	0	0	0	0	0	0	0	0	7	1246	0	0	24	0	60	0	8	0	10	0	0	0	0	0	15	0	34	0	5	0	0	1	4	0	0
Pentachlorophenol	0	0	17	43	0	0	0	0	83	0	0	133	0	1439	39	0	25	0	60	0	128	0	12	3	0	0	0	0	13	0	36	2	0	52	0	19	14	0	0
Simazine	0	284	12	45	0	0	20	47	164	0	0	0	9	1478	18	0	23	0	60	0	490	0	15	3	0	0	0	0	14	0	31	0	0	69	2	20	34	0	0
Tributyltin cation	0	0	0	0	0	0	0	0	20	0	0	0	0	126	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichloromethane	0	4	12	42	0	0	14	0	162	0	0	0	0	1437	39	0	27	0	0	0	453	0	16	3	1	0	0	0	12	0	75	0	0	0	0	0	36	0	0
Trifluralin	0	0	0	45	0	0	12	50	97	0	0	0	9	1478	17	13	0	0	4	0	355	0	0	1	0	0	0	0	14	0	18	0	0	62	2	20	35	0	0
Σ Benzo(b)fluoranthene, Benzo(k)fluoranthene	0	0	5	30	0	0	9	50	0	0	0	0	7	1435	10	0	23	0	56	0	183	0	14	3	1	0	0	0	15	0	73	0	0	27	0	0	37	0	0
Σ Benzo(g,h,i)perylene, Indeno(1,2,3-cd)pyrene	0	0	4	30	0	0	6	37	0	0	0	0	0	126	0	0	23	0	0	0	35	0	0	0	0	0	0	0	15	0	97	0	0	27	0	19	36	0	0
Σ Cyclodienes	0	0	1	43	6	0	15	51	0	0	0	0	0	1449	35	0	41	83	60	0	179	0	15	0	13	0	0	0	15	0	57	0	0	69	0	19	11	0	0
Σ HCH	0	0	2	44	0	0	14	50	0	0	0	0	8	1458	30	0	41	84	60	0	288	0	15	3	4	0	0	0	15	10	0	0	0	69	2	2	36	0	0

4 Current State

4.1 Hazardous substances in groundwater across Europe in 1999 – 2009

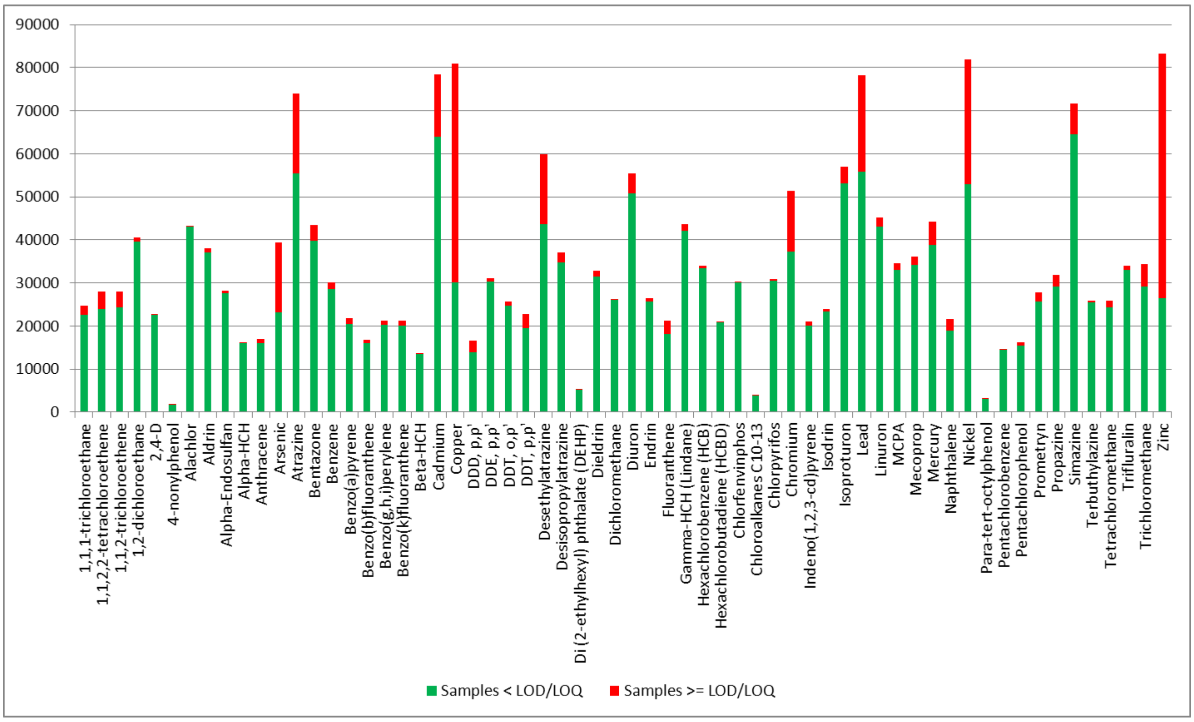
4.1.1 Overview

The number and percentage of negative (samples < LOQ) and positive (samples >= LOQ) findings within the 1999-2009 period are shown in figures 4.1.1.1 and 4.1.1.2. The number and percentage of monitoring stations with negative findings (all samples in station < LOQ within 1999-2009 period) and positive findings (at least one sample in station >= LOQ within the 1999–2009 period) are shown in figures 4.1.1.3 and 4.1.1.4.

The maximum concentrations in groundwater are shown in figure 4.1.1.5. Metals and metalloids (As, Cu, Pb, Ni, Zn), 1,1,2,2-tetrachloroethene, pentachlorophenol, PAHs (anthracene, fluoranthene) and bentazone were reported in concentrations higher than 1000 μg/l.

Pesticides, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), metals and metalloids are substances most frequently occurring and exceeding drinking water standards in groundwater across Europe. The most significant pollutants are triazine pesticides, especially atrazine and its metabolites, benzo(a)pyrene and lead. Those substances have exceeded the drinking water standards in more than 2% of monitoring stations during the last ten years.

Figure 4.1.1.1 Number of negative/positive samples in groundwater in 1999-2009



Note: The figures 4.1.1.1 – 4.1.1.4 do not reflect Austrian data. Contrary to the WISE-SoE dataset definition, Austrian data were reported as stations' annual averages without a specification of how many samples had been used for the annual average calculations and how many samples had been found below and above the LOD/LOQ.

Figure 4.1.1.2 Percentage of negative/positive samples in groundwater in 1999–2009

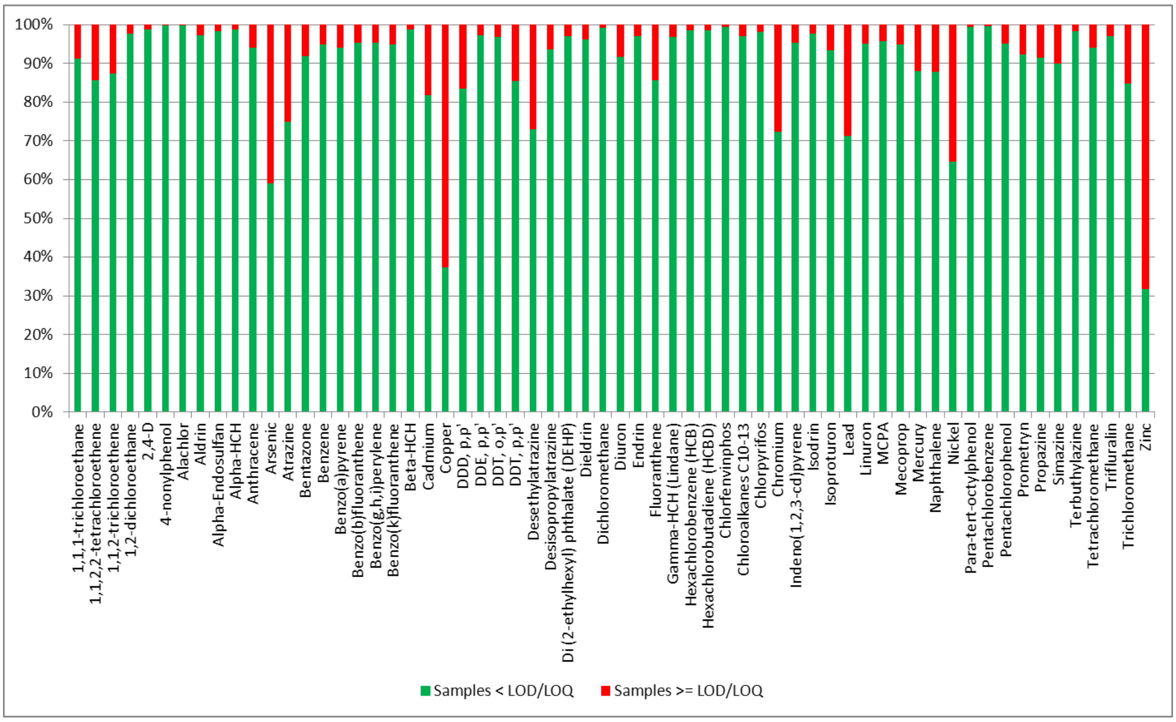


Figure 4.1.1.3 Number of stations with negative/positive findings in groundwater in 1999–2009

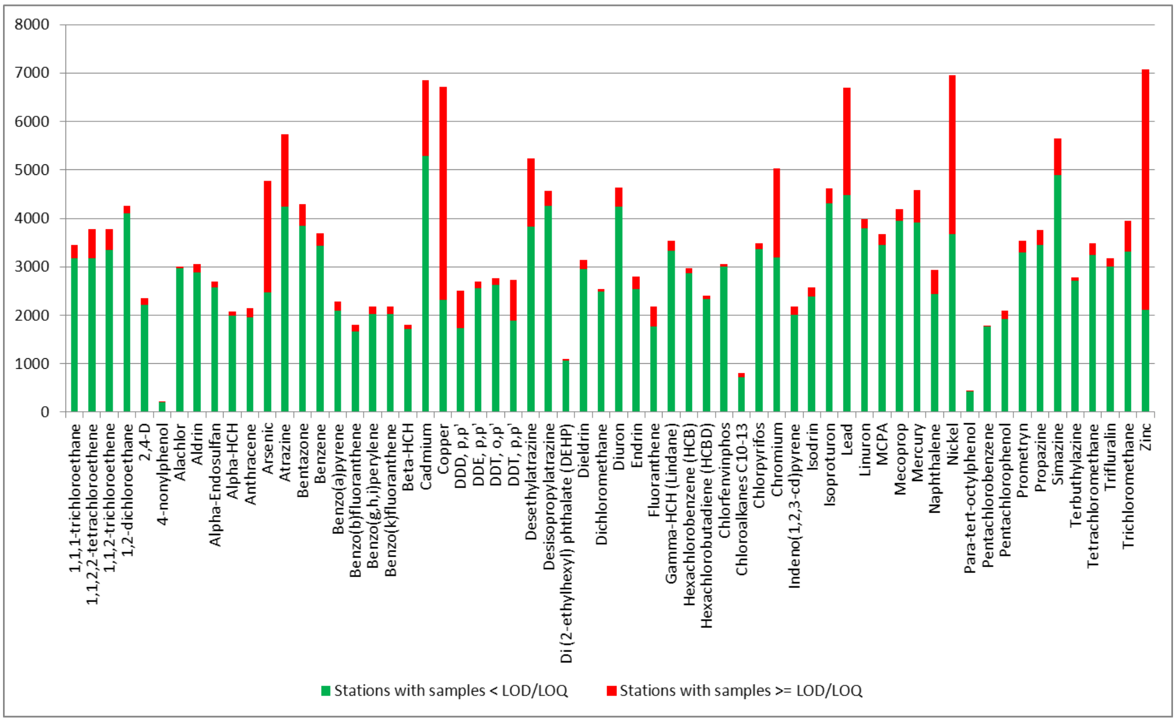


Figure 4.1.1.4 Percentage of stations with negative/positive findings in groundwater in 1999-2009

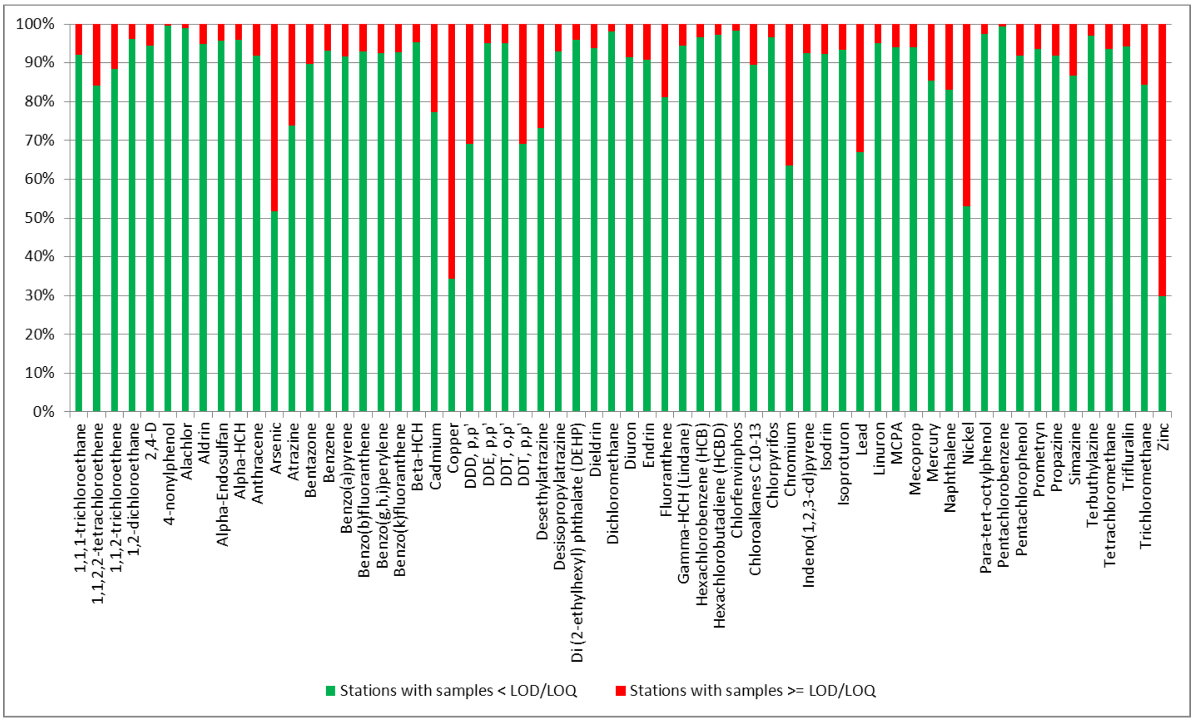


Figure 4.1.1.5 Maximum reported groundwater concentrations in 1999 –2009 period

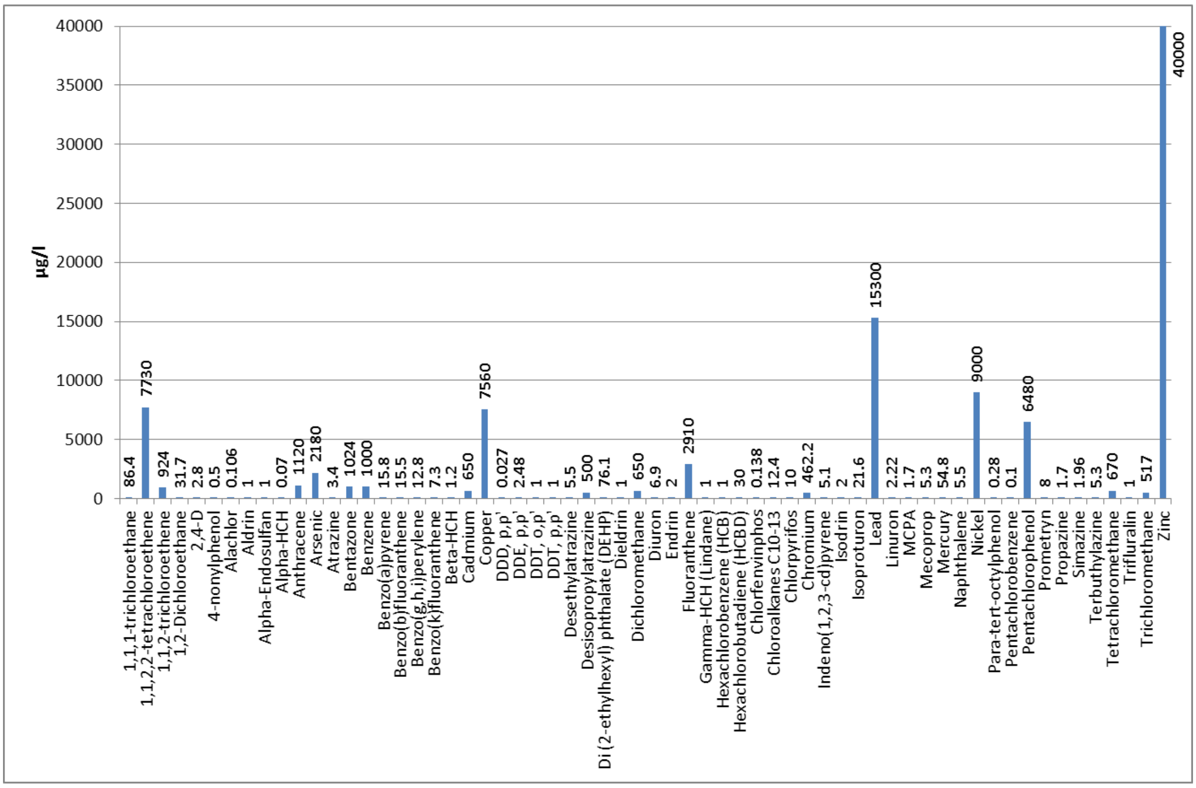


Table 4.1.1.1 Maximum concentrations (µg/l) reported by countries in 1999-2009

Country	1,1,1-trichloroethane	1,1,2,2-tetrachloroethene	1,1,2-trichloroethene	1,2-Dichloroethane	2,4-D	4-nonylphenol	Alachlor	Aldrin	Alpha-Endosulfan	Alpha-HCH
AL										
AT				0.28			<0.05	<0.02		
BA								0.005	0.005	
BE	4.8	29.6	9.69	13	0.029		<0.01	<0.0075		
BG		33	2.38		0.01		0.03	0.01	0.005	0.01
CY		6.58	0.28				0.106			
CZ		80.4	64.5	6.58	0.33		0.045	0.0041	0.032	0.035
DE	1.3			0.5	<0.1		<0.02	<0.001	<0.001	<0.005
DK	0.4	0.95	0.43	<0.02	2.8		<0.01			
EE										
FR	31	56.1	184	2.7	0.57	0.5	0.09	0.009	0.14	0.07
GB	86.4	7730	924	6.62	1.25	0.461		1	1	0.01
HR	0.1			<2			<0.1			<0.01
CH	0.8	4.7	1.24		<0.02		<0.01			
IE	0.8	<1	<1	<1	0.1					
IS				<1						
IT										
LT								<0.005	<0.004	<0.005
LU										
LV		<0.1	<0.1	<1						
PL										
PT							<0.01		<0.025	
RS								0.002		<0.001
SE										
SI	4.64	180	66		<0.1		<0.05	<0.01	0.04	<0.01
SK	76	116	40	31.7	<0.01	<1	<0.025	<0.025		

Country	Anthracene	Arsenic	Atrazine	Bentazone	Benzene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Beta-HCH
AL										
AT			2.8	5.105						
BA										
BE	0.124	32.59	0.62	1024	0.4	0.098	0.121	0.092	0.091	
BG		400	0.711							0.009
CY		41	0.399							
CZ	1.2	76	2.3	0.793	2.7	1.58	3.5	1.3	3.2	0.169
DE	<0.01	252	0.33	3.5	<1	<0.01	<0.01	<0.01	<0.01	<0.005
DK		64	0.43	0.71	0.66					
EE		10.5								
FR	5.2	300	1.48	1.267	3.7	15.8	15.5	12.8	7.3	1.2
GB	1120	1790	3	306	1000	2.61	0.02	1.22	1.19	0.01
HR	<0.01	7.1	0.13		<0.5	<0.01	<0.01	<0.01	<0.01	<0.01
CH		8.2	0.14	0.095	<0.1					
IE	0.03	234	0.07	0.19	0.1	<0.09				
IS	<0.005				<0.2	<0.005	<0.005	<0.005	<0.005	
IT			<0.01							
LT			3.4							<0.005
LU						0.002	0.002	0.002	0.002	
LV		12								
PL		24								
PT			<0.034							
RS			3.009							0.014
SE										
SI		2	0.64	1.09	<1					<0.01
SK	0.086	2180	0.68	<0.01	55.8	0.31	0.35	0.33	0.19	

Table 4.1.1.1 continued

Country	Cadmium	Copper	DDD, p,p'	DDE, p,p'	DDT, o,p'	DDT, p,p'	Desethylatrazine	Desisopropylatrazine	Di (2-ethylhexyl) phthalate	Dieldrin
AL		3								
AT	4.666667	0.11					3.175			
BA	1.94	240								0.005
BE	2.29	1613		<0.014		0.001	0.695	0.278		<0.0075
BG	5	46	0.01	0.251	0.01	0.0102	<0.005	<0.005		0.01
CY	2.84	26								
CZ	7.3	891	0.002	0.0045	0.003	0.003	0.539	0.077	26.9	0.0087
DE	650	1010			<0.0008	<0.0012	0.49	0.32		<0.001
DK	9.7	1100					5.5	0.33	3.7	
EE	<0.2									
FR	9	1000	<0.1	<0.1	0.007	0.009	1.67	0.73	19	0.14
GB	102	7560	0.01	0.055	1	1	1.25	500	76.1	1
HR	1.9	28.8	<0.05	<0.05		<0.05				<0.08
CH	<0.2	4.9					0.27	0.26		
IE	1.8	711				<0.05				<0.1
IS	0.0053	0.902								
IT										
LT	<0.3	25								<0.005
LU										
LV	0.44	<1.9								
PL	43.81	35.54								
PT										
RS	21	320	0.027		0.027	0.006				0.028
SE	0.153	15								
SI	2.3	94	<0.005	<0.01	<0.01	<0.01	0.47	0.14		0.005
SK	5.3	106		2.48		<0.025	0.2	0.05	<5	<0.025

Country	Dichloromethane	Diuron	Endrin	Fluoranthene	Gamma-HCH	Hexachlorobenzene	Hexachlorobutadiene	Chlorfenvinphos	Chloroalkanes C10-13	Chlorpyrifos
AL										
AT	9.62	3.7			0.06375	<0.025				
BA			0.005							
BE		0.834		0.333	0.386	<5	<1	0.001		
BG		0.04	0.01		0.009	0.015		0.01		0.05
CY								<0.005		<0.012
CZ	2.39	0.14	0.036	8.9	0.013	0.006	<100		12.4	1.34
DE	50	1.1	<0.001	<0.01	0.05	<0.001	<0.01	<0.01		<0.01
DK	0.041	0.023								<0.01
EE										
FR	176	6.9	2	32.9	0.13	0.013	30	0.02	<10	0.02
GB	650	4.03	1	2910	1	1	2	0.138		10
HR	<0.5		<0.08	<0.01	<0.01	<0.01	<0.09	<0.05		<0.05
CH		0.021								
IE		3.06			0.03					
IS	<6			<0.005						
IT										
LT			<0.005		<0.005	<0.005		<1		<1
LU				0.002						
LV										
PL										
PT					<0.02	<0.02		<0.025		
RS			0.024		0.022	<0.001				
SE										
SI	7.4	0.005	<0.01		<0.01	<0.003	0.0006	<0.05		<0.05
SK	8.4	<0.01	<0.025	1.39	0.0125	0.015	0.05	<0.01		<0.02

Table 4.1.1.1 continued

Country	Chromium	Indeno(1,2,3-cd)pyrene	Isodrin	Isoproturon	Lead	Linuron	MCPA	Mecoprop	Mercury	Naphthalene	Nickel
AL	58				110						55
AT				0.18375	0.044	0.4			7.333333		0.074
BA	10.31				2.44				0.3		2.7
BE	10.4	0.07		0.825	97.5	0.013	0.02	0.029	2	0.031	405.8
BG	28.9	0.0004	0.005		25				2		25.5
CY	67				24.1				1		158
CZ	41.8	1.7	0.01	0.569	230	0.11	0.72	0.35	54.8	0.65	150
DE	32	<0.01	<0.001	21.6	147	<0.05	<0.1	2.116	0.24		200
DK	9			0.01	61	<0.01	0.28	5.3	0.11	0.37	490
EE					5.2				<1		
FR	12.3	5.1	2	2	360	0.24	1.7	0.77	3.1	0.5	292
GB	297	1.64	0.03	7.58	15300	2.22	1.52	5.09	15.7	5.5	9000
HR	13.4	<0.01	<0.05		57.5				<0.3	0.18	5.1
CH	4.4			<0.05	<1		<0.02	0.048	<0.5	<0.05	11
IE	462.2			0.08	62.5		0.33	1.1	1.31	<0.2	206
IS		<0.005			0.0666				<0.002	<0.2	0.32
IT											
LT					<2						
LU		0.002									
LV	<1.4				21				<0.06		18
PL	11.025				10				1.38		217
PT											
RS					106				1.6		41.1
SE	0.58				4.4						5.9
SI	17			0.24	35		<0.1	0.48	0.15		54
SK	67	0.26	<0.0125	<0.02	56		<0.02		23.9	0.28	174

Country	Para-tert-octylphenol	Pentachlorobenzene	Pentachlorophenol	Prometryn	Propazine	Simazine	Terbuthylazine	Tetrachloromethane	Trifluralin	Trichloromethane	Zinc
AL											1160
AT						0.26375					16.89333
BA											1630
BE			0.333	<0.025	0.026	0.347	1.595	0.6	0.005	26.2	7087
BG				0.045	0.292	0.229	<0.005	0.02	0.03		3930
CY					1.234	0.077			0.104		2242
CZ		0.1	0.025	1.67		0.095	5.3	12.2	0.055	109	1700
DE			<0.05	0.13	0.04	0.067	0.16	0.025	<0.01	23	23000
DK			0.12			0.27	0.07	0.4		6.6	2000
EE											
FR	0.28	0.1	2	0.19	0.09	1.3	0.26	670	0.03	254	40000
GB	0.037	<0.01	6480	8	0.093	1.96		8.13	1	517	17500
HR			2			<0.03				0.78	5619
CH					<0.01	0.027	<0.05	<0.05		0.73	30
IE						<0.01					3783
IS										<1	2.16
IT											
LT				<1	<1	<1			<1		116
LU											
LV										<1	95
PL											17030.37
PT						<0.04					
RS					0.013	0.29					3305
SE											93
SI			<0.1	0.239	<0.05	0.4	0.649	<0.2	<0.05	12	13000
SK	<1	<0.025	271	1.24		0.27	0.34	0.95	<0.02	5.8	1113

4.1.2 Occurrence and concentrations of hazardous substances in groundwater

1,1,2,2-tetrachloroethene

The assessment is based on data from 12 countries for the 1999-2009 and 2008-2009 periods, see tables 3.1.2 and 3.1.3. The substance was found in 14 % of samples (Fig. 4.1.1.2) and in 16 % of stations (Fig. 4.1.1.4). The number of reported stations has been substantially increasing since 2005 (Fig. 4.1.2.1a). 1,1,2,2-tetrachloroethene occurred in 10 of the 12 assessed countries (Fig. 4.1.2.1b) and exceeded the drinking water standard in 6 countries in 2008-2009 (Fig. 4.1.2.1c). The highest concentration of 7730 µg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

1,1,2-trichloroethene

The assessment is based on data from 12 countries for the 1999-2009 and 2008-2009 periods, see tables 3.1.2 and 3.1.3. The substance was found in 12 % of samples (Fig. 4.1.1.2) and in 12 % of stations (Fig. 4.1.1.4). The number of reported stations has been substantially increasing since 2005 (Fig. 4.1.2.2a). 1,1,2,-trichloroethene occurred in 10 of the 12 assessed countries (Fig. 4.1.2.2b) and exceeded the drinking water standard in 4 countries in 2008-2009 (Fig. 4.1.2.2c). The highest concentration of 924 µg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

1,2-dichloroethane

The assessment is based on data from 13 countries for the 1999-2009 period and 12 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 2 % of samples (Fig. 4.1.1.2) and in 3 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2005 (Fig. 4.1.2.3a). 1,2,-dichloroethane occurred in 6 of the 12 assessed countries (Fig. 4.1.2.3b) and exceeded the drinking water standard in 3 countries in 2008-2009 (Fig. 4.1.2.3c). The highest concentration of 31.7 µg/l was reported by Slovakia in the 1999-2009 period, see table 4.1.1.1.

2,4-D

The assessment is based on data from 10 countries for the 1999-2009 period and 9 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 1 % of samples (Fig. 4.1.1.2) and in 6 % of stations (Fig. 4.1.1.4). The number of reported stations has been substantially increasing since 2005 (Fig. 4.1.2.4a). 2,4-D occurred in 5 of the 12 assessed countries (Fig. 4.1.2.4b) and exceeded the drinking water standard in 3 countries in 2008-2009 (Fig. 4.1.2.4c). The highest concentration of 2.8 µg/l (a possible point source) was reported by Denmark in the 1999-2009 period, see table 4.1.1.1.

Alachlor

The assessment is based on data from 12 countries for the 1999-2009 period and 9 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 0.2 % of samples (Fig. 4.1.1.2) and in 1 % of stations (Fig. 4.1.1.4). The number of reported stations has been substantially increasing since 2005 (Fig. 4.1.2.5a). Alachlor occurred in 4 of the 9 assessed countries (Fig. 4.1.2.5b) and exceeded the drinking water standard in 1 country in 2008-2009 (Fig. 4.1.2.5c). The highest concentration of 0.106 µg/l was reported by Cyprus in the 1999-2009 period, see table 4.1.1.1.

Arsenic

The assessment is based on data from 15 countries for the 1999-2009 period and 15 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 41 % of samples (Fig. 4.1.1.2) and in 48 % of stations (Fig. 4.1.1.4). The number of reported stations has been substantially increasing since 2006 (Fig. 4.1.2.6a). Arsenic occurred in 15 of the 15 assessed countries (Fig. 4.1.2.6b) and exceeded the drinking water standard in 13 countries in 2008-2009 (Fig. 4.1.2.6c). The highest concentration of 2180 µg/l was reported by Slovakia in the 1999-2009 period, see table 4.1.1.1.

Atrazine

The assessment is based on data from 12 countries for the 1999-2009 period and 15 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 25 % of samples (Fig. 4.1.1.2) and in 26 % of stations (Fig. 4.1.1.4). The number of reported stations has been slightly increasing since 2005 (Fig. 4.1.2.7a). Atrazine occurred in 15 of the 15 assessed countries (Fig. 4.1.2.7b) and exceeded the drinking water standard in 12 countries in 2008-2009 (Fig. 4.1.2.7c). The highest concentration of 3.4 µg/l was reported by Lithuania in the 1999-2009 period, see table 4.1.1.1.

Bentazone

The assessment is based on data from 10 countries for the 1999-2009 period and 10 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 8 % of samples (Fig. 4.1.1.2) and in 10 % of stations (Fig. 4.1.1.4). The number of reported stations has been substantially increasing since 2005 (Fig. 4.1.2.8a). Bentazone occurred in 9 of the 10 assessed countries (Fig. 4.1.2.8b) and exceeded the drinking water standard in 9 countries in 2008-2009 (Fig. 4.1.2.8c). The highest concentration of 1024 µg/l was reported by Belgium in the 1999-2009 period, see table 4.1.1.1.

Benzene

The assessment is based on data from 12 countries for the 1999-2009 period and 12 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 5 % of samples (Fig. 4.1.1.2) and in 6 % of stations (Fig. 4.1.1.4). The number of reported stations has been slightly increasing since 2005 (Fig. 4.1.2.9a). Benzene occurred in 6 of the 12 assessed countries (Fig. 4.1.2.9b) and exceeded the drinking water standard in 4 countries in 2008-2009 (Fig. 4.1.2.9c). The highest concentration of 1000 µg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

Benzo(a)pyrene

The assessment is based on data from 10 countries for the 1999-2009 period and 9 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 6 % of samples (Fig. 4.1.1.2) and in 9 % of stations (Fig. 4.1.1.4). The number of reported stations has been slightly increasing since 2005 (Fig. 4.1.2.10a). Benzo(a)pyrene occurred in 5 of the 9 assessed countries (Fig. 4.1.2.10b) and exceeded the drinking water standard in 5 countries in 2008-2009 (Fig. 4.1.2.10c). The highest concentration of 15.8 µg/l was reported by France in the 1999-2009 period, see table 4.1.1.1.

Cadmium

The assessment is based on data from 22 countries for the 1999-2009 period and 21 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 19 % of samples (Fig. 4.1.1.2) and in 23 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2006 (Fig. 4.1.2.11a). Cadmium occurred in 18 of the 21 assessed countries (Fig. 4.1.2.11b) and exceeded the drinking water standard in 5 countries in 2008-2009 (Fig. 4.1.2.11c). The highest concentration of 650 µg/l was reported by Germany in the 1999-2009 period, see table 4.1.1.1.

Chlorpyrifos

The assessment is based on data from 11 countries for the 1999-2009 period and 9 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 2 % of samples (Fig. 4.1.1.2) and in 2 % of stations (Fig. 4.1.1.4). The number of reported stations has been slightly increasing since 2006 (Fig. 4.1.2.12a). Chlorpyrifos occurred in 4 of the 9 assessed countries (Fig. 4.1.2.12b) and did not exceed the drinking water standard in 2008-2009 (Fig. 4.1.2.12c). The highest concentration of 10 µg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

DDD p,p'

The assessment is based on data from 7 countries for the 1999-2009 period and 7 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 17 % of samples (Fig. 4.1.1.2) and in 30 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2006 (Fig. 4.1.2.13a). DDD p,p'occurred in 3 of the 7 assessed countries (Fig. 4.1.2.13b) and did not exceed the drinking water standard in 2008-2009 (Fig. 4.1.2.13c). The highest concentration of 0.027 µg/l was reported by the Republic of Serbia in the 1999-2009 period, see table 4.1.1.1.

DDT p,p'

The assessment is based on data from 11 countries for the 1999-2009 period and 11 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 15 % of samples (Fig. 4.1.1.2) and in 30 % of stations (Fig. 4.1.1.4). The number of reported stations has been oscillating around 2200 from 2006 (Fig. 4.1.2.14a). DDT p,p' occurred in 5 of the 11 assessed countries (Fig. 4.1.2.14b) and exceeded the drinking water standard in 1 country in 2008-2009 (Fig. 4.1.2.14c). The highest concentration of 1 µg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

Desethylatrazine

The assessment is based on data from 11 countries for the 1999-2009 period and 10 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 27 % of samples (Fig. 4.1.1.2) and in 27 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2005 (Fig. 4.1.2.15a). Desethylatrazine occurred in 10 of the 10 assessed countries (Fig. 4.1.2.15b) and exceeded the drinking water standard in 10 countries in 2008-2009 (Fig. 4.1.2.15c). The highest concentration of 5.5 µg/l (a possible point source) was reported by Denmark in the 1999–2009 period, see table 4.1.1.1.

Desisopropylatrazine

The assessment is based on data from 10 countries for the 1999-2009 period and 9 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 6 % of samples (Fig. 4.1.1.2) and in 7 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2005 (Fig. 4.1.2.16a). Desisopropylatrazine occurred in 8 of the 9 assessed countries (Fig. 4.1.2.16b) and exceeded the drinking water standard in 6 countries in 2008-2009 (Fig. 4.1.2.16c). The highest concentration of 500 µg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

Dieldrin

The assessment is based on data from 13 countries for the 1999-2009 period and 11 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 4 % of samples (Fig. 4.1.1.2) and in 6 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2005 (Fig. 4.1.2.17a). Dieldrin occurred in 4 of the 11 assessed countries (Fig. 4.1.2.17b) and exceeded the drinking water standard in 2 countries in 2008-2009 (Fig. 4.1.2.17c). The highest concentration of 1 µg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

Diuron

The assessment is based on data from 12 countries for the 1999-2009 period and 11 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 9 % of samples (Fig. 4.1.1.2) and in 9 % of stations (Fig. 4.1.1.4). The number of reported stations has been slightly increasing since 2005 (Fig. 4.1.2.18a). Diuron occurred in 7 of the 11 assessed countries (Fig. 4.1.2.18b) and exceeded the drinking water standard in 4 countries in 2008-2009 (Fig. 4.1.2.18c). The highest concentration of 6.9 µg/l was reported by France in the 1999-2009 period, see table 4.1.1.1.

Gamma HCH

The assessment is based on data from 14 countries for the 1999-2009 period and 11 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 3 % of samples (Fig. 4.1.1.2) and in 5 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2005 (Fig. 4.1.2.19a). Gamma HCH occurred in 7 of the 11 assessed countries (Fig. 4.1.2.19b) and exceeded the drinking water standard in 2 countries in 2008-2009 (Fig. 4.1.2.19c). The highest concentration of 1 µg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

Isoproturon

The assessment is based on data from 11 countries for the 1999-2009 period and 10 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 7 % of samples (Fig. 4.1.1.2) and in 7 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2005 (Fig. 4.1.2.20a). Isoproturon occurred in 6 of the 10 assessed countries (Fig. 4.1.2.20b) and exceeded the drinking water standard in 14 countries in 2008-2009 (Fig. 4.1.2.20c). The highest concentration of 21.6 µg/l was reported by Germany in the 1999-2009 period, see table 4.1.1.1.

Lead

The assessment is based on data from 23 countries for the 1999-2009 period and 22 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 29 % of samples (Fig. 4.1.1.2) and in 33 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2002 (Fig. 4.1.2.21a). Lead occurred in 21 of the 22 assessed countries (Fig. 4.1.2.21b) and exceeded the drinking water standard in 6 countries in 2008-2009 (Fig. 4.1.2.21c). The highest concentration of 15300 µg/l was reported by the United Kingdom in the 1999–2009 period, see table 4.1.1.1.

Linuron

The assessment is based on data from 8 countries for the 1999-2009 period and 7 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 5 % of samples

(Fig. 4.1.1.2) and in 5 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2003 (Fig. 4.1.2.22a). Linuron occurred in 5 of the 7 assessed countries (Fig. 4.1.2.22b) and exceeded the drinking water standard in 4 countries in 2008-2009 (Fig. 4.1.2.22c). The highest concentration of 2.22 µg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

MCPA

The assessment is based on data from 9 countries for the 1999-2009 period and 8 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 4 % of samples (Fig. 4.1.1.2) and in 5 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2005 (Fig. 4.1.2.23a). MCPA occurred in 5 of the 8 assessed countries (Fig. 4.1.2.23b) and exceeded the drinking water standard in 3 countries in 2008-2009 (Fig. 4.1.2.23c). The highest concentration of 1.7 µg/l was reported by France in the 1999-2009 period, see table 4.1.1.1.

Mecoprop

The assessment is based on data from 9 countries for the 1999-2009 period and 8 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 5 % of samples (Fig. 4.1.1.2) and in 6 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2003 (Fig. 4.1.2.24a). Mecoprop occurred in 8 of the 8 assessed countries (Fig. 4.1.2.24b) and exceeded the drinking water standard in 6 countries in 2008-2009 (Fig. 4.1.2.24c). The highest concentration of 5.3 µg/l (a possible point source) was reported by Denmark in the 1999–2009 period, see table 4.1.1.1.

Mercury

The assessment is based on data from 20 countries for the 1999-2009 period and 17 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 12 % of samples (Fig. 4.1.1.2) and in 15 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2003 (Fig. 4.1.2.25a). Mercury occurred in 14 of the 17 assessed countries (Fig. 4.1.2.25b) and exceeded the drinking water standard in 5 countries in 2008-2009 (Fig. 4.1.2.25c). The highest concentration of 54.8 µg/l was reported by the Czech Republic in the 1999-2009 period, see table 4.1.1.1.

Nickel

The assessment is based on data from 21 countries for the 1999-2009 period and 21 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 35 % of samples (Fig. 4.1.1.2) and in 47 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2002 (Fig. 4.1.2.26a). Nickel occurred in 20 of the 21 assessed countries (Fig. 4.1.2.26b) and exceeded the drinking water standard in 13 countries in 2008-2009 (Fig. 4.1.2.26c). The highest concentration of 9000 µg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

Prometryn

The assessment is based on data from 9 countries for the 1999-2009 period and 8 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 8 % of samples (Fig. 4.1.1.2) and in 7 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2004 (Fig. 4.1.2.27a). Prometryn occurred in 7 of the 8 assessed countries (Fig. 4.1.2.27b) and exceeded the drinking water standard in 5 countries in 2008-2009 (Fig. 4.1.2.27c). The highest concentration of 8 µg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

Propazine

The assessment is based on data from 10 countries for the 1999-2009 period and 9 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 9 % of samples (Fig. 4.1.1.2) and in 8 % of stations (Fig. 4.1.1.4). The number of reported stations has been substantially increasing since 2005 (Fig. 4.1.2.28a). Propazine occurred in 7 of the 9 assessed countries (Fig. 4.1.2.28b) and exceeded the drinking water standard in 1 country in 2008-2009 (Fig. 4.1.2.28c). The highest concentration of 1.7 μg/l was reported by Slovenia in the 1999-2009 period, see table 4.1.1.1.

Simazine

The assessment is based on data from 17 countries for the 1999-2009 period and 15 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 10 % of samples (Fig. 4.1.1.2) and in 13 % of stations (Fig. 4.1.1.4). The number of reported stations has been substantially increasing since 2002 (Fig. 4.1.2.29a). Simazine occurred in 13 of the 15 assessed countries (Fig. 4.1.2.29b) and exceeded the drinking water standard in 6 countries in 2008-2009 (Fig. 4.1.2.29c). The highest concentration of 1.96 μg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

Terbuthylazine

The assessment is based on data from 9 countries for the 1999-2009 period and 7 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 2 % of samples (Fig. 4.1.1.2) and in 3 % of stations (Fig. 4.1.1.4). The number of reported stations has been increasing since 2005 (Fig. 4.1.2.30a). Terbuthylazine occurred in 6 of the 7 assessed countries (Fig. 4.1.2.30b) and exceeded the drinking water standard in 6 countries in 2008-2009 (Fig. 4.1.2.30c). The highest concentration of 5.3 μg/l was reported by the Czech Republic in the 1999-2009 period, see table 4.1.1.1.

Trifluralin

The assessment is based on data from 10 countries for the 1999-2009 period and 9 countries for the 2008-2009 period, see tables 3.1.2 and 3.1.3. The substance was found in 3 % of samples (Fig. 4.1.1.2) and in 5 % of stations (Fig. 4.1.1.4). The number of reported stations has been substantially increasing since 2003 (Fig. 4.1.2.31a). Trifluralin occurred in 5 of the 9 assessed countries (Fig. 4.1.2.31b) and exceeded the drinking water standard in 2 countries in 2008-2009 (Fig. 4.1.2.31c). The highest concentration of 1 μg/l was reported by the United Kingdom in the 1999-2009 period, see table 4.1.1.1.

Figures of the mean concentrations and numbers of stations with data from the period 1999-2009 based on the indicator are shown in figures 4.1.2.1a – 4.1.2.31a for selected hazardous substances found in groundwater in Europe

Figures showing the percentage of stations in the 2008-2009 period for each country in each of the indicator categories for selected hazardous substances in groundwater are shown in figures 4.1.2.1b – 4.1.2.31b.

Maps of the maximum concentrations from the 2008 - 2009 period based on the indicator for selected hazardous substances in groundwater across Europe in individual countries are shown in figures 4.1.2.1c – 4.1.2.31c.

Figure 4.1.2.1a Long-term indicator (mean concentration, number of sites within indicator class) for 1,1,2,2-tetrachloroethene in groundwater

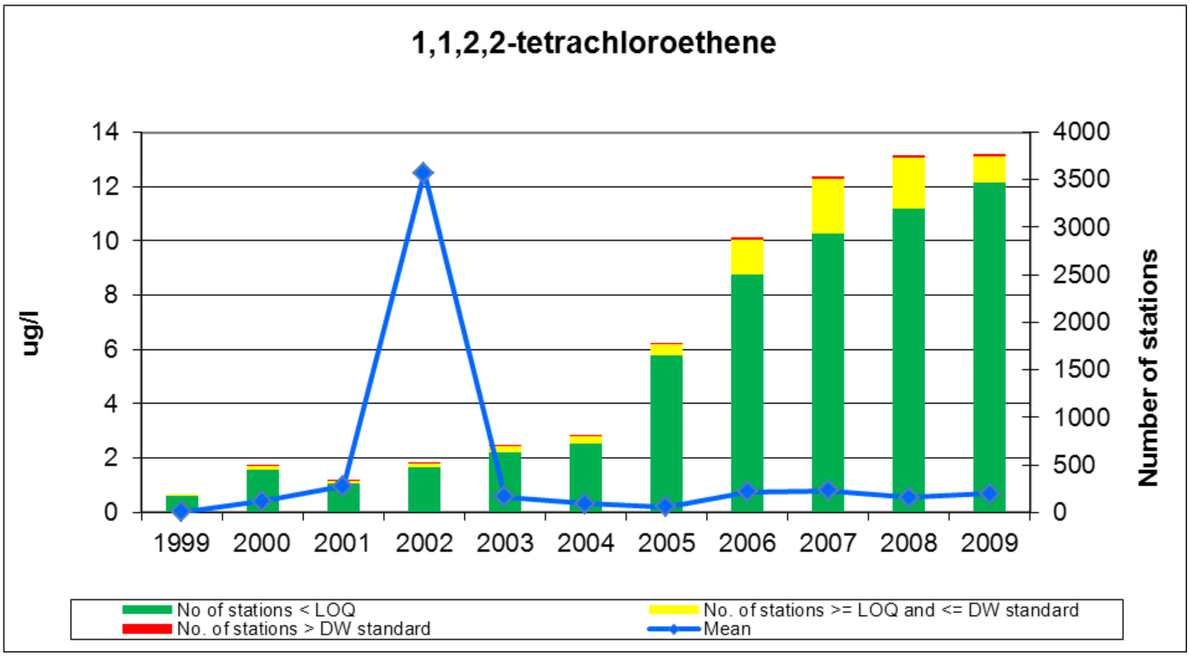


Figure 4.1.2.1b Indicator for 1,1,2,2-tetrachloroethene in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

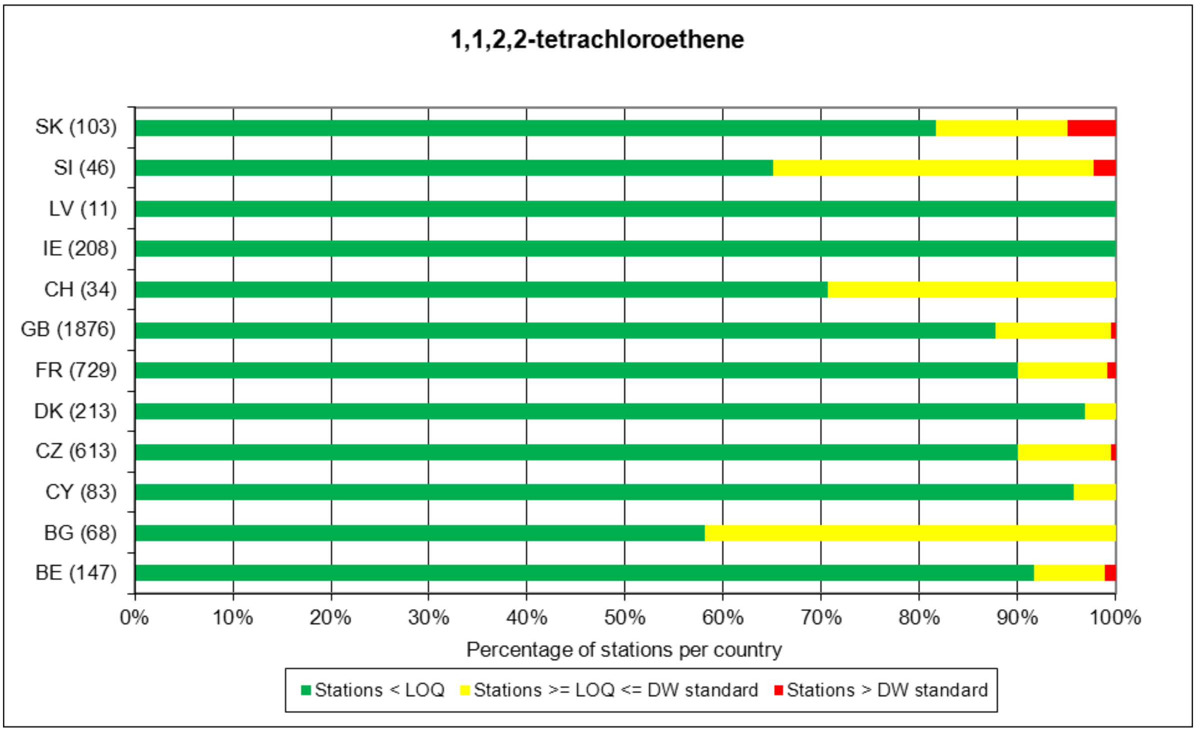


Figure 4.1.2.1c Map of the indicator for 1,1,2,2-tetrachloroethene in groundwater in 2008–2009

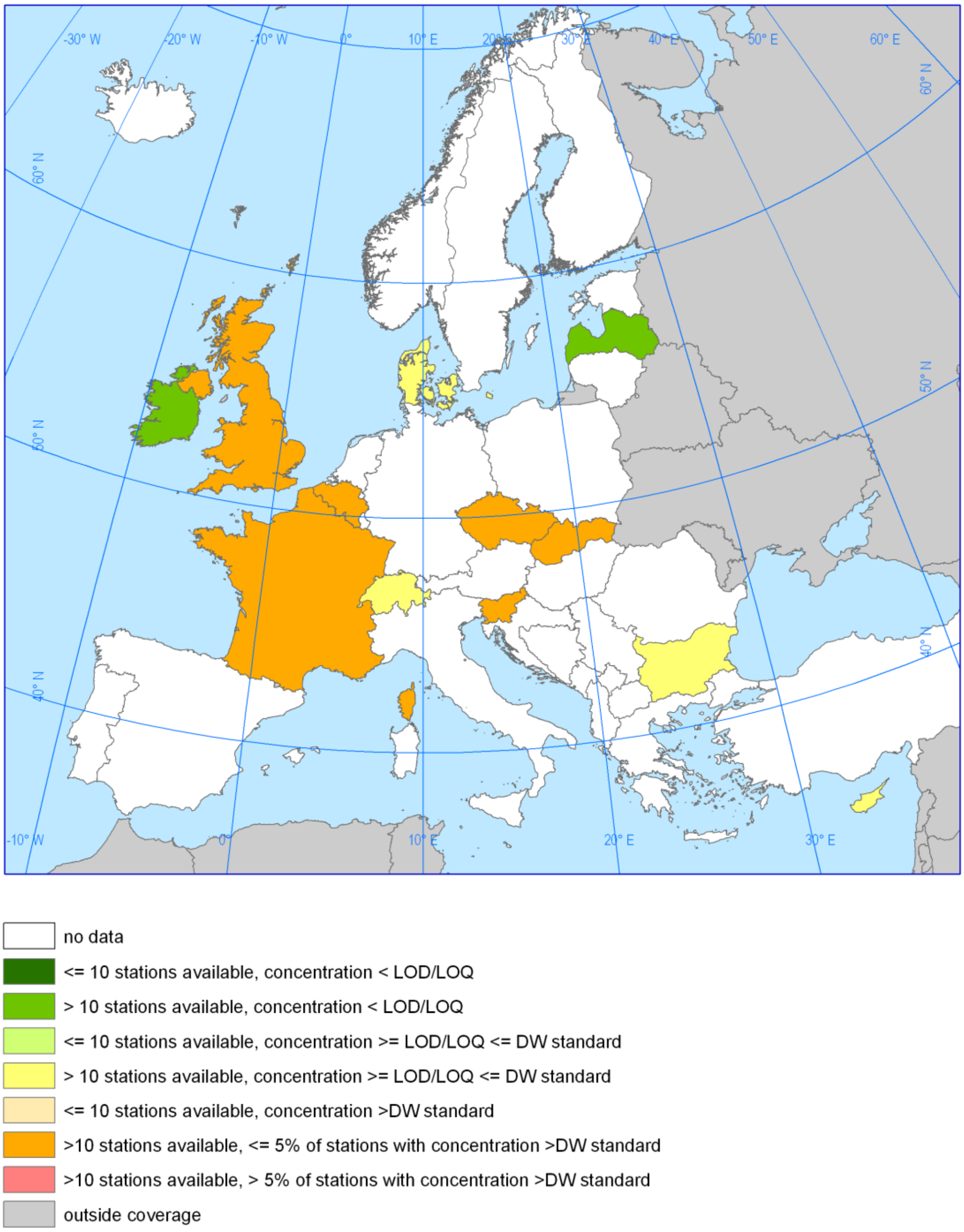


Figure 4.1.2.2a Long-term indicator (mean concentration, number of sites within indicator class) for 1,1,2-trichloroethene in groundwater

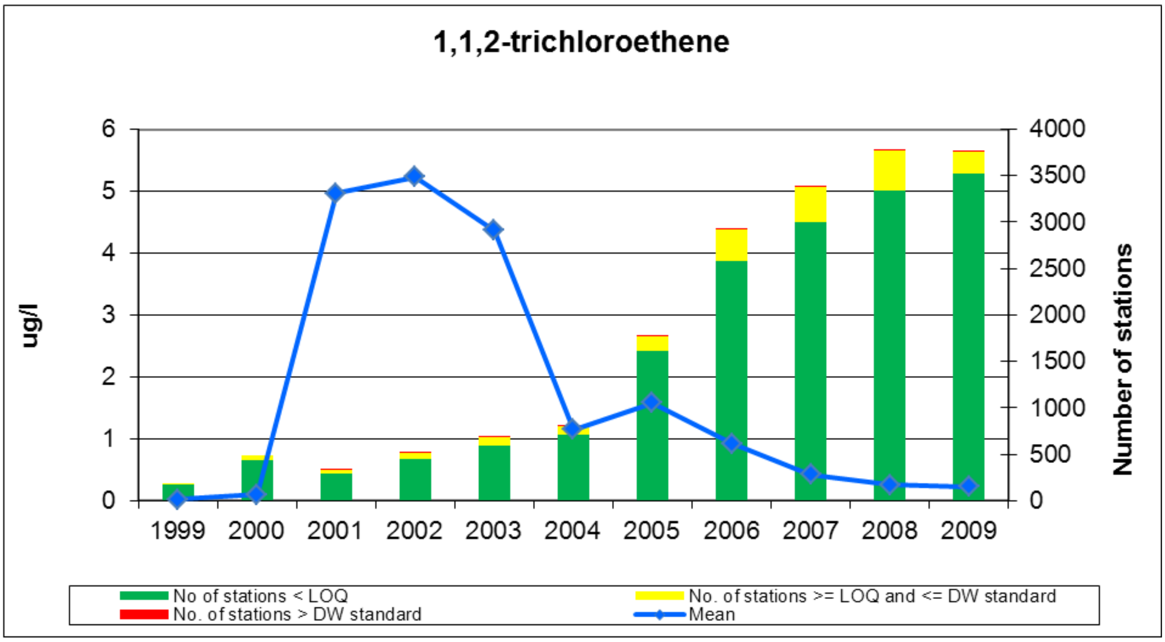


Figure 4.1.2.2b Indicator for 1,1,2-trichloroethene in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

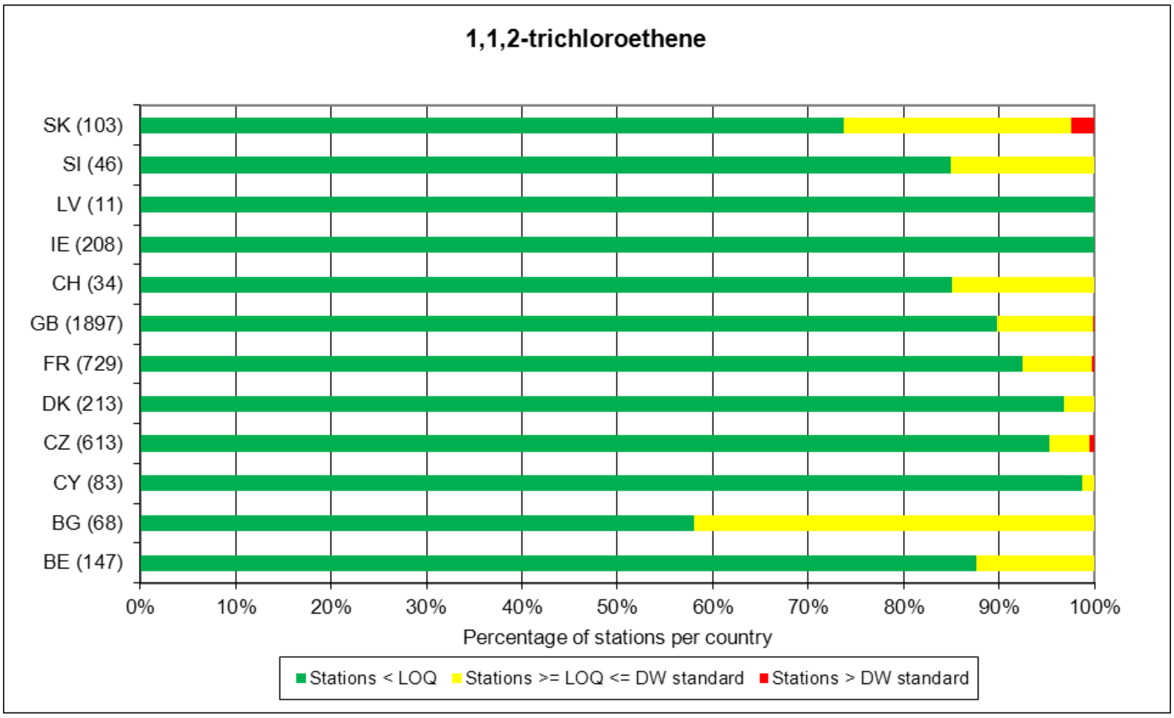
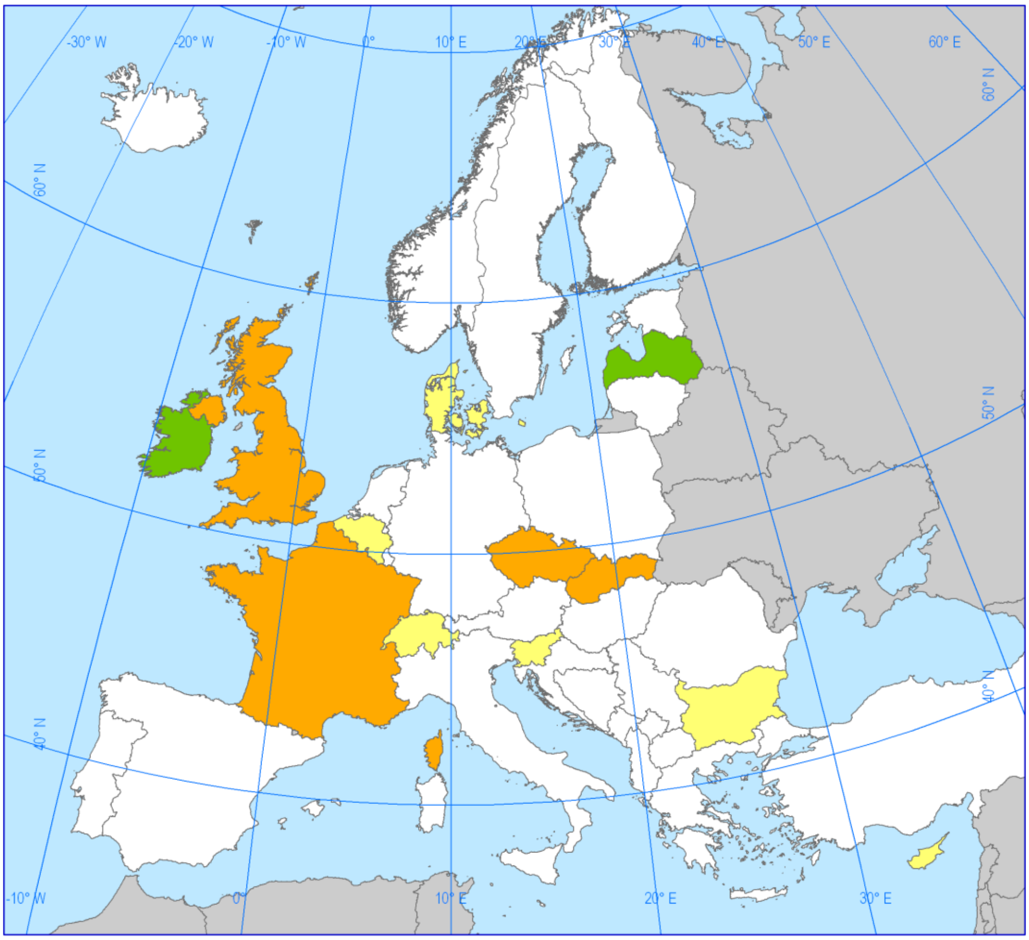


Figure 4.1.2.2c Map of the indicator for 1,1,2-trichloroethene in groundwater in 2008-2009



no data
<= 10 stations available, concentration < LOD/LOQ
> 10 stations available, concentration < LOD/LOQ
<= 10 stations available, concentration >= LOD/LOQ <= DW standard
> 10 stations available, concentration >= LOD/LOQ <= DW standard
<= 10 stations available, concentration >DW standard
>10 stations available, <= 5% of stations with concentration >DW standard
>10 stations available, > 5% of stations with concentration >DW standard
outside coverage

Figure 4.1.2.3a Long-term indicator (mean concentration, number of sites within indicator class) for 1,2-dichloroethane in groundwater

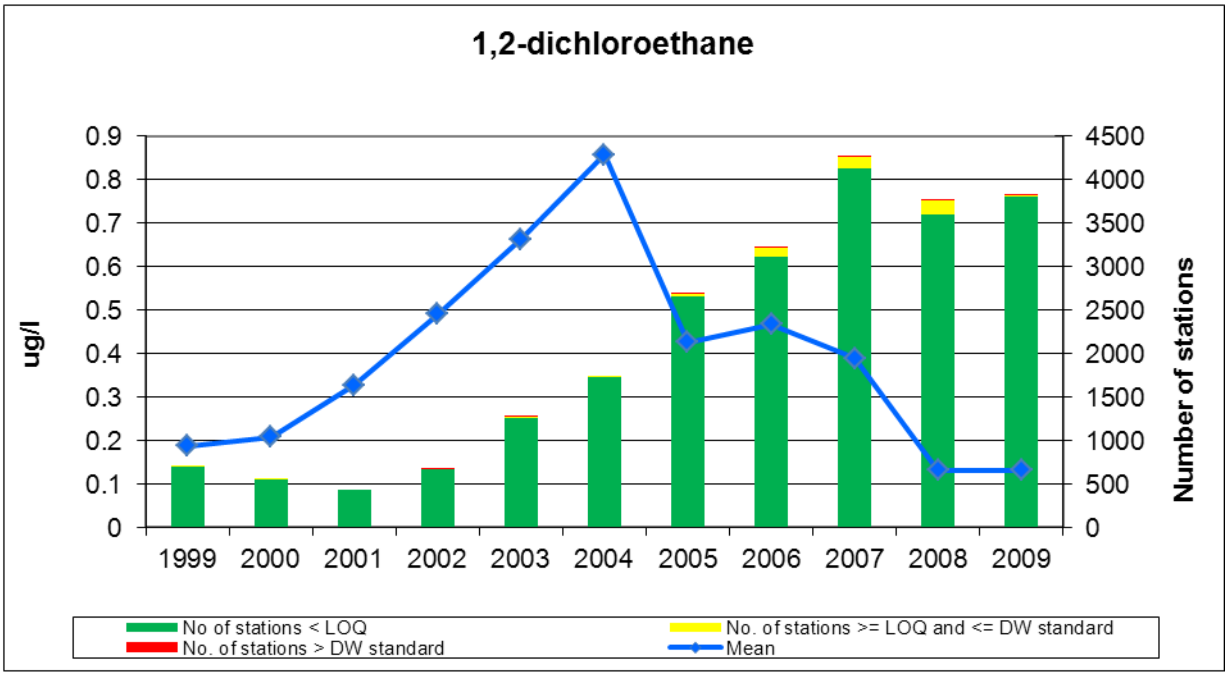


Figure 4.1.2.3b Indicator for 1,2-dichloroethane in groundwater in 2008 – 2009 (number of stations per country shown in parenthesis)

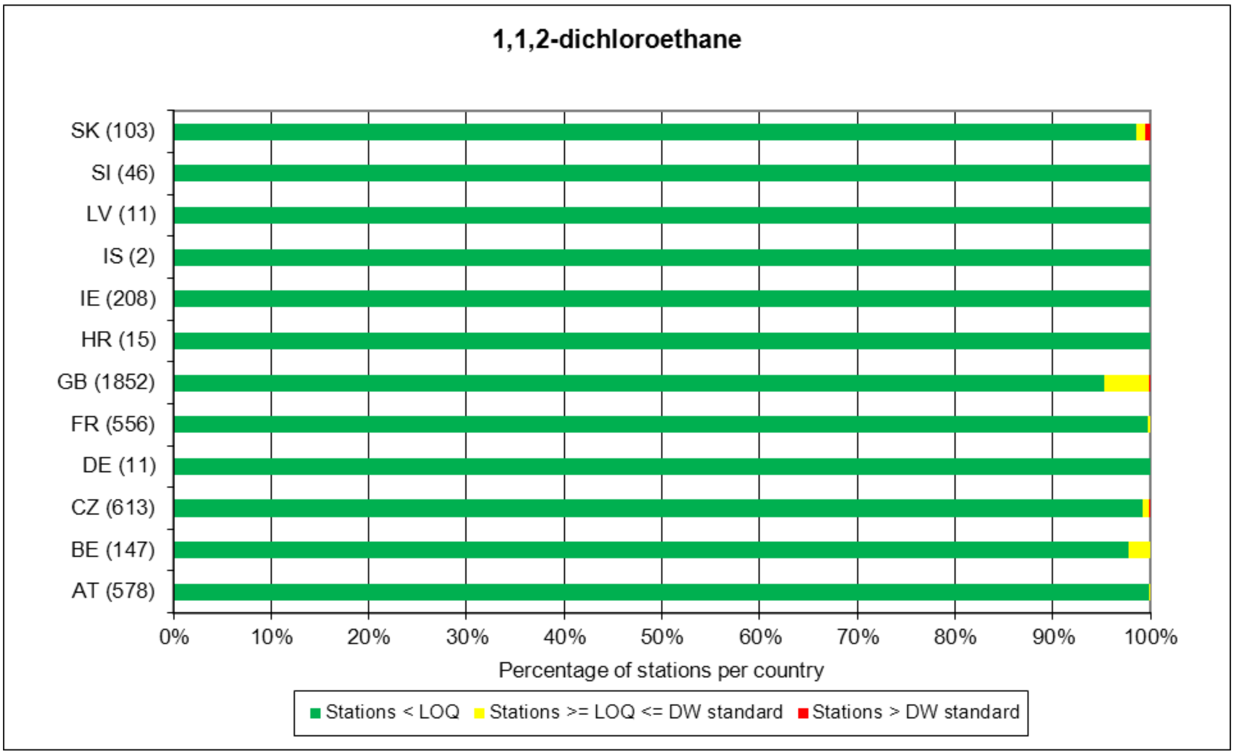


Figure 4.1.2.3c Map of the indicator for 1,2-dichloroethane in groundwater in 2008–2009

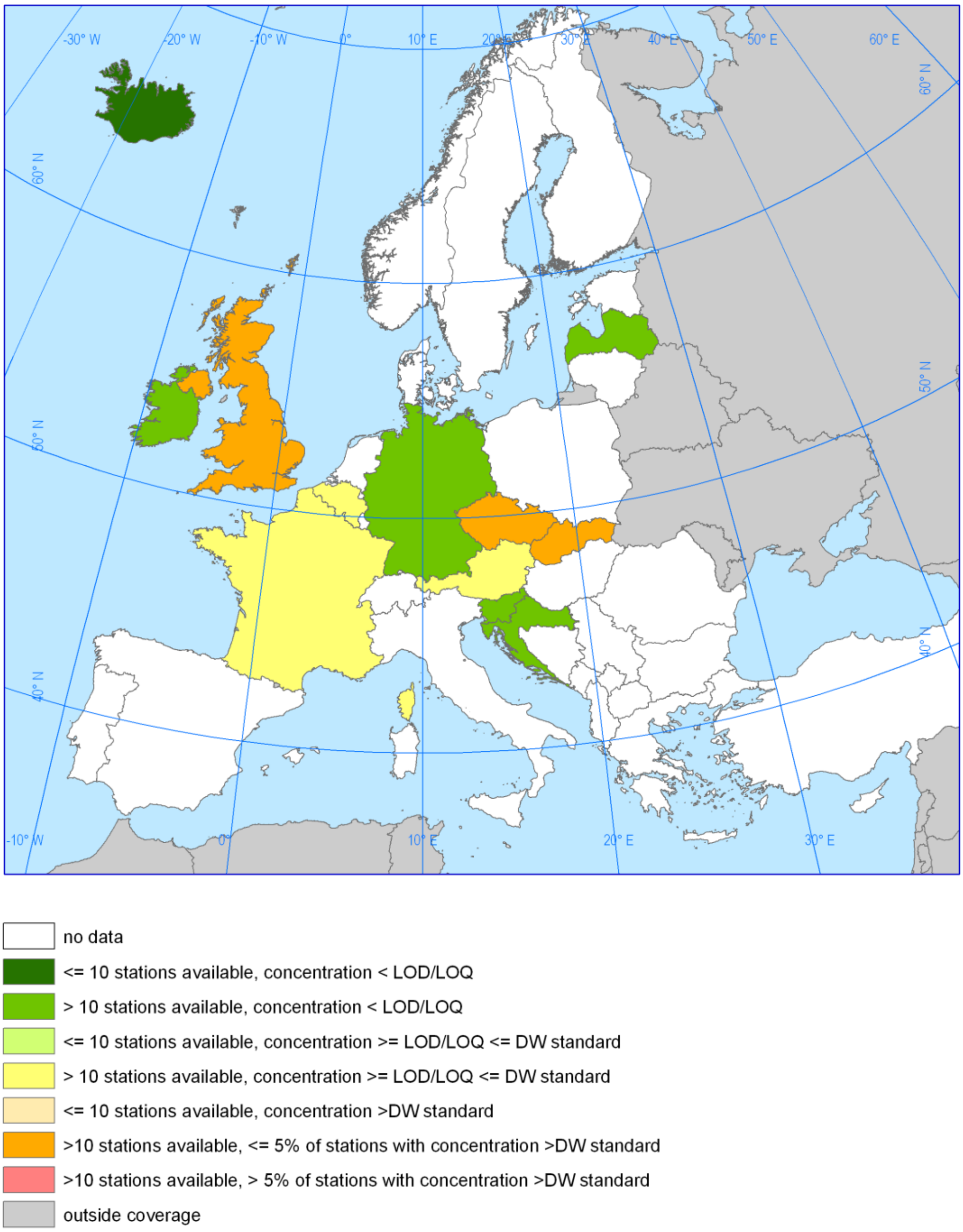


Figure 4.1.2.4a Long-term indicator (mean concentration, number of sites within indicator class) for 2,4-D in groundwater

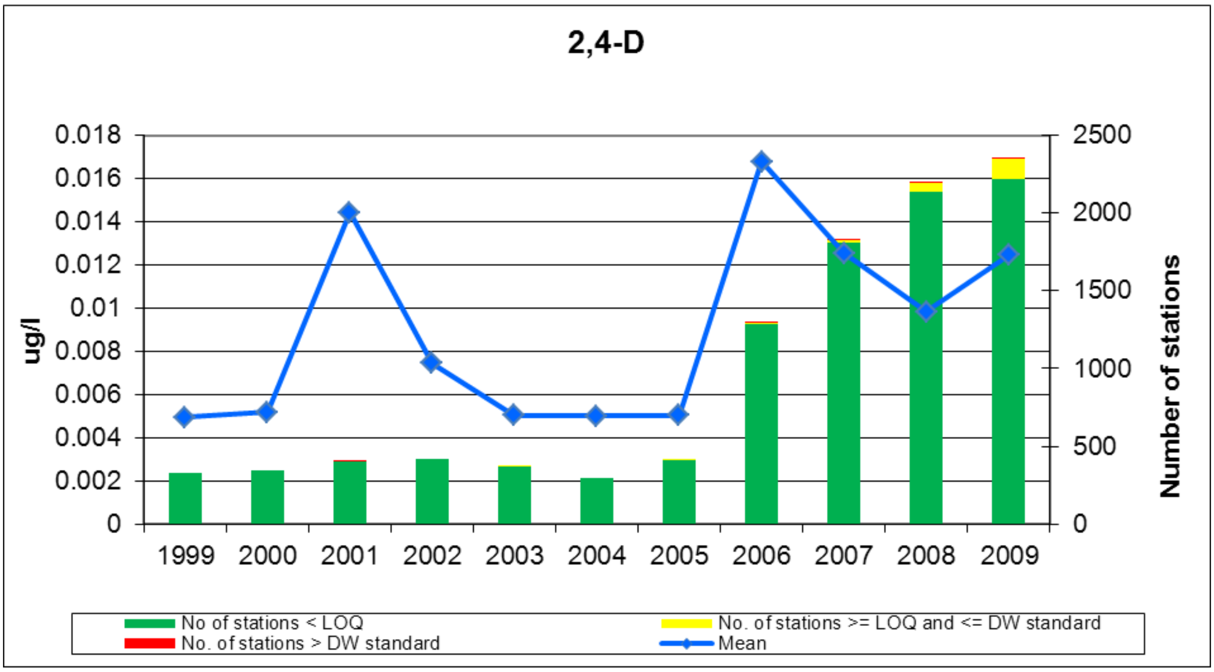


Figure 4.1.2.4b Indicator for 2,4-D in groundwater in 2008 - 2009 (number of stations per country shown in parenthesis)

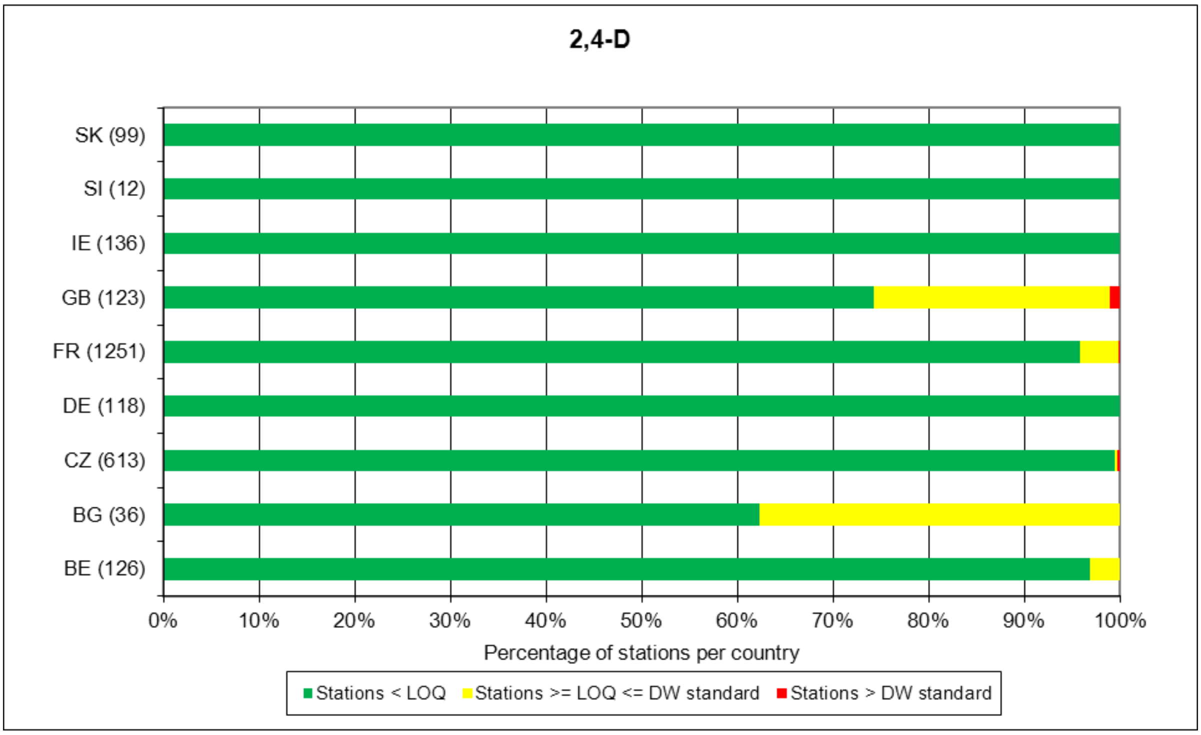
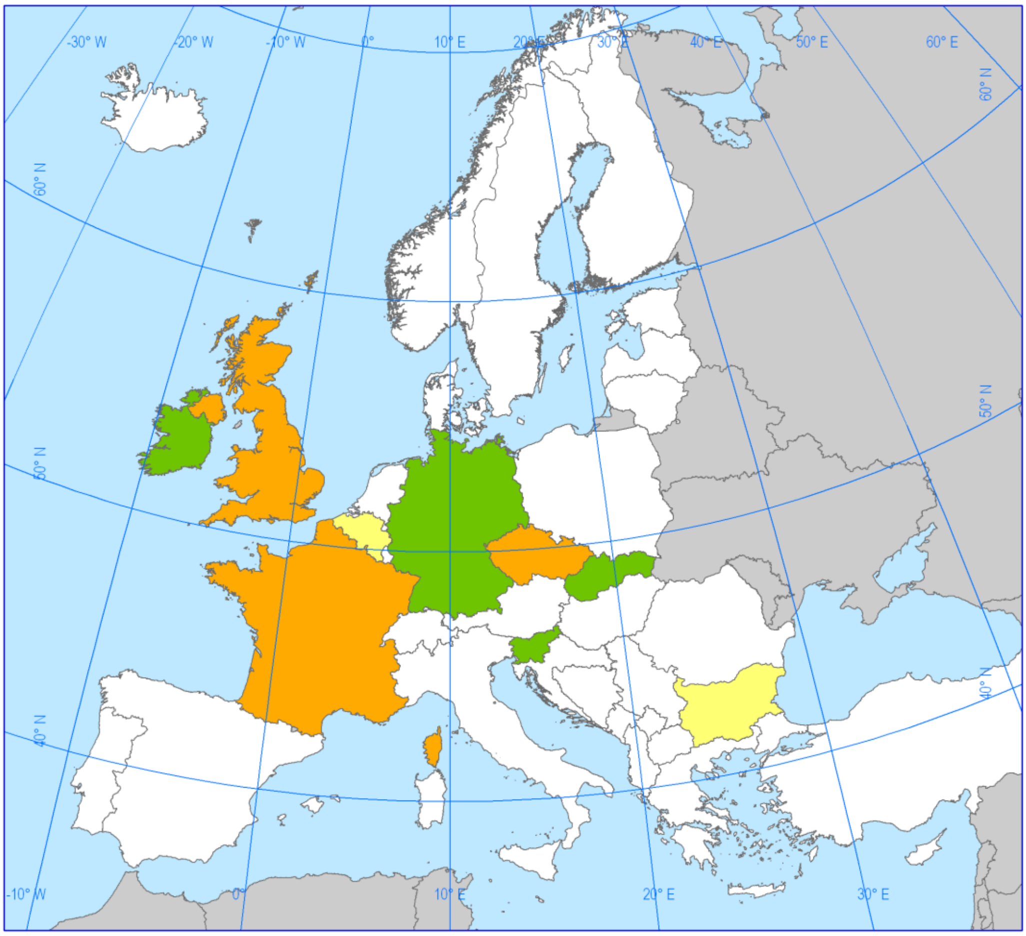


Figure 4.1.2.4c Map of the indicator for 2,4-D in groundwater in 2008-2009



no data

<= 10 stations available, concentration < LOD/LOQ

> 10 stations available, concentration < LOD/LOQ

<= 10 stations available, concentration >= LOD/LOQ <= DW standard

> 10 stations available, concentration >= LOD/LOQ <= DW standard

<= 10 stations available, concentration >DW standard

>10 stations available, <= 5% of stations with concentration >DW standard

>10 stations available, > 5% of stations with concentration >DW standard

outside coverage

Figure 4.1.2.5a Long-term indicator (mean concentration, number of sites within indicator class) for alachlor in groundwater

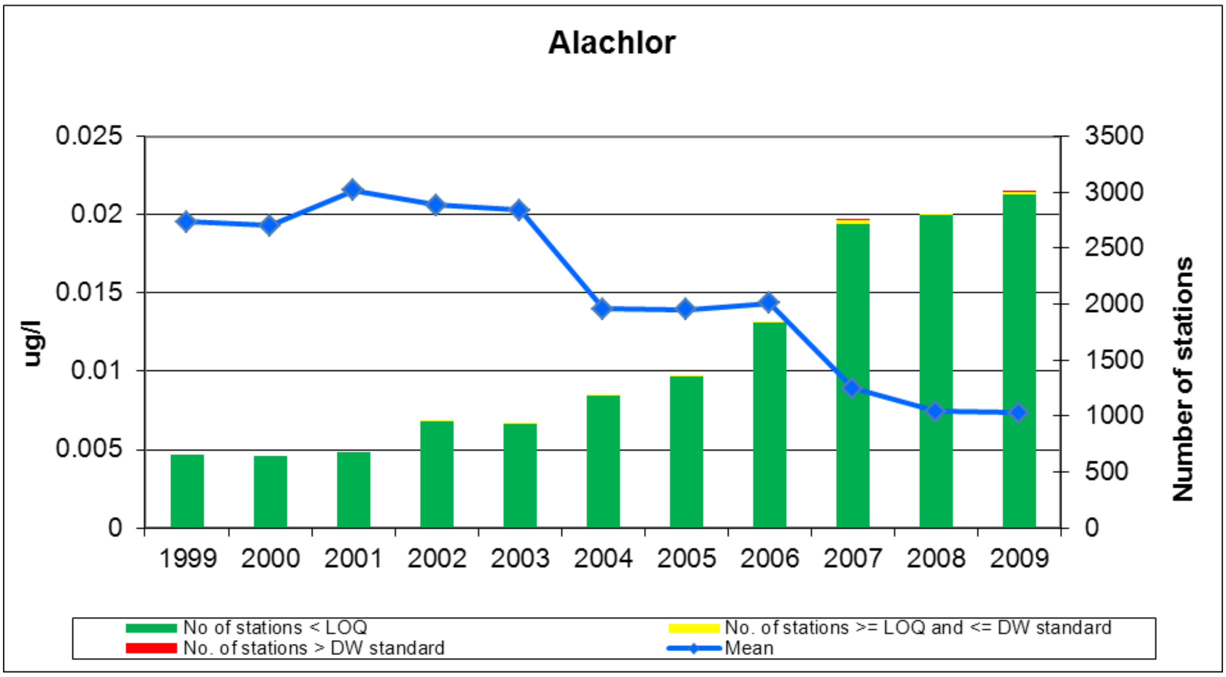


Figure 4.1.2.5b Indicator for alachlor in groundwater in 2008 – 2009 (number of stations per country shown in parenthesis)

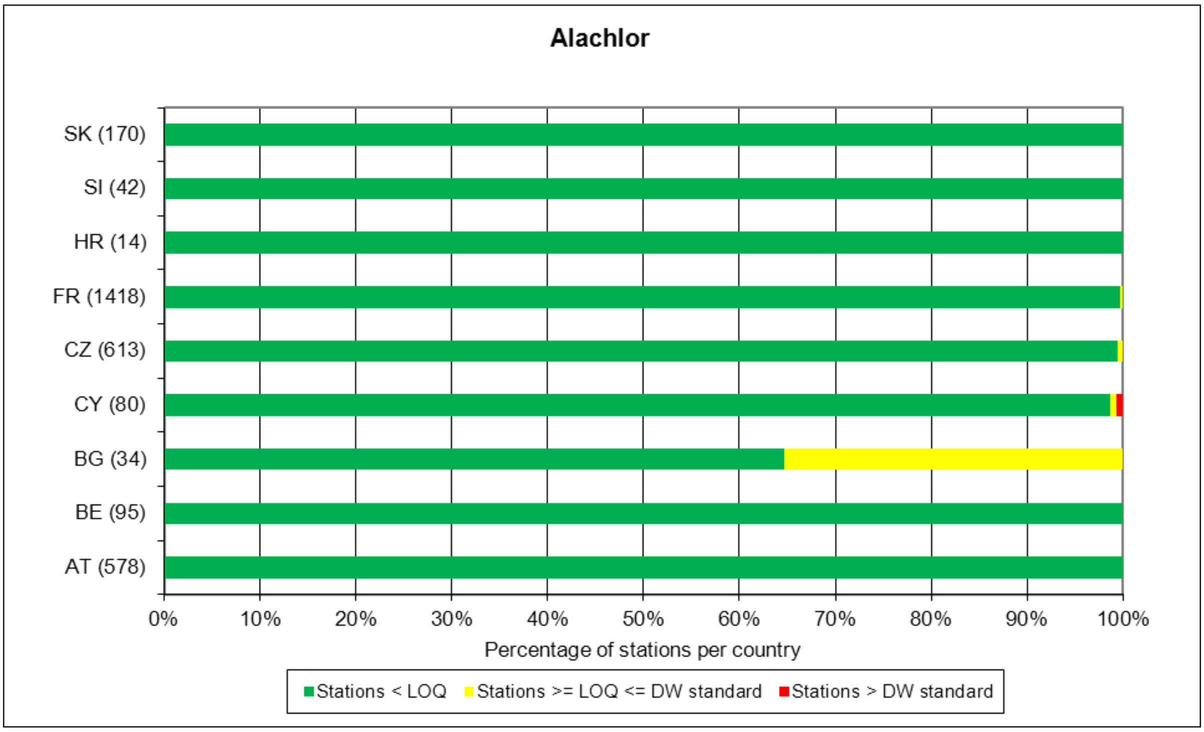


Figure 4.1.2.5c Map of the indicator for alachlor in groundwater in 2008-2009

- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Note: Only one station with a concentration above the DW standard was reported by Cyprus

Figure 4.1.2.6a Long-term indicator (mean concentration, number of sites within indicator class) for arsenic in groundwater

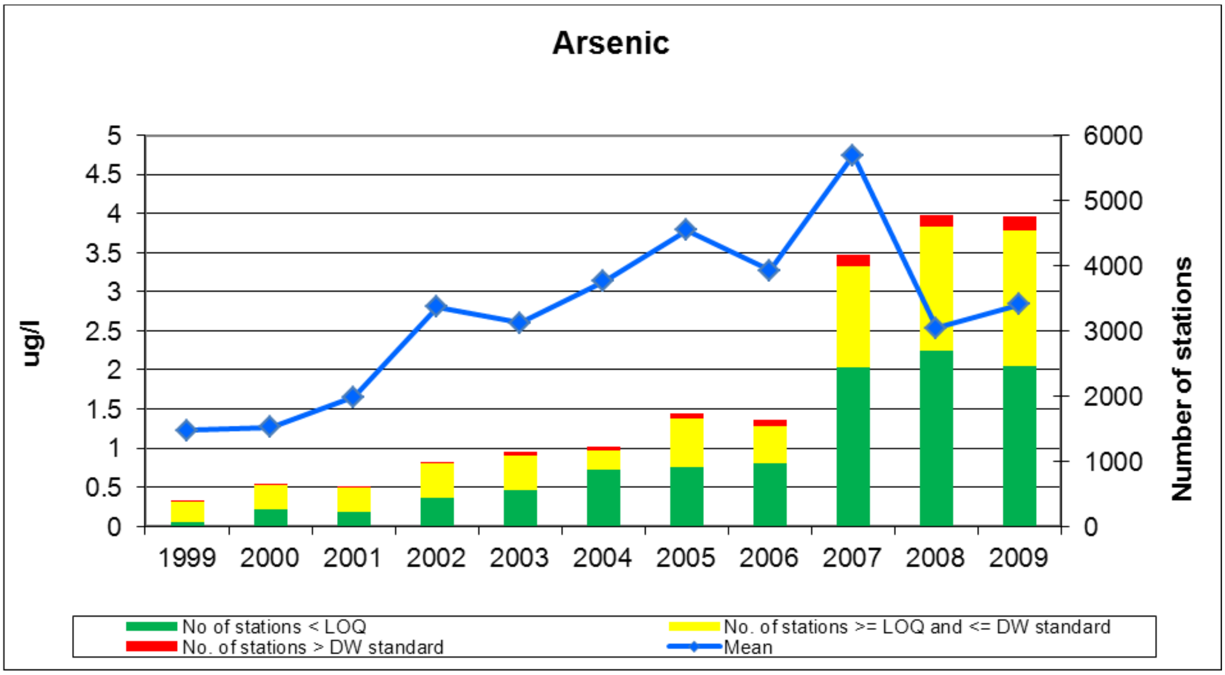


Figure 4.1.2.6b Indicator for arsenic in groundwater in 2008 - 2009 (number of stations per country shown in parenthesis)

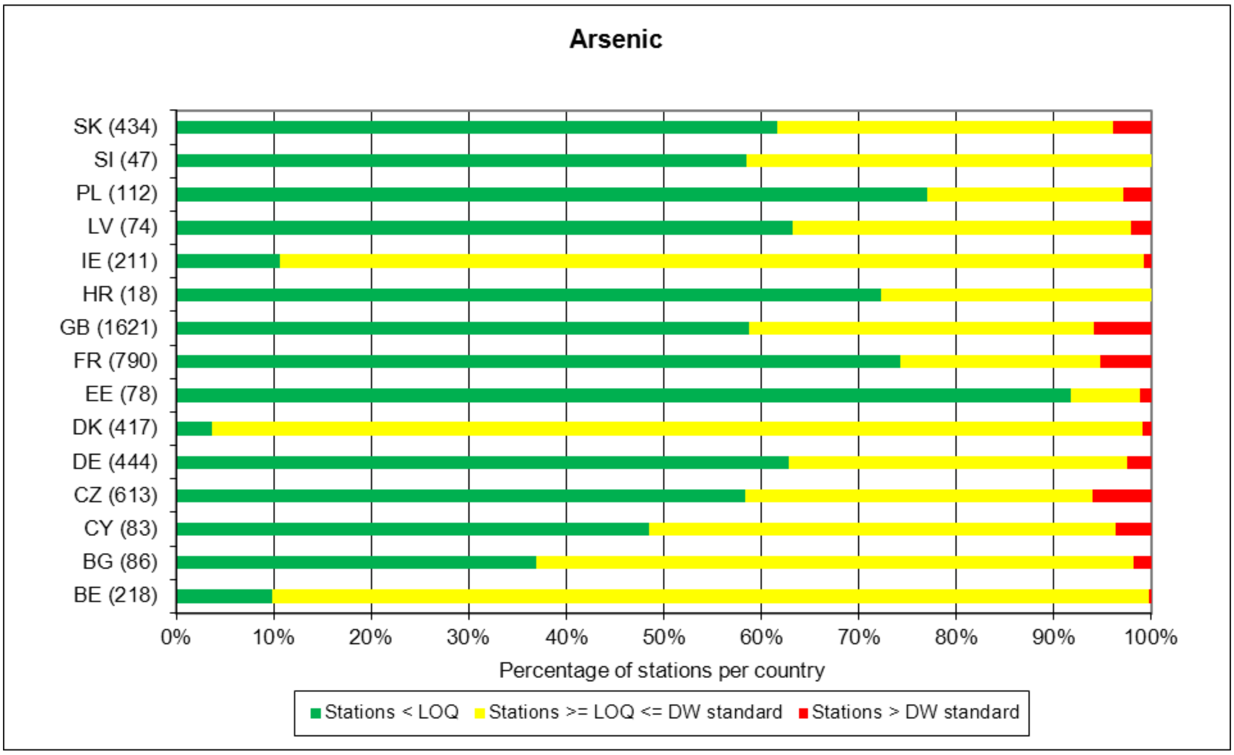
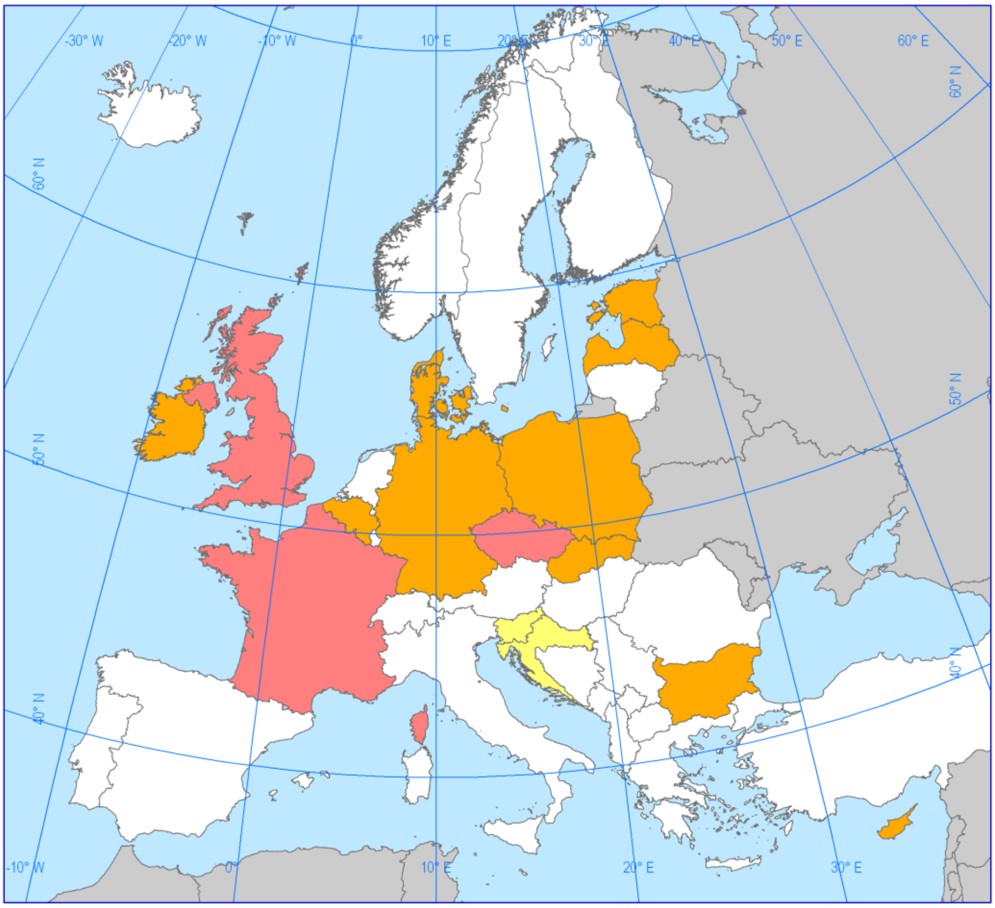


Figure 4.1.2.6c Map of the indicator for arsenic in groundwater in 2008-2009



- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Note: Only very few stations (up to 6) with a concentration above the DW standard were reported by Belgium, Bulgaria, Cyprus, Denmark, Estonia, Ireland, Latvia and Poland.

Figure 4.1.2.7a Long-term indicator (mean concentration, number of sites within indicator class) for atrazine in groundwater

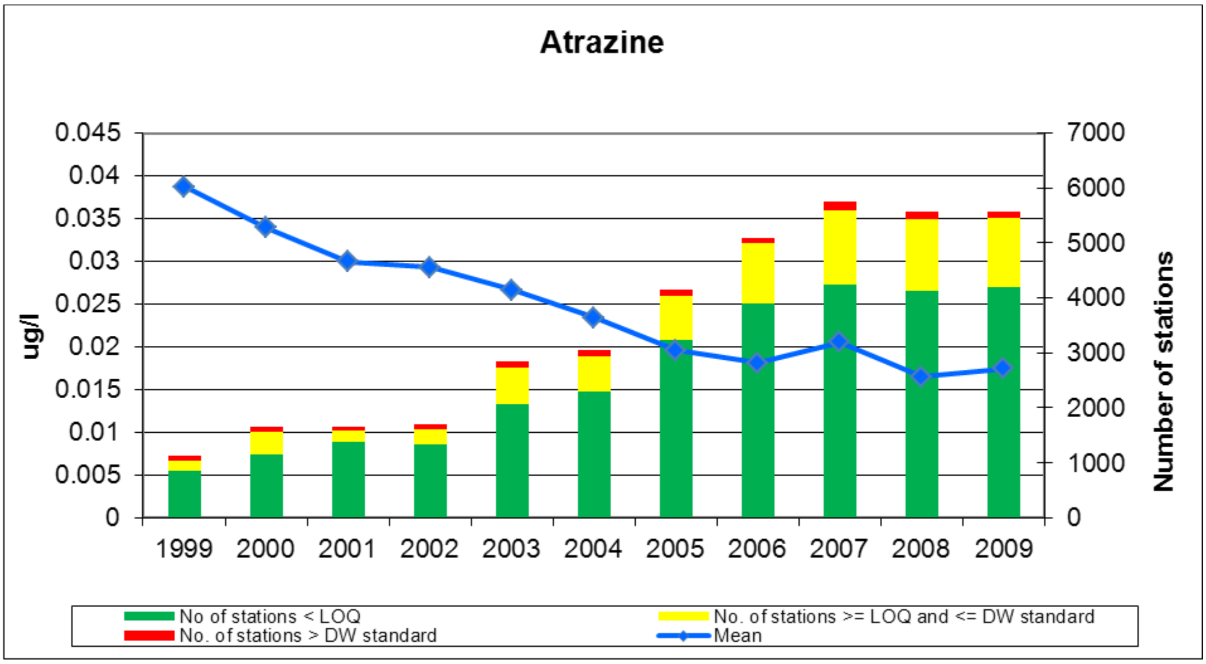


Figure 4.1.2.7b Indicator for atrazine in groundwater in 2008 - 2009 (number of stations per country shown in parenthesis)

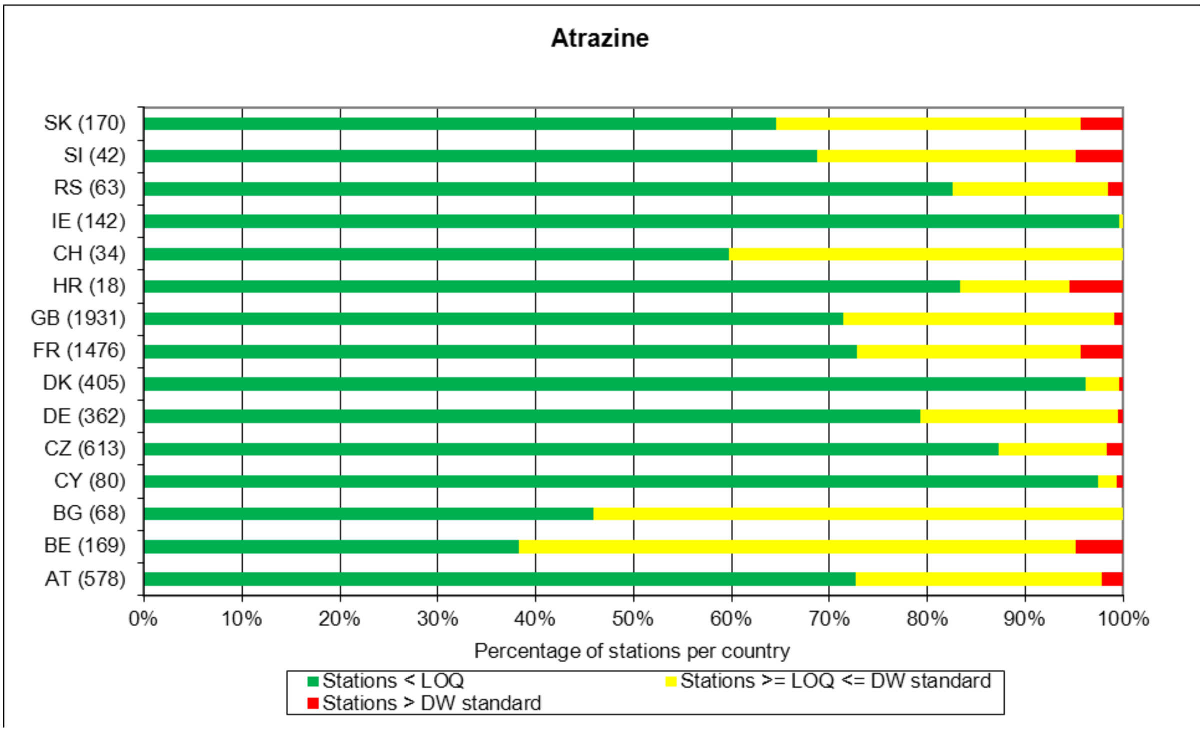
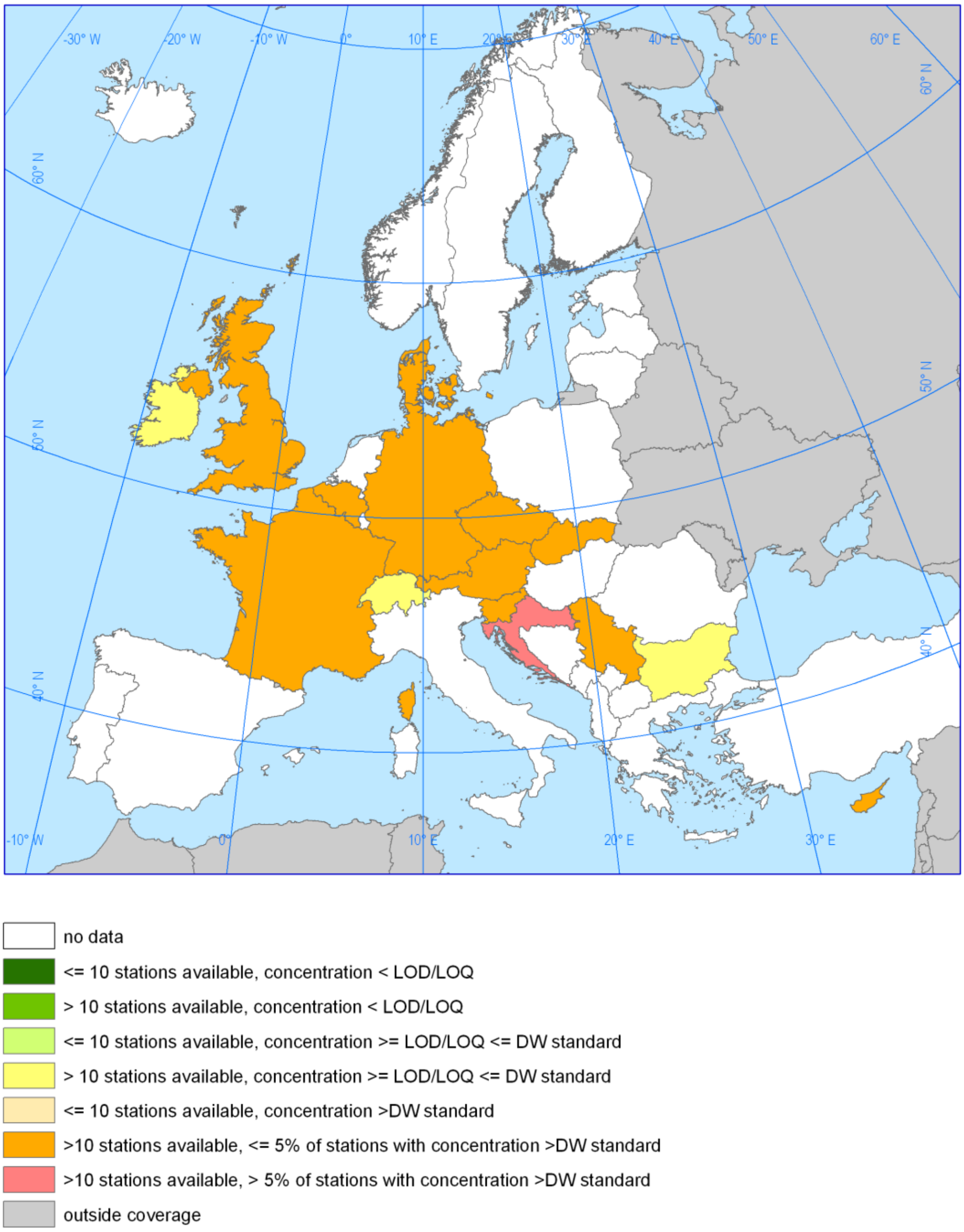


Figure 4.1.2.7c Map of the indicator for atrazine in groundwater in 2008-2009



Note: Only few stations (up to 4) with a concentration above the DW standard were reported by Cyprus, Croatia, Denmark, Germany, Republic of Serbia and Slovenia

Figure 4.1.2.8a Long-term indicator (mean concentration, number of sites within indicator class) for bentazone in groundwater

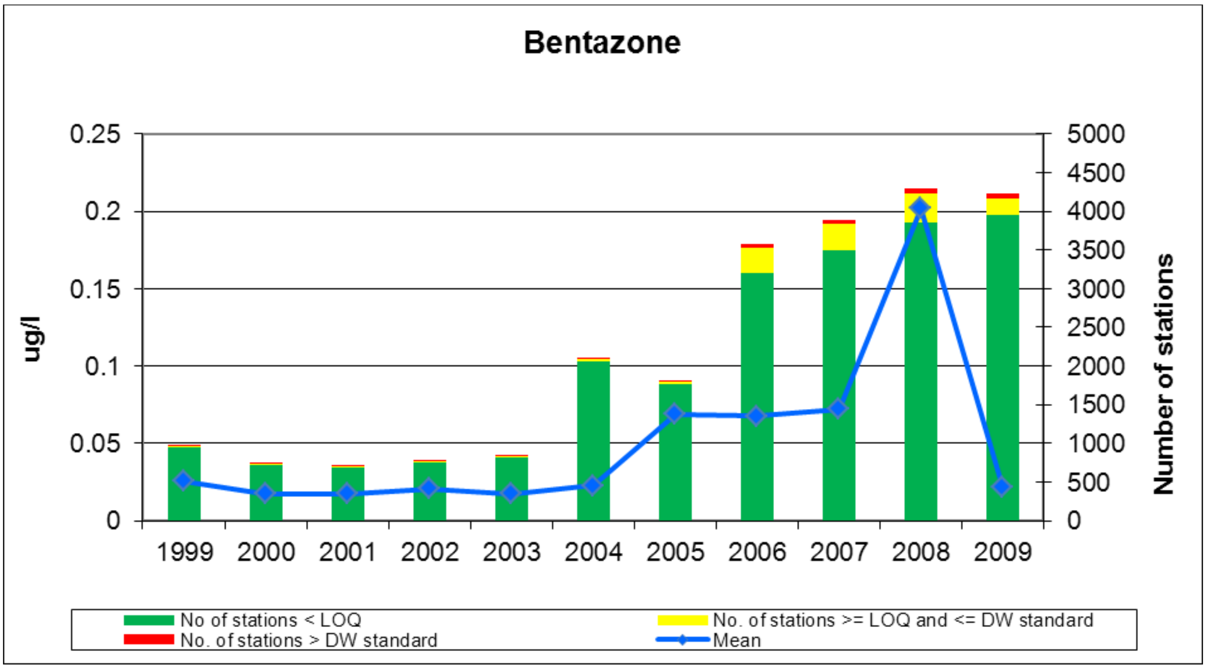


Figure 4.1.2.8b Indicator for bentazone in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

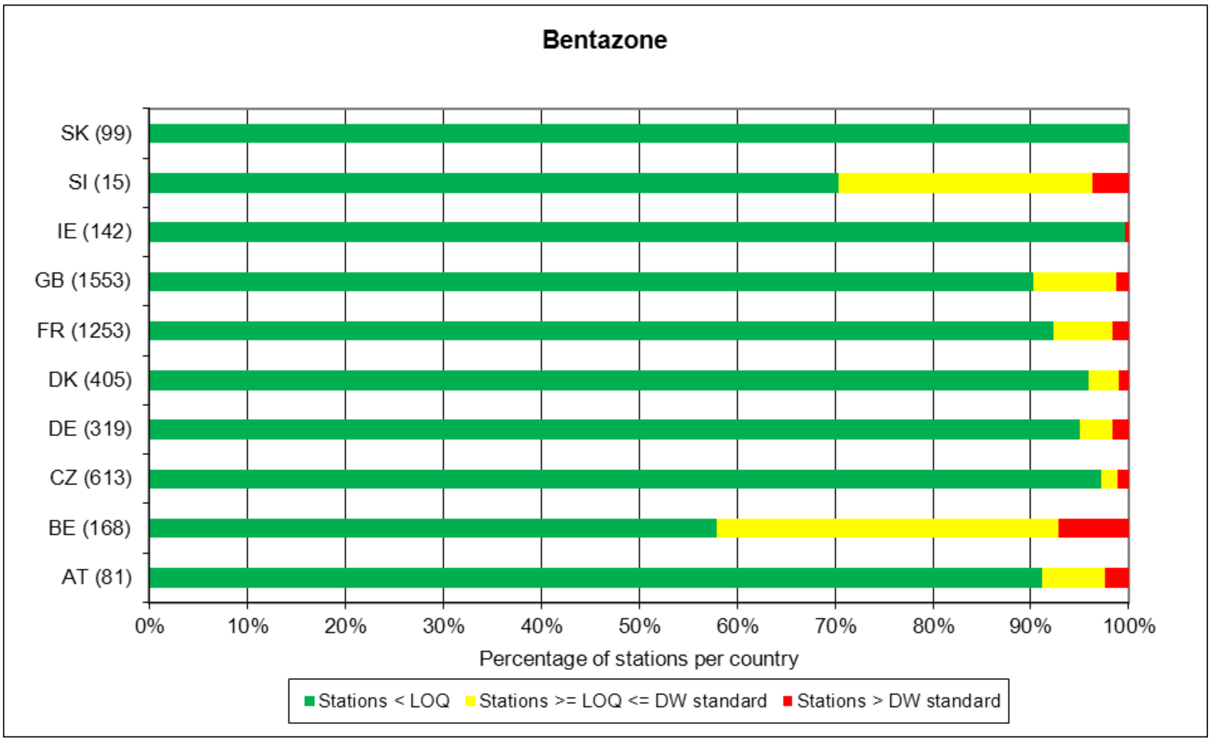
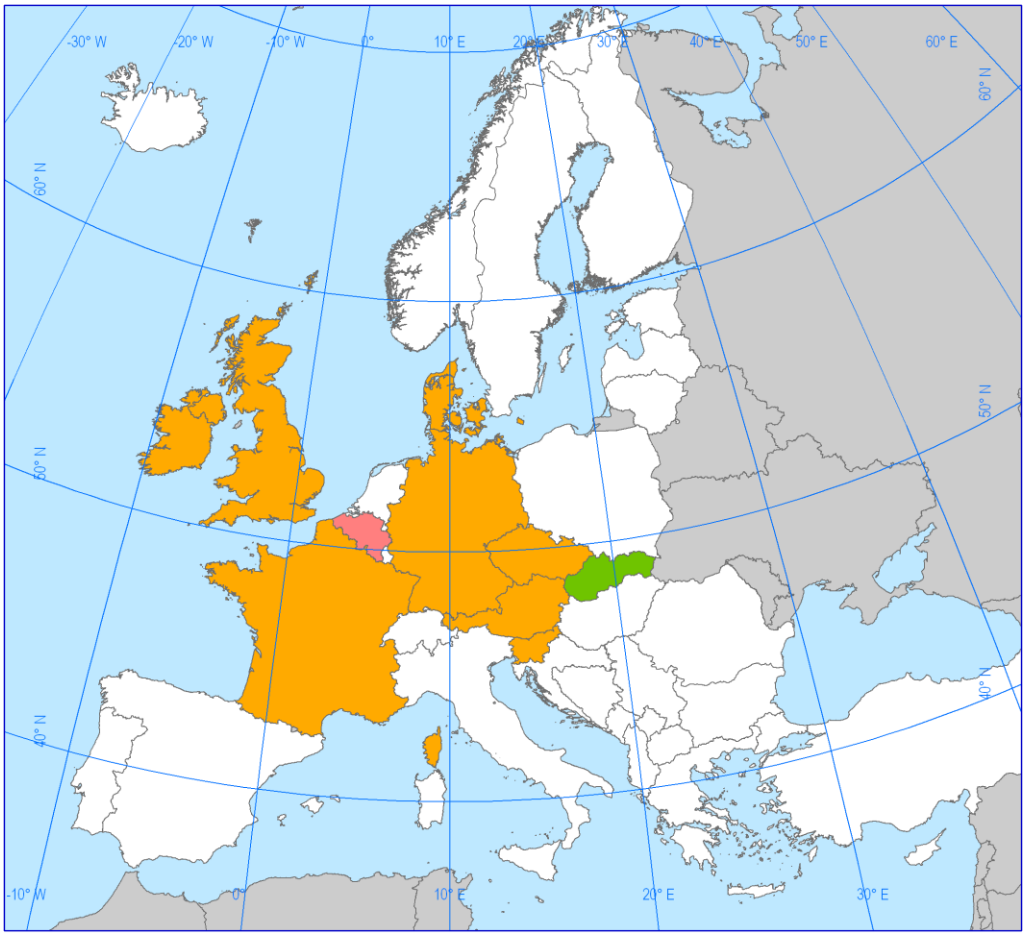


Figure 4.1.2.8c Map of the indicator for bentazone in groundwater in 2008–2009



- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Figure 4.1.2.9a Long-term indicator (mean concentration, number of sites within indicator class) for benzene in groundwater

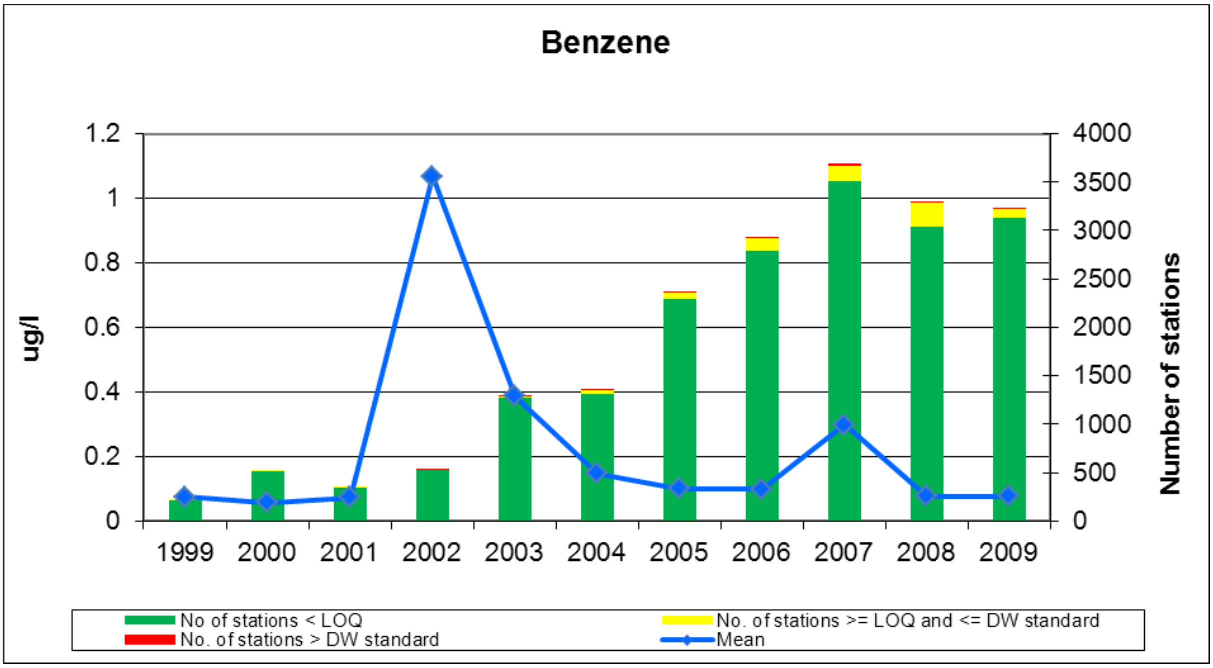


Figure 4.1.2.9b Indicator for benzene in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

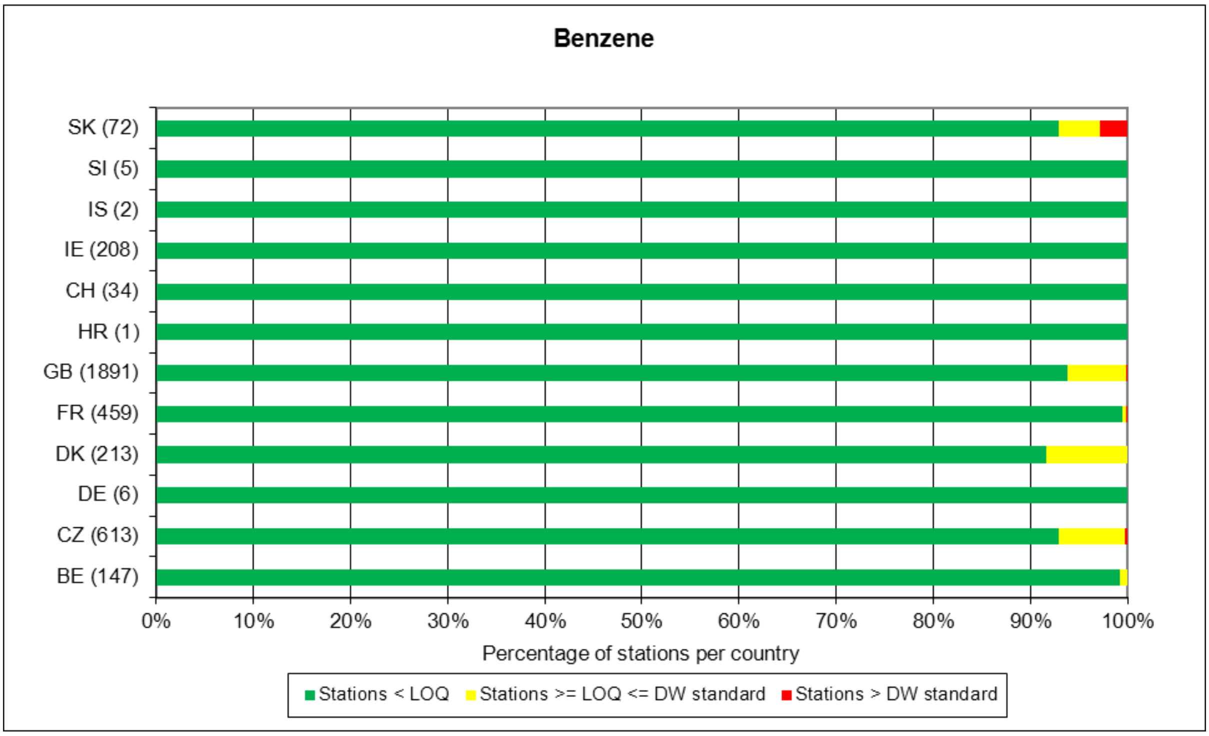
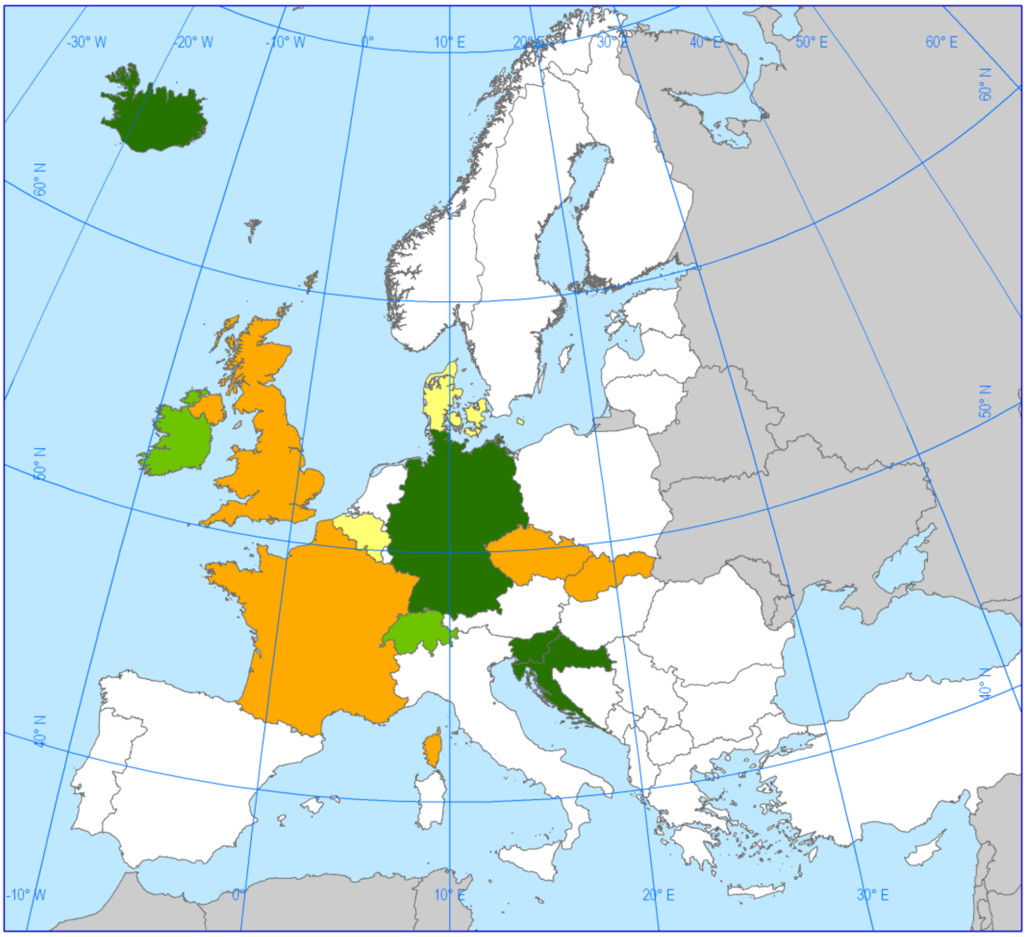


Figure 4.1.2.9c Map of the indicator for benzene in groundwater in 2008–2009



- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Figure 4.1.2.10a Long-term indicator (mean concentration, number of sites within indicator class) for benzo(a)pyrene in groundwater

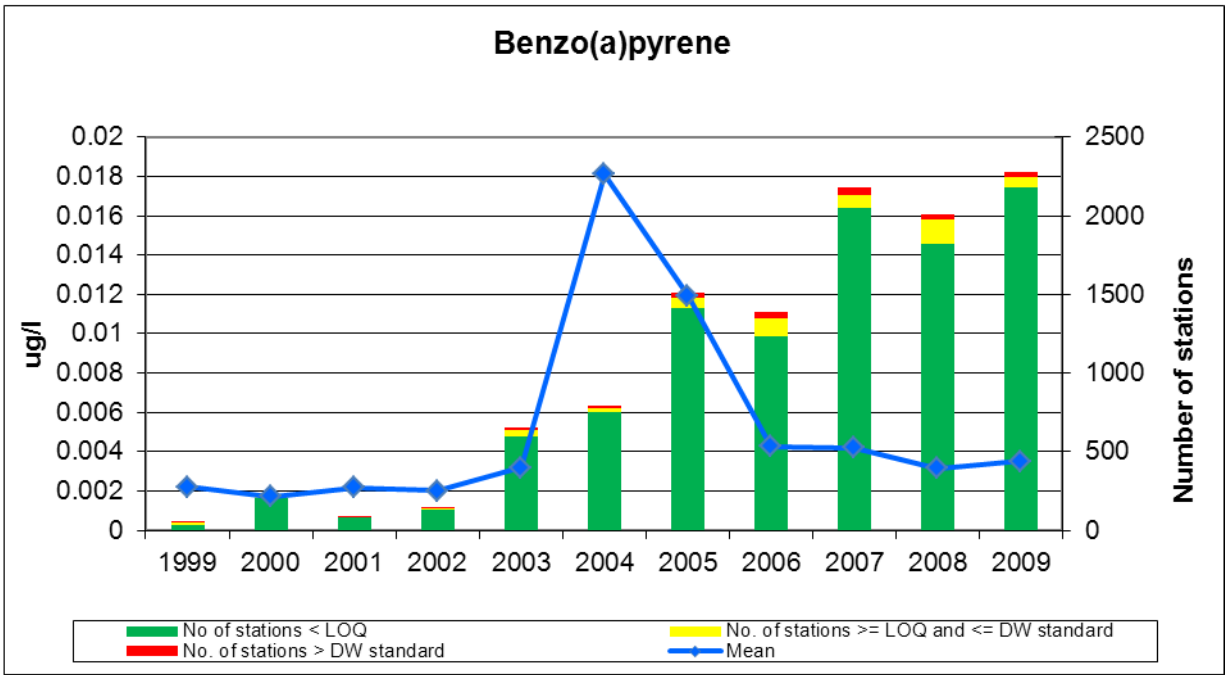


Figure 4.1.2.10b Indicator for benzo(a)pyrene in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

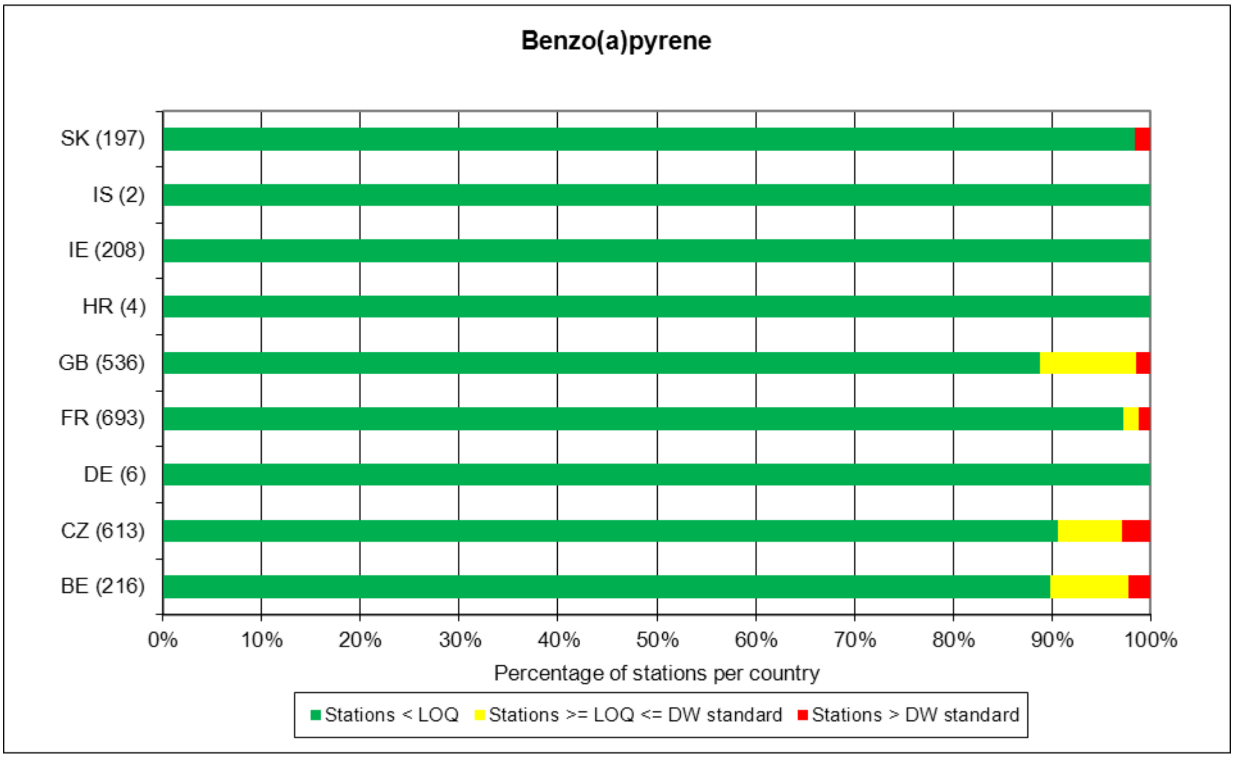


Figure 4.1.2.10c Map of the indicator for benzo(a)pyrene in groundwater in 2008–2009

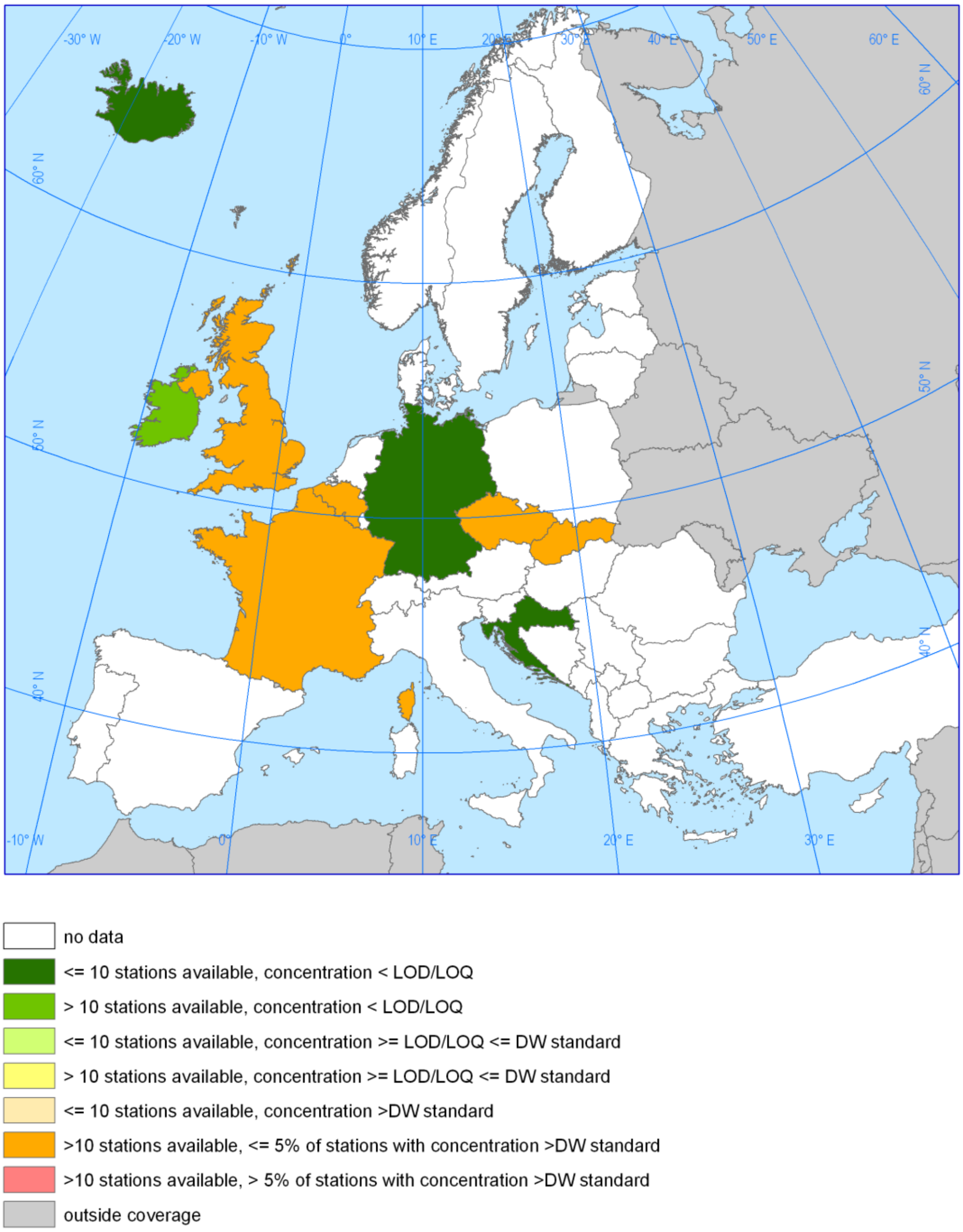


Figure 4.1.2.11 Long-term indicator (mean concentration, number of sites within indicator class) for cadmium in groundwater

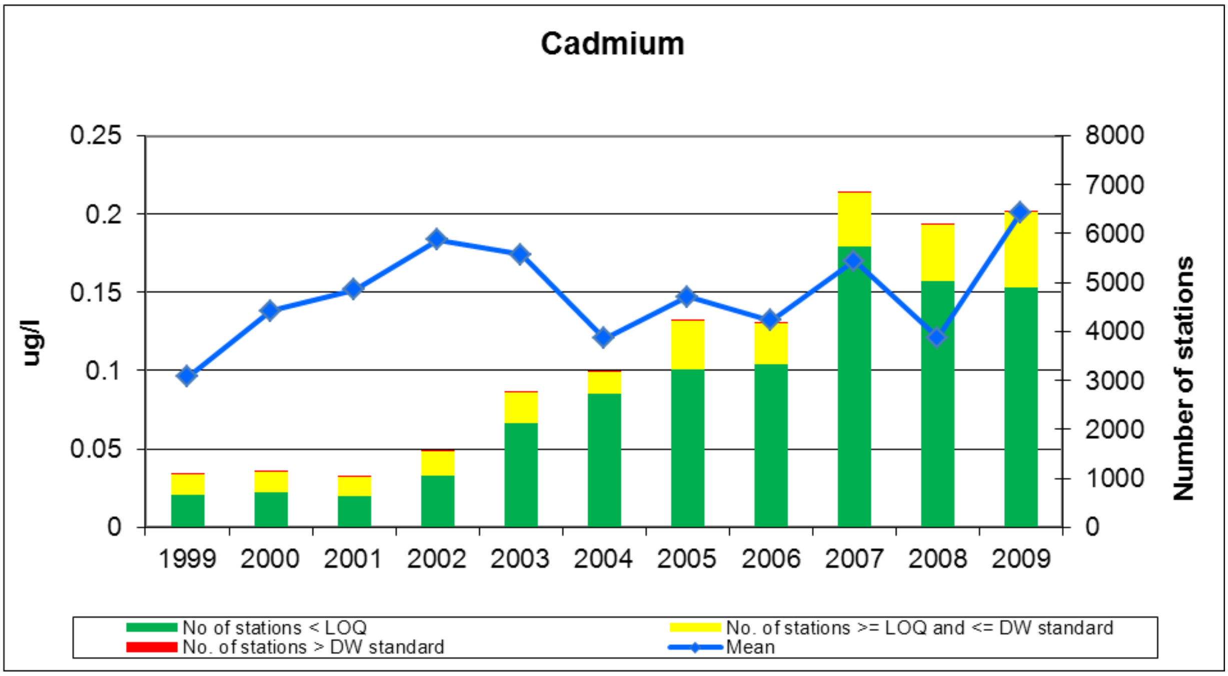


Figure 4.1.2.11b Indicator for cadmium in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

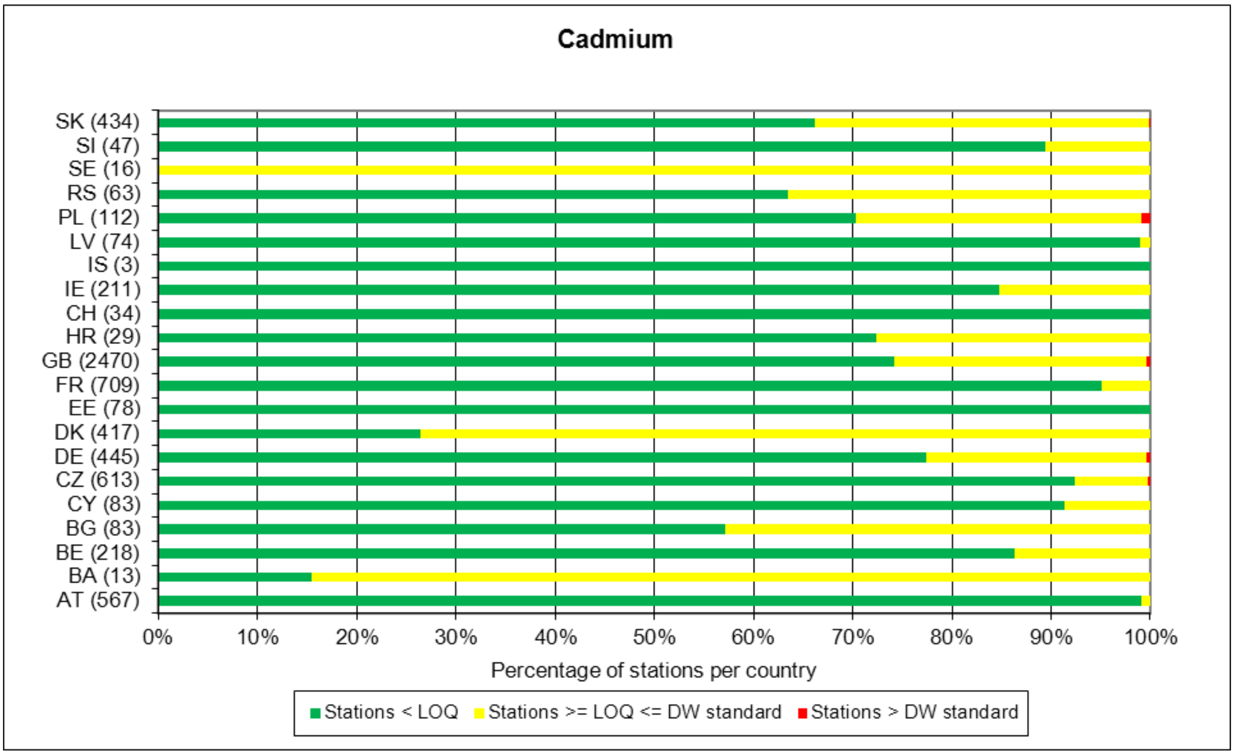
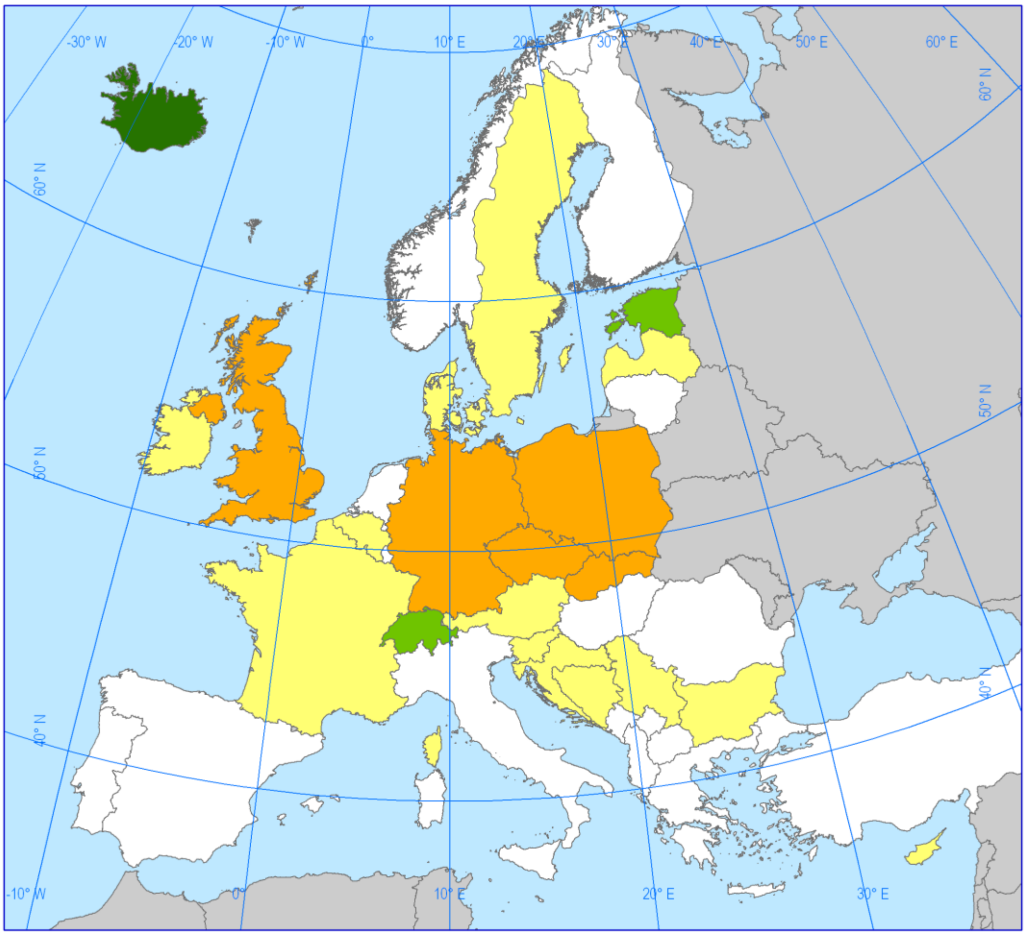


Figure 4.1.2.11c Map of the indicator for cadmium in groundwater in 2008–2009



- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Figure 4.1.2.12a Long-term indicator (mean concentration, number of sites within indicator class) for chlorpyrifos in groundwater

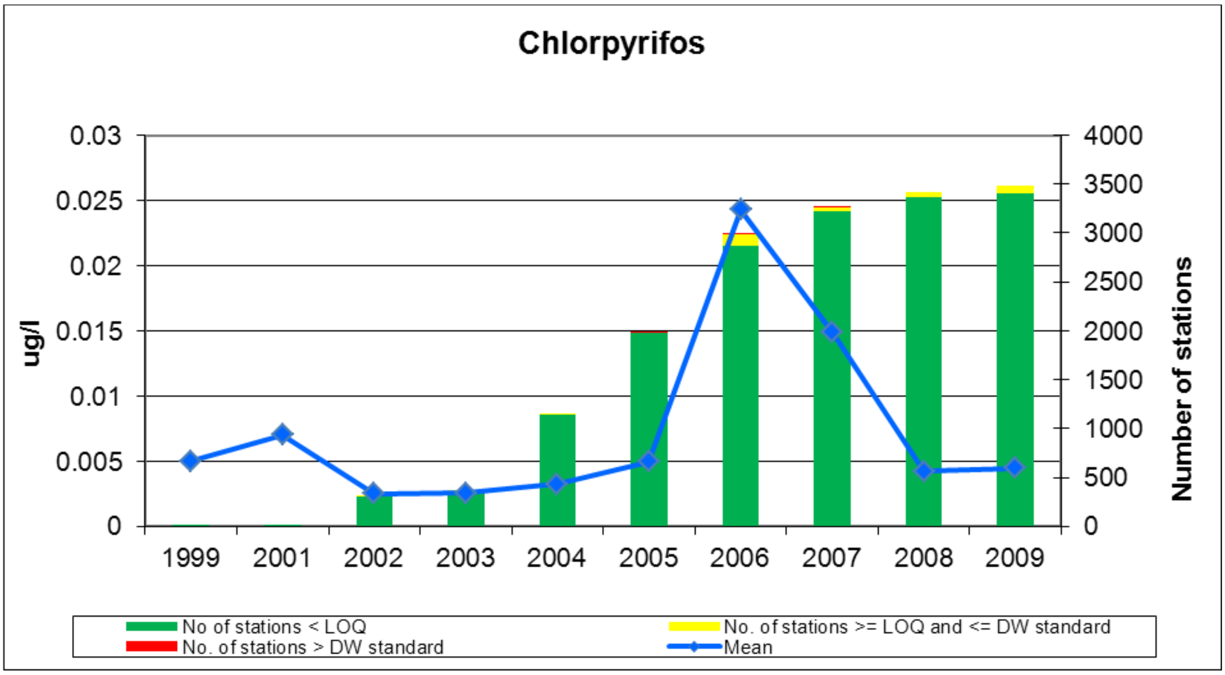


Figure 4.1.2.12b Indicator for chlorpyrifos groundwater in 2008–2009 (number of stations per country shown in parenthesis)

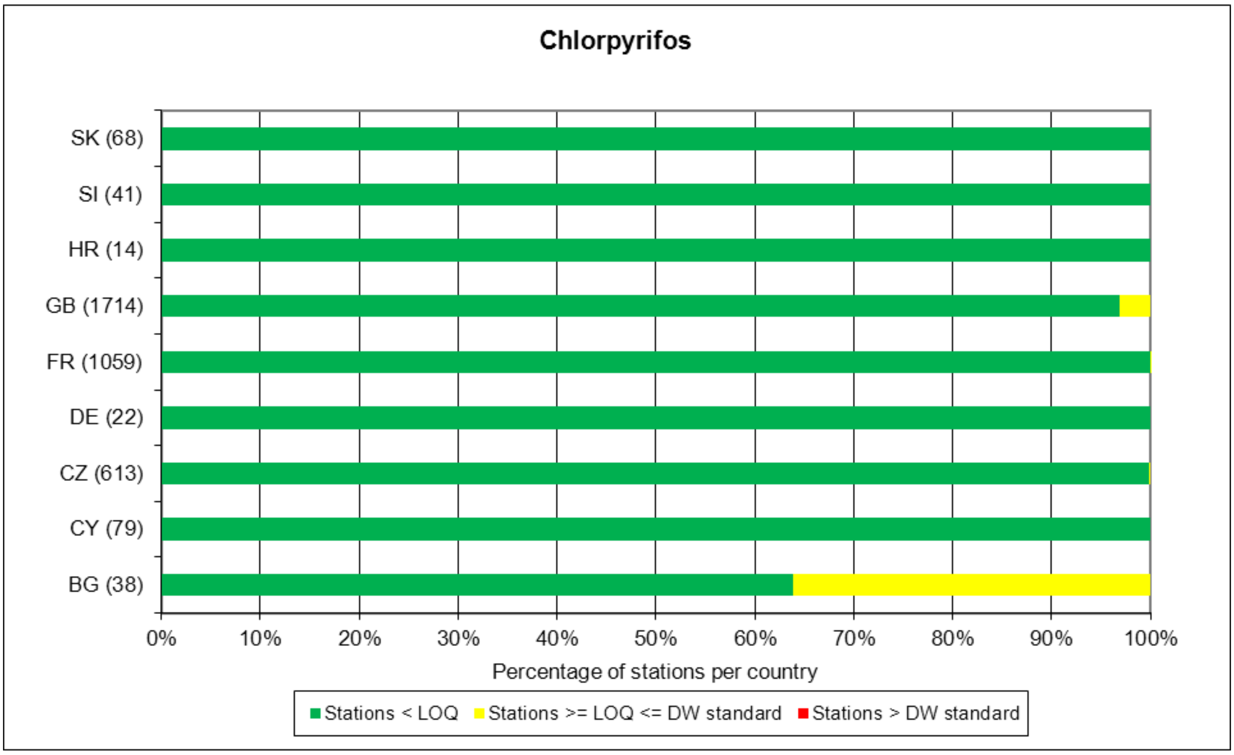
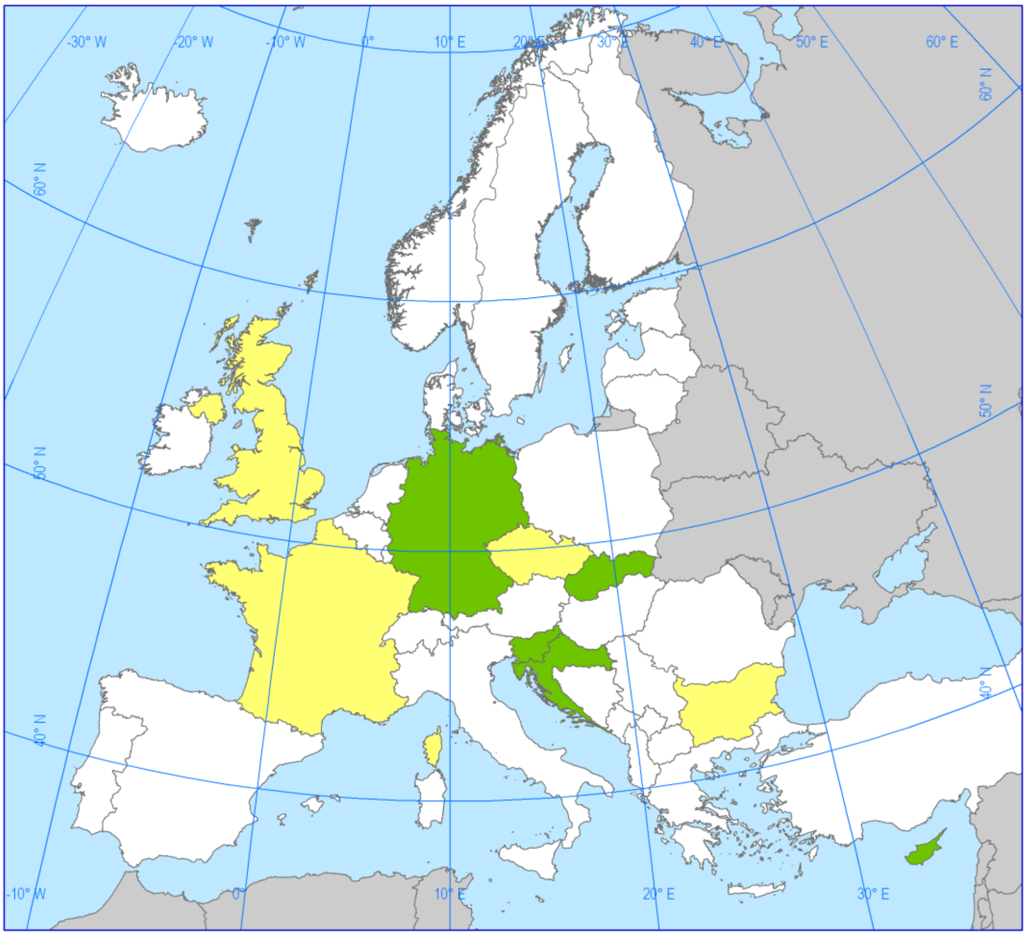


Figure 4.1.2.12c Map of the indicator for chlorpyrifos in groundwater in 2008–2009



- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Figure 4.1.2.13a Long-term indicator (mean concentration, number of sites within indicator class) for DDD p,p´ in groundwater

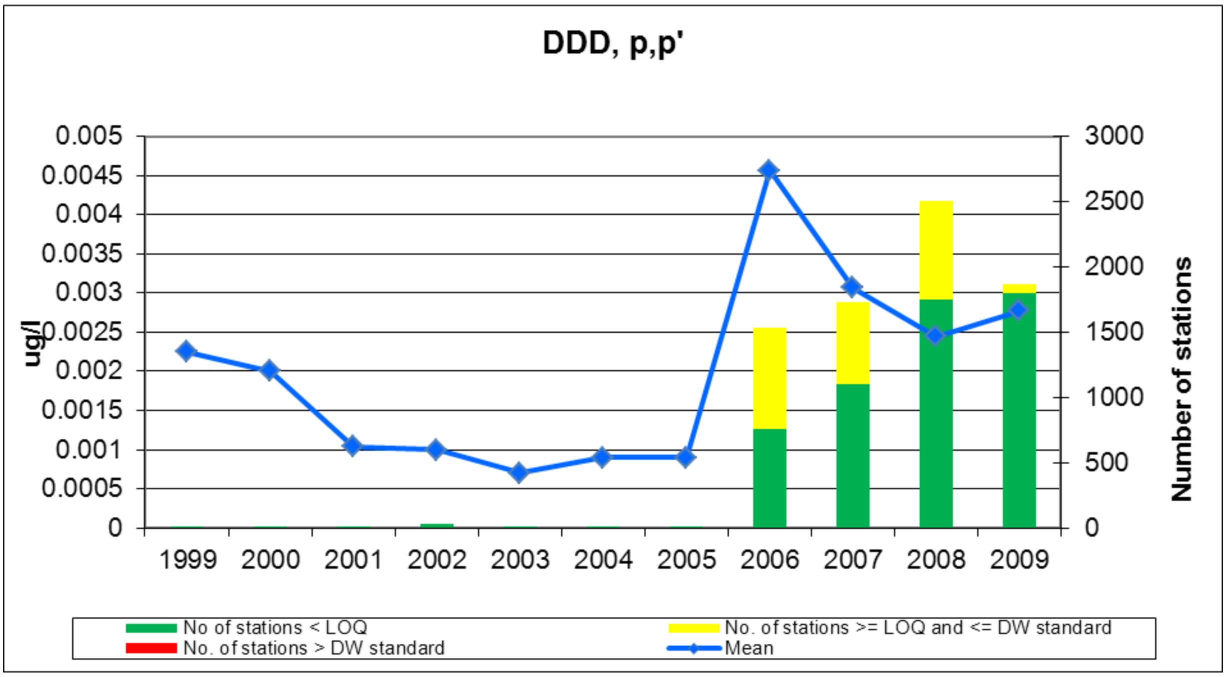


Figure 4.1.2.13b Indicator for DDD p,p´ in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

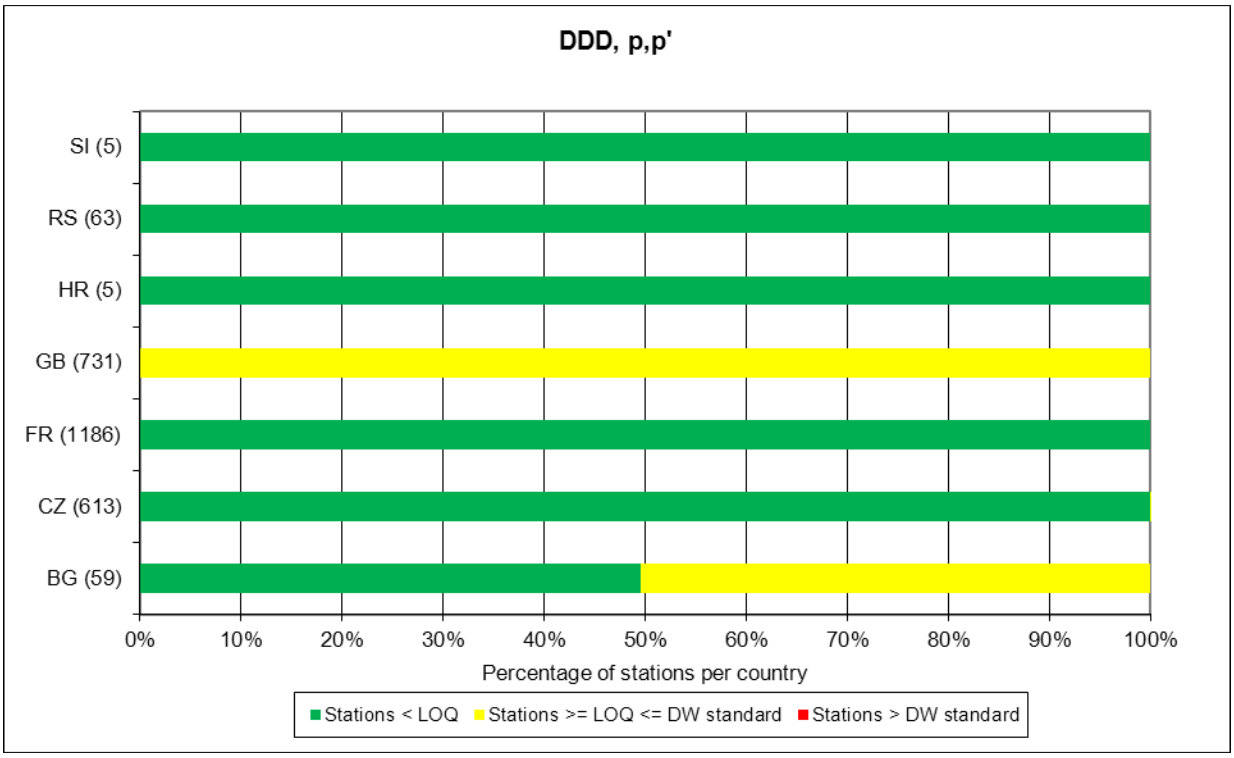


Figure 4.1.2.13c Map of the indicator for DDD p,p´ in groundwater in 2008–2009

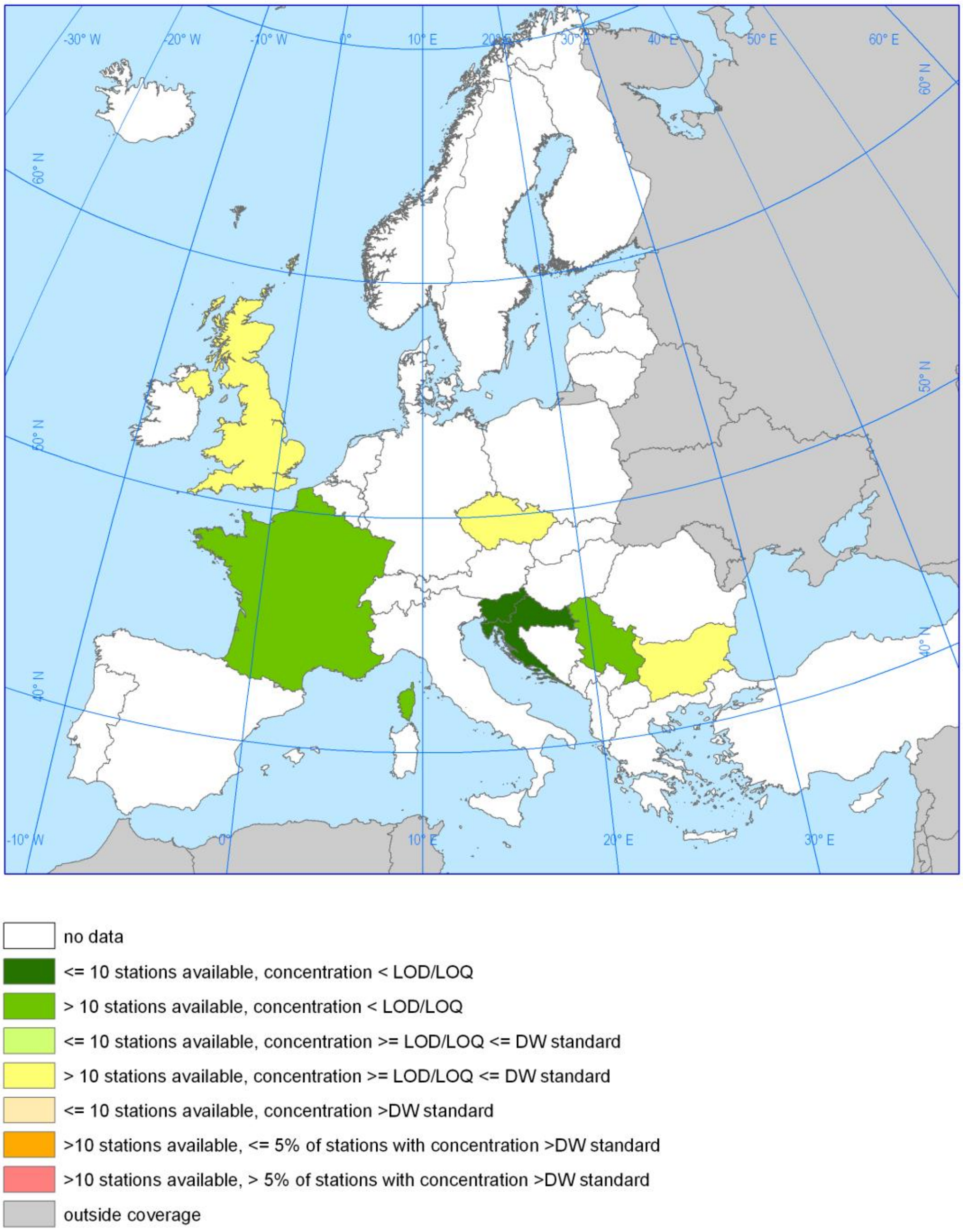


Figure 4.1.2.14a Long-term indicator (mean concentration, number of sites within indicator class) for DDT p,p´ in groundwater

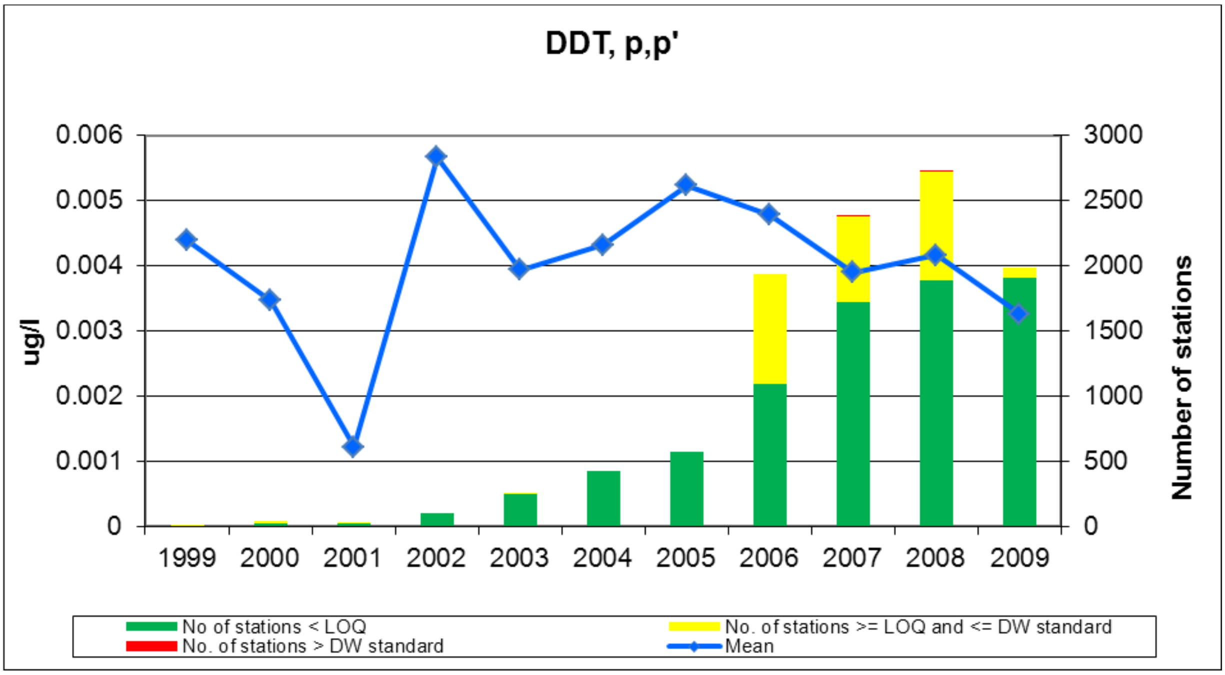


Figure 4.1.2.14b Indicator for DDT p,p´ in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

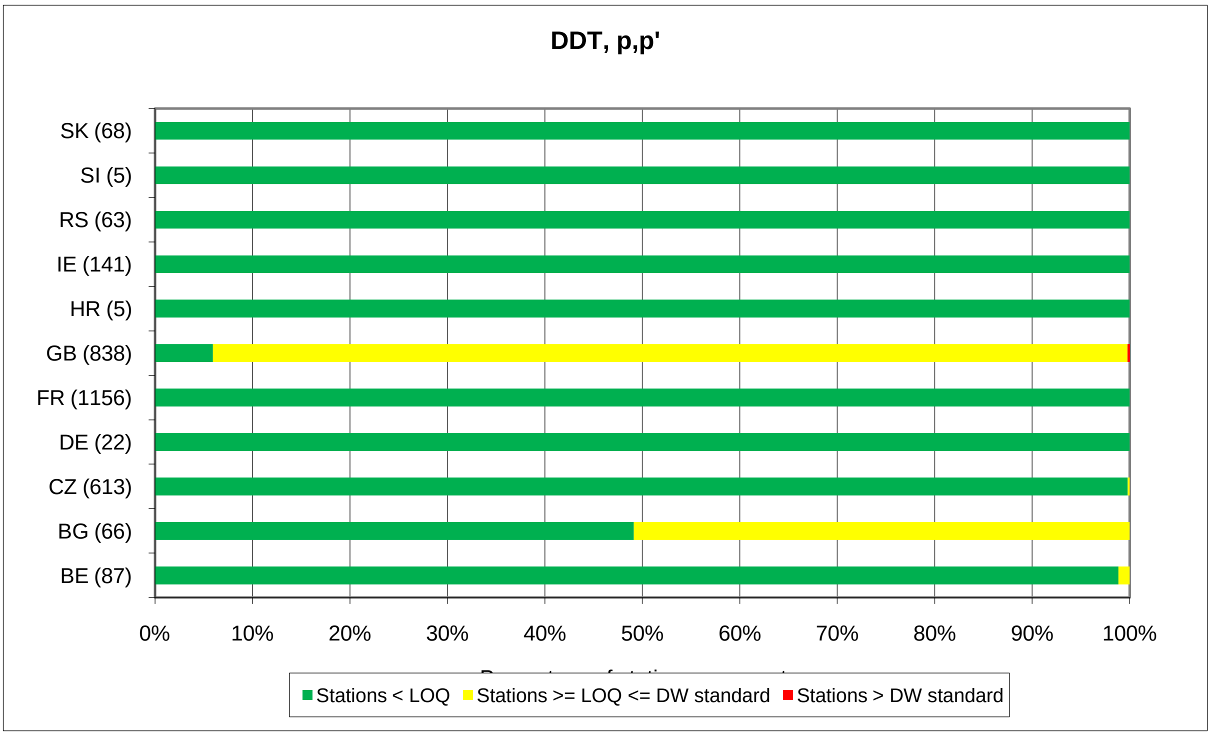


Figure 4.1.2.14c Map of the indicator for DDT p,p´ in groundwater in 2008–2009

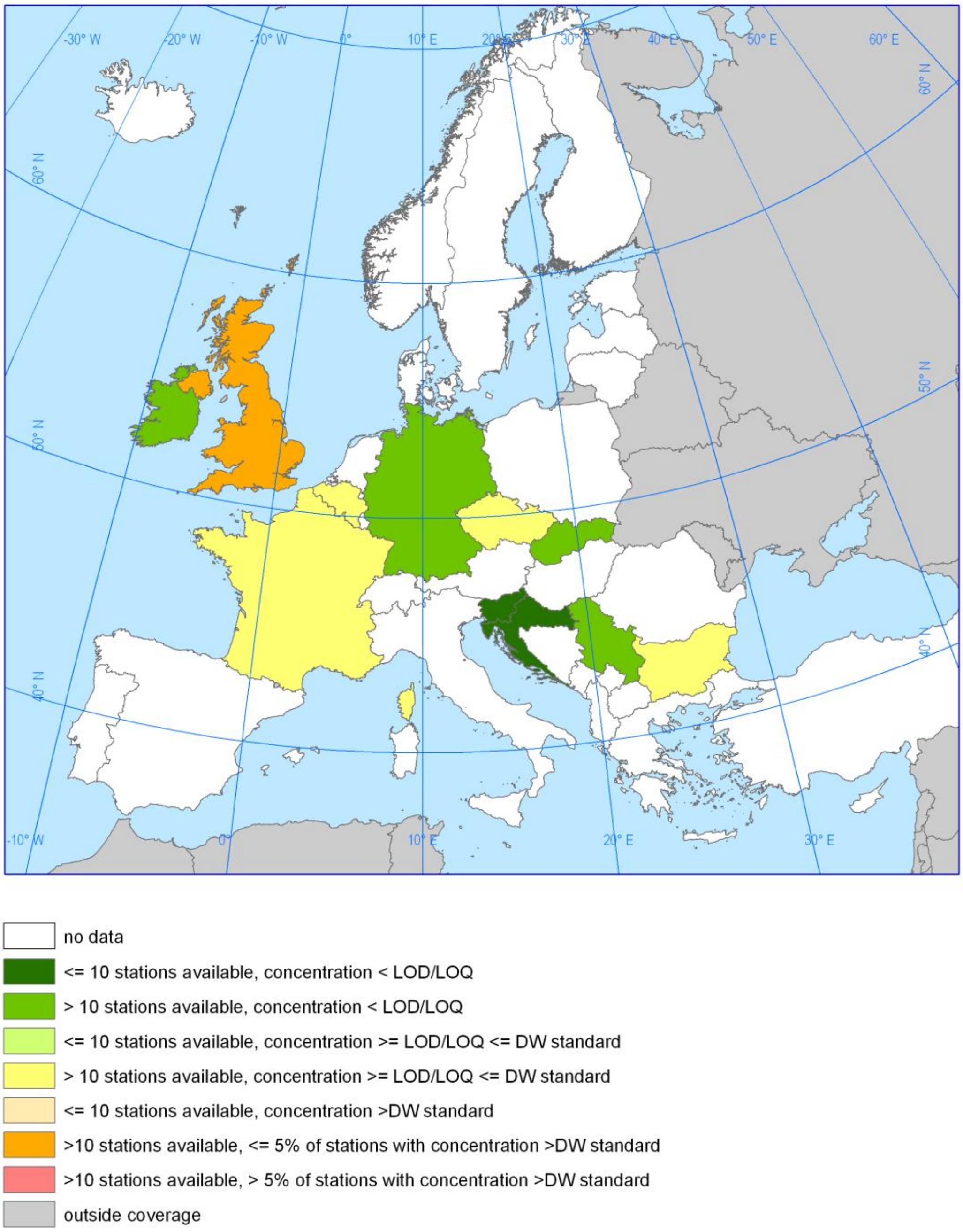


Figure 4.1.2.15a Long-term indicator (mean concentration, number of sites within indicator class) for desethylatrazine in groundwater

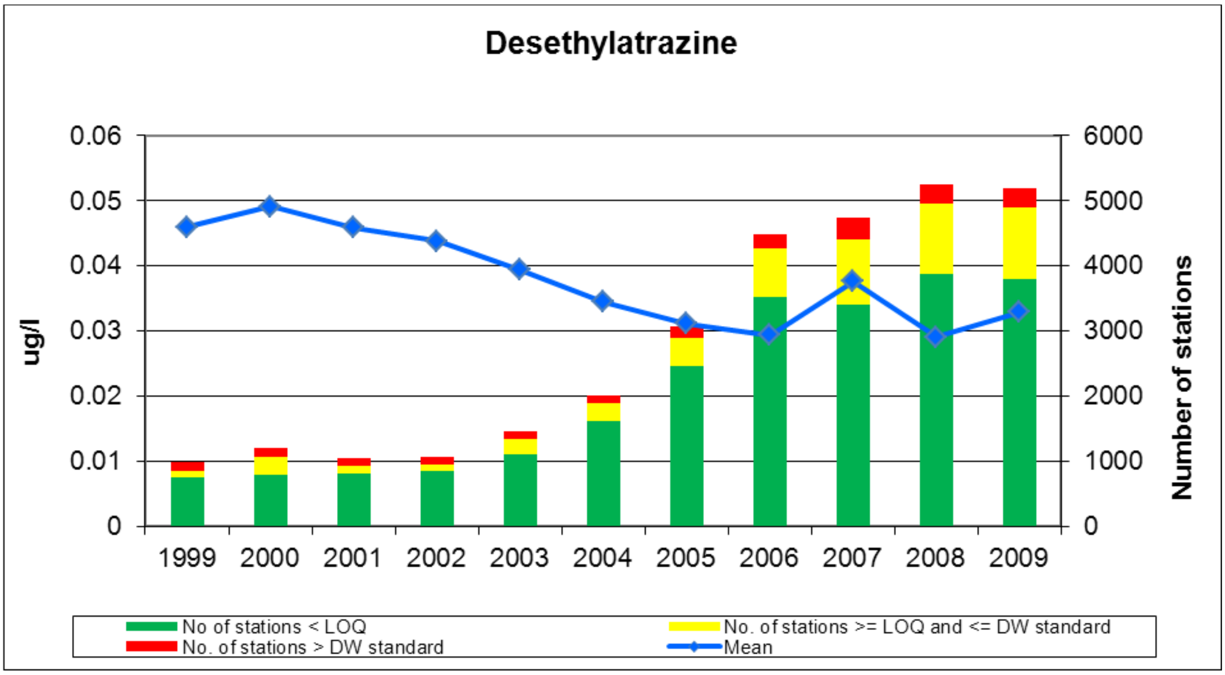


Figure 4.1.2.15b Indicator for desethylatrazine in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

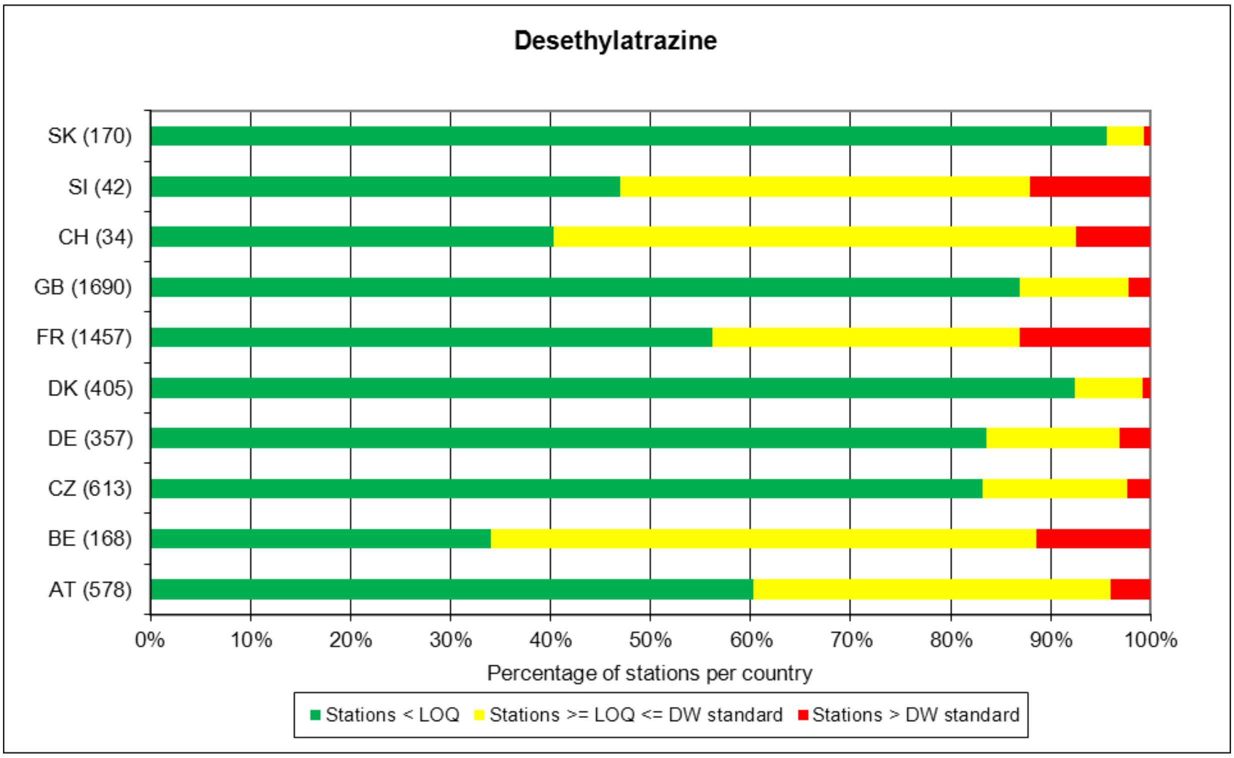


Figure 4.1.2.15c Map of the indicator for desethylatrazine in groundwater in 2008–2009

- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Figure 4.1.2.16a Long-term indicator (mean concentration, number of sites within indicator class) for desisopropylatrazine in groundwater

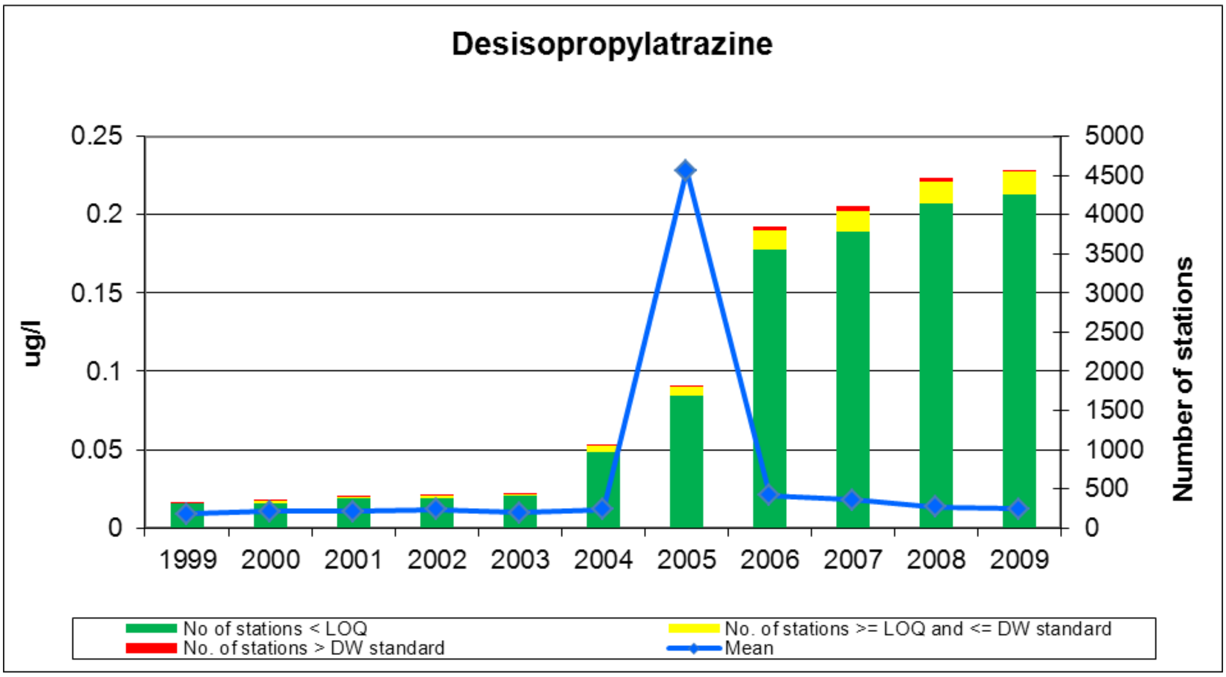


Figure 4.1.2.16b Indicator for desisopropylatrazine in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

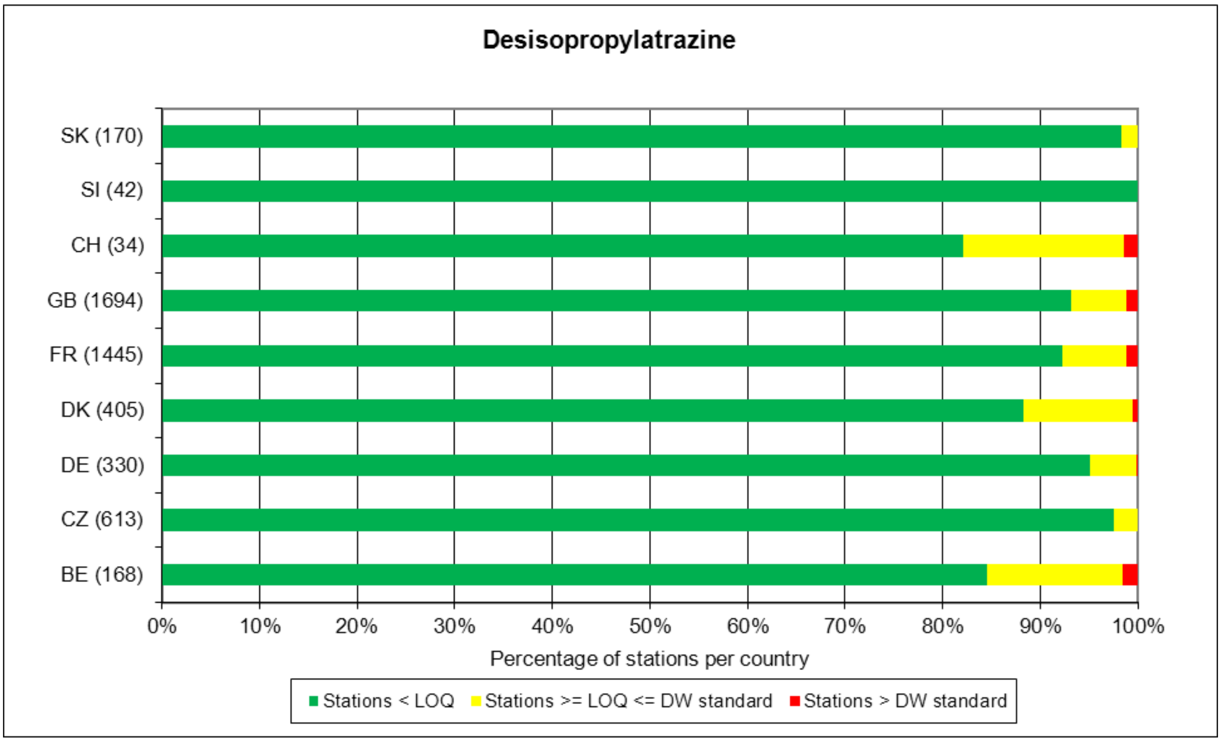


Figure 4.1.2.16c Map of the indicator for desisopropylatrazine in groundwater in 2008–2009

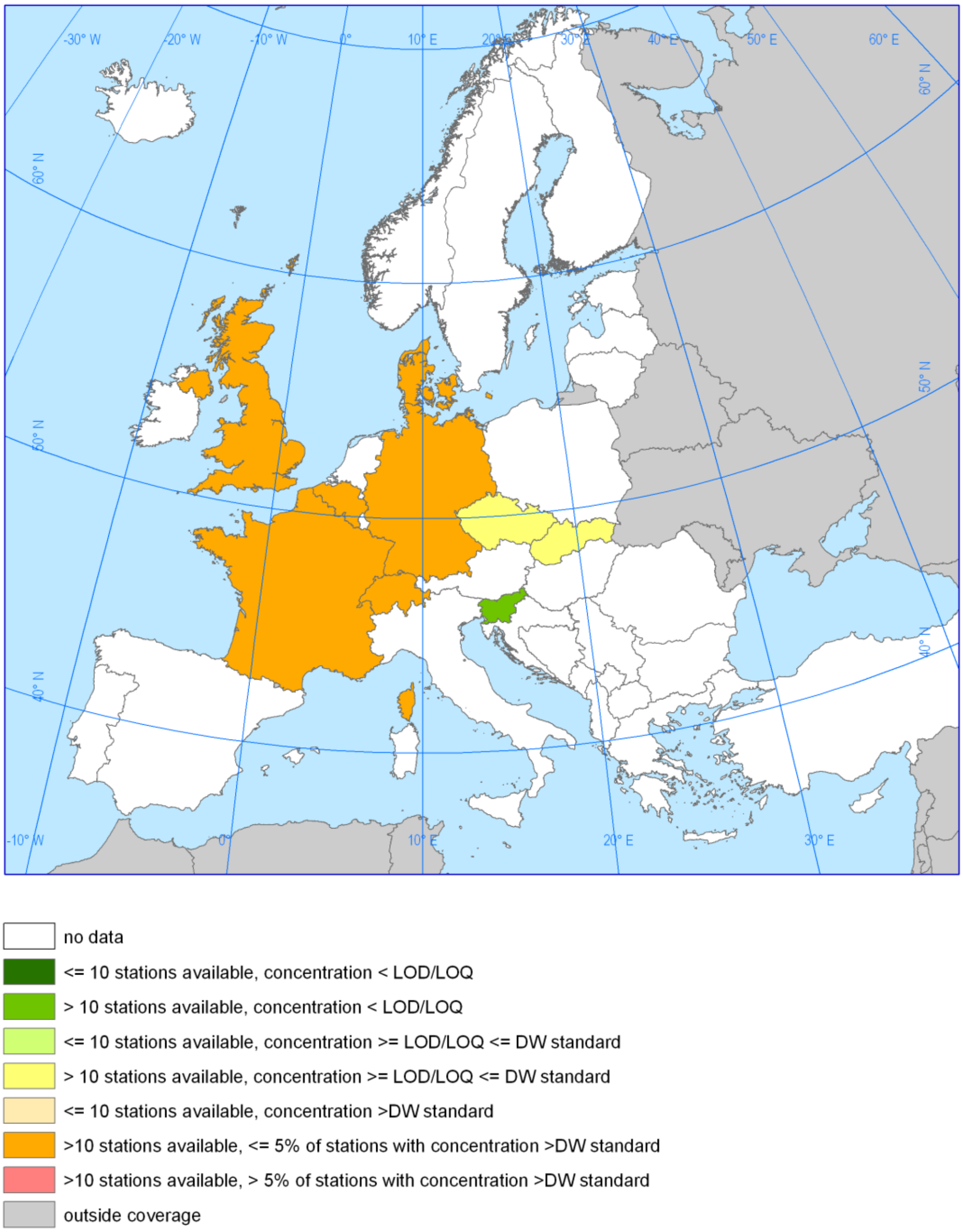


Figure 4.1.2.17a Long-term indicator (mean concentration, number of sites within indicator class) for dieldrin in groundwater

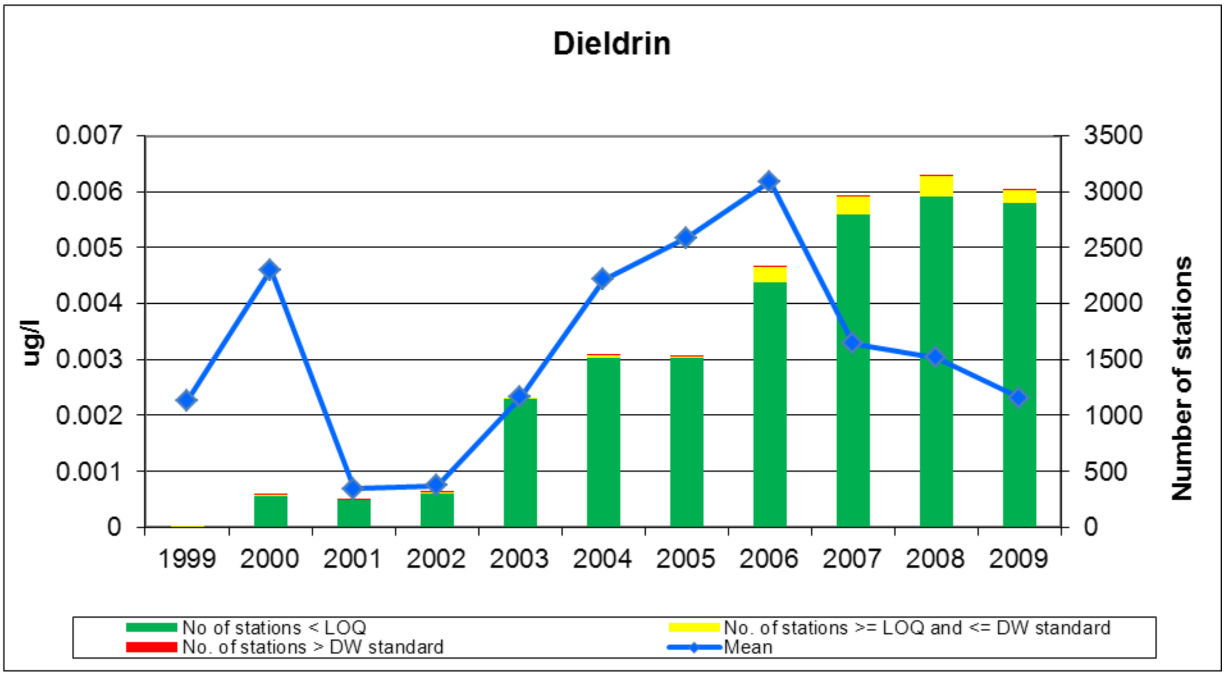


Figure 4.1.2.17b Indicator for dieldrin in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

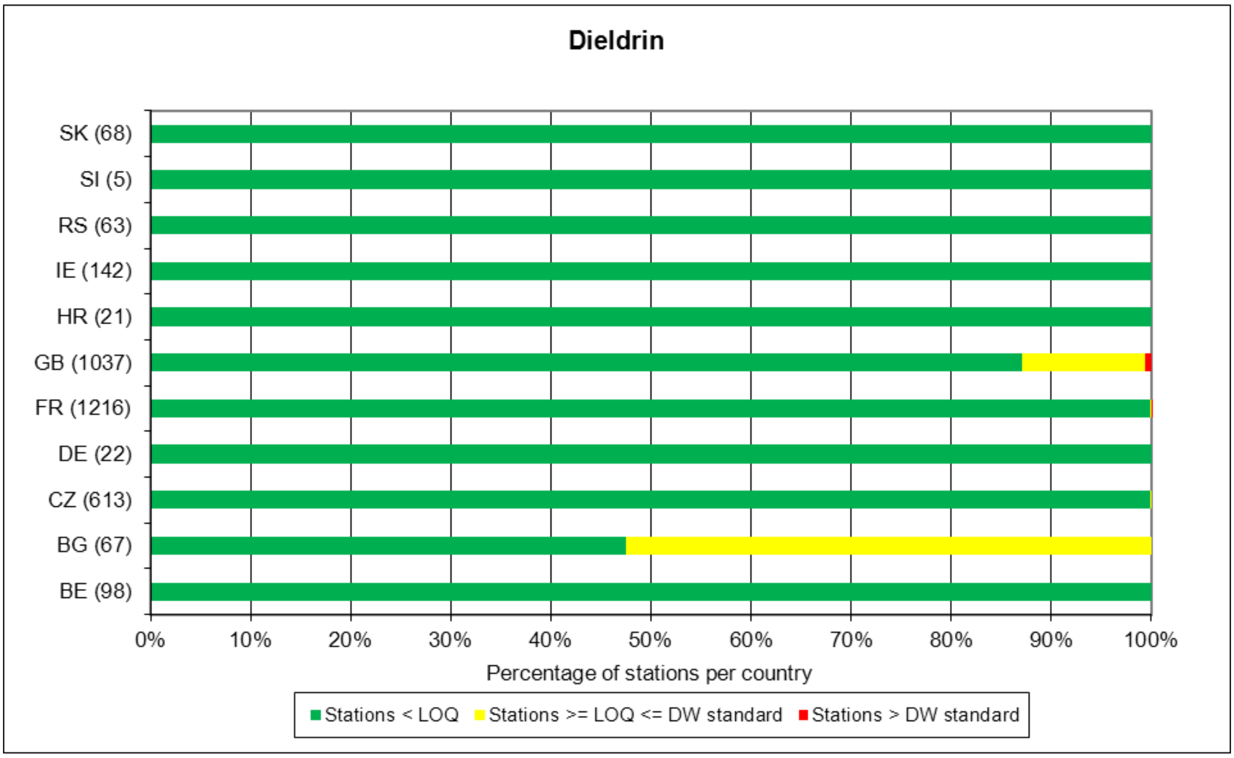


Figure 4.1.2.17c Map of the indicator for dieldrin in groundwater in 2008–2009

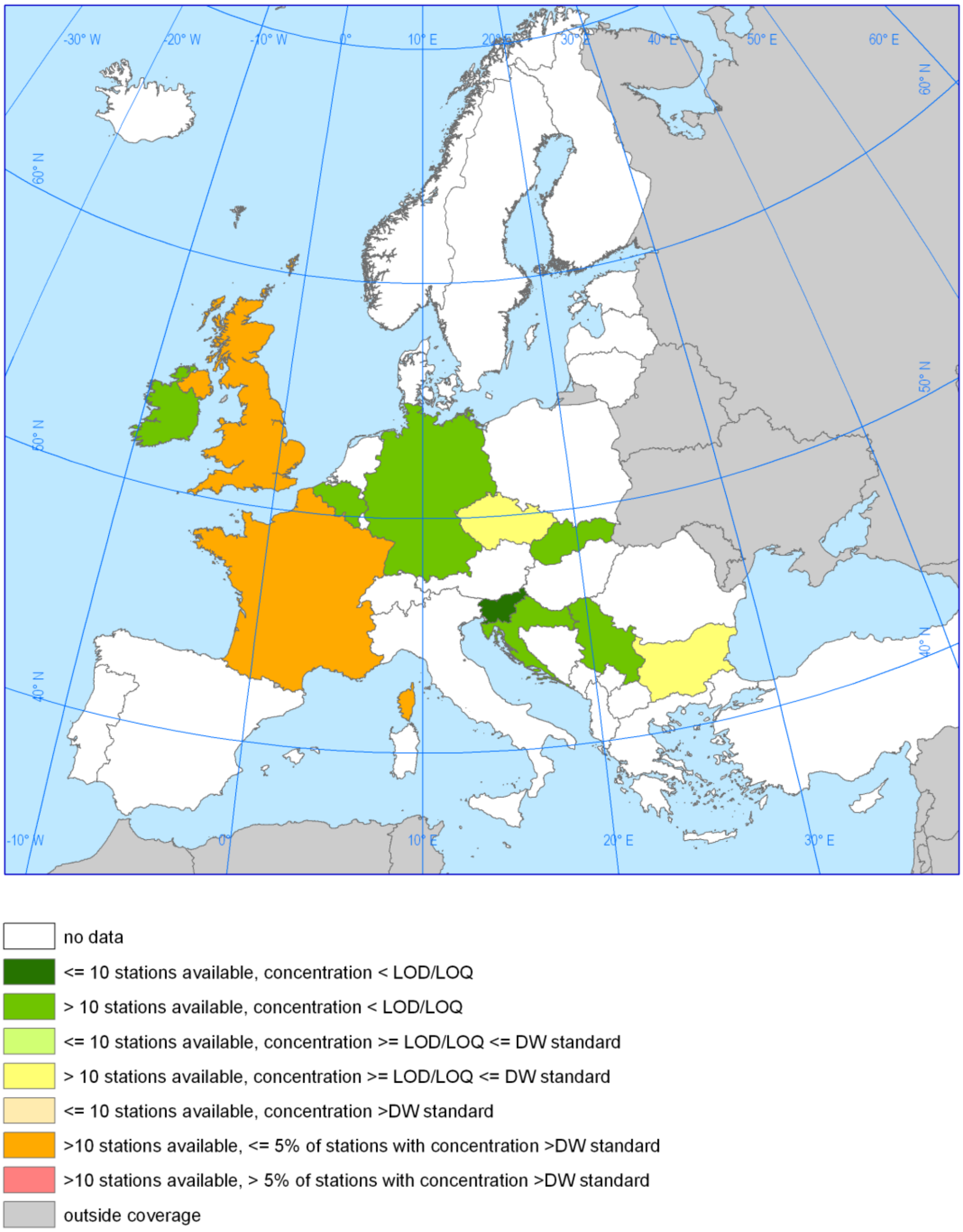


Figure 4.1.2.18a Long-term indicator (mean concentration, number of sites within indicator class) for diuron in groundwater

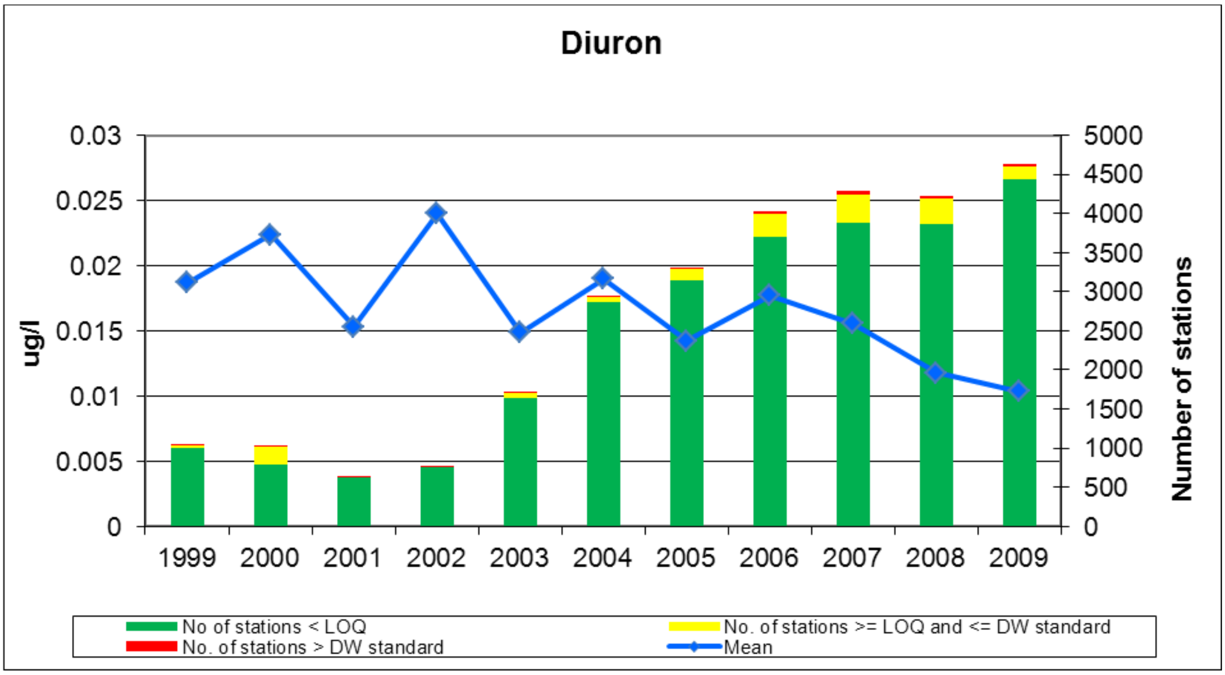


Figure 4.1.2.18b Indicator for diuron in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

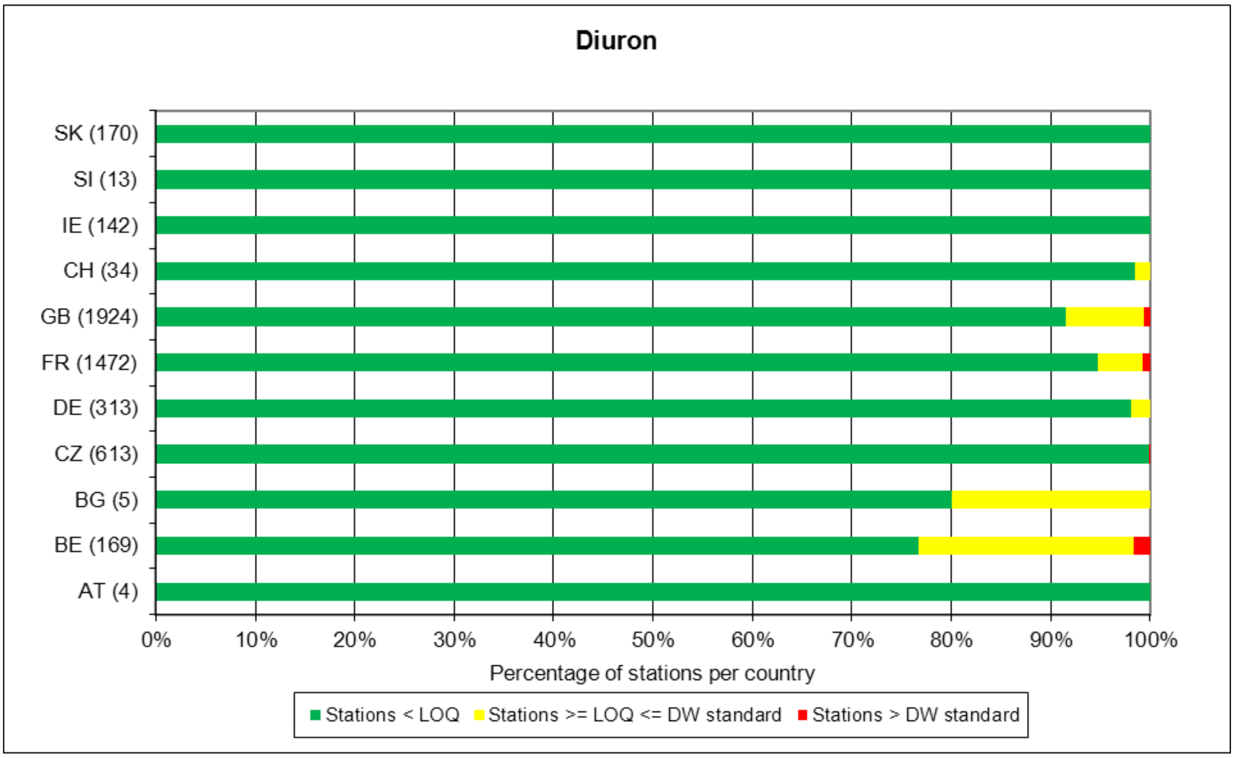


Figure 4.1.2.18c Map of the indicator for diuron in groundwater in 2008–2009

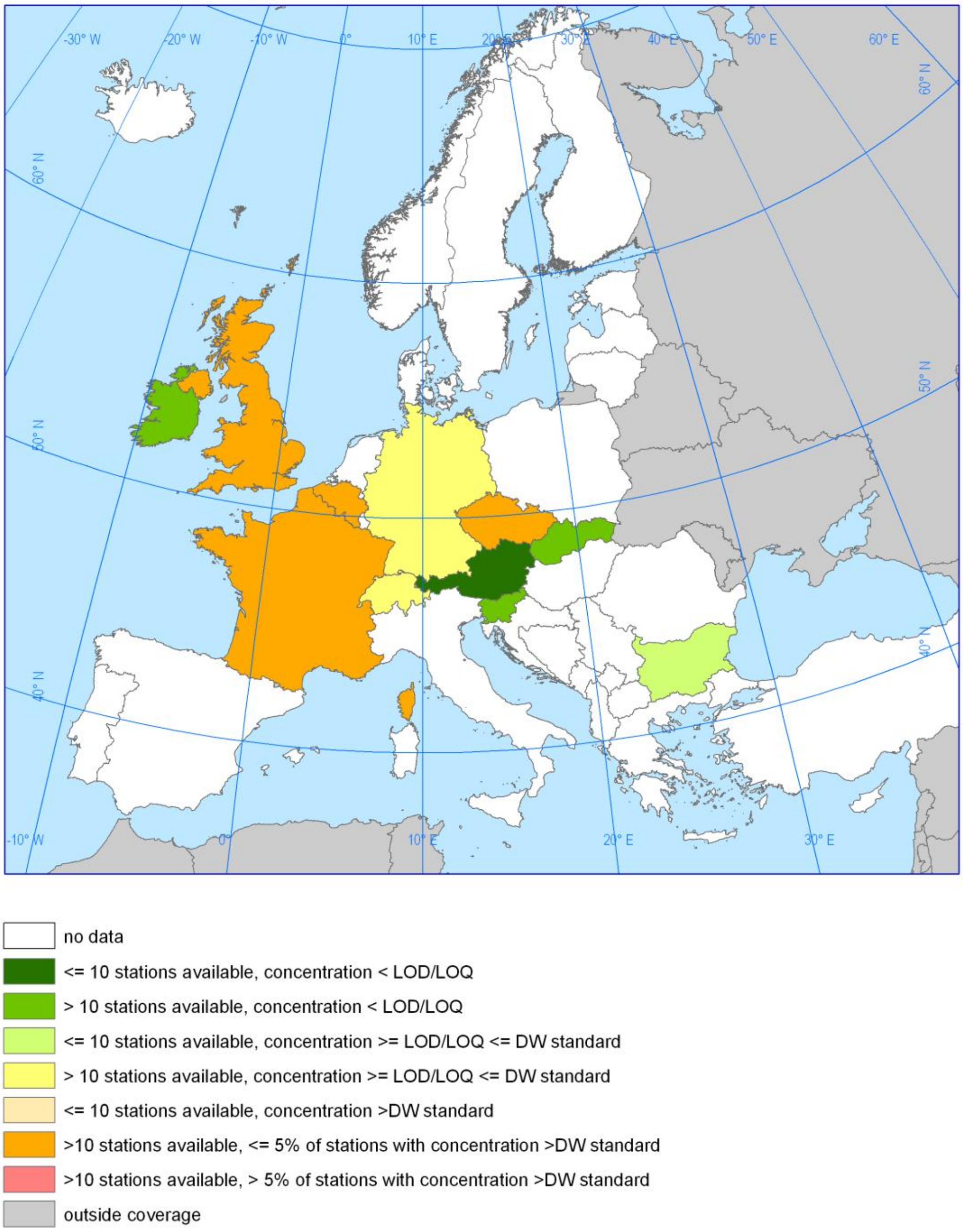


Figure 4.1.2.19a Long-term indicator (mean concentration, number of sites within indicator class) for gamma-HCH in groundwater

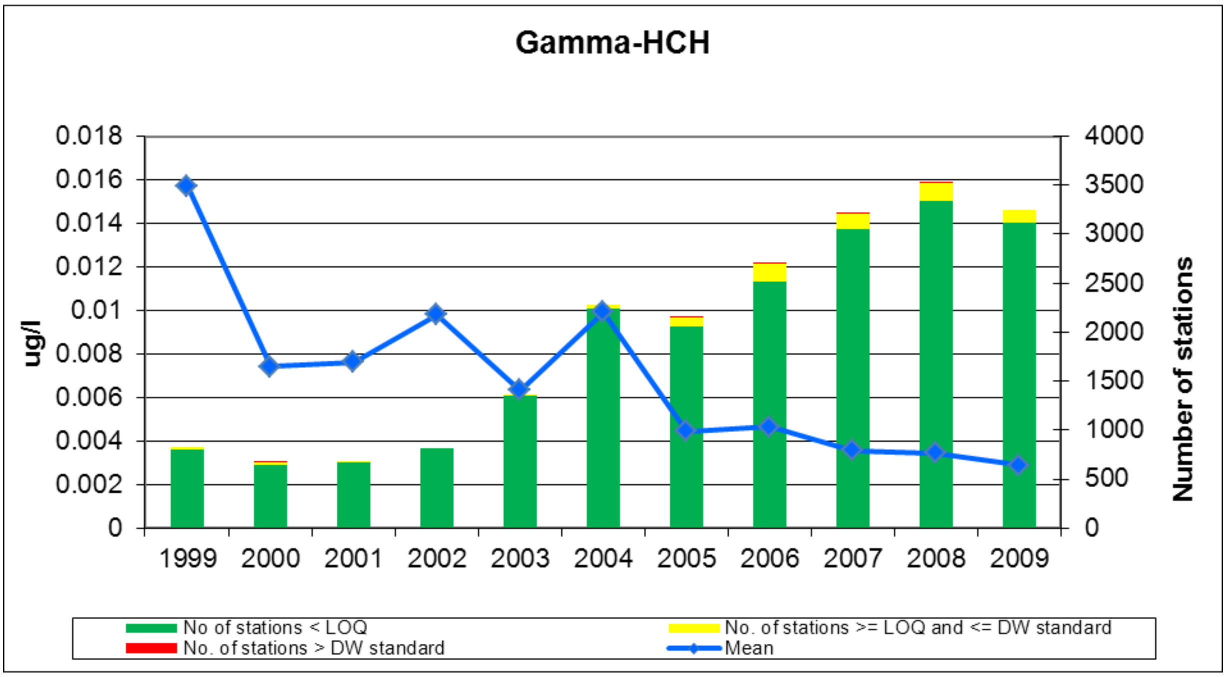


Figure 4.1.2.19b Indicator for gamma-HCH in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

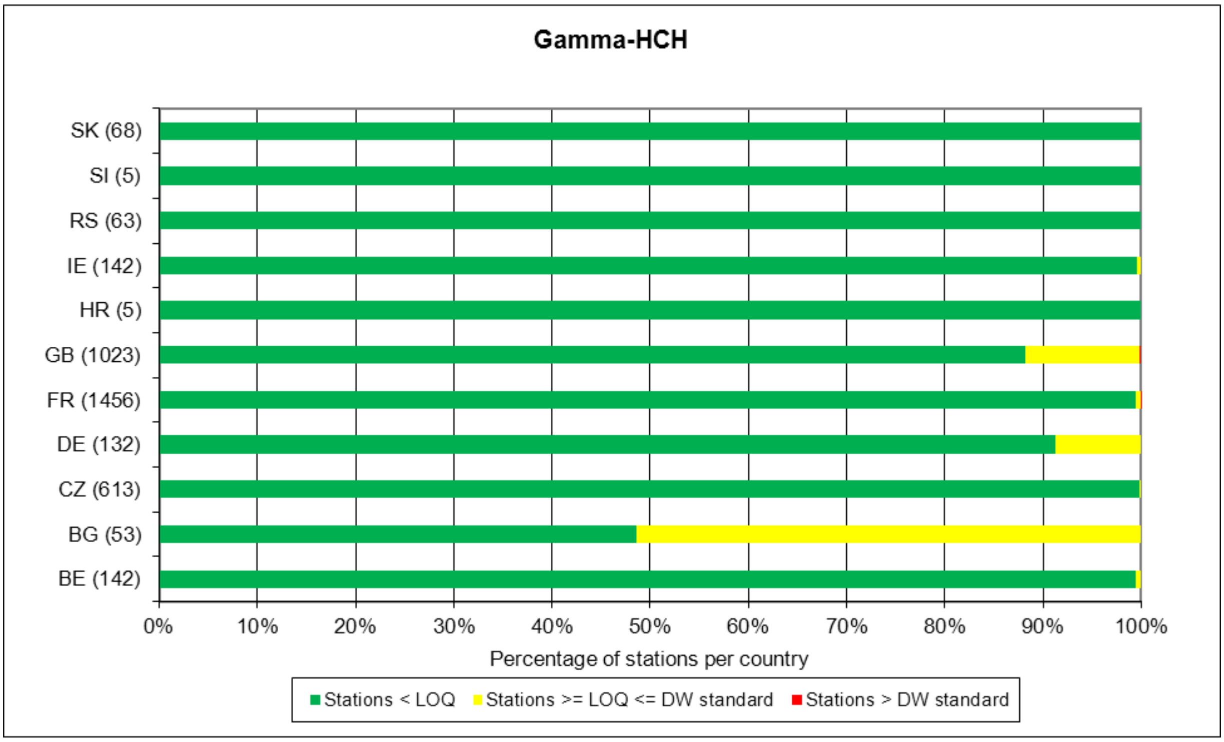
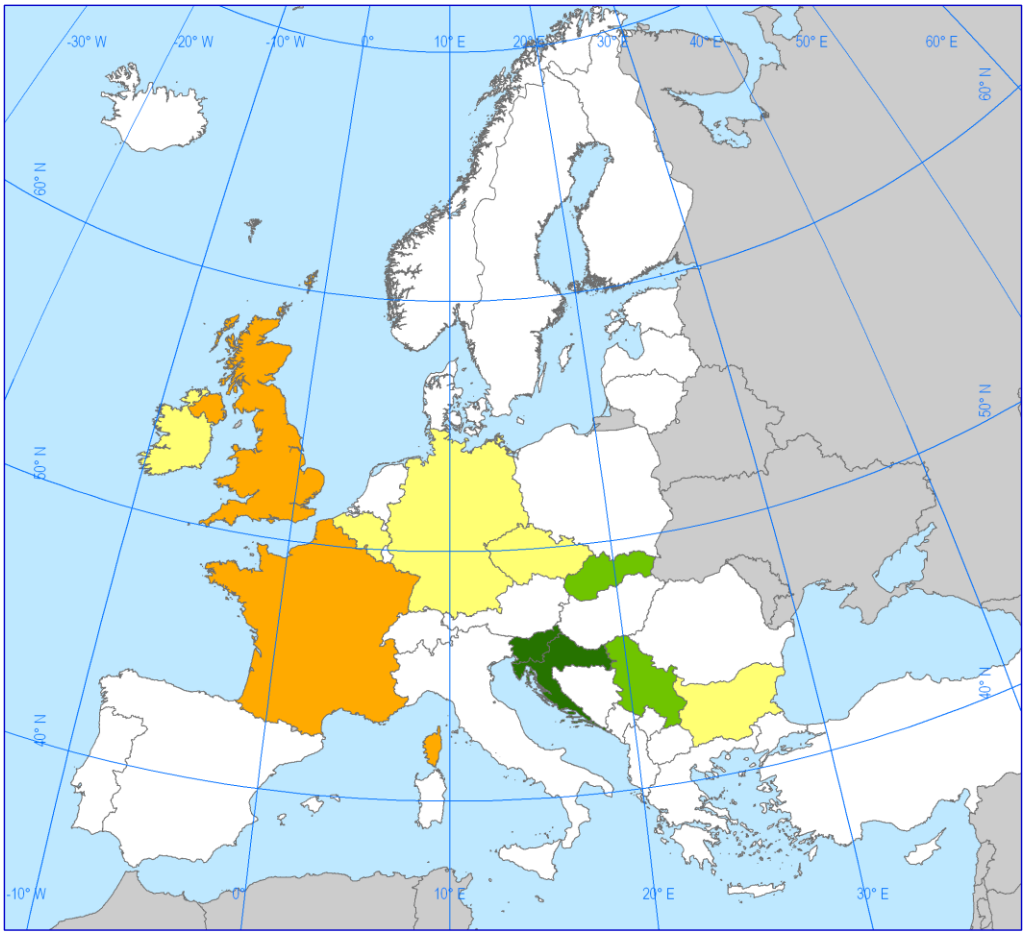


Figure 4.1.2.19c Map of the indicator for gamma-HCH in groundwater in 2008–2009



- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Figure 4.1.2.20a Long-term indicator (mean concentration, number of sites within indicator class) for isoproturon in groundwater

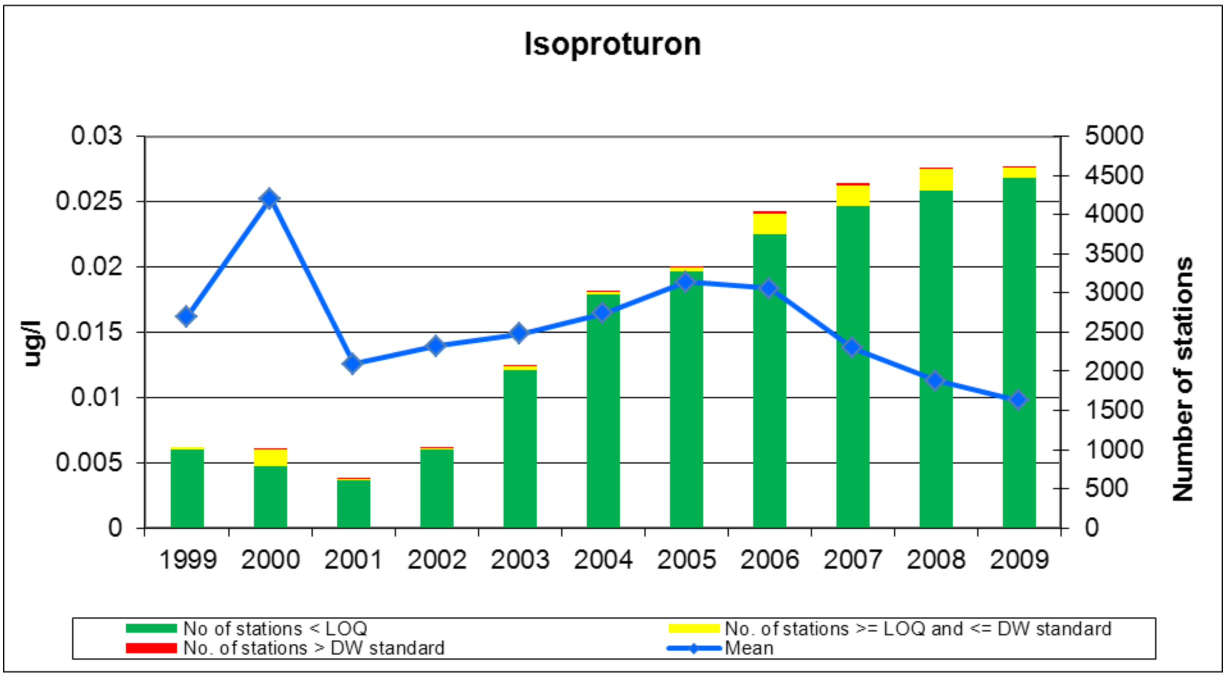


Figure 4.1.2.20b Indicator for isoproturon in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

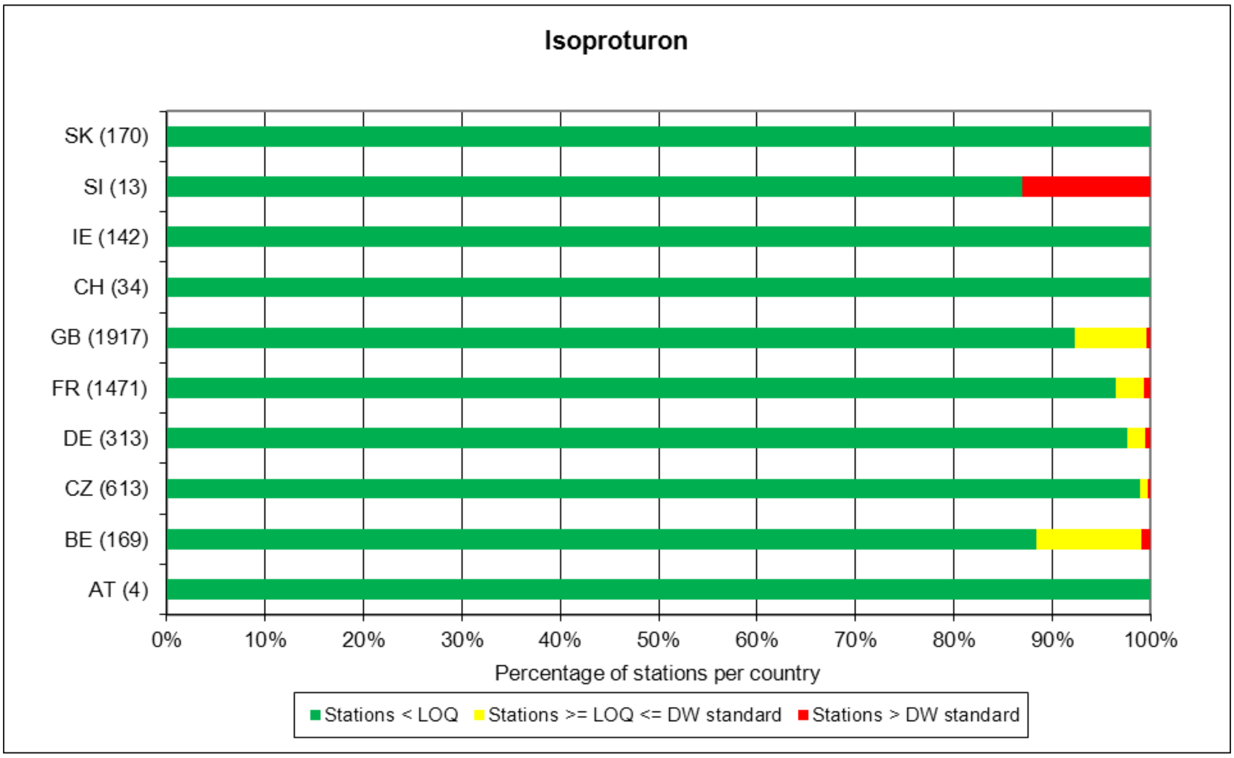
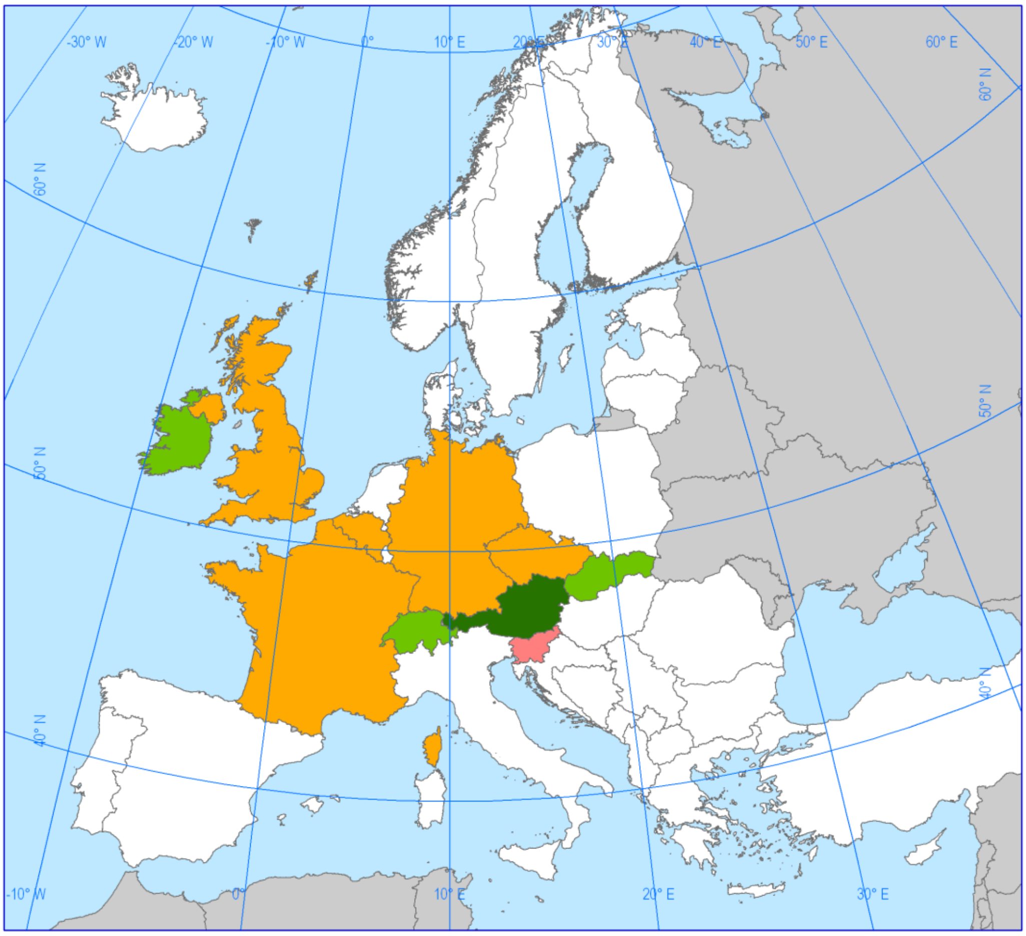


Figure 4.1.2.20c Map of the indicator for isoproturon in groundwater in 2008–2009



- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Figure 4.1.2.21a Long-term indicator (mean concentration, number of sites within indicator class) for lead in groundwater

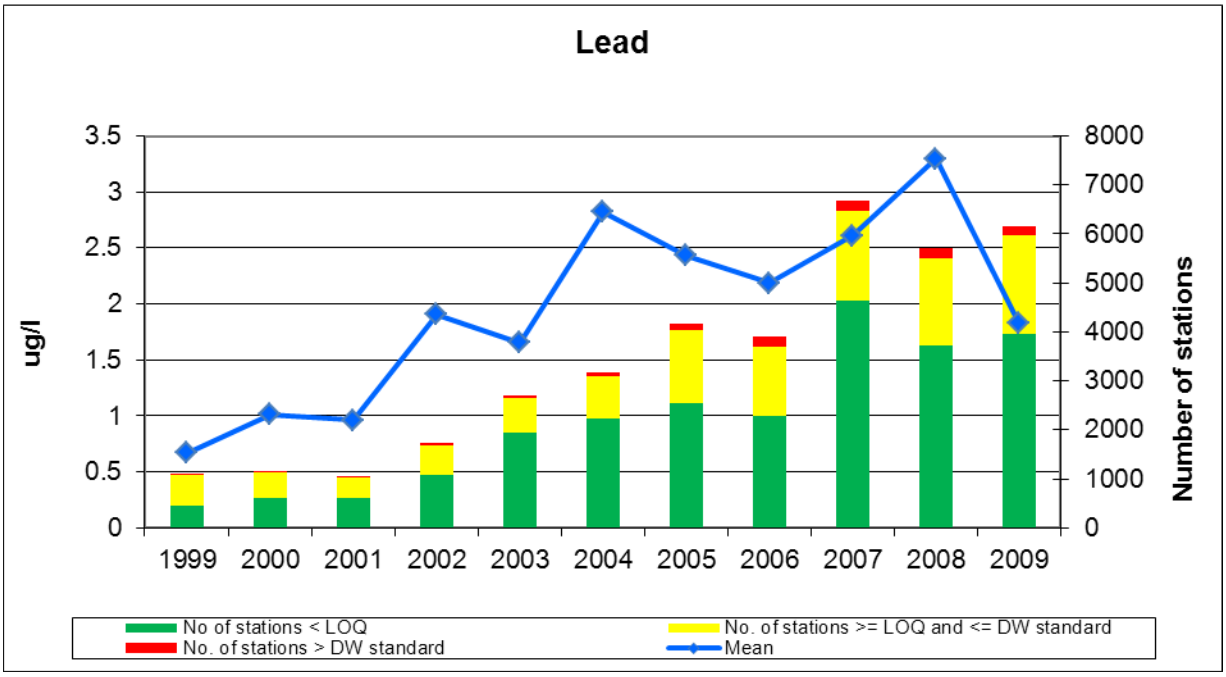


Figure 4.1.2.21b Indicator for lead in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

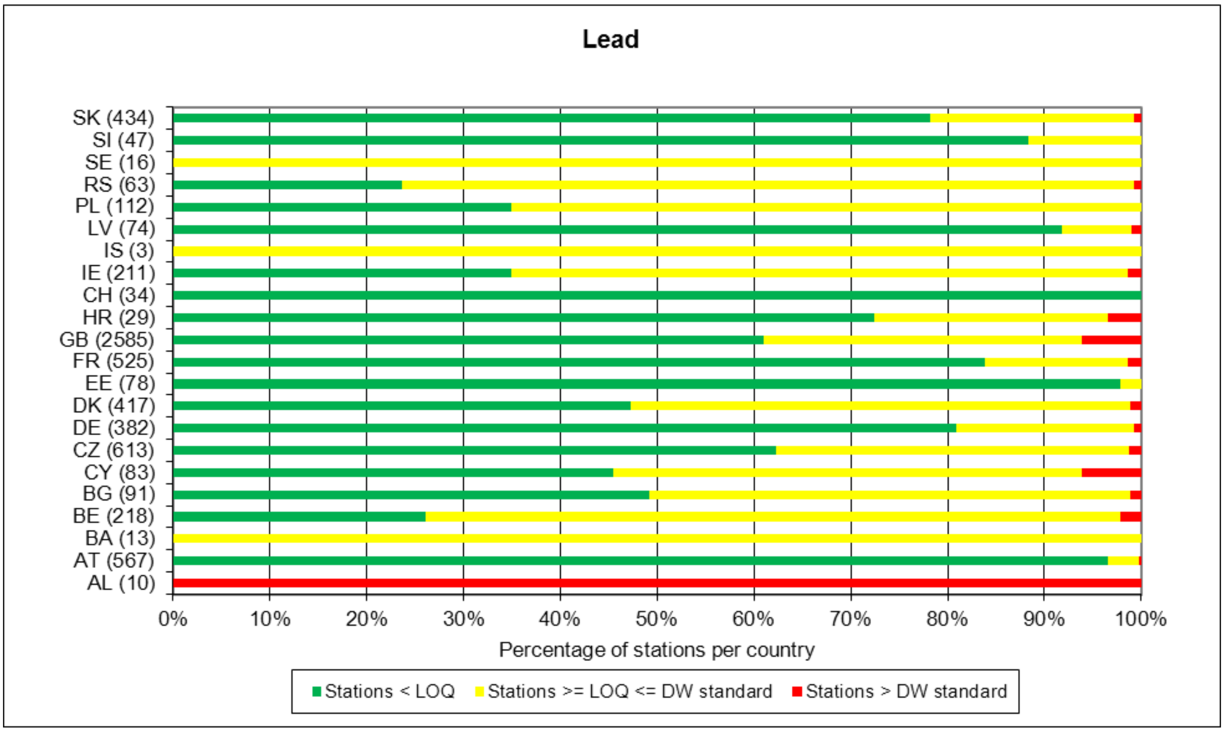
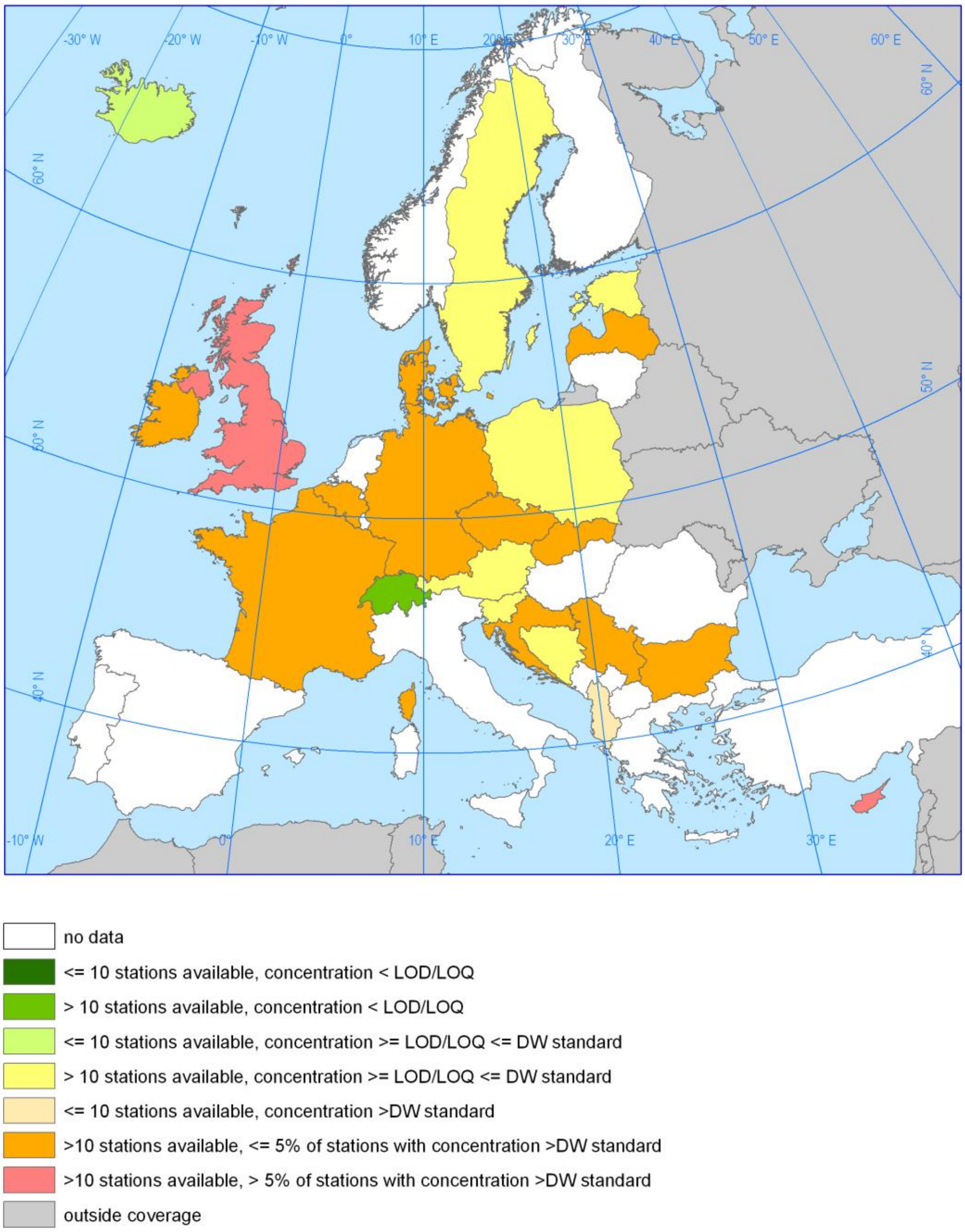


Figure 4.1.2.21c Map of the indicator for lead in groundwater in 2008–2009



Note: Only very few stations (up to 8) with a concentration above the DW standard were reported by Belgium, Bulgaria, Croatia, Denmark, Germany, Ireland, Latvia, Republic of Serbia and Slovakia.

Figure 4.1.2.22a Long-term indicator (mean concentration, number of sites within indicator class) for linuron in groundwater

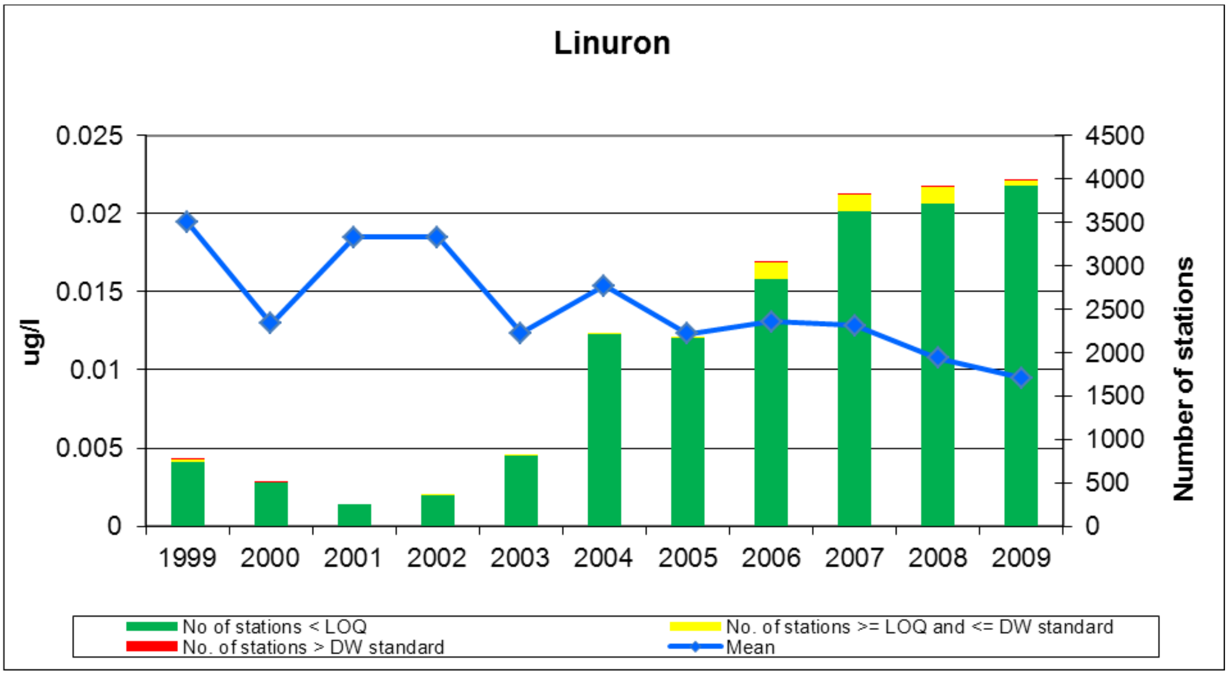


Figure 4.1.2.22b Indicator for linuron in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

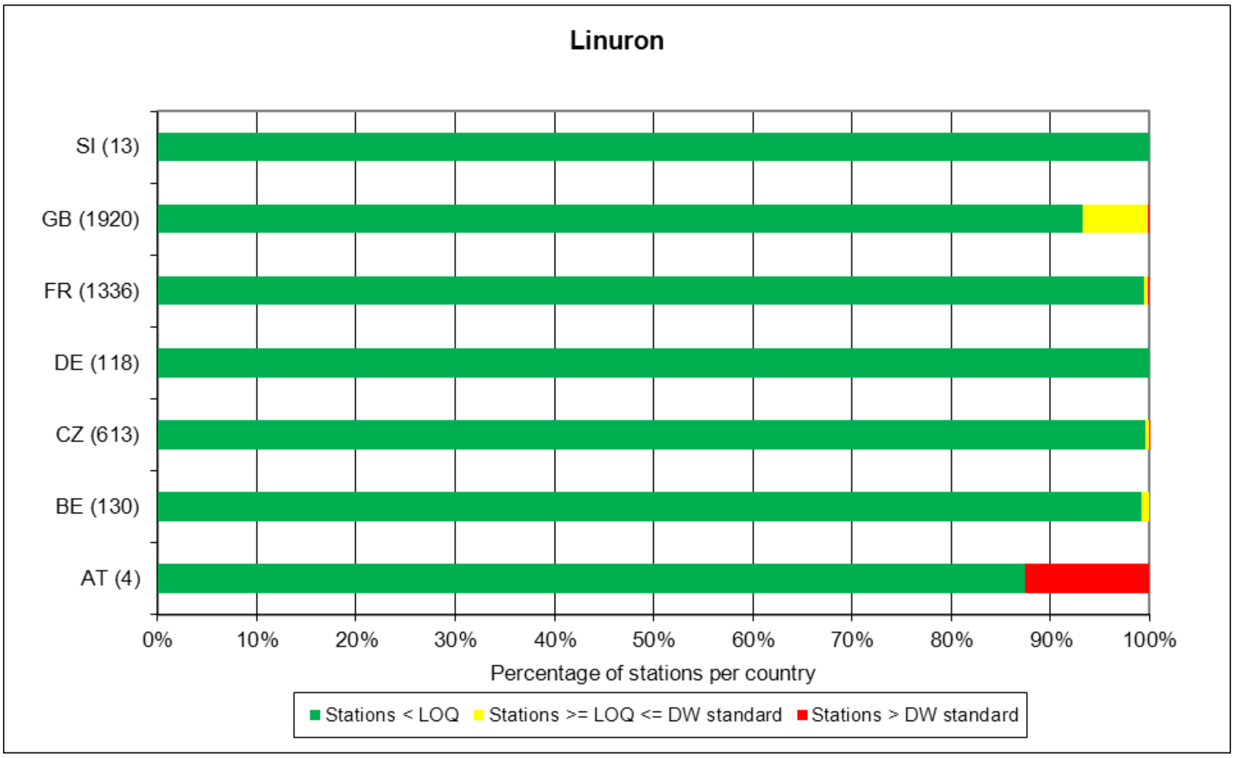


Figure 4.1.2.22c Map of the indicator for linuron in groundwater in 2008–2009

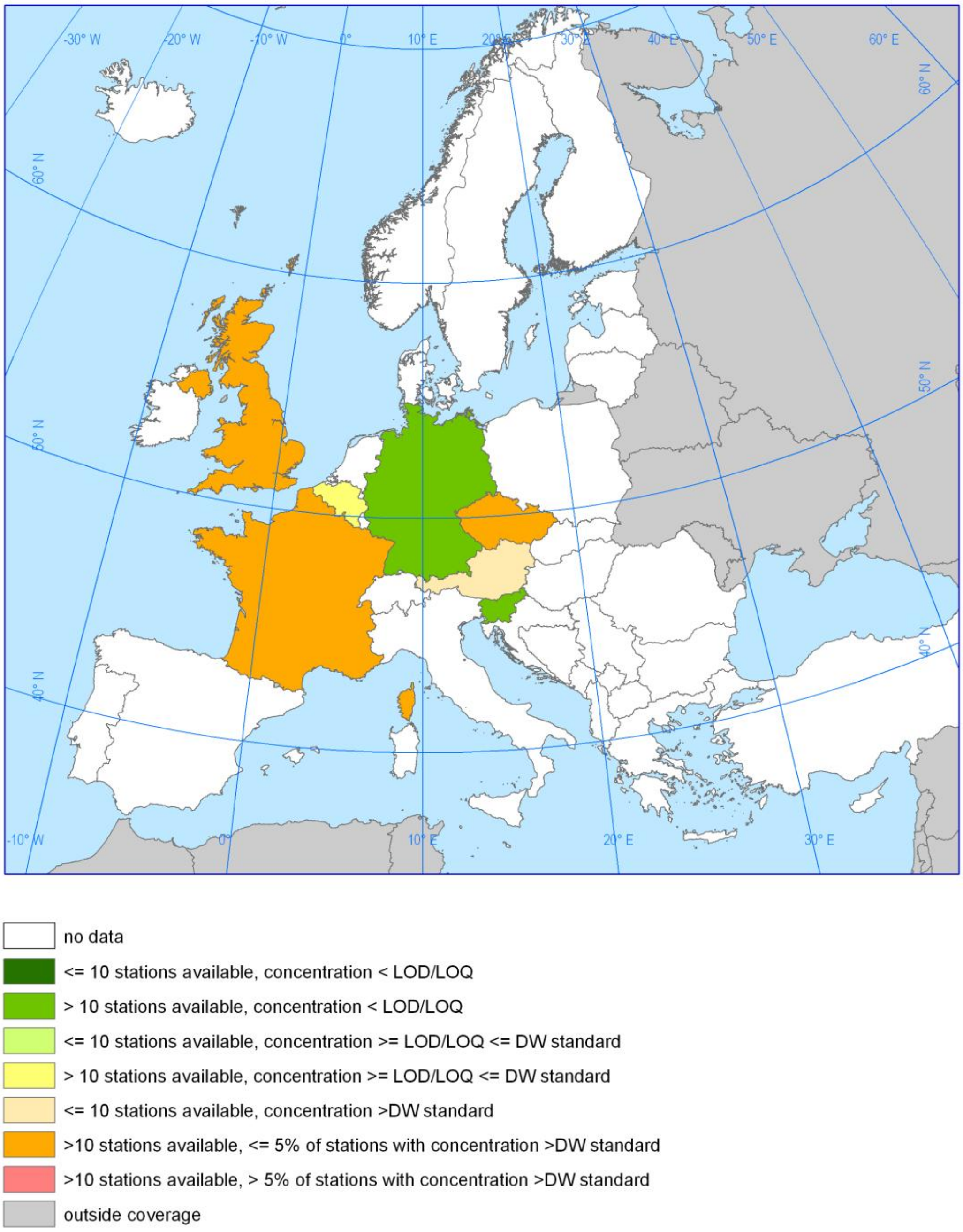


Figure 4.1.2.23a Long-term indicator (mean concentration, number of sites within indicator class) for MCPA in groundwater

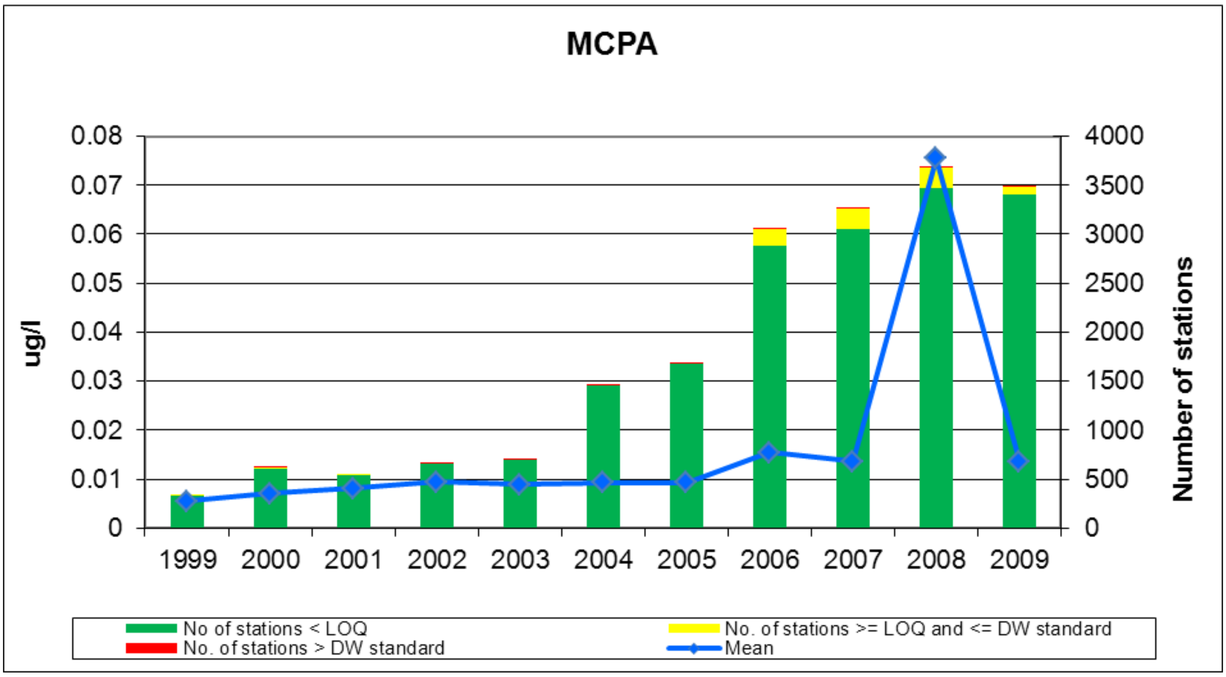


Figure 4.1.2.23b Indicator for MCPA in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

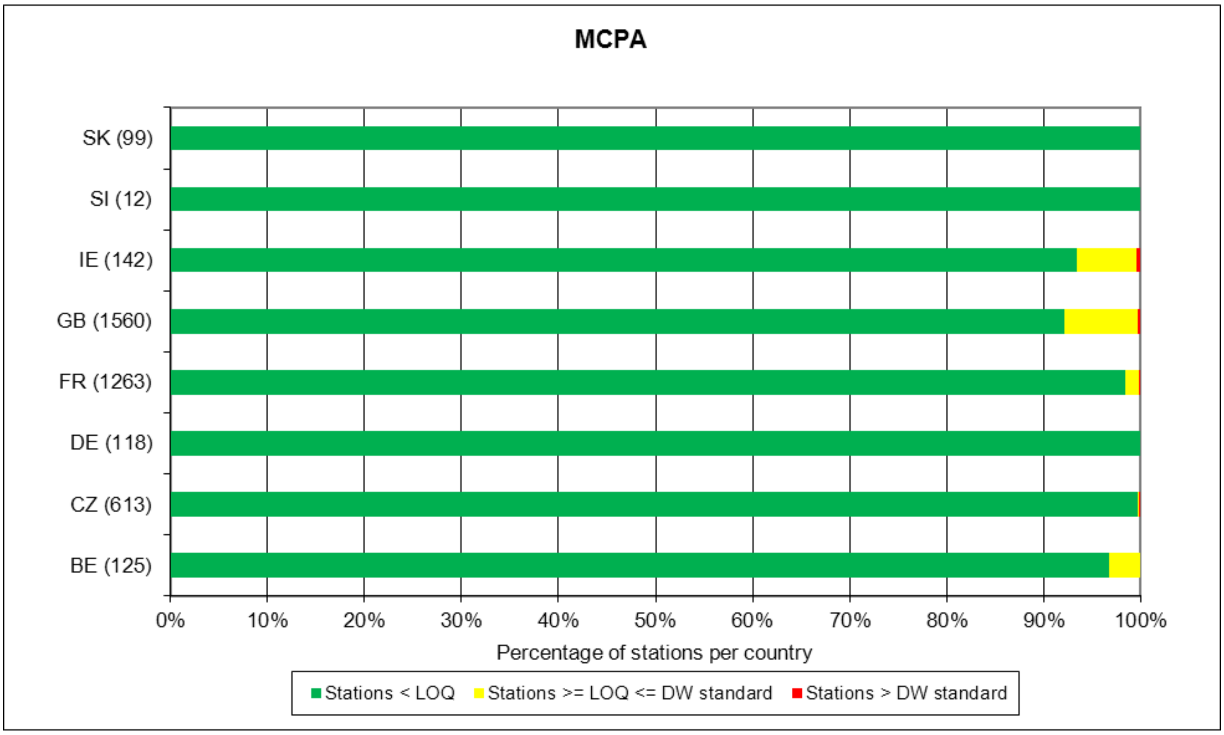


Figure 4.1.2.23c Map of the indicator for MCPA in groundwater in 2008–2009

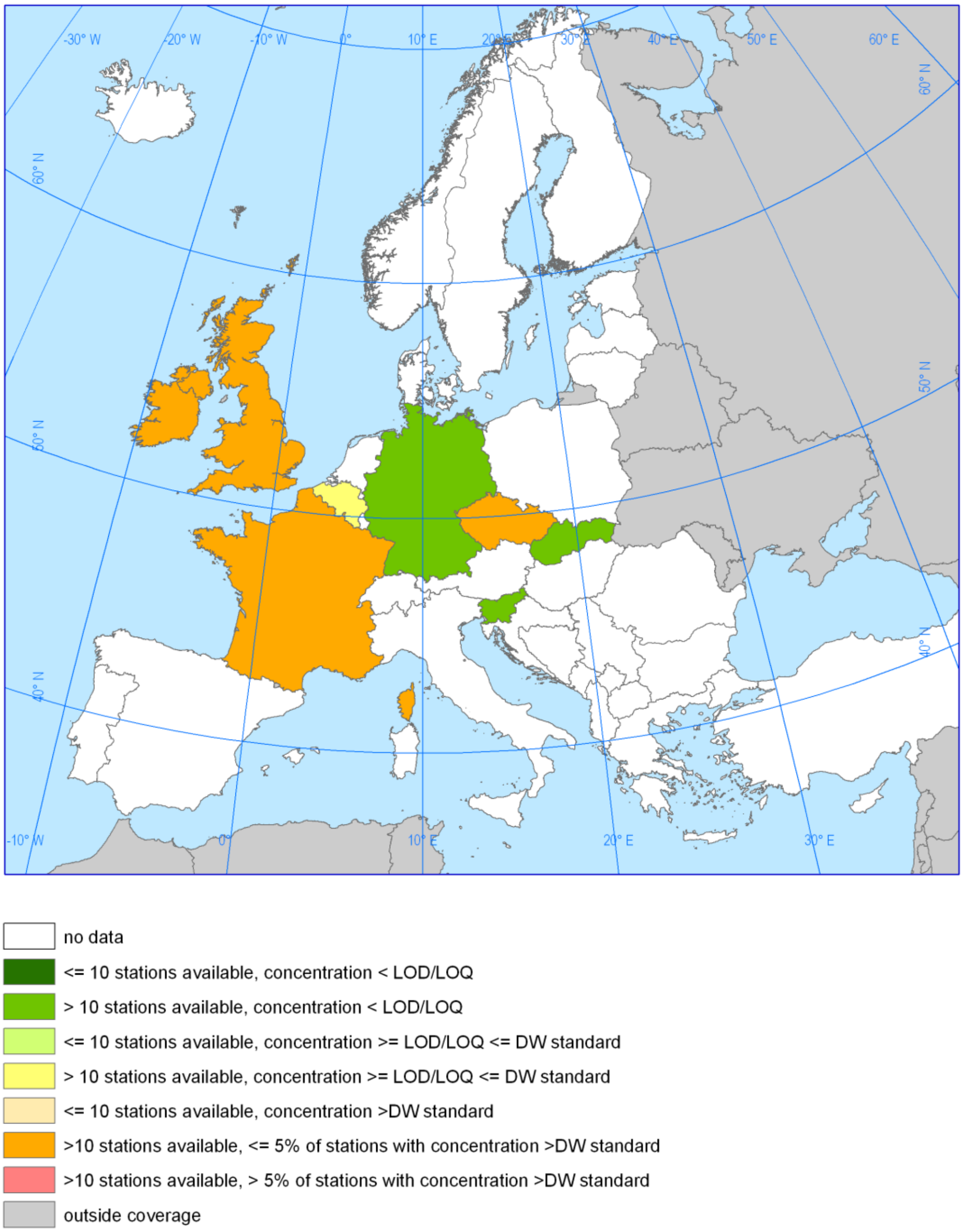


Figure 4.1.2.24a Long-term indicator (mean concentration, number of sites within indicator class) for mecoprop (MCPP) in groundwater

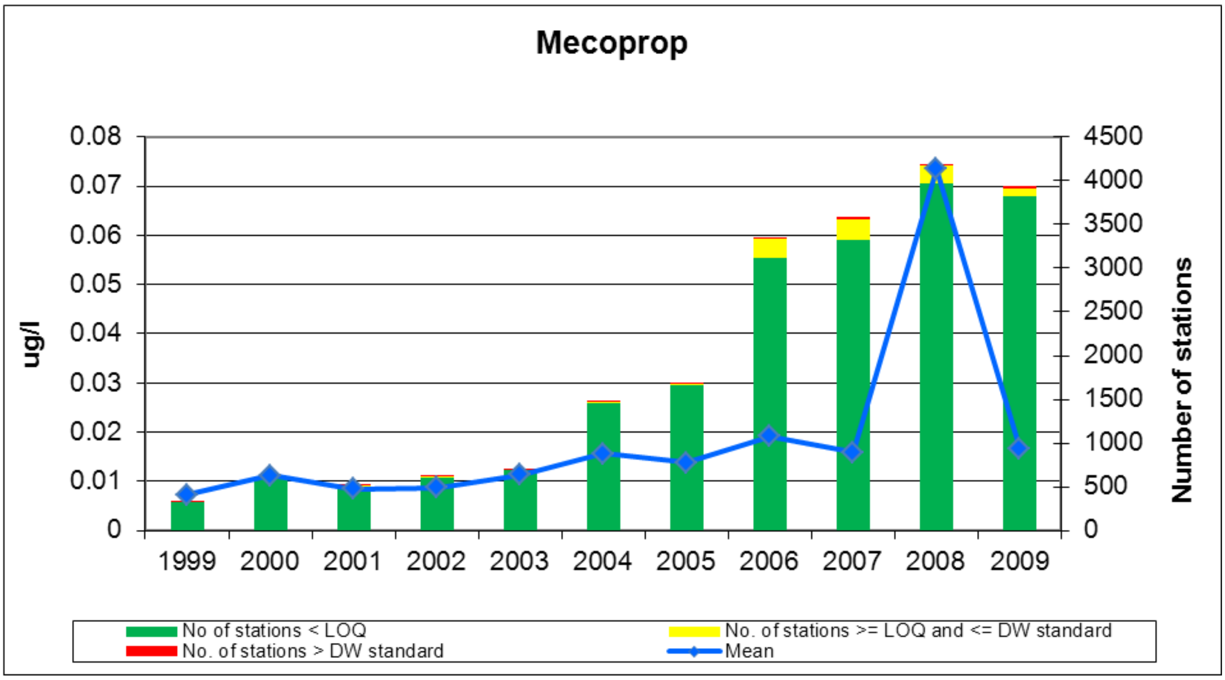


Figure 4.1.2.24b Indicator for mecoprop (MCPP) in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

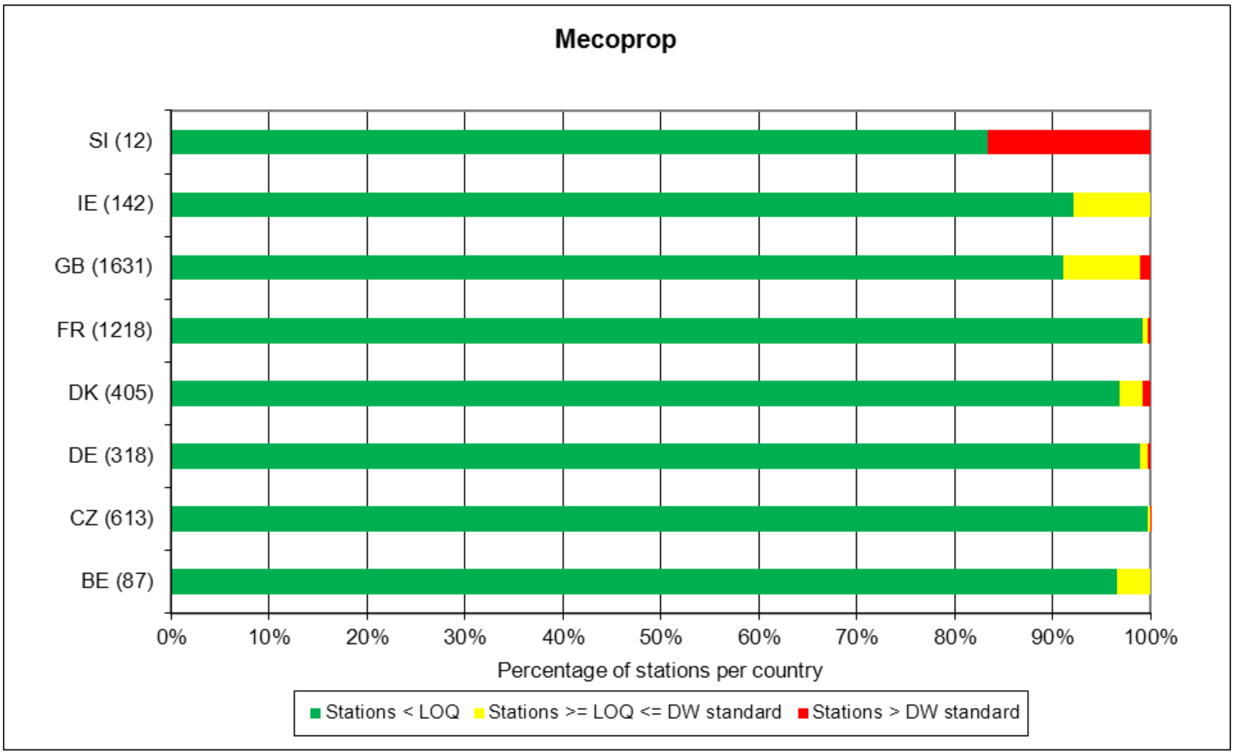


Figure 4.1.2.24c Map of the indicator for mecoprop (MCPP) in groundwater in 2008–2009

- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Figure 4.1.2.25a Long-term indicator (mean concentration, number of sites within indicator class) for mercury in groundwater

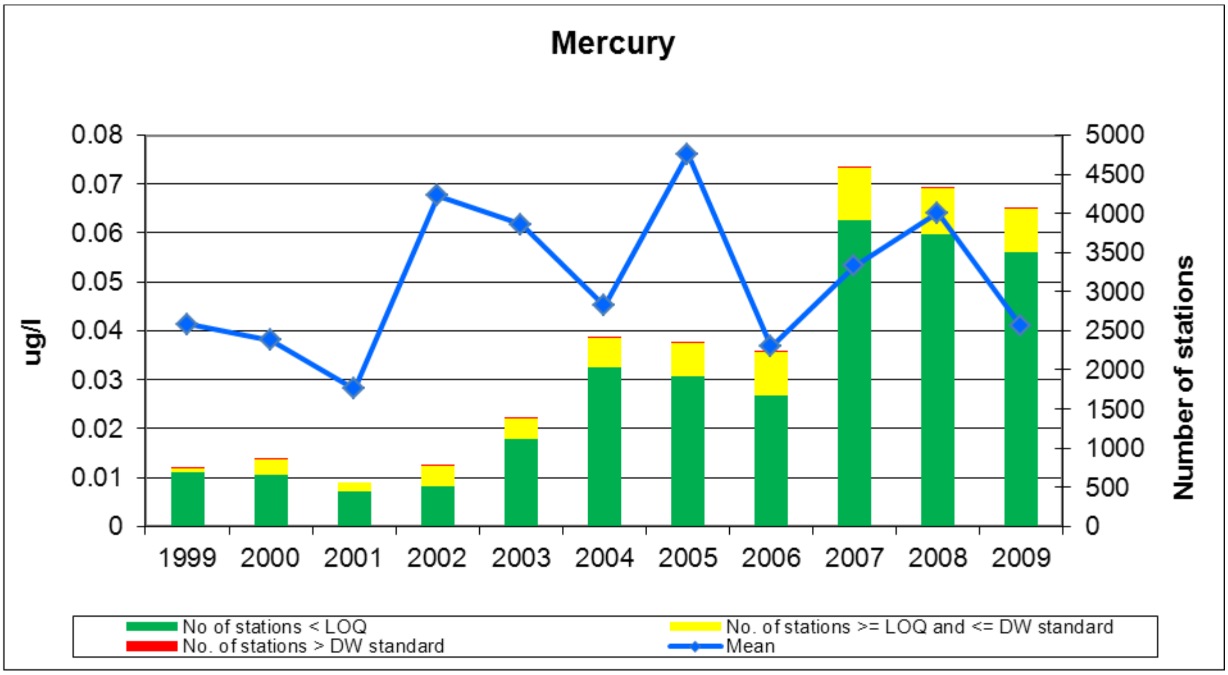


Figure 4.1.2.25b Indicator for mercury in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

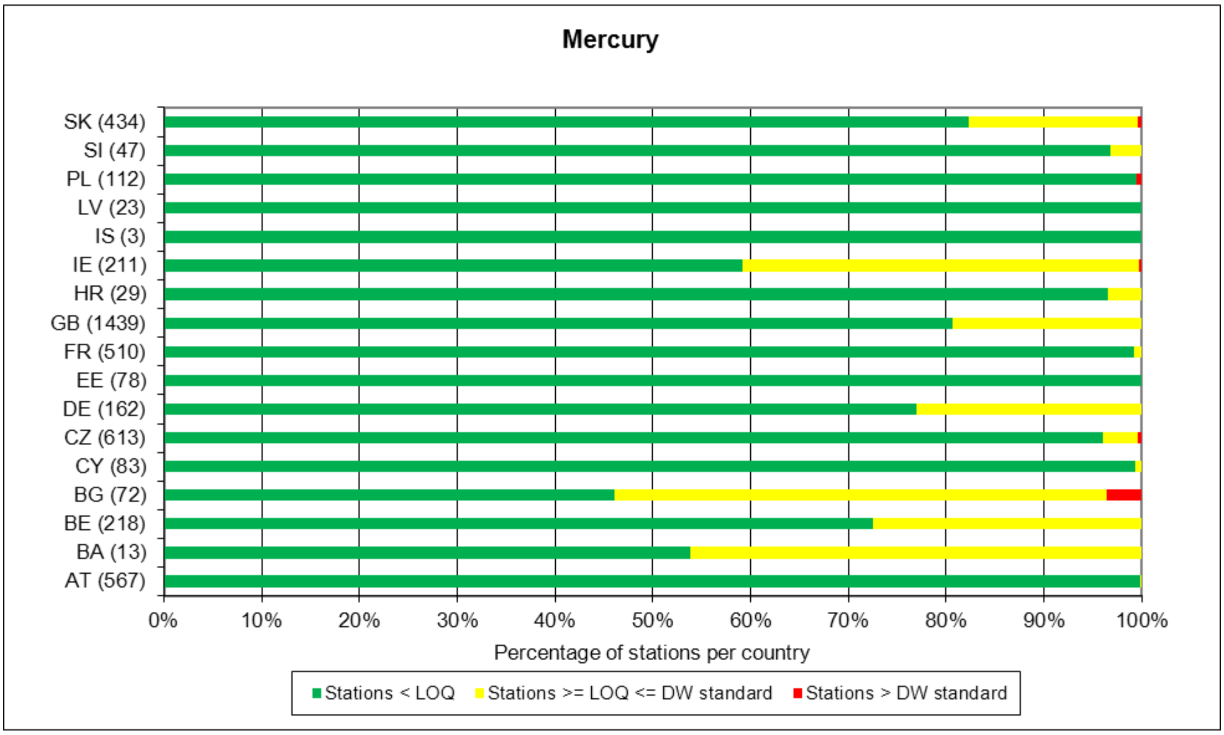
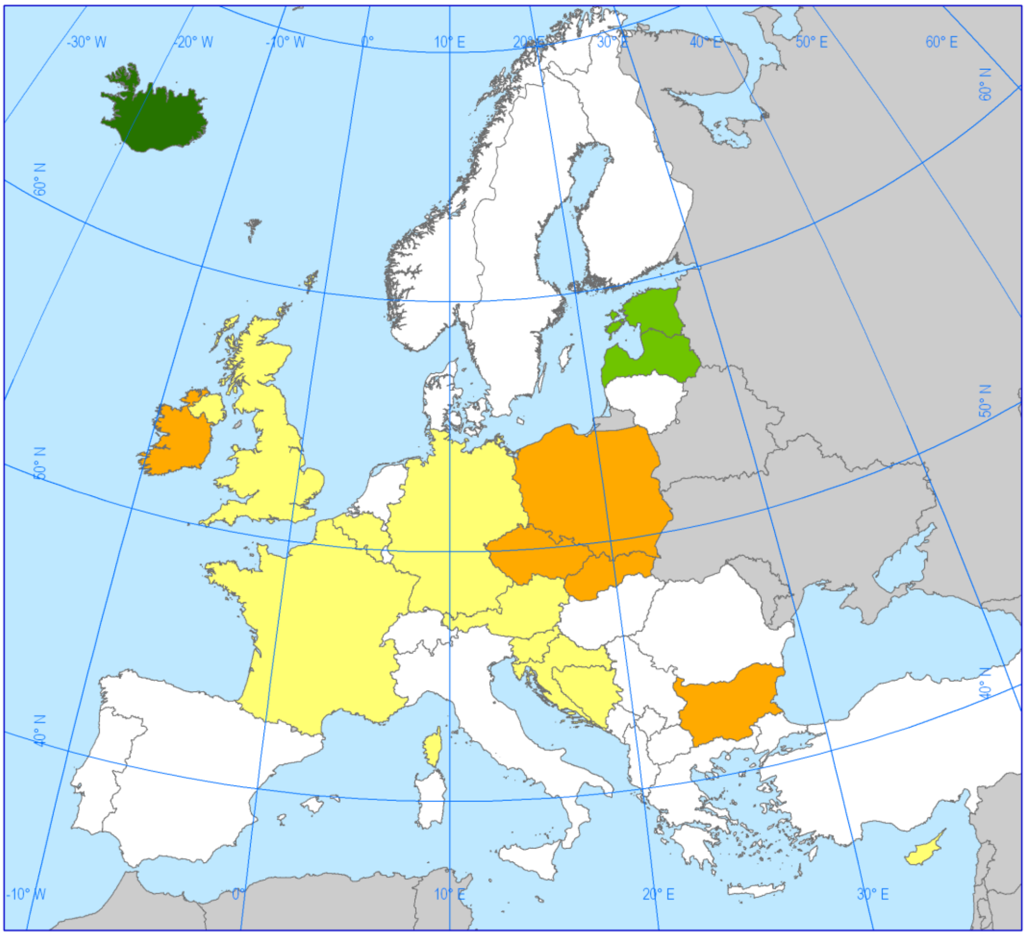


Figure 4.1.2.25c Map of the indicator for mercury in groundwater in 2008–2009



no data
<= 10 stations available, concentration < LOD/LOQ
> 10 stations available, concentration < LOD/LOQ
<= 10 stations available, concentration >= LOD/LOQ <= DW standard
> 10 stations available, concentration >= LOD/LOQ <= DW standard
<= 10 stations available, concentration >DW standard
>10 stations available, <= 5% of stations with concentration >DW standard
>10 stations available, > 5% of stations with concentration >DW standard
outside coverage

Figure 4.1.2.26a Long-term indicator (mean concentration, number of sites within indicator class) for nickel in groundwater

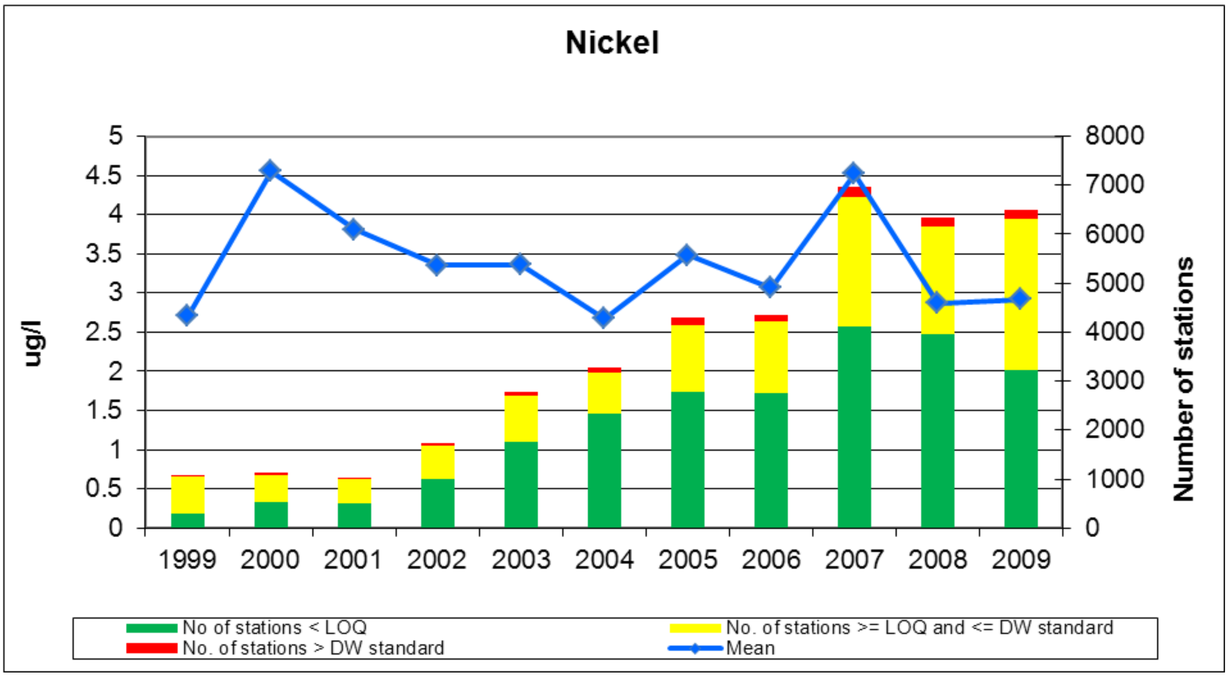


Figure 4.1.2.26b Indicator for nickel in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

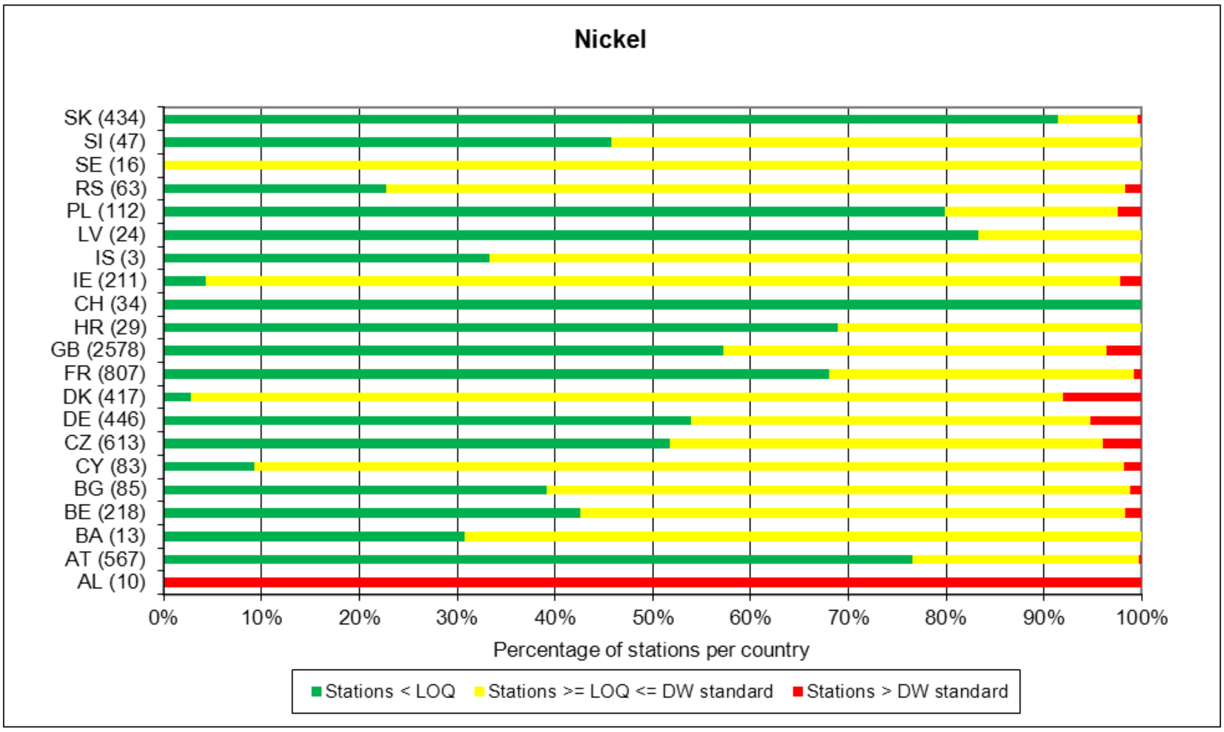
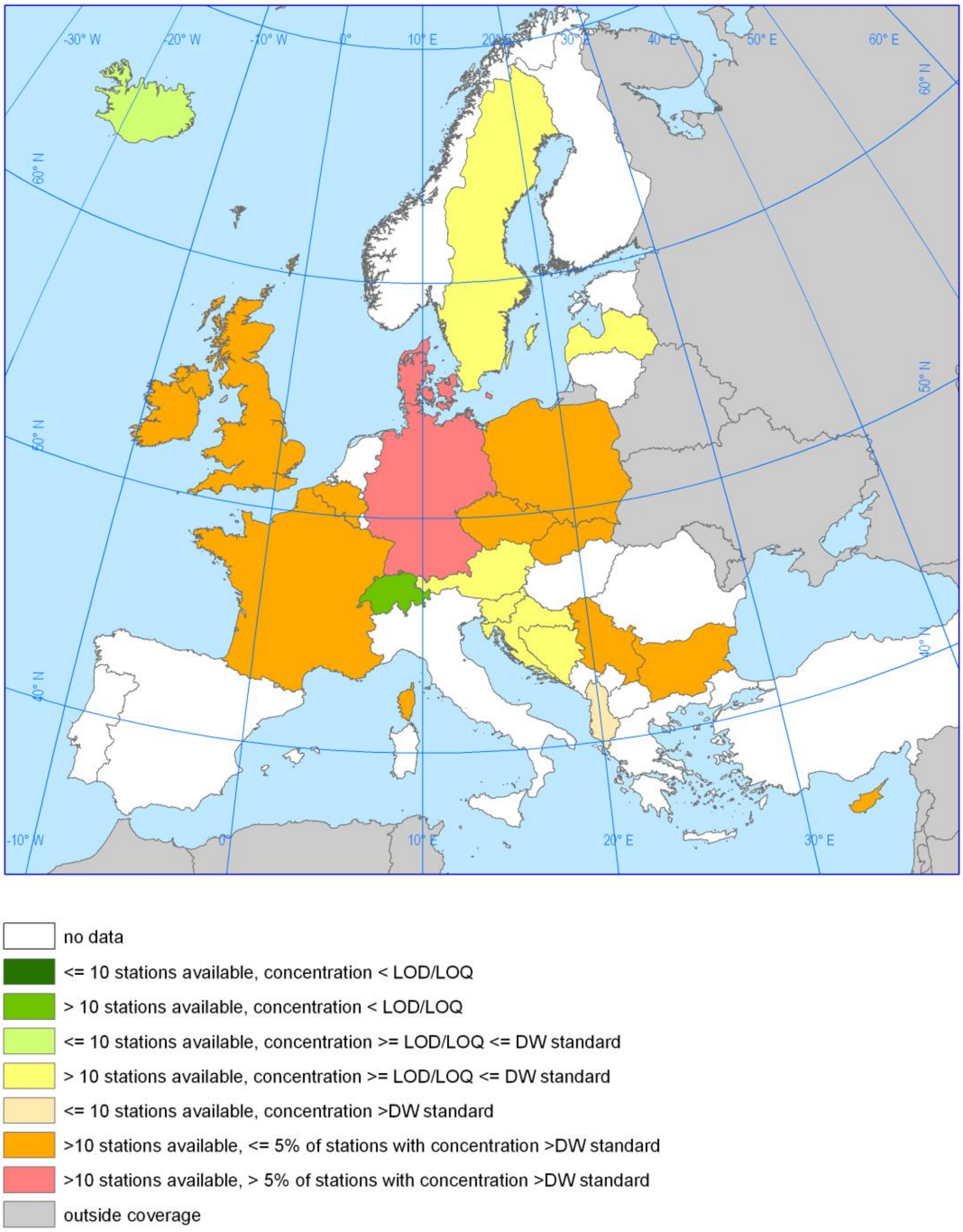


Figure 4.1.2.26c Map of the indicator for nickel in groundwater in 2008–2009



Note: Only three stations with concentration above the DW standard were reported by Cyprus

Figure 4.1.2.27a Long-term indicator (mean concentration, number of sites within indicator class) for prometryn in groundwater

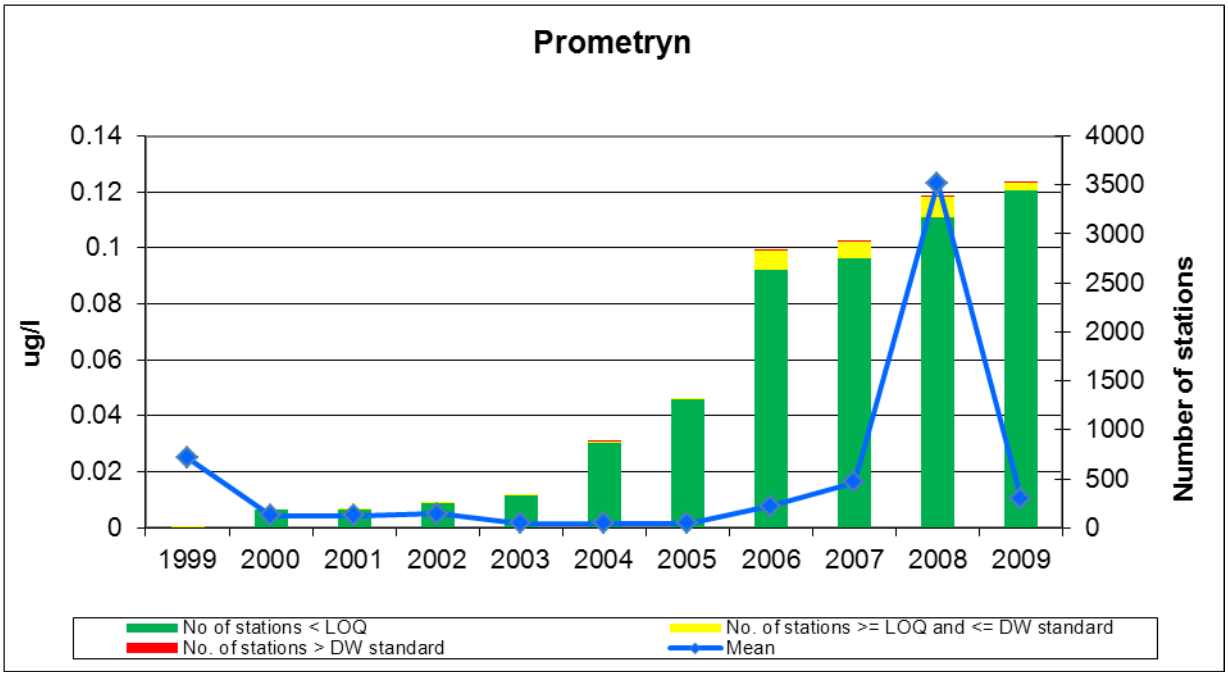


Figure 4.1.2.27b Indicator for prometryn in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

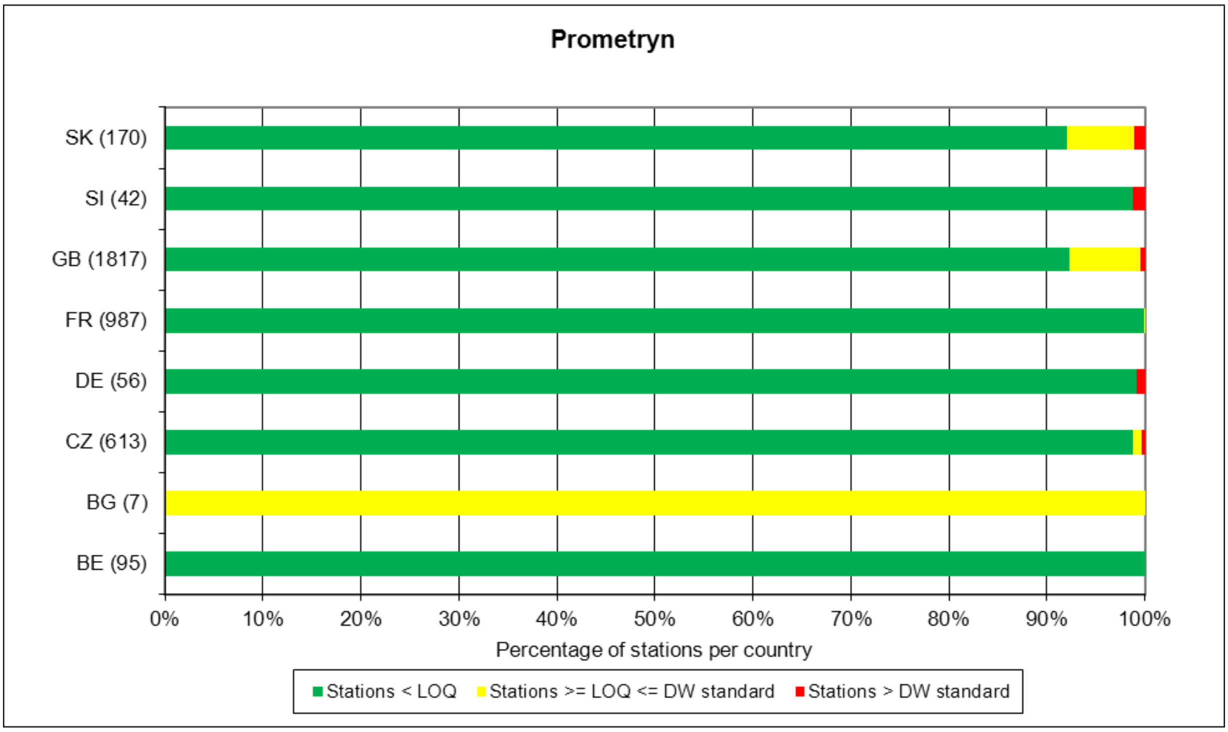
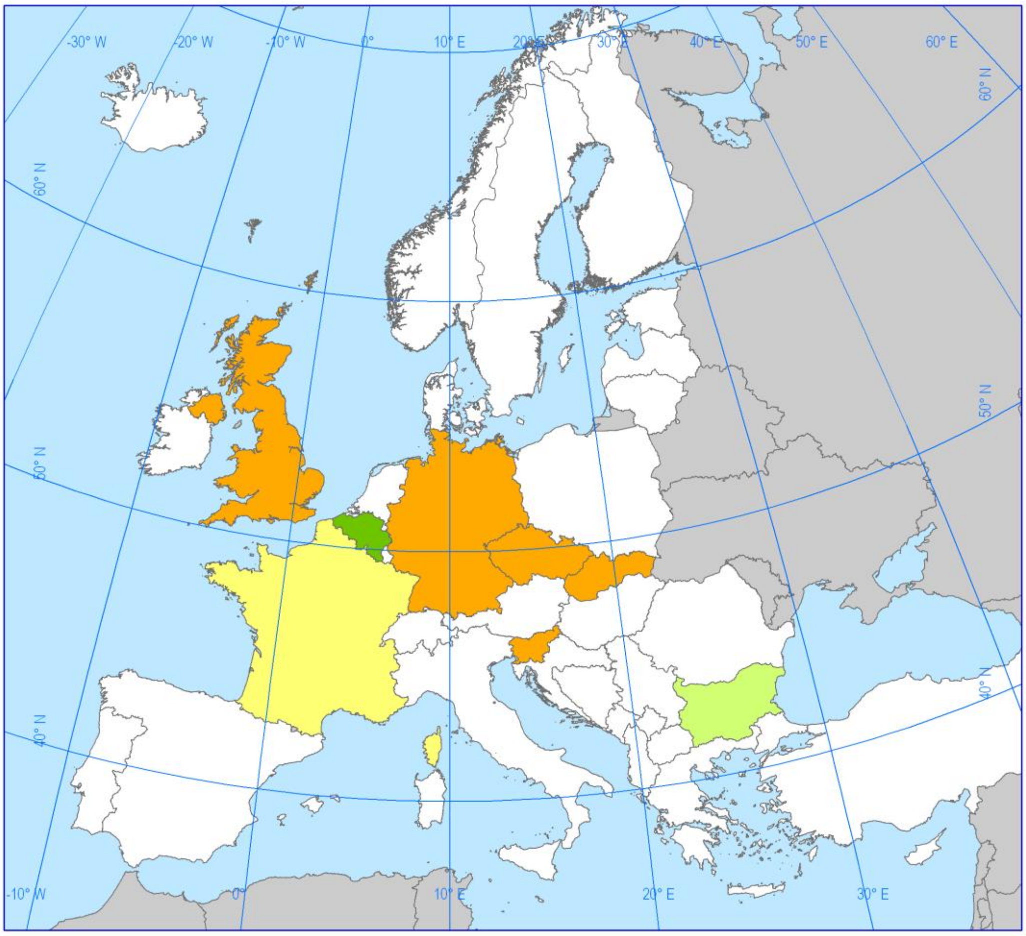


Figure 4.1.2.27c Map of the indicator for prometryn in groundwater in 2008–2009



- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Figure 4.1.2.28a Long-term indicator (mean concentration, number of sites within indicator class) for propazine in groundwater

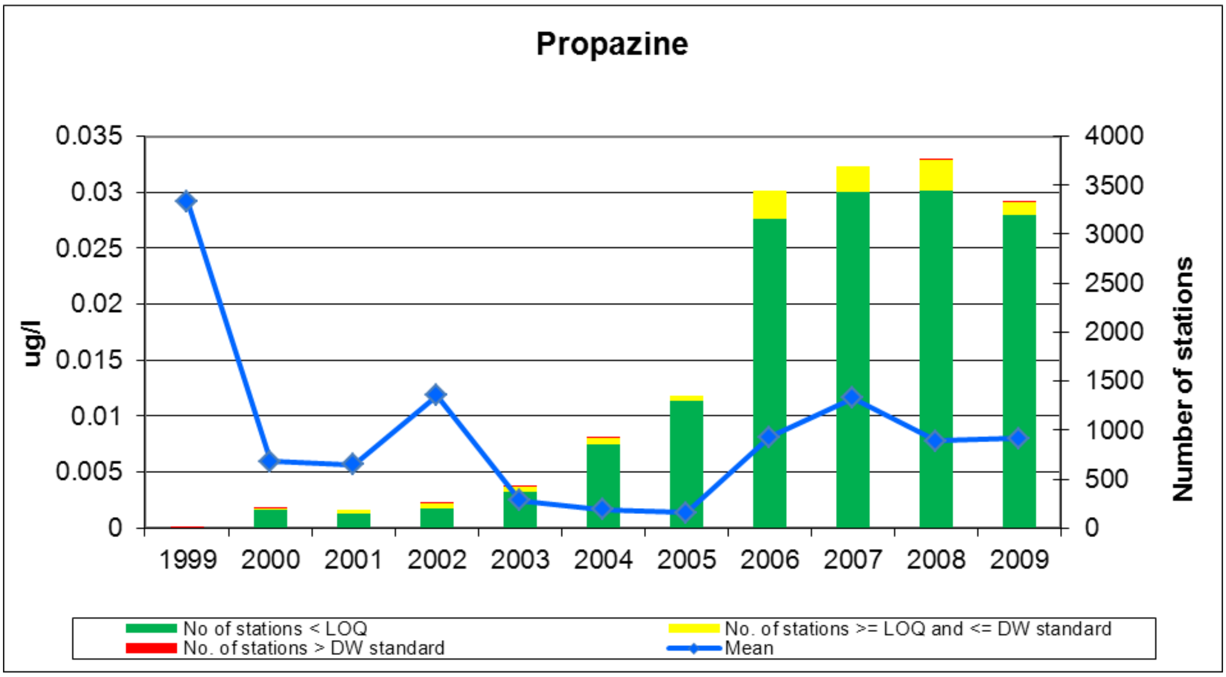


Figure 4.1.2.28b Indicator for propazine in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

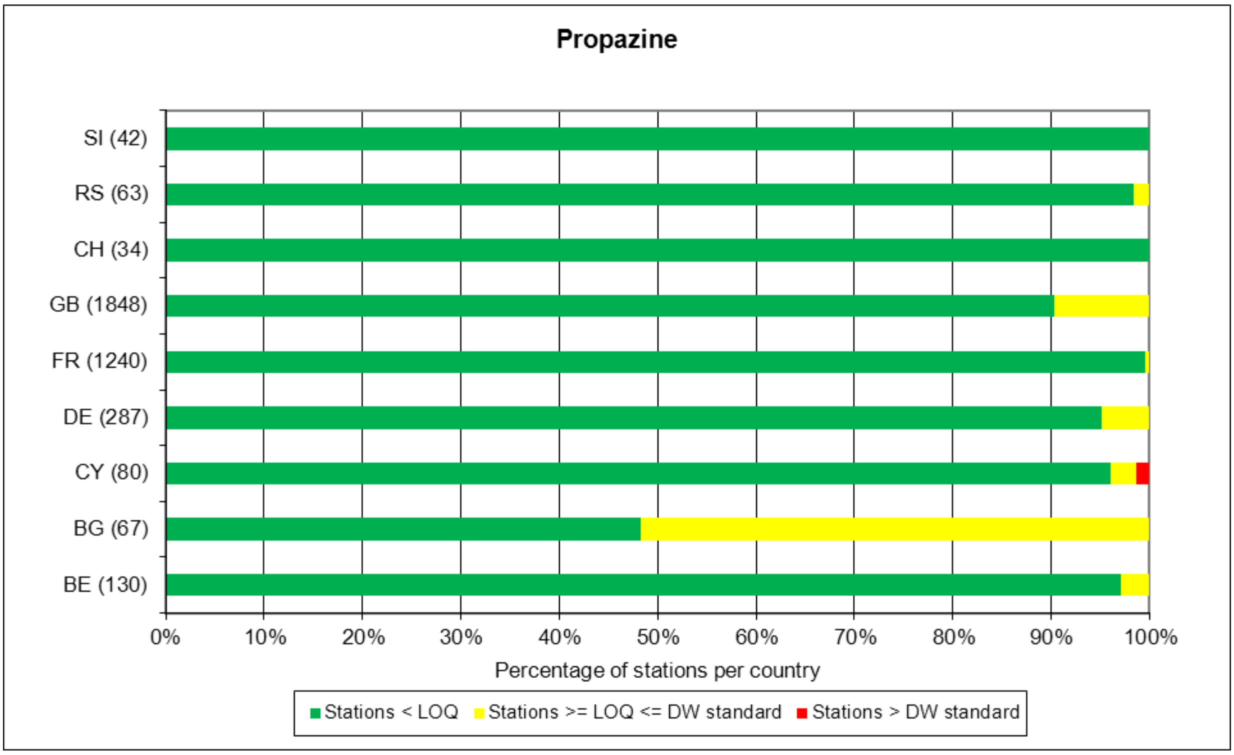
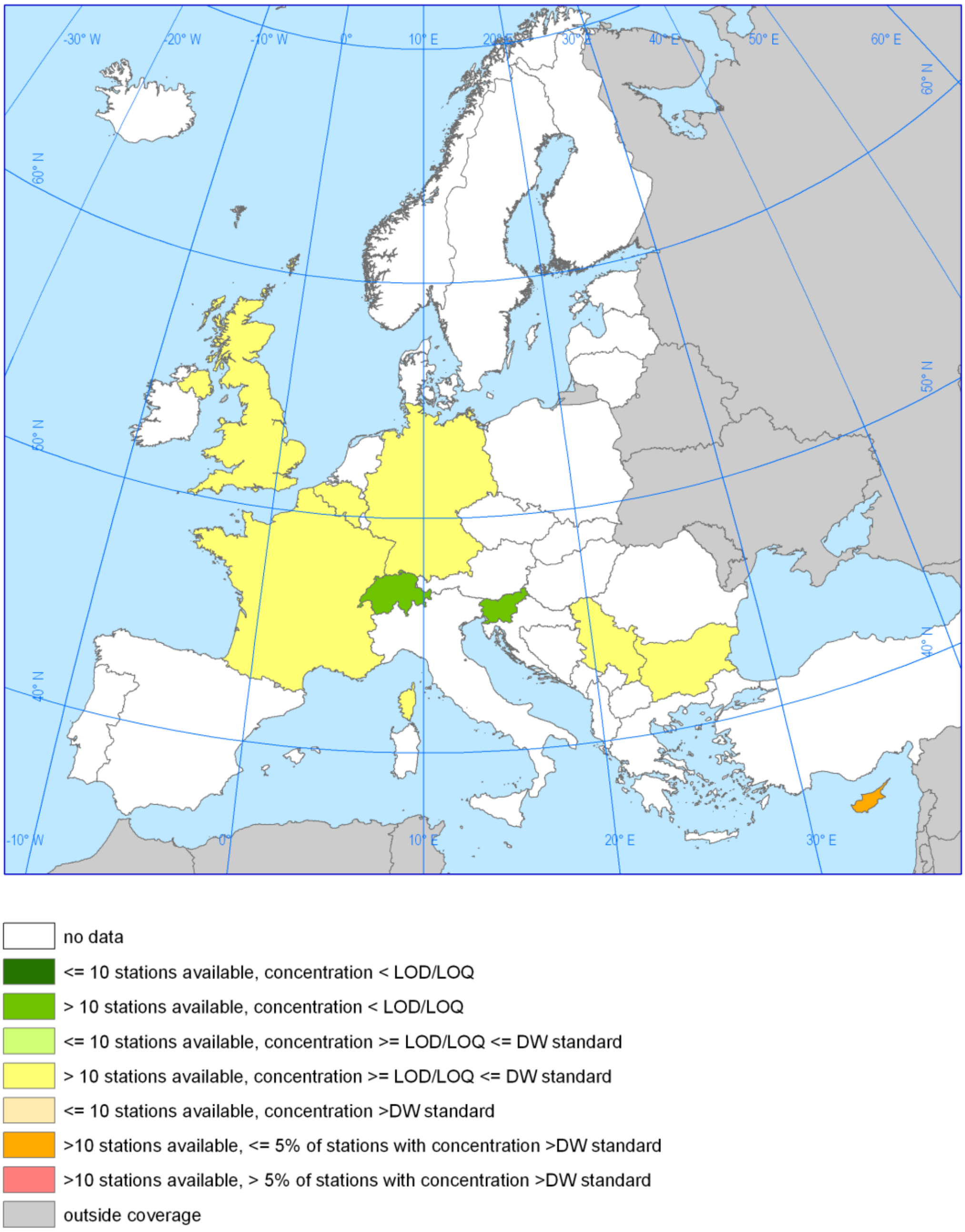


Figure 4.1.2.28c Map of the indicator for propazine in groundwater in 2008–2009



Note: Only two stations with concentration above the DW standard were reported by Cyprus

Figure 4.1.2.29a Long-term indicator (mean concentration, number of sites within indicator class) for simazine in groundwater

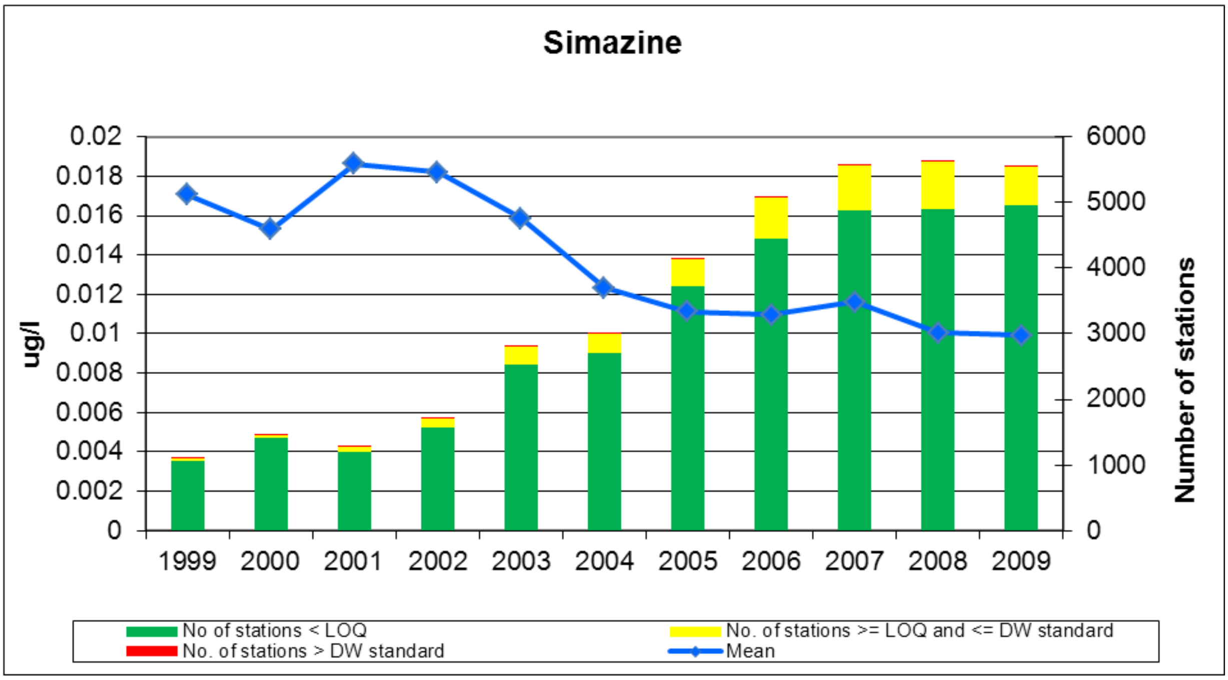


Figure 4.1.2.29b Indicator for simazine in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

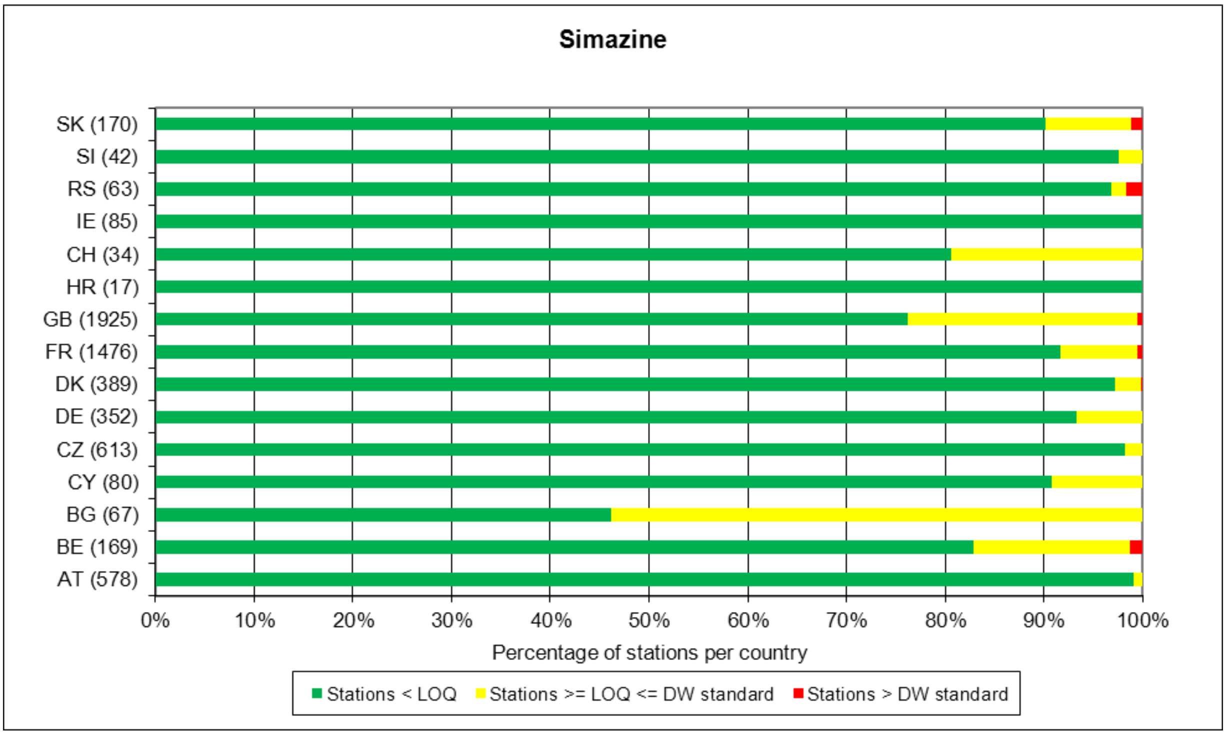
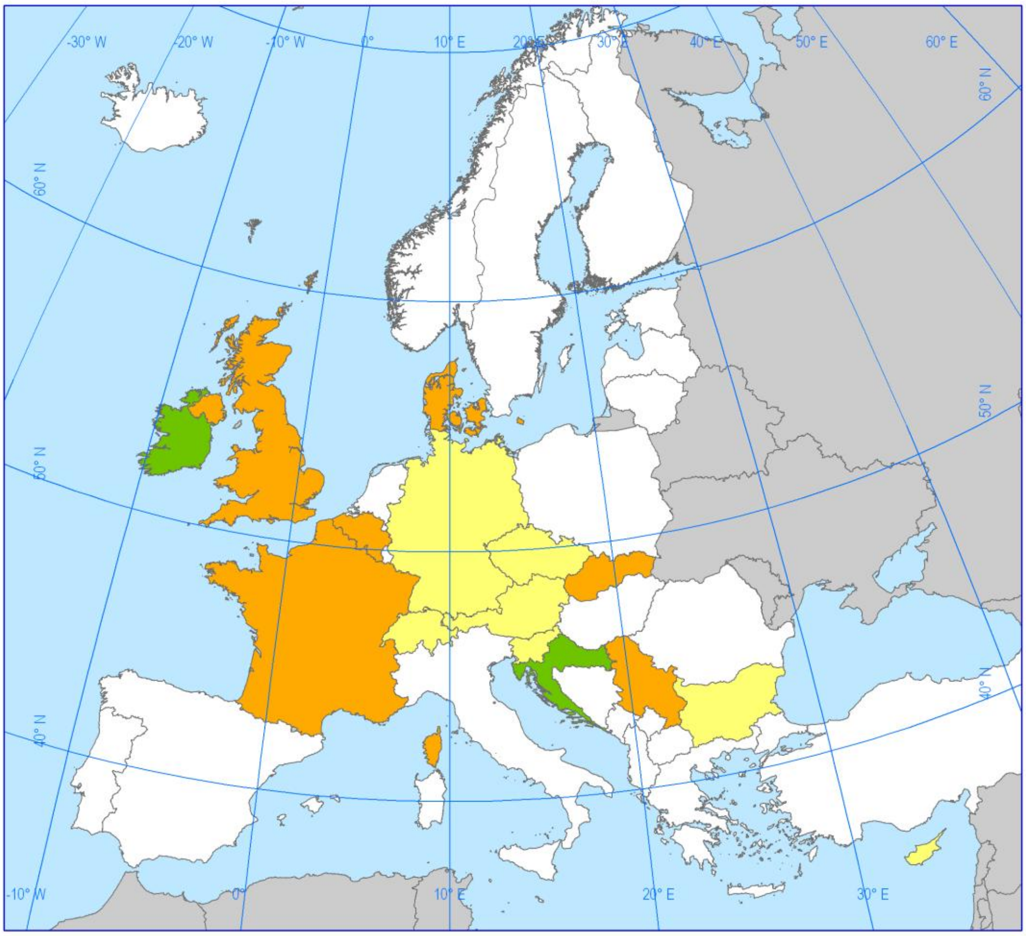


Figure 4.1.2.29c Map of the indicator for simazine in groundwater in 2008–2009



- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Figure 4.1.2.30a Long-term indicator (mean concentration, number of sites within indicator class) for terbuthylazine in groundwater

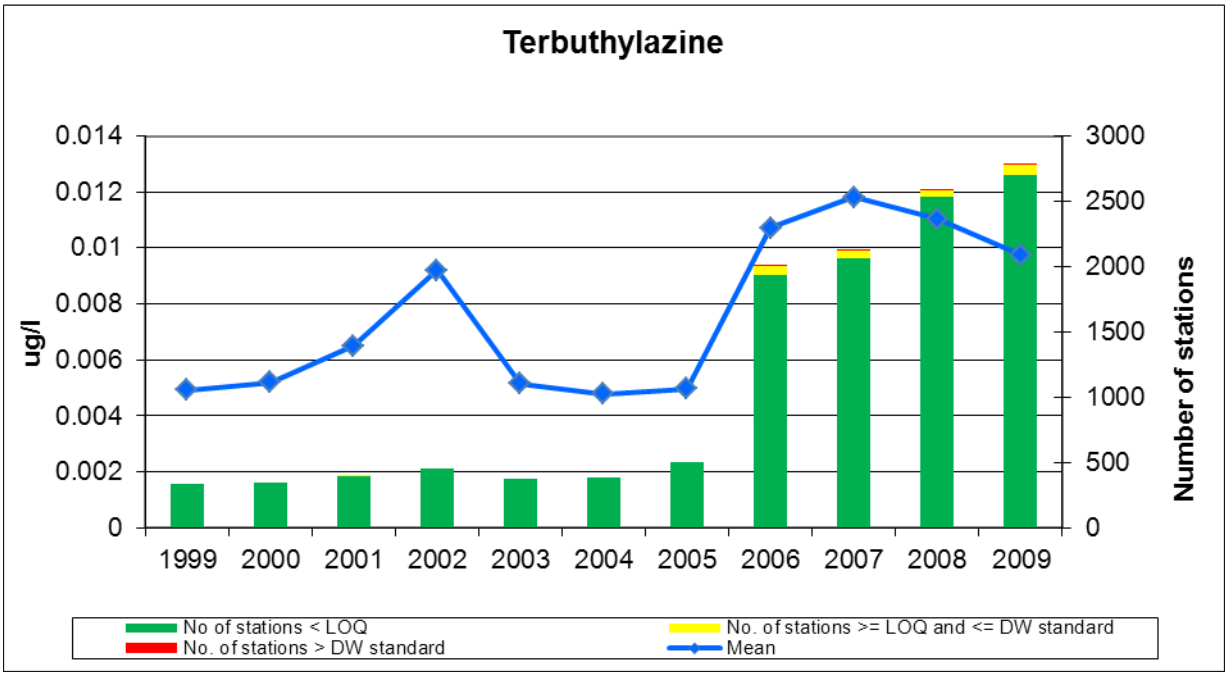


Figure 4.1.2.30b Indicator for terbuthylazine in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

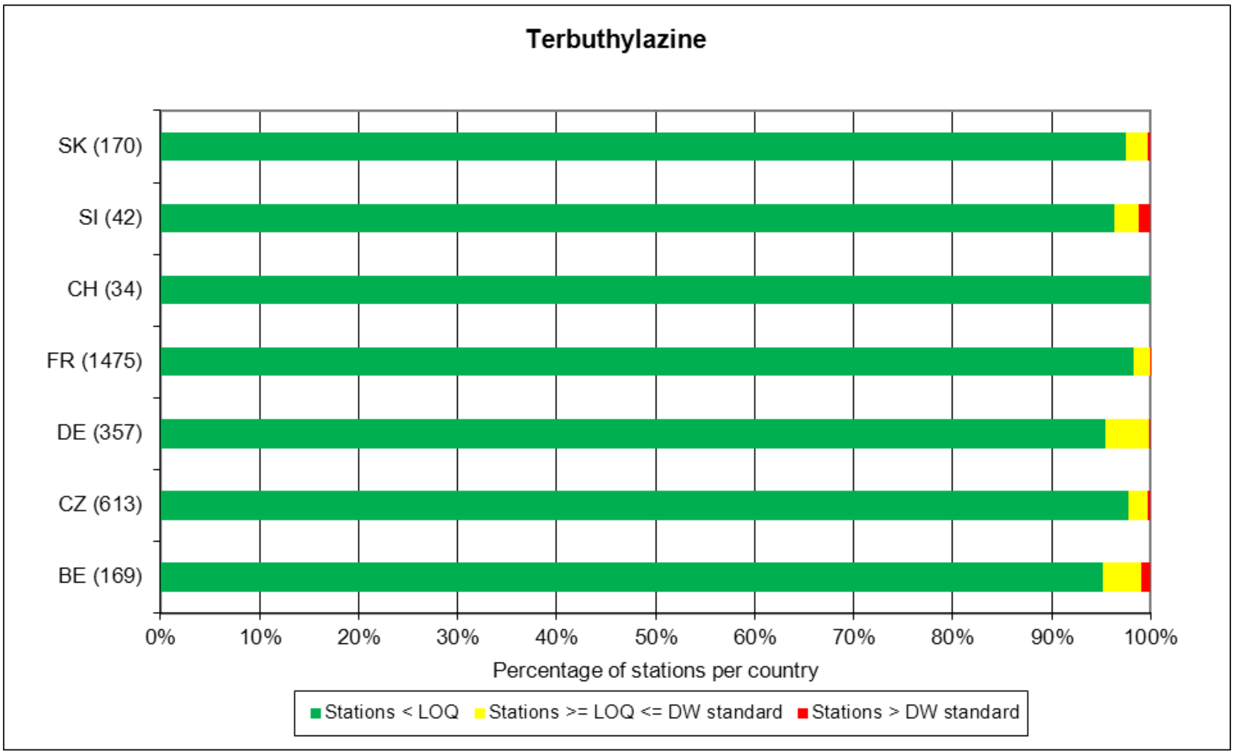


Figure 4.1.2.30c Map of the indicator for terbuthylazine in groundwater in 2008–2009

- no data
- <= 10 stations available, concentration < LOD/LOQ
- > 10 stations available, concentration < LOD/LOQ
- <= 10 stations available, concentration >= LOD/LOQ <= DW standard
- > 10 stations available, concentration >= LOD/LOQ <= DW standard
- <= 10 stations available, concentration >DW standard
- >10 stations available, <= 5% of stations with concentration >DW standard
- >10 stations available, > 5% of stations with concentration >DW standard
- outside coverage

Figure 4.1.2.31a Long-term indicator (mean concentration, number of sites within indicator class) for trifluralin in groundwater

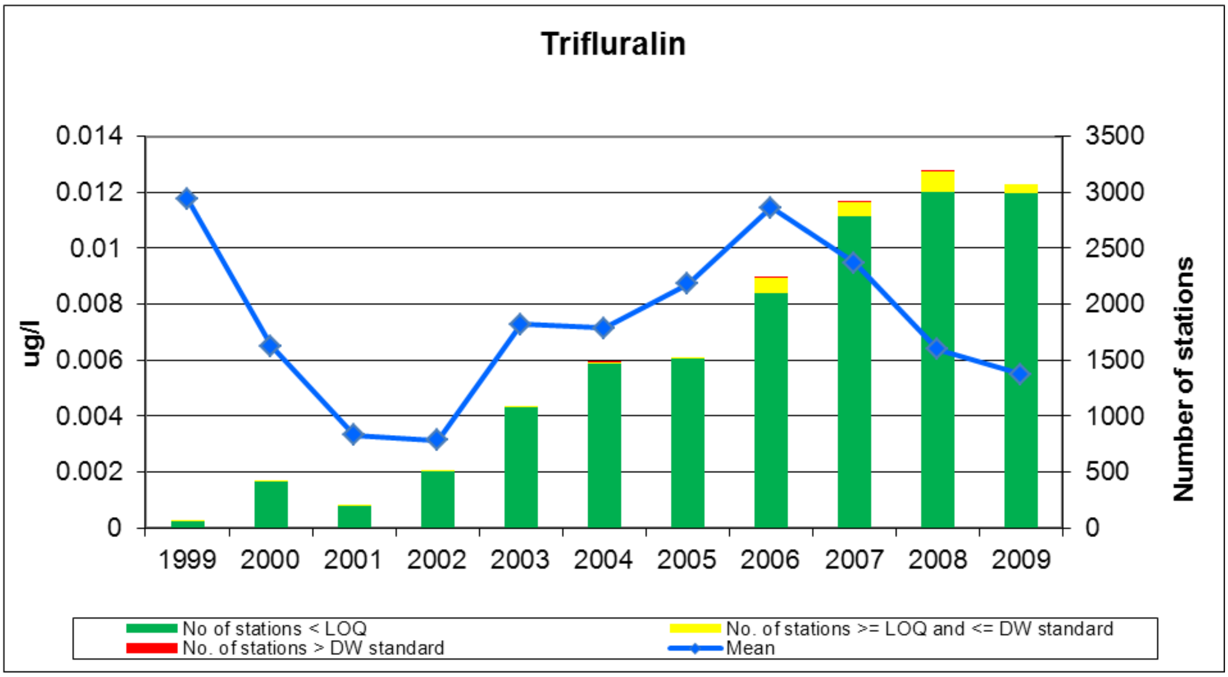


Figure 4.1.2.31b Indicator for trifluralin in groundwater in 2008–2009 (number of stations per country shown in parenthesis)

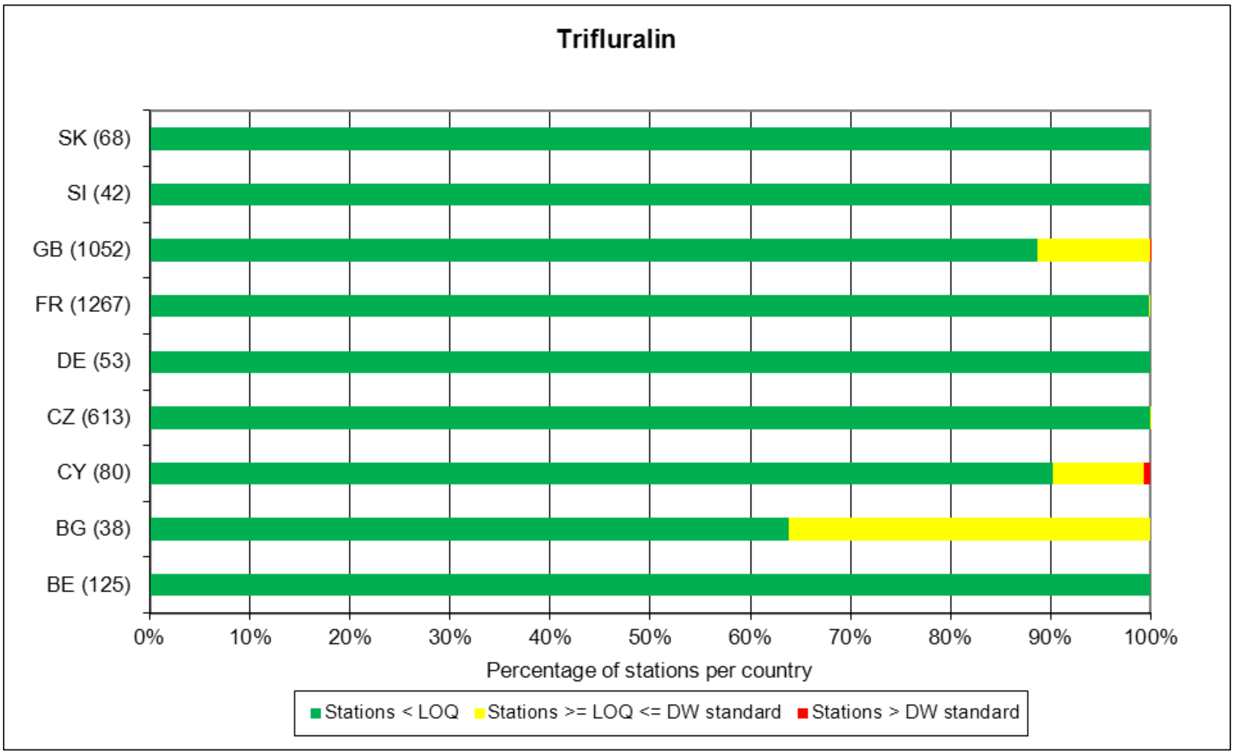
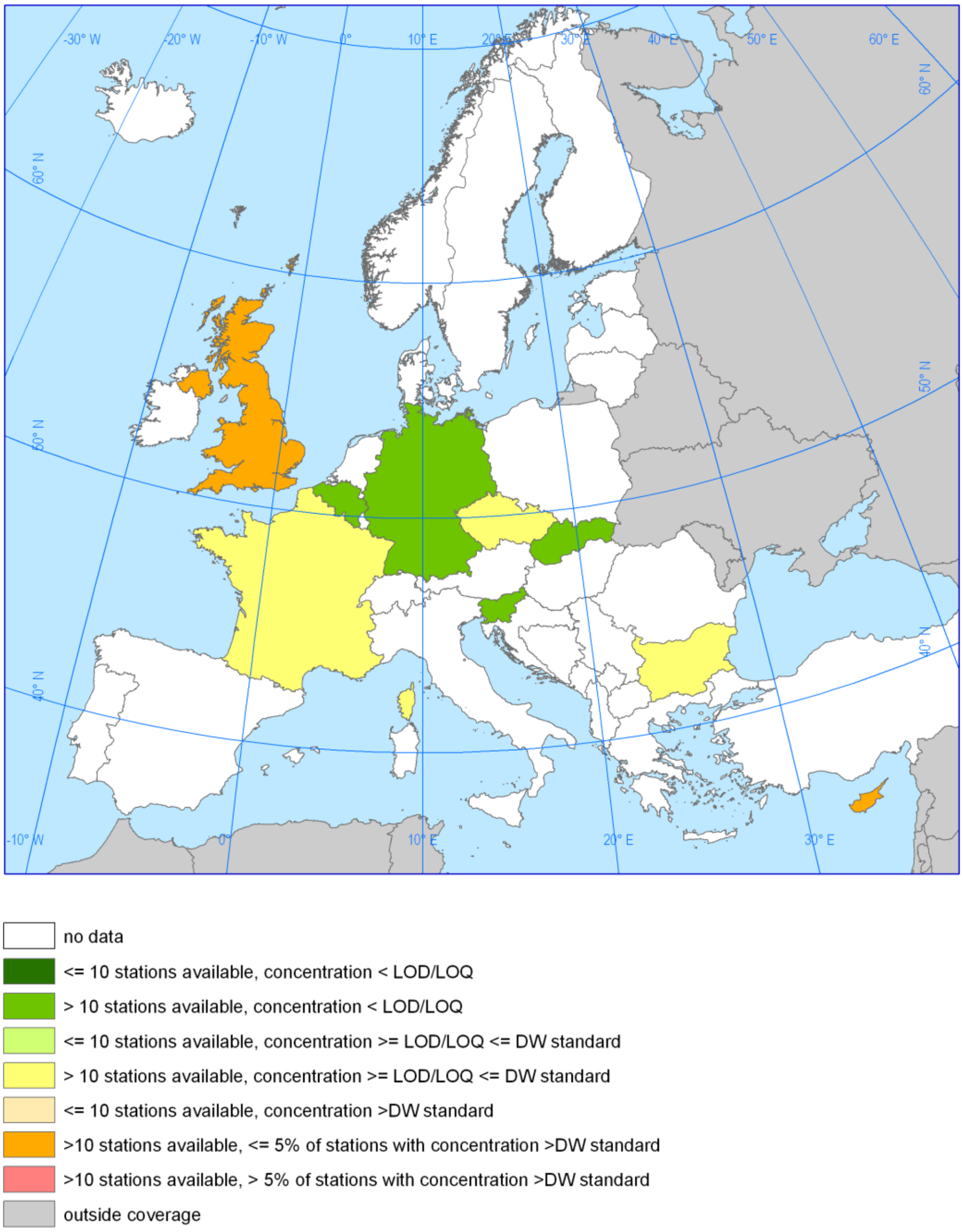


Figure 4.1.2.31c Map of the indicator for trifluralin in groundwater in 2008–2009



Note: Only one station in Cyprus and two stations in United Kingdom with a concentration above the DW standard were reported

4.2 Hazardous substances in the marine environment in 1998–2010

4.2.1 Overview

Hazardous substances are widespread in the marine environment. The pathway of contamination is not always obvious. Although hot spots tend to be directly linked to particular human activities, the substances are also found in organisms that are collected far away from point-sources. Some substances are transported by ocean currents, the atmosphere or by migrating species. Considerable efforts have been made to establish and maintain monitoring programmes to assess the level, trends and effects of hazardous substances in biota and sediment, and to select the preferred indicator matrices. However, there is a lack of reliable and consistent data for many hazardous substances and for several regions. Although basic legislation is in place to combat excessive exposure, specific assessment criteria with respect to levels, trends and effects need to be further developed for the indicator matrices.

The results reveal that concentrations are generally low or moderate for all seven hazardous substances. Cadmium, lead and mercury are found at low concentrations in the earth's crust and occur naturally in seawater. HCB, lindane, PCB and DDT are synthetic substances that are not found naturally in the environment. Human activities have caused a general mobilisation of these hazardous substances in aquatic and terrestrial environments. In the marine environment, they accumulate in fish and shell fish, and because these in return are a food source for marine wildlife and humans the substances are moved to higher levels in the food chain. The contaminants are not needed for any organism (they are not essential) and are toxic. In humans long-term exposure or consumption of contaminated seafoods can be detrimental. The main sources, at least in the North Sea, are from general waste/disposal, burning of fossil fuels and industrial activities, including mining and production.

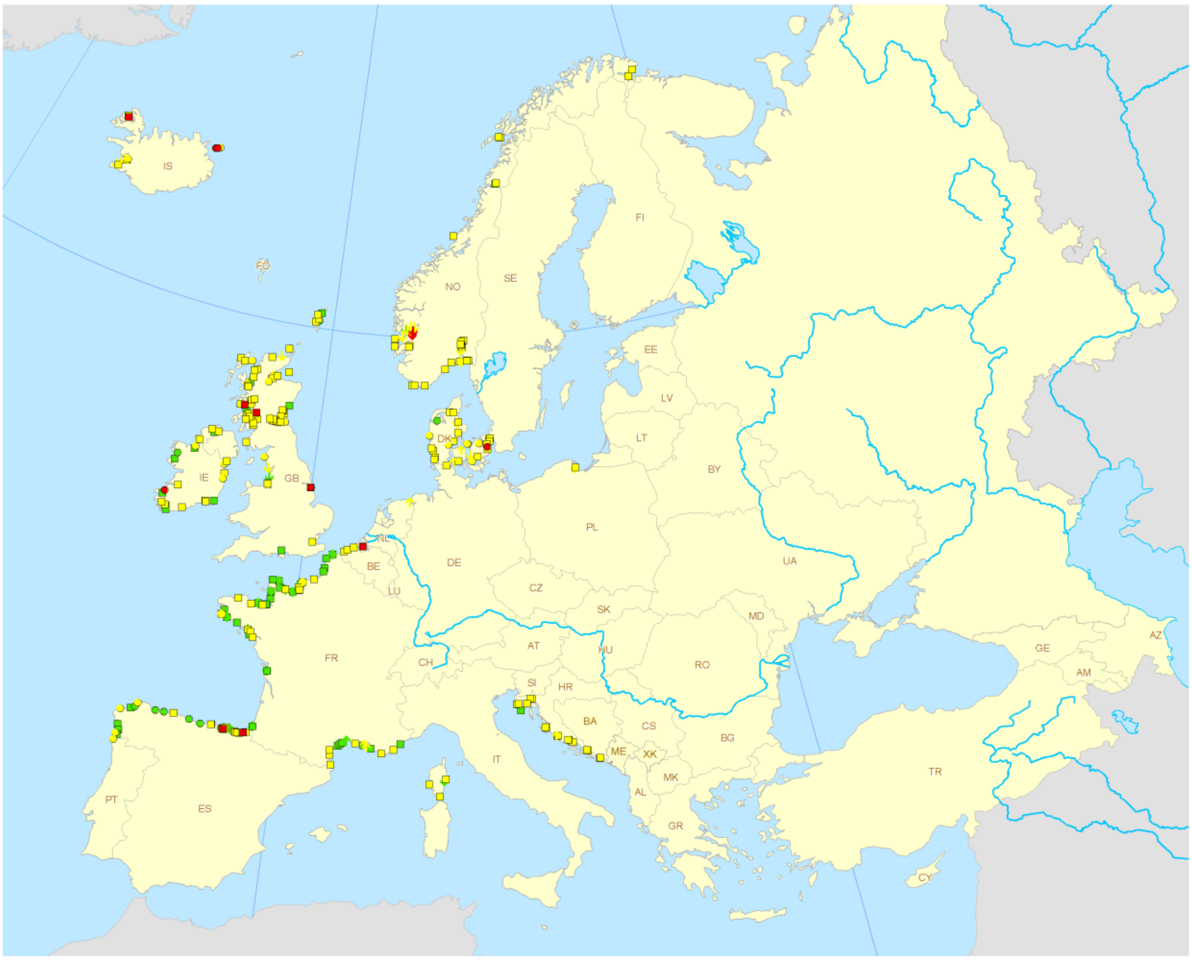
4.2.2 Occurrence and concentrations of hazardous substances in the marine environment

Results are shown in maps (Figures 4.2.2.1 to 4.2.2.7), with one map for each substance. The maps show an assessment for each time series, using the symbols described in Table 2.2.1.

Cadmium

Concentrations of cadmium in recent years were generally classified as Low or Moderate in mussels and fish of the north-east Atlantic, fish in the Baltic Sea, and mussels in the Mediterranean. No general regional trend was detected in any of these regions, which indicates that no general change in status is anticipated (Assessment based on results for 1998-2010).

Figure 4.2.2.1 Trends and Low, Moderate and High concentrations of cadmium in biota in European Seas



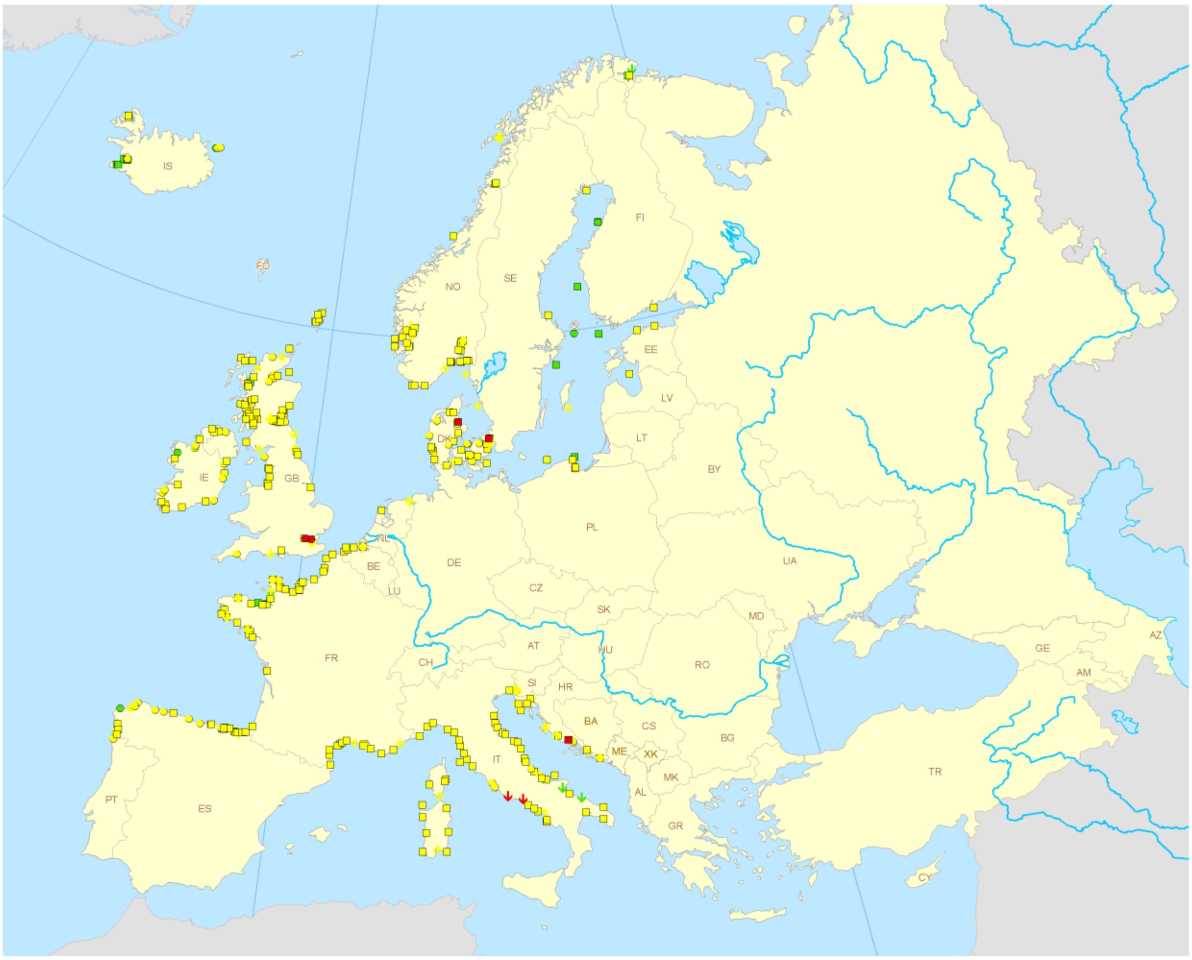
Notes: The arrows indicate direction of significant trend (if any) and the colour indicates the concentration category for recent years as Low (green), Moderate (yellow) and High (red). (See Table 2.2.1 for description of symbols).

Sources: Data from HELCOM, OSPAR and EEA member countries.

Mercury

Concentrations of mercury in recent years were generally classified as Low or Moderate in mussels and fish of the north-east Atlantic, fish in the Baltic Sea, and mussels in the Mediterranean, which is positive. However, there is an overweight of upward trends in the Mediterranean Sea (Assessment based on results for 1998-2010).

Figure 4.2.2.2 Trends and Low, Moderate and High concentrations of mercury in biota in European Seas



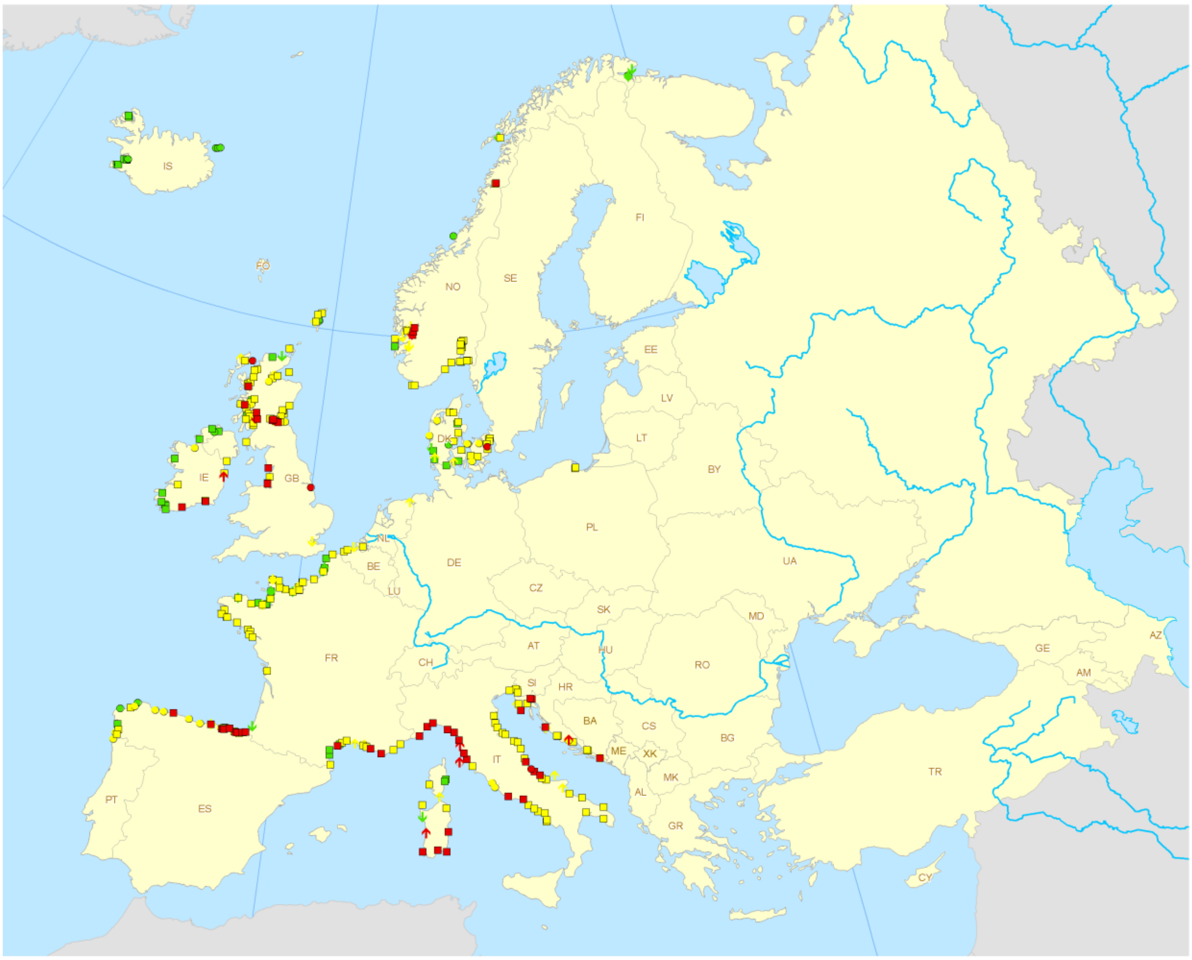
Notes: Arrows indicate direction of significant trend (if any) and the colour indicates the concentration category for recent years as Low (green), Moderate (yellow) and High (red). (See Table 2.2.1 for a description of the symbols).

Sources: Data from HELCOM, OSPAR and EEA member countries.

Lead

Concentrations of lead in recent years were generally classified as Low or Moderate in mussels and fish of the north-east Atlantic, Baltic Sea and the Mediterranean Seas. The fraction of High level stations was largest in the Mediterranean (only mussels monitored here). A regional downward trend was found for the north-east Atlantic but a regional upward trend in the Mediterranean (Assessment based on results for 1998-2010).

Figure 4.2.2.3 Trends and Low, Moderate and High concentrations of lead in biota in European Seas



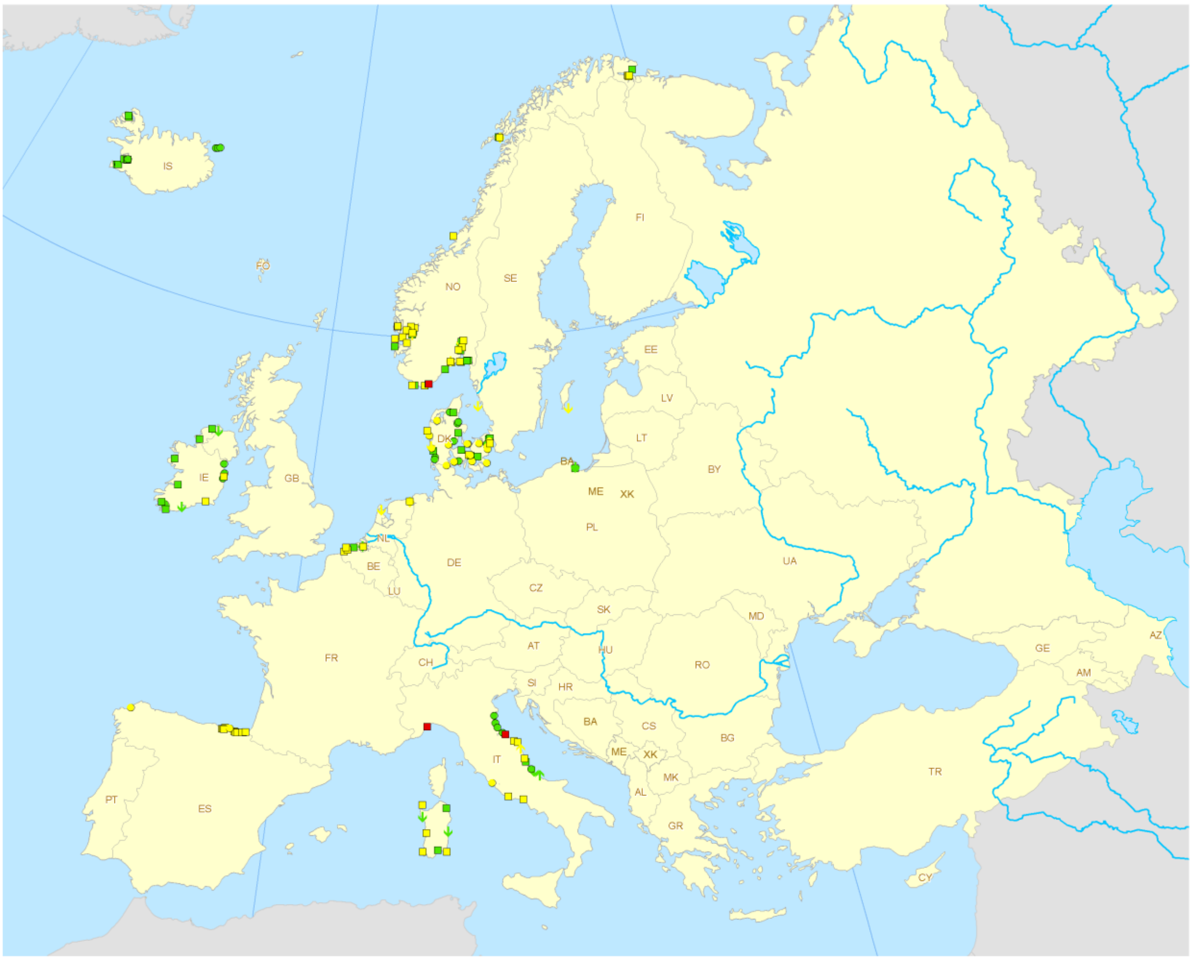
Note: The arrows indicate direction of significant trend (if any) and the colour indicates the concentration category for recent years as Low (green), Moderate (yellow) and High (red). (See Table 2.2.1 for description of symbols).

Sources: Data from HELCOM, OSPAR and EEA member countries.

Hexachlorobenzene (HCB)

Concentrations of HCB in recent years were generally classified as Low or Moderate in the north-east Atlantic, the Baltic Sea and the Mediterranean Sea. There is a predominance of no indication of improvement (no significant trend) for Moderate or High classifications (Assessment based on results for 1998-2010).

Figure 4.2.2.4 Trends and Low, Moderate and High concentrations of HCB in biota in European Seas



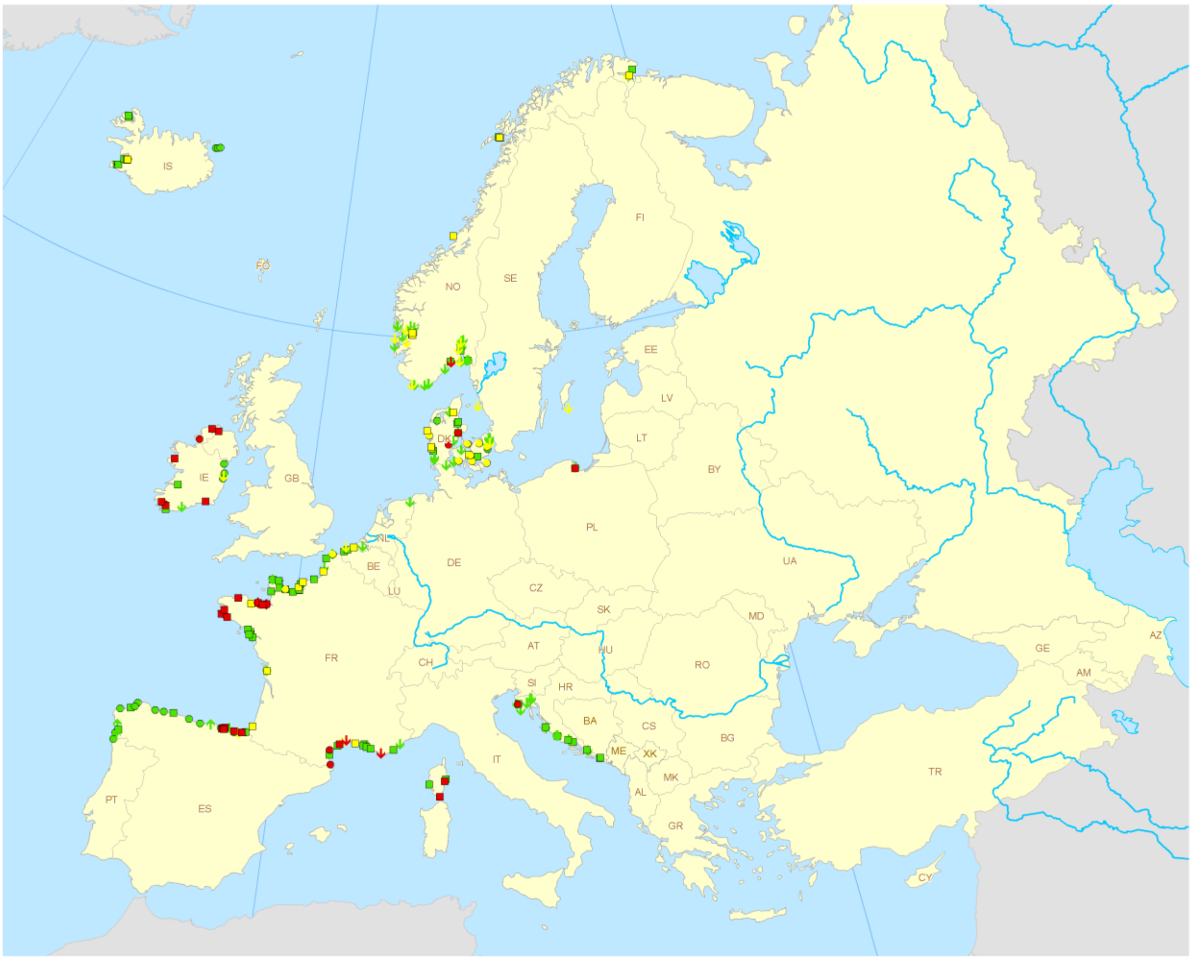
Notes: HCB = hexachlorobenzene. The arrows indicate direction of significant trend (if any) and the colour indicates the concentration category for recent years as Low (green), Moderate (yellow) and High (red). (See Table 2.2.1 for description of symbols).

Sources: Data from HELCOM, OSPAR and EEA member countries.

Gamma-HCH (Lindane)

Concentrations of lindane in recent years were generally classified as Low or Moderate in the north-east Atlantic, the Baltic Sea, and the Mediterranean Sea. Regional downward trends were found in all three seas; these are positive signs. However, where High concentrations are found, there is a predominance of not significant trends, and no indication of general improvement (Assessment based on results for 1998-2010).

Figure 4.2.2.5 Trends and Low, Moderate and High concentrations of lindane in biota in European Seas



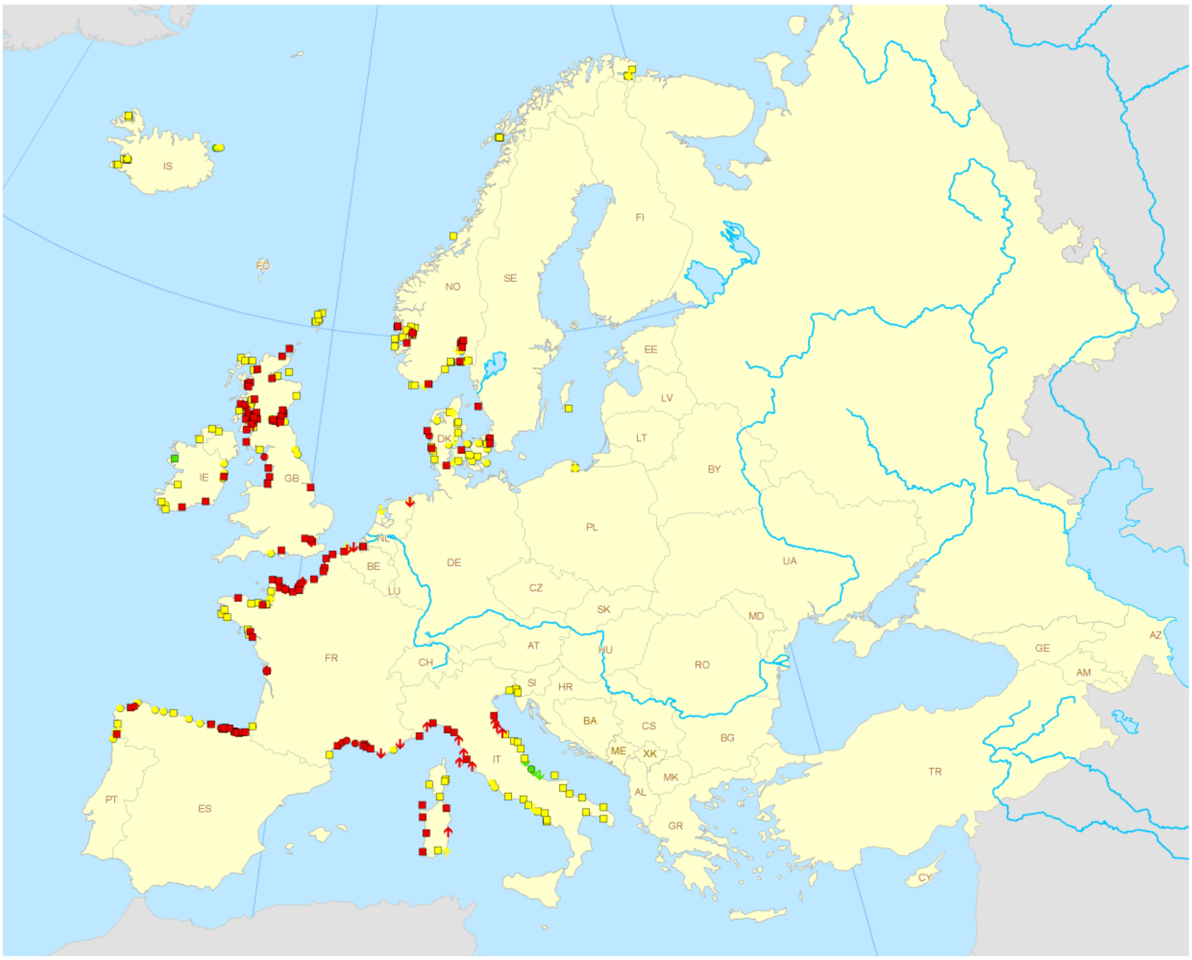
Notes: Lindane = gamma hexachlorocyclohexane (γHCH). The arrows indicate direction of significant trend (if any) and the colour indicates the concentration category for recent years as Low (green), Moderate (yellow) and High (red). (See Table 2.2.1 for description of symbols).

Sources: Data from HELCOM, OSPAR and EEA member countries.

PCB

Concentrations of PCB in recent years were generally classified as Moderate or High in the north-east Atlantic, Baltic Sea and Mediterranean Sea. High concentrations were more dominant in the north-east Atlantic. Generally there was a predominance of downward trends over upward trends and a regional downward trend was found in the north-east Atlantic, which is positive. However, the large number of time series with High concentrations and that showed no significant downward trend could be grounds for concern (Assessment based on results for 1998-2010).

Figure 4.2.2.6 Trends and Low, Moderate and High concentrations of PCB in biota in European Seas



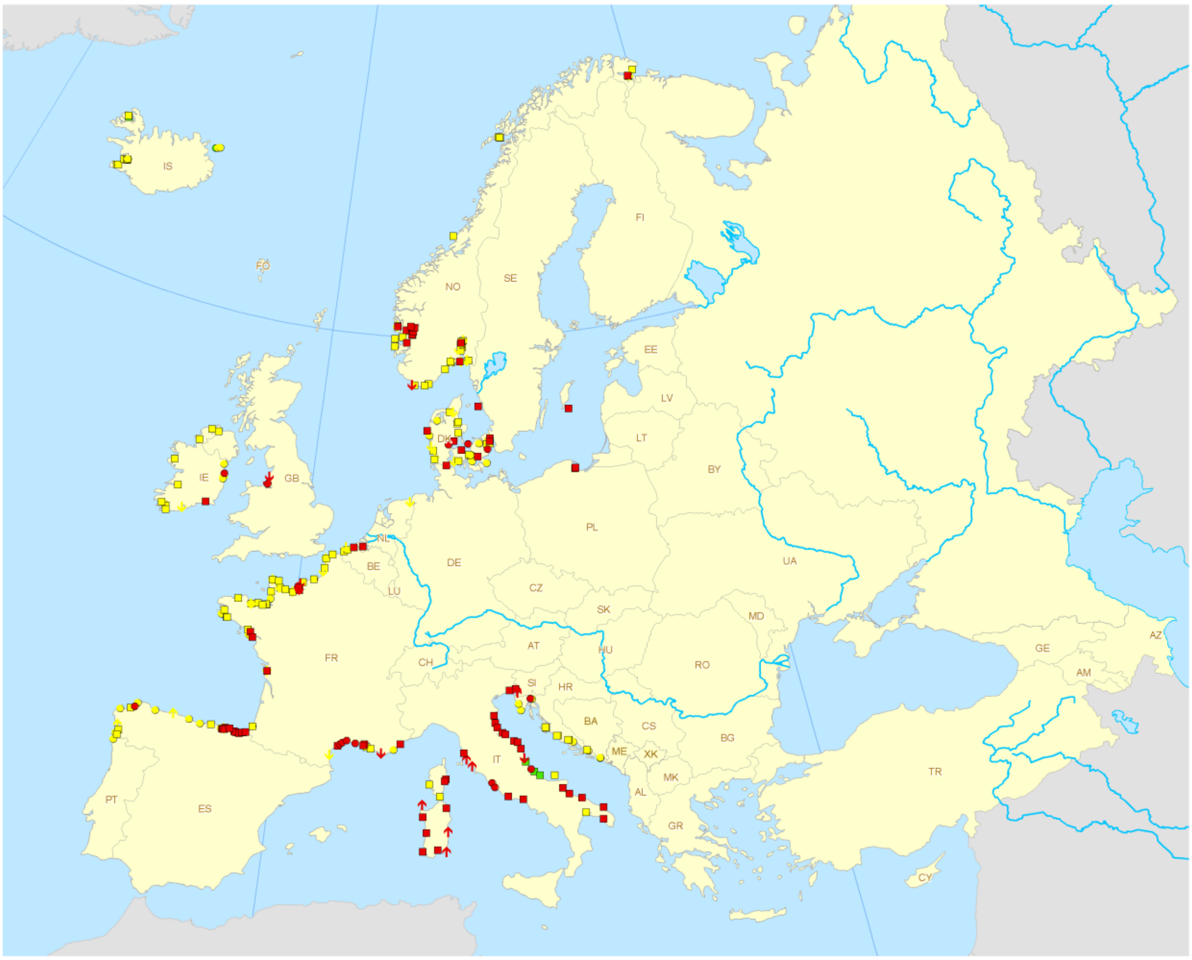
Notes: PCB = assessment based on the classification of the second highest congener of polychlorinated biphenyl (PCB) congeners 28, 52, 101, 118, 138, 153 and 180. The arrows indicate direction of significant trend (if any) and colour indicates the concentration category for recent years as Low (green), Moderate (yellow) and High (red). (See Table 2.2.1 for description of symbols).

Sources: Data from HELCOM, OSPAR and EEA member countries.

DDT

Concentrations of DDT in recent years were predominantly classified as Moderate or High in the north-east Atlantic, Baltic Sea and Mediterranean Sea. High level classifications were more dominant in the Baltic and Mediterranean Seas than in the north-east Atlantic. Generally there was a predominance of downward trends over upward trends and a regional downward trend was found in the north-east Atlantic, which is positive. However, the large number of time series with High concentrations and that showed no significant downward trend could be grounds for concern (Assessment based on results for 1998-2010).

Figure 4.2.2.7 Trends and Low, Moderate and High concentrations of DDT in biota in European Seas



Notes: DDT using DDE as representative. The arrows indicate direction of significant trend (if any) and colour indicates the concentration category for recent years as Low (green), Moderate (yellow) and High (red). (See Table 2.2.1 for description of symbols).

Sources: Data from HELCOM, OSPAR and EEA member countries.

4.3 *Hazardous substances in rivers across Europe in 1999 - 2009*

4.3.1 Overview

Metals and pesticides were among the substances monitored most often at the stations. Several of the substances were measured at concentrations below LOD or LOQ. Cadmium, lead, and nickel were the only compounds where more than 50% of the samples were measured at levels above LOD or LOQ. Maximum concentrations of several of the compounds reported by the countries might be considered as considerably exceeding the EQS.

An overview of the available data used for the assessment is given in Figures 4.3.1.1-4.3.1.3 and Table 4.3.1.1.

Figure 4.3.1.1 No. of river stations with available data within the 1999–2009 period

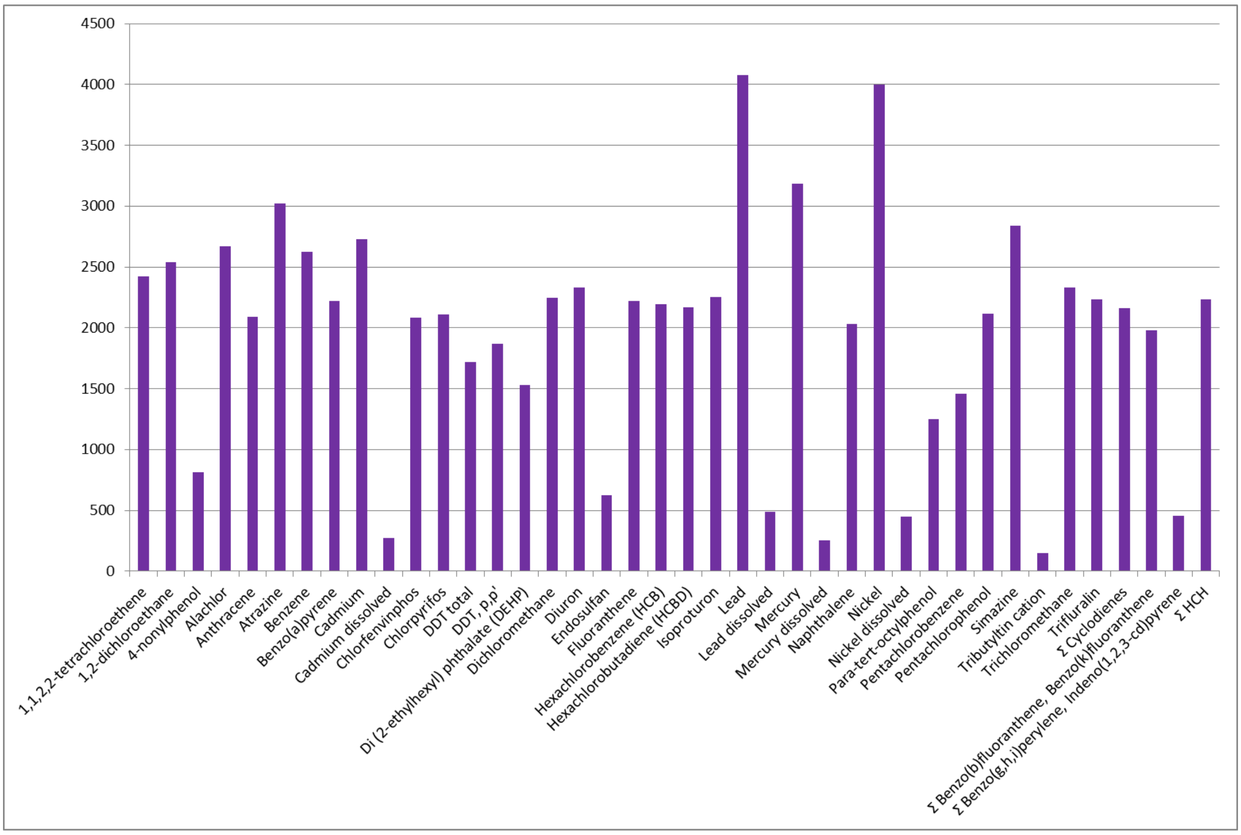


Figure 4.3.1.2 Negative/positive findings in rivers in 2008–2009

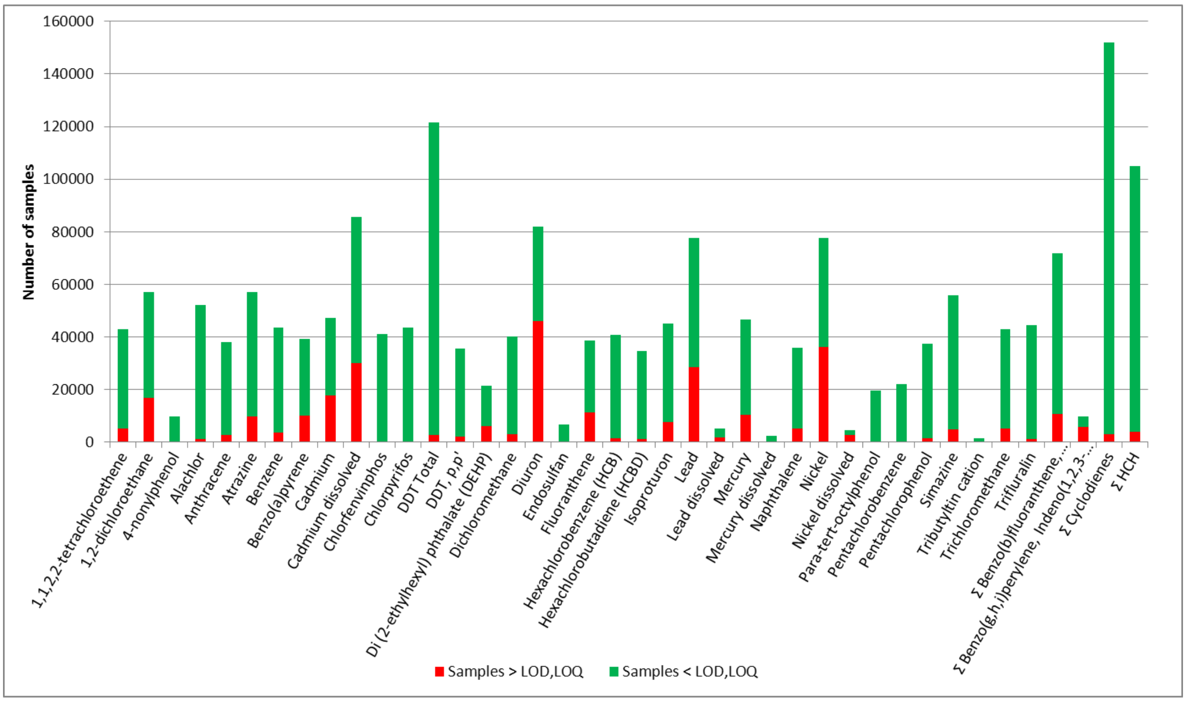


Figure 4.3.1.3 Percentage of negative/positive findings in rivers in 2008–2009

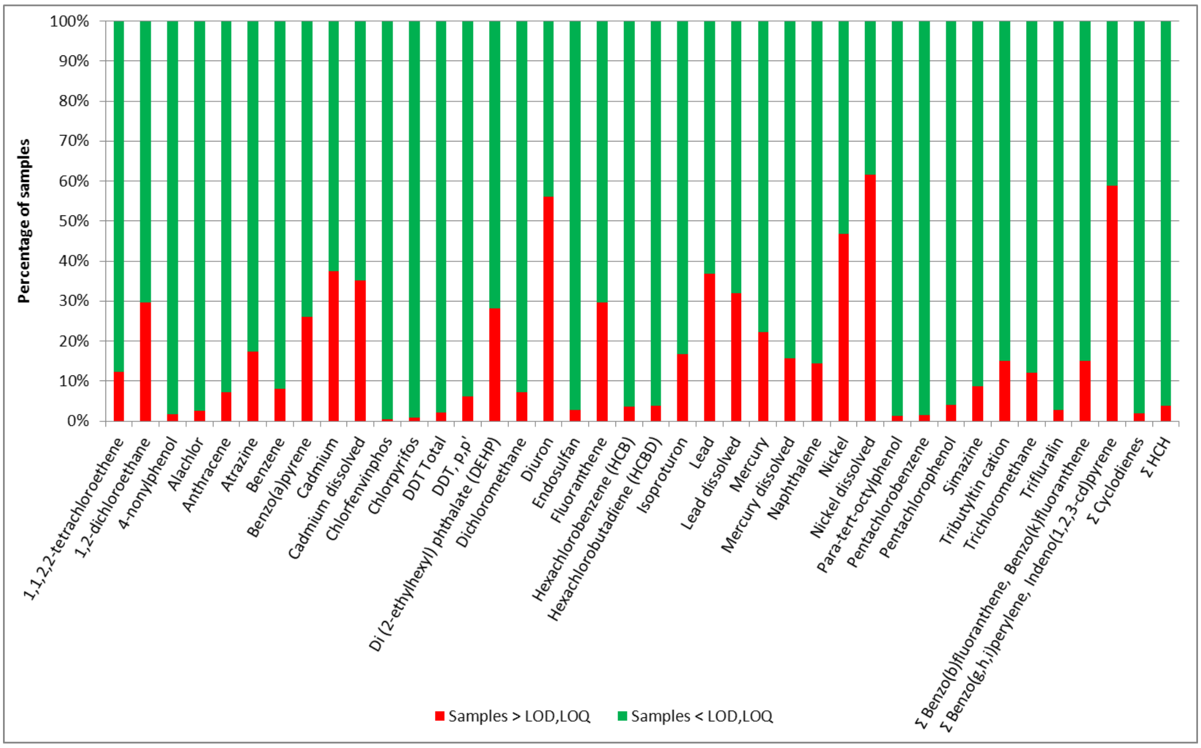


Figure 4.3.1.4 Maximum annual river concentrations in 1999–2009

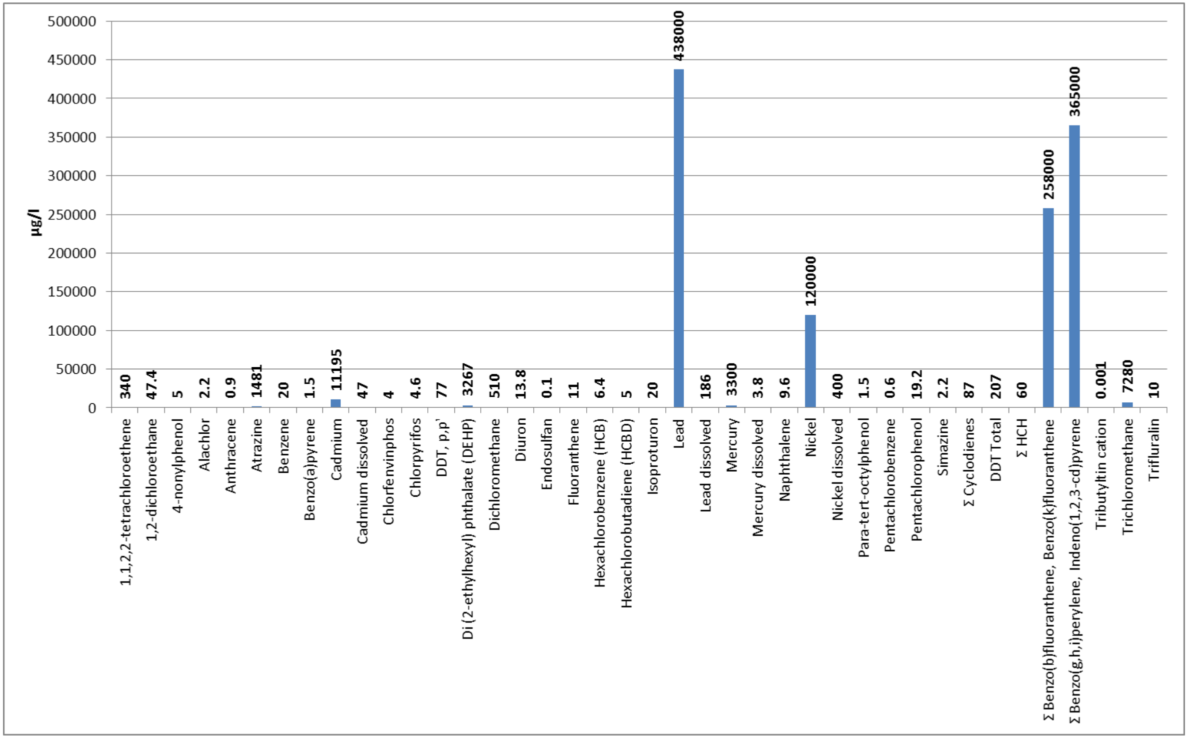


Table 4.3.1.1 Maximum annual river concentrations (µg/l) reported by countries in 1999–2009 (< indicates concentration less than LOD or LOQ)

CountryCode	1,1,2,2-tetrachloroethene	1,2-dichloroethane	4-nonylphenol	Alachlor	Anthracene	Atrazine	Benzene	Benzo(a)pyrene	Cadmium	Cadmium dissolved
AT		0.75		0.04		0.1			3.2	
BA				0.1	0.8	0.1	1	0.5	12	
BE	3.3	21	0.1	1	0.2	0.9	2	< 0.3	12	
BG									43	
CH									1	
CY	0.03	0.3		0.9		0.1	0.1	< 0.002	1.7	
CZ		0.4		0.3		1	4.7	0.2	2.7	
EE									21	
FI			0.1	0.1	< 0.003	0.03		0.02	2.3	
FR	6.9	24	0.2	2.2	0.9	2	2.7	1.5	8.7	
GB	1	< 4.2	0.4		0.1	0.7	1.5	0.1	10.9	0.1
HR		1		0.1	0.001	0.8	0.2	0.01	2.5	
HU						1481	3.4		1390	
IE		0.5	0	0.01	0.003	0.02	0.5	0.2	0.3	
IS									0.005	
IT	340	5	0.1	< 2.5	0.05	< 2.5	20	< 0.3	9.9	
LT	0.2		0		0.04	0.5	0.06	0.02	1.6	
LU	2.5	5		0.3	0.1	0.04	0.5	0.03		
LV					0.01			< 0.01	0.2	
MK									11195	
NL	0.2	0.4		0.01	0.04	0.03	0.06	0.1	0.6	0.3
NO									0.2	
PL	2.5	5		0.3	0.37	1.2	14	0.4	600	
RS				0.01		2.5		< 0.05	9.5	1.2
SE				0.01		0.01			0.3	
SI			0	0.03	< 0.003	1	0.2		0.2	
SK	1.1	47.4	5	< 0.004	0.1	0.8	4.5	0.07	2.3	
XK										47

Table 4.3.1.1 continued

Country	Chlorfenvinphos	Chlorpyrifos	DDT, p,p'	Di (2-ethylhexyl) phthalate (DEHP)	Dichloromethane	Diuron	Endosulfan	Fluoranthene	Hexachlorobenzene (HCB)	Hexachlorobutadiene (HCBD)
AT										
BA	0.1		0.01	2.5	0.4	0.1		11		
BE	0.01	0.2	0.01	6.5	180	1.8	0.1	0.9	0.002	0.05
BG										
CH										
CY	0.2	0.01	0.002		2.5	0.03			0.03	0.03
CZ		0.1	77			4		0.4	6.4	0.1
EE										
FI	0.1	0.01	< 0.005	180		0.3		0.04		2.2
FR	25.4	0.9	0.2	3267	510	26	0.01	1.9	0.1	0.6
GB	0.01		0.02	204	35.9	0.7		0.2	0	0.01
HR	0.01	0.01	0.04		0.2	0.04	0.01	0.02	< 0.0003	< 0.05
HU			10							
IE	0.01			2	2.6	0.8		0.4	0.01	0.1
IS										
IT	0.4	4.6	< 0.05	< 0.05	12	< 0.8	0.01	< 0.06	< 0.01	< 1.0
LT			2	0.01	2.5	< 0.05	0.002	0.1	< 0.008	0.03
LU	< 0.05	< 0.02		0.8	10	0.2	0.01	0.1		0.01
LV			< 0.007					< 0.03	0.001	
MK										
NL	0.01	0.2	0.001	5.5	10	1.2	< 0.0005	0.1	0.001	0.01
NO										
PL	4	0.3	0.06	2.9	61.5	0.5	0.1	0.5	0.1	5
RS	0.01	0.02	0.09			0.2		< 0.05	0.02	
SE	0	0.001				0.03				
SI	0.03	0.01	0.003	0.5	2.5	0.01		0.02	0.01	< 0.05
SK	0.01	0.04	0.02	72	0.7	0.01	< 0.003	0.2	0.02	0.1
XK										

Table 4.3.1.1 continued

Country	Isoproturon	Lead	Lead dissolved	Mercury	Mercury dissolved	Naphthalene	Nickel	Nickel dissolved	Para-tert-octylphenol	Pentachlorobenzene
AT		153.9	6.4	124	< 0.02		122			
BA	0.1	108.8		3		2	100			
BE	2.1	173		3.4		0.3	88		1.5	0.02
BG		80					334			
CH		33.4		1.5			35.2			
CY	0.03	67.4				0.1	1644			
CZ	0.3	80		2			770			
EE		52.3		1.7			21			
FI	0.3	15		0.5		0.04	63		0.1	0.01
FR	20	324		8		9.6	286		0.7	0.6
GB	2.7	86.3	2.6	0.1	0.05	0.4	45.7	8.5	< 0.2	
HR	0.02	17	2.3	< 0.05		0.1	105	7.2		0.0003
HU		22		92			430			
IE	4.6	23		0.1		0.5	5		0.01	0.01
IS		0.02		< 0.001						
IT	< 2.0	438000	5	41		1.4	120000	6	< 0.05	< 0.05
LT	0.2	56		0.2			14		0.03	< 0.003
LU	1.1								< 0.05	
LV		4.8		0.03		< 0.02	7			
MK							15970			
NL	0.2	22	3	0.2	0.03	0.2	12	5.9	0.02	0.0003
NO		7.7		< 0.02			39.7			
PL	0.3	9000		3300		0.7	5000		0.05	0.05
RS	0.1	70.3	43	0.7	3.8		649.2	380.9		
SE	1	7.5		0.02			15			
SI	0.3	3.6		0.2			4.1		0.01	< 0.002
SK	0.003	41		19.1		0.3	16.3			0.02
XK			186					400		

Table 4.3.1.1 continued

Country	Pentachlorophenol	Simazine	Σ Cyclodienes	DDT Total	Σ HCH	Σ Benzo(b)fluoranthene, Benzo(k)fluoranthene	Σ Benzo(g,h,i)perylene, Indeno(1,2,3-cd)pyrene	Tributyltin cation	Trichloromethane	Trifluralin
AT		0.2							0.03	
BA	0.1	0.1	1.4	0.01	0.1	1.6	0.1		0.4	
BE	0.4	2.2	0.01	0.01	0.2	258000	365000		13.4	0.2
BG			0.01							
CH										
CY		0.9	< 0.002	< 0.003	0.03	< 0.004	< 0.0008		0.3	0.4
CZ		0.3	0.01	207	0.1	0.1	0.1			0.05
EE										
FI		< 0.05		< 0.005	0.01	0.03				0.02
FR	19.2	1.7	0.1	0.2	1.1	8.3	0.5	0.001	184	2.5
GB	0.03	0.01	0.01		0	0.1		0.001	8.4	0.02
HR	0.01	0.4	0.01	0.2	0.01	0.01	0.01		2.6	
HU			87	10	60					
IE	0.01	0.02	0.01		0.01	0.2				0.01
IS										
IT	6.8	< 2.5	0.1	0.1	0.1	0.3	0.2		7280	< 0.3
LT	0.2	0.5	0.003	2	< 0.003	0.02			3829	
LU	0.01	< 0.05			< 0.006	0.03			2.5	0.01
LV			0.001	< 0.007	0.01	0.01				
MK										
NL	0.1	0.1	0.1	0.001	0.003	0.1	0.1		0.4	0.01
NO					< 0.0004					
PL	0.3	1.4	5	0.1		0.2	3		43	10
RS	0.1	0.3	0.3	0.1	0.01	< 0.005	< 0.002			< 0.02
SE		0.01			0					0.002
SI	0.04	0.1	0.01	< 0.003	0.01		0.002			0.03
SK	0.03	0.03	0.02	< 0.02	0.02	0.1	0.04		40.5	0.02
XK										

4.3.2 Occurrence and concentrations of hazardous substances in rivers

1,1,2,2-tetrachloroethene

The assessment is based on data from 12 countries for the 2001-2009 period and the number of samples reported have increased considerably over the last few years. All reported concentrations were below environmental quality standards (EQS).

1,2-dichloroethane

The assessment is based on data from 14 countries for the 1999-2009 period and the number of samples reported have increased considerably since 2004. All reported concentrations were below EQS.

4-Nonylphenol

The assessment is based on data from 9 countries for the 2006-2009 period and the number of samples reported have increased considerably since 2006. All reported concentrations were below EQS.

Alachlor

The assessment is based on data from 20 countries for the 1999-2009 period and the number of samples reported have increased considerably since 1999. Except for a few samples from PL which were above EQS, all reported concentrations were below EQS.

Anthracene

The assessment is based on data from 19 countries for the 2004-2009 period and the number of samples reported have increased considerably since 2006. Except for some samples from BA, GR, and RO which were above EQS, reported concentrations were below EQS.

Atrazine

The assessment is based on data from 22 countries for the 1999-2009 period and the number of samples reported have increased considerably since 2005. Except for some samples from PL and GB (less than 5%) which were above EQS, reported concentrations were below EQS.

Benzene

The assessment is based on data from 18 countries for the 1999-2009 period and the number of samples reported have increased considerably since 2005. Except for some samples from PL (about 15%) and GR which were above EQS, reported concentrations were below EQS.

Benzo(a)pyrene

The assessment is based on data from 21 countries for the 2001-2009 period and the number of samples reported have increased considerably since 2005. Except for some samples from BE, PL, less than 5 % and BA (few samples reported) which were above EQS, reported concentrations were below EQS.

Cadmium

The assessment is based on data from 27 countries for the 1999-2009 period and the number of samples reported have increased considerably since 2005. Measured concentrations of Cd are exceeded and are above EQS in several countries. Data on dissolved concentrations is scarce.

Chlorfenvinphos

The assessment is based on data from 17 countries for the 2001-2009 period and the number of samples reported have increased considerably since 2005. Except for some samples from PL (about 25 %), reported concentrations were below EQS.

Chlorpyrifos

The assessment is based on data from 14 countries for the 2001-2009 period and the number of samples reported have increased considerably since 2001. Except from PL, where about 40% of the samples reported were above EQS, other reported data was below EQS.

DDT total

The assessment is based on data from 13 countries for the 2003-2009 period and the number of samples reported have increased considerably since 2005. All reported concentrations were below EQS.

DDT, p,p'

The assessment is based on data from 16 countries for the 2005-2009 period and the number of samples reported have increased considerably since 2005. Except for some samples from RO (few data reported), reported concentrations were below EQS.

Di (2-ethylhexyl) phthalate (DEHP)

The assessment is based on data from 13 countries for the 2006-2009 period and the number of samples reported have increased considerably since 2006. Most of the samples from SK were exceeded and are above EQS, and 10% of the samples from BA (few samples reported). In samples from FR, GB, and PL less than 10% of the samples exceeded EQS.

Dichloromethane

The assessment is based on data from 16 countries for the 2005-2009 period and the number of samples reported have increased considerably since 2005. Except for some samples from PL (about 8 %), reported concentrations were below EQS.

Diuron

The assessment is based on data from 16 countries for the 2005-2009 period and the number of samples reported have increased considerably since 2005. Except from about 30% of the samples from PL, reported concentrations were below EQS.

Endosulfan

The assessment is based on data from 7 countries for the 2005-2009 period and the number of samples reported have increased since 2005. The extent of data, both number of samples and countries reporting endosulfan is few. Concentrations above EQS are reported from measurements in PL, IT, and BE. About 30 % of reported samples from PL were above 30%.

Fluoranthene

The assessment is based on data from 20 countries for the 2001-2009 period and the number of samples reported have increased since 2005. Except for some samples from BE and PL (about 15 and 5 % of samples, respectively) and BA (few samples analysed), reported concentrations were below EQS.

Hexachlorobenzene (HCB)

The assessment is based on data from 17 countries for the 1999-2009 period and the number of samples reported have increased considerably since 2005. Except for about 20% of samples from PL which are close to EQS, reported concentrations were below EQS.

Hexachlorobutadiene (HCBD)

The assessment is based on data from 15 countries for the 1999-2009 period and the number of samples reported have increased considerably since 2005. Except from about 20 and 25 % of samples from FI and PL, respectively, reported above EQS, the rest of the countries reported concentrations below EQS.

Isoproturon

The assessment is based on data from 20 countries for the 2003-2009 period and the number of samples reported have increased considerably since 2003. About 50 % of the samples from PL were close to EQS, while less than 5 % of samples form IT, IE, BE, and BA (few samples) were above EQS. The rest of the reported samples were below EQS.

Lead

The assessment is based on data from 25 countries for the 1999-2009 period and the number of samples reported have increased considerably since 2005. Samples from SK, RO, PL, GB, EE, BG, and BE were reported about EQS. About 65 % of the samples from SK were above EQS. The rest of the reported samples were below EQS. Few data on the dissolved phase was reported. In data from XK about 90% of samples were above EQS.

Mercury

The assessment is based on data from 21 countries for the 1999-2009 period and the number of samples reported have increased considerably since 2005. Samples from SK, RS, RO, PL, IT, FR, FI, DE, CZ, BE, and BA were reported above EQS. In samples from PL, RO, and RS 80-100 % of the samples were above EQS. The rest of the reported samples were below EQS. Few data on the dissolved phase was reported.

Naphthalene

The assessment is based on data from 15 countries for the 2004-2009 period and the number of samples reported have increased considerably since 2006. About 35 % of the samples from PT (few samples) were reported above EQS. The rest of the reported samples were below EQS.

Nickel

The assessment is based on data from 15 countries for the 1999-2009 period and the number of samples reported have increased considerably since 2005. Samples from RS, PL, MK, IT, CY, and BG were reported above EQS. The rest of the reported samples were below EQS. Few data on the dissolved phase was reported.

Para-tert-octylphenol

The assessment is based on data from 12 countries for the 2006-2009 period and the number of samples reported have increased considerably since 2006. About 15 % of the samples from GB (few samples) and 5 % from BE were reported above EQS. The rest of the reported samples were below EQS.

Pentachlorobenzene

The assessment is based on data from 11 countries for the 2006-2009 period and the number of samples reported have increased considerably since 2006. Samples from PL, RO (few samples), and IT (few samples) were reported above EQS. The rest of the reported samples were below EQS.

Pentachlorophenol

The assessment is based on data from 17 countries for the 2004-2009 period and the number of samples reported have increased considerably since 2005. All reported concentrations were below EQS.

Simazine

The assessment is based on data from 18 countries for the 1999-2009 period and the number of samples reported have increased considerably since 2005. About 25 % of the samples from PL and less than 5 % from IT were reported above EQS. The rest of the reported samples were below EQS.

Tributyltin cation

The assessment is based on data from 3 countries for the 2005-2009 period and the number of samples reported in 2009 were considerable higher compared to previous years. Less than 5 % of samples from FR were above EQS. Few samples from GB and DE were analysed, but 35 and 100 % of the samples were above EQS.

Trichloromethane

The assessment is based on data from 13 countries for the 2005-2009 period and the number of samples reported have increased considerably since 2005. About 5 % of the samples from SK and PL were above EQS. The rest of the reported samples were below EQS.

Trifluralin

The assessment is based on data from 17 countries for the 2002-2009 period and the number of samples reported have increased considerably since 2005. IT, CY, ES, and PL reported concentrations above EQS. The rest of the reported samples were below EQS.

Σ Benzo(b)fluoranthene, Benzo(k)fluoranthene

The assessment is based on data from 14 countries for the 2001-2009 period and the number of samples reported have increased considerably since 2001. BA (few samples), BE, and PL reported concentrations above EQS. About 90 and 10 % of the samples from BE and PL were above EQS, respectively. The rest of the reported samples were below EQS.

Σ Benzo(g,h,i)perylene, Indeno(1,2,3-cd)pyrene

The assessment is based on data from 14 countries for the 2001-2009 period and the number of samples reported have increased considerably since 2005. EQS were exceeded in most of the samples, and often above 60 % of the samples.

Σ Cyclodienes

The assessment is based on data from 16 countries for the 1999-2009 period and the number of samples reported have increased considerably since 2006. BA (few samples) and PL reported concentrations above EQS. In PL, about 5 % of the samples were above EQS. The rest of the reported samples were below EQS.

Σ Hexachlorocyclohexane (HCH)

The assessment is based on data from 16 countries for the 2003-2009 period and the number of samples reported have increased considerably since 2006. BA (few samples) reported concentrations above EQS. The rest of the reported samples were below EQS.

Charts of mean concentrations and numbers of stations with data from the period 1999-2009 based on the indicator are shown in figures 4.3.2.1a – 4.3.2.40a for selected hazardous substances in rivers in Europe.

Charts showing the percentage of stations in the 2008-2009 period for each country in each of the indicator categories for selected hazardous substances in rivers are shown in figures 4.3.2.1b – 4.3.2.40b.

Maps of maximum concentrations from the 2008 - 2009 period based on the indicator for selected hazardous substances in rivers across Europe in individual stations are shown in figures 4.3.2.1c – 4.3.2.40c.

Figure 4.3.2.1a Long-term traffic-light indicator and number of stations for 1,1,2,2-tetrachloroethene in rivers

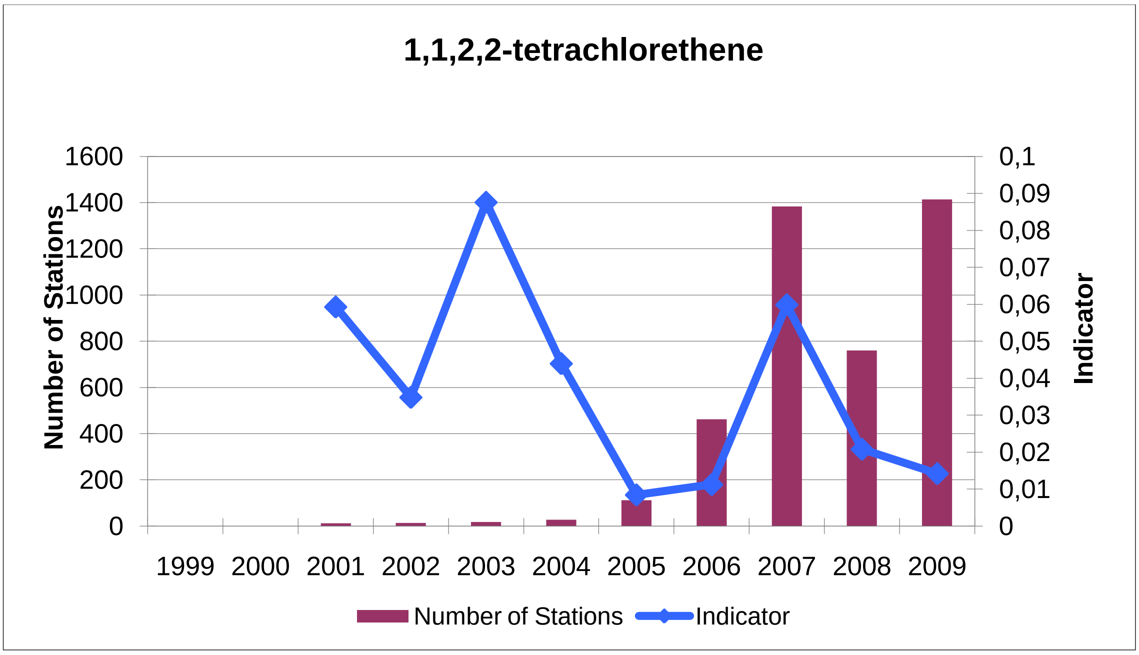


Figure 4.3.2.1b Traffic-light indicator for 1,1,2,2-tetrachloroethene in rivers from 2008–2009 (number of stations per country is shown in parenthesis)

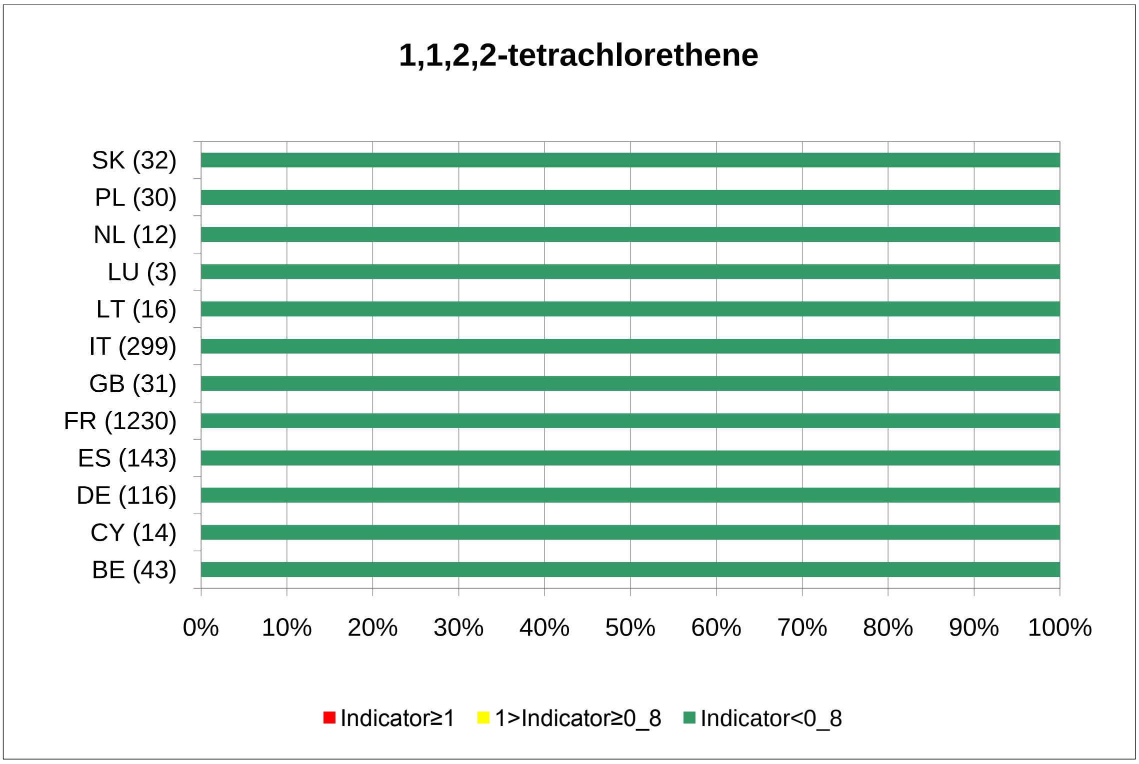
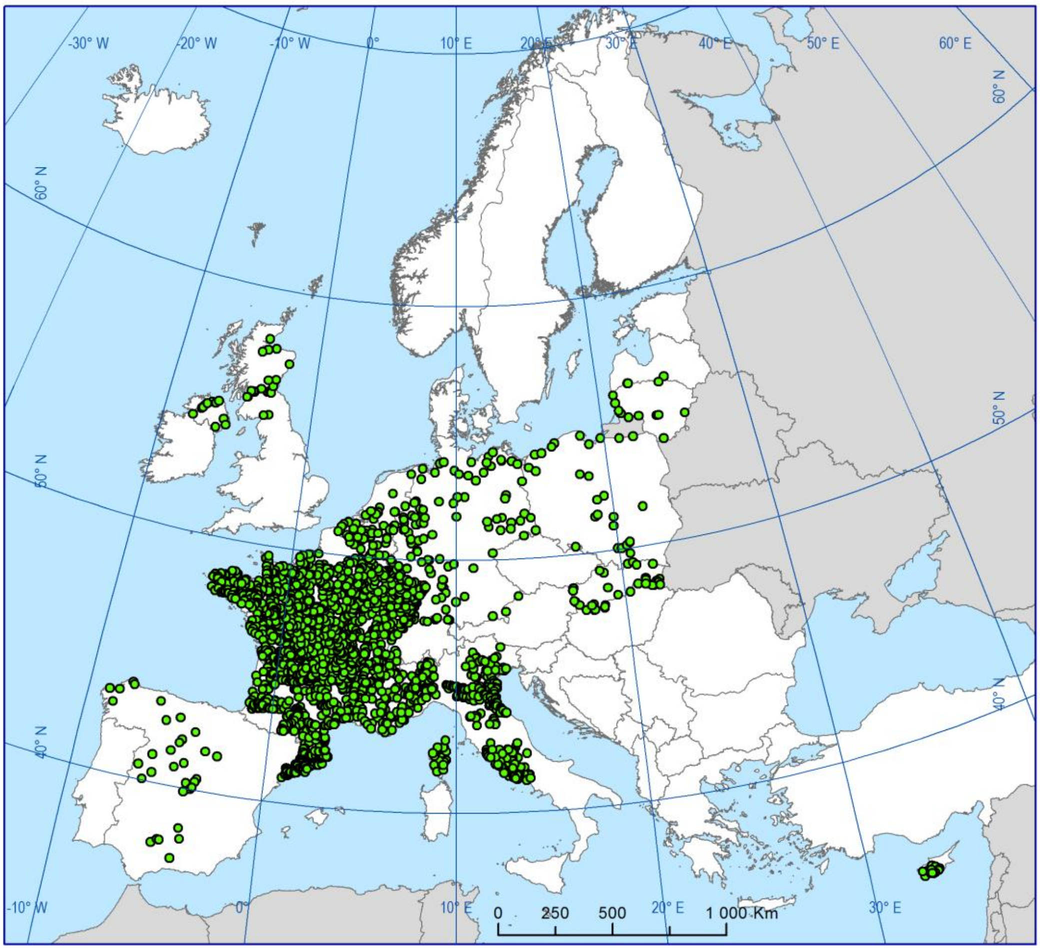


Figure 4.3.2.1c Map of traffic-light indicator for 1,1,2,2-tetrachloroethene in rivers in 2008–2009



Indicator<0.8

1>Indicator≥0.8

Indicator≥1

outside coverage

Figure 4.3.2.2a Long-term traffic-light indicator and number of stations for 1,2-dichloroethane in rivers

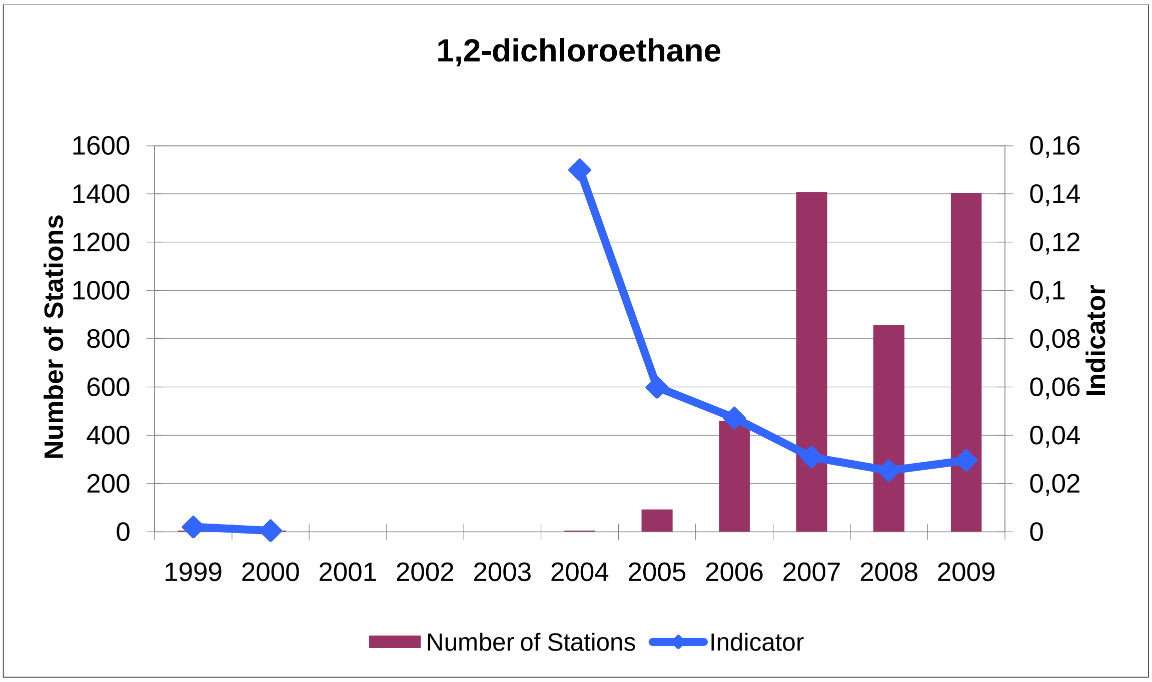


Figure 4.3.2.2b Traffic-light indicator for 1,2-dichloroethane in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

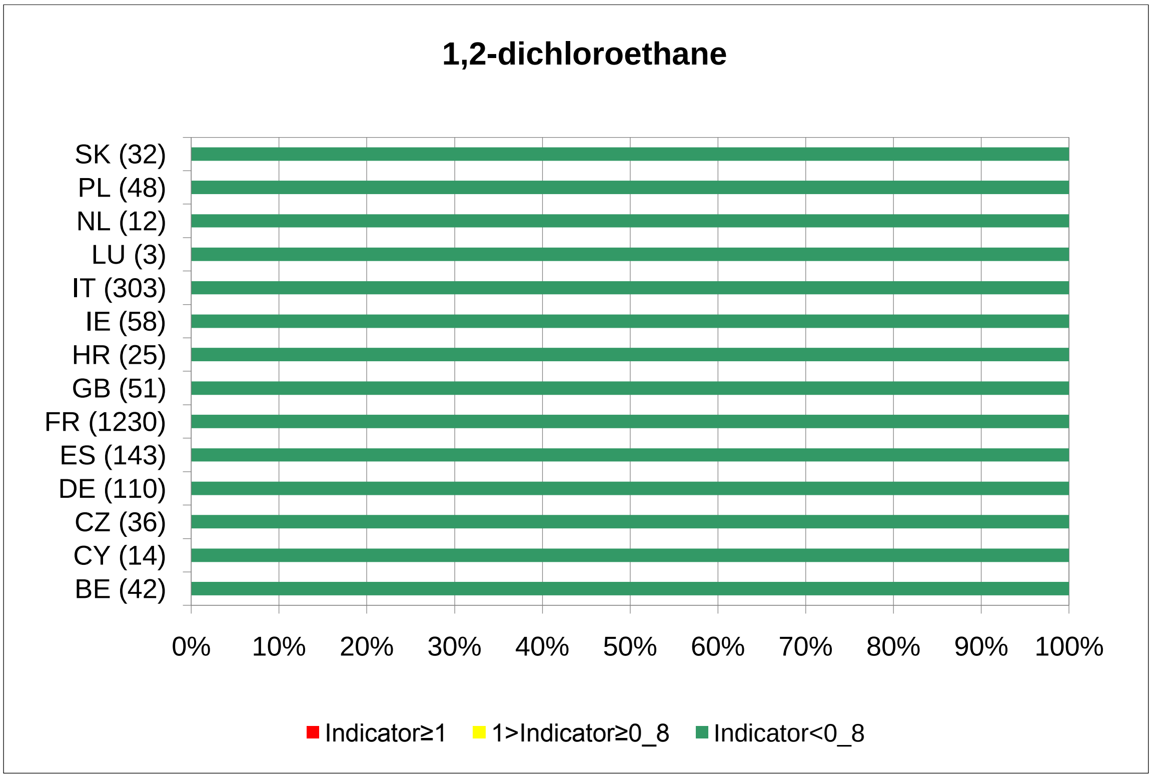


Figure 4.3.2.2c Map of traffic-light indicator for 1,2-dichloroethane in rivers in 2008–2009

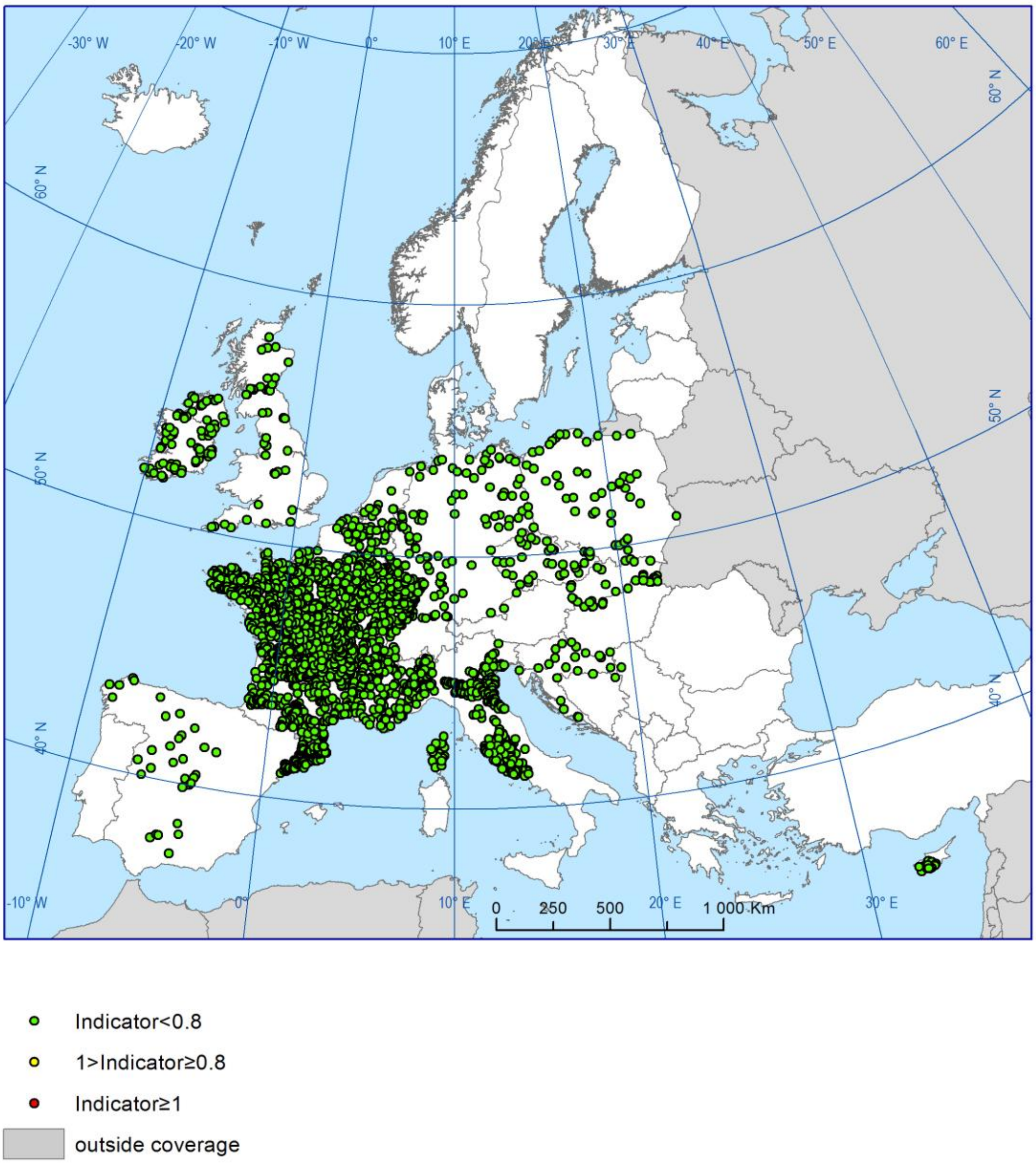


Figure 4.3.2.3a Long-term traffic-light indicator and number of stations for 4-nonylphenol in rivers

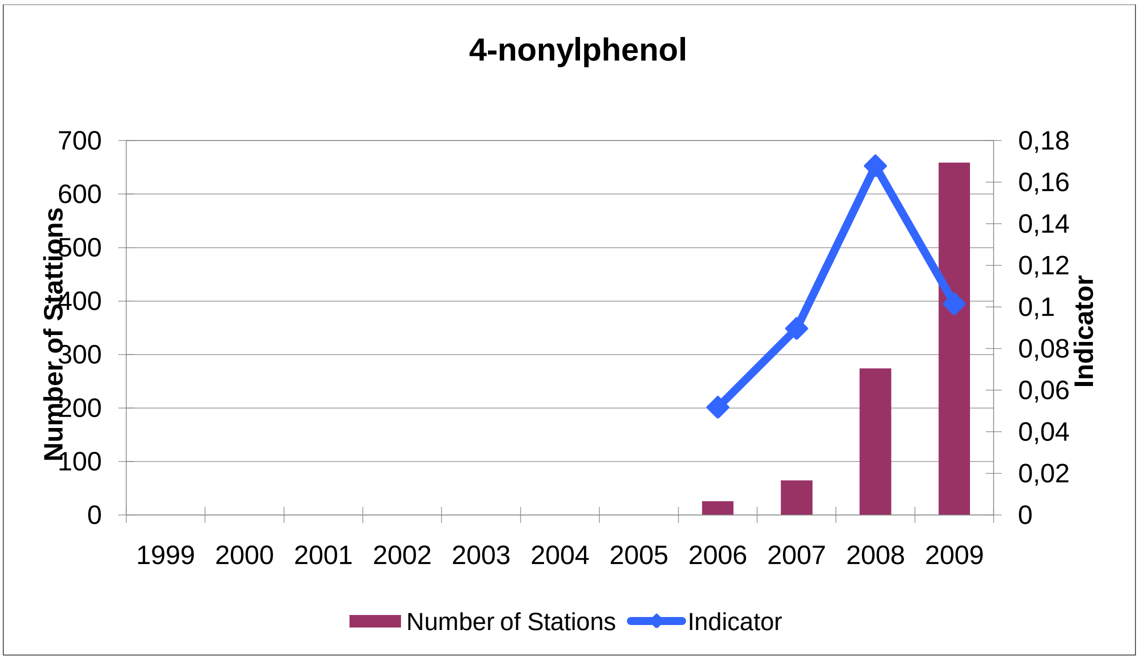


Figure 4.3.2.3b Traffic-light indicator for 4-nonylphenol in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

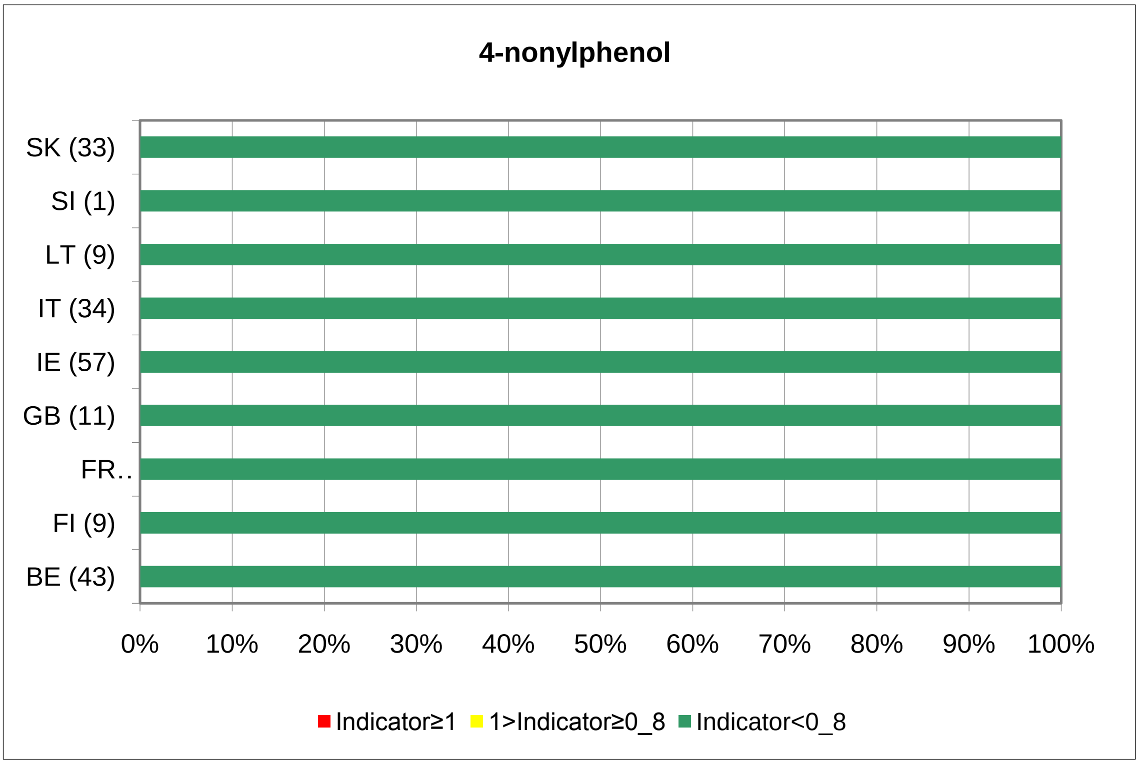


Figure 4.3.2.3c Map of traffic-light indicator for 4-nonylphenol in rivers in 2008–2009

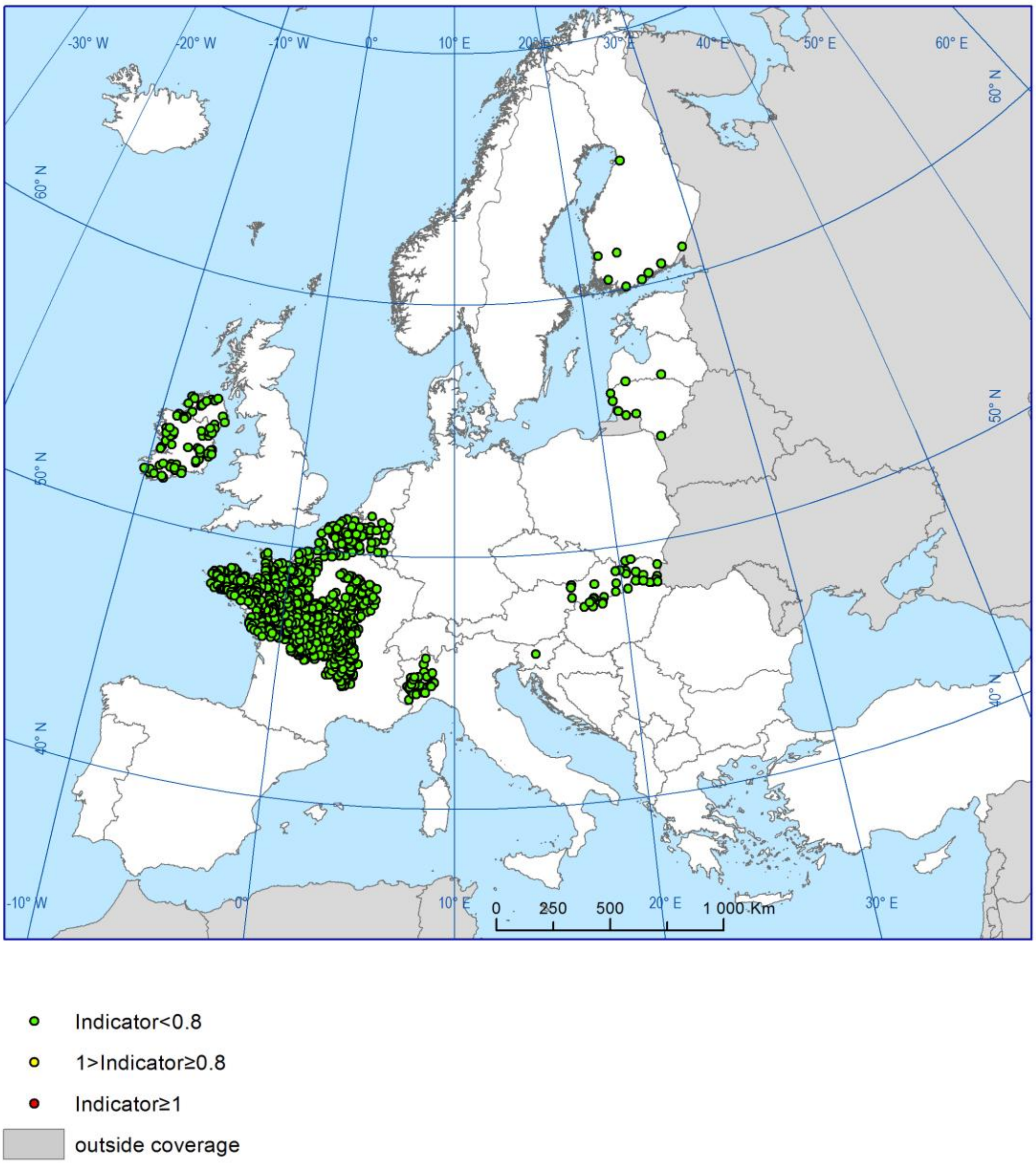


Figure 4.3.2.4a Long-term traffic-light indicator and number of stations for alachlor in rivers

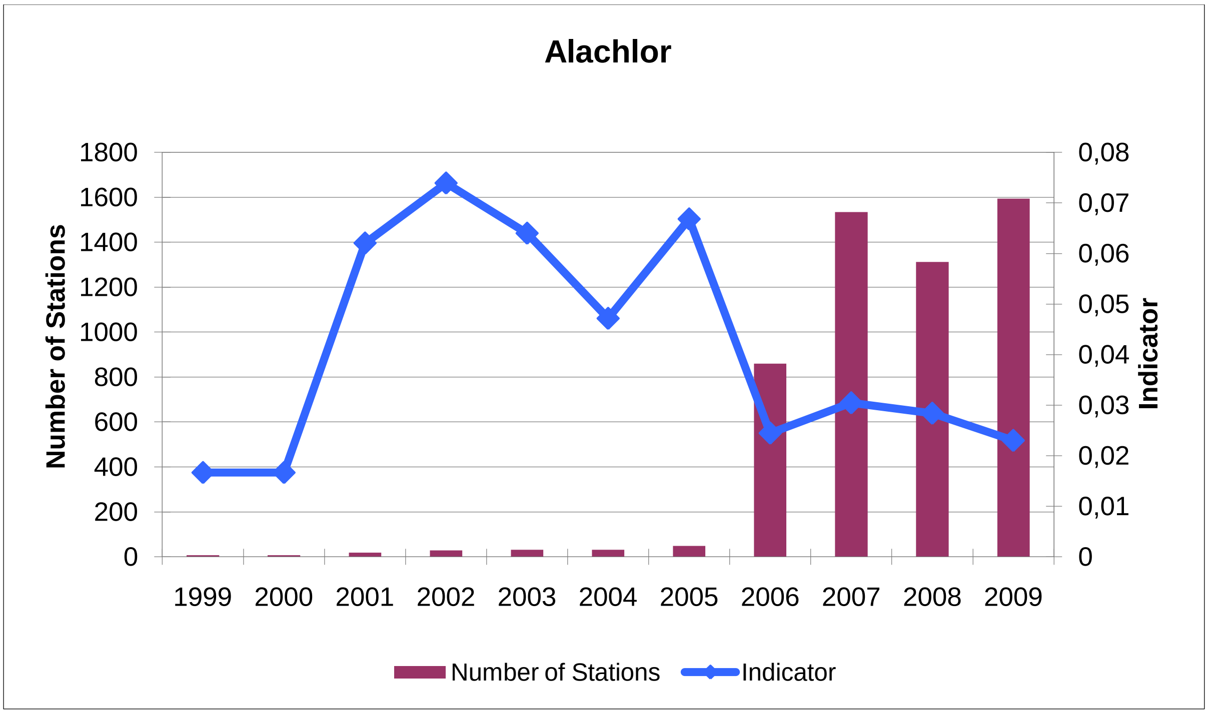


Figure 4.3.2.4b Traffic-light indicator for alachlor in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

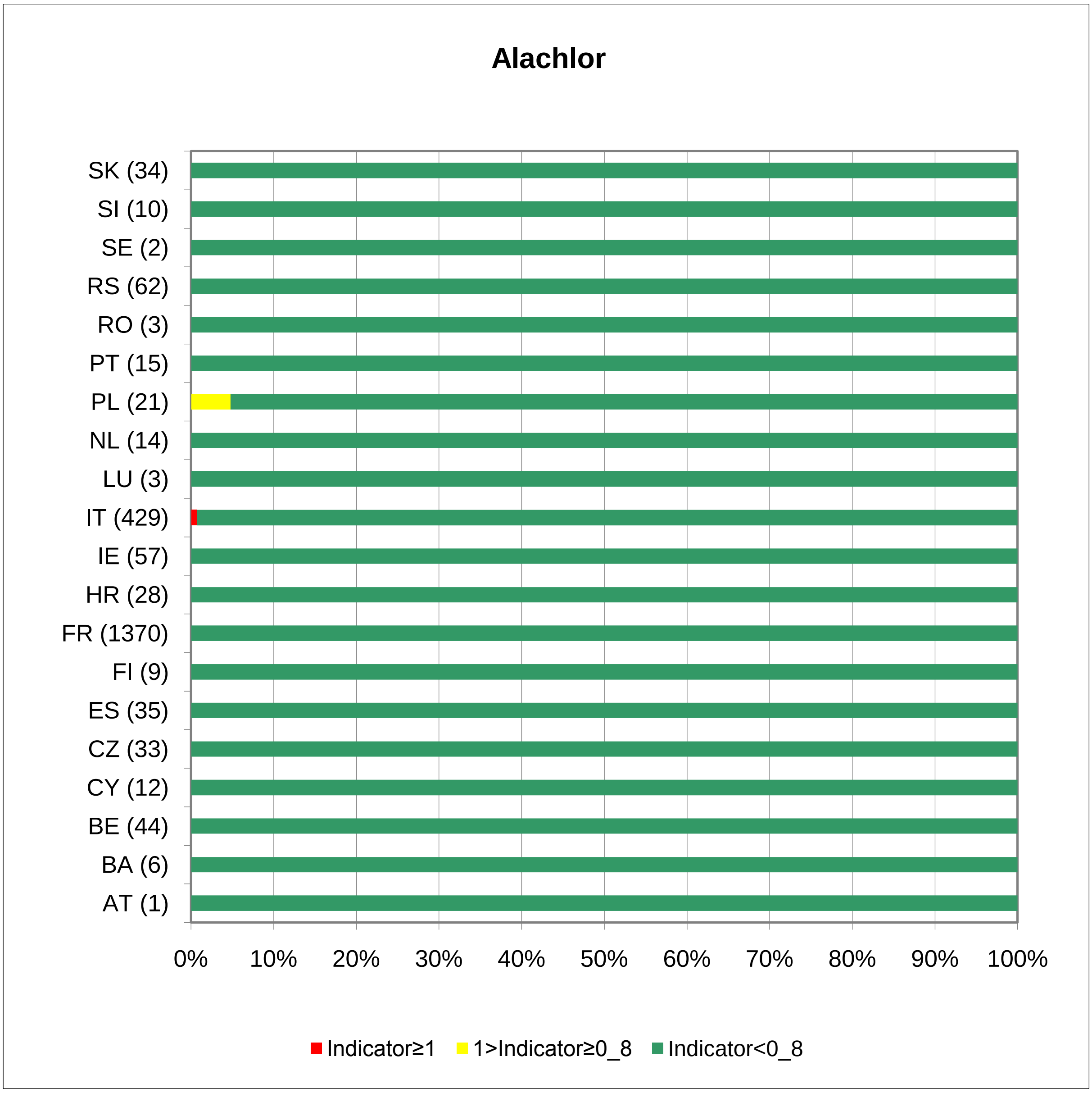


Figure 4.3.2.4c Map of traffic-light indicator for alachlor in rivers in 2008–2009

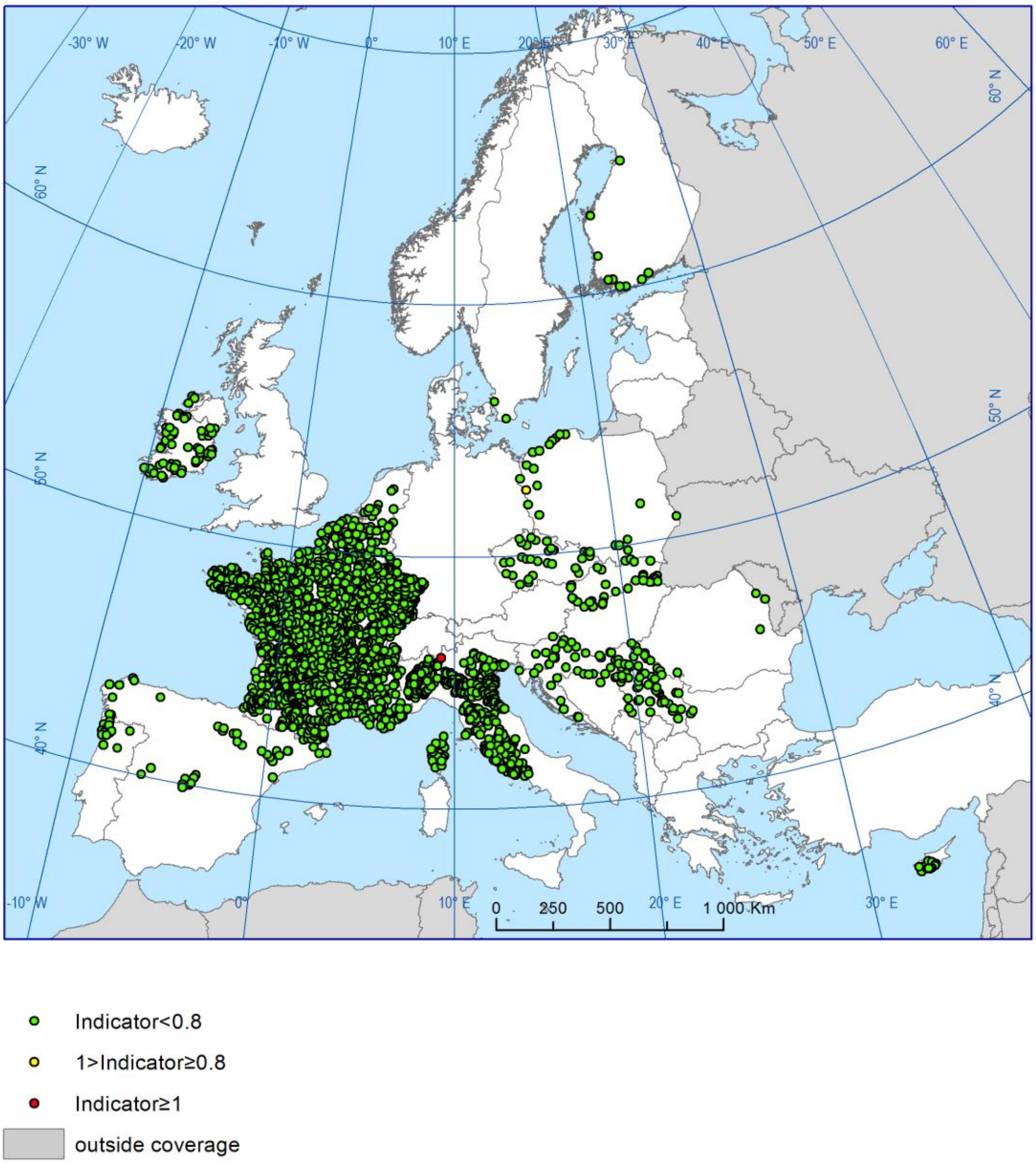


Figure 4.3.2.5a Long-term traffic-light indicator and number of stations for anthracene in rivers.

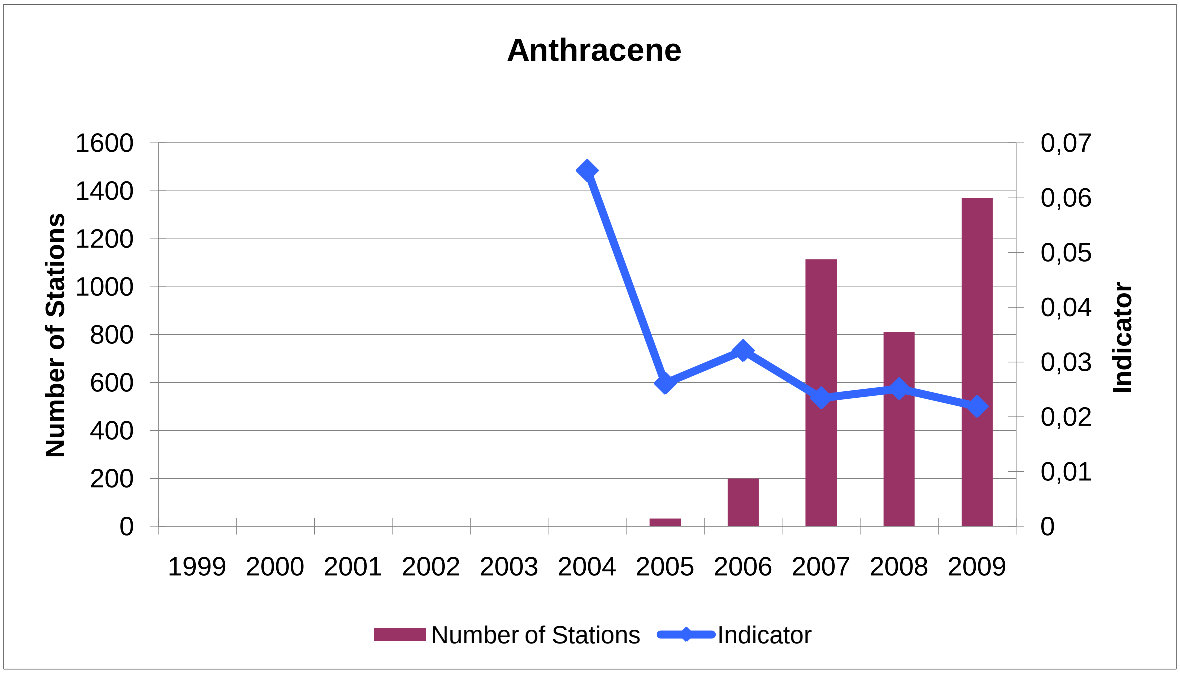


Figure 4.3.2.5b Traffic-light indicator for anthracene in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

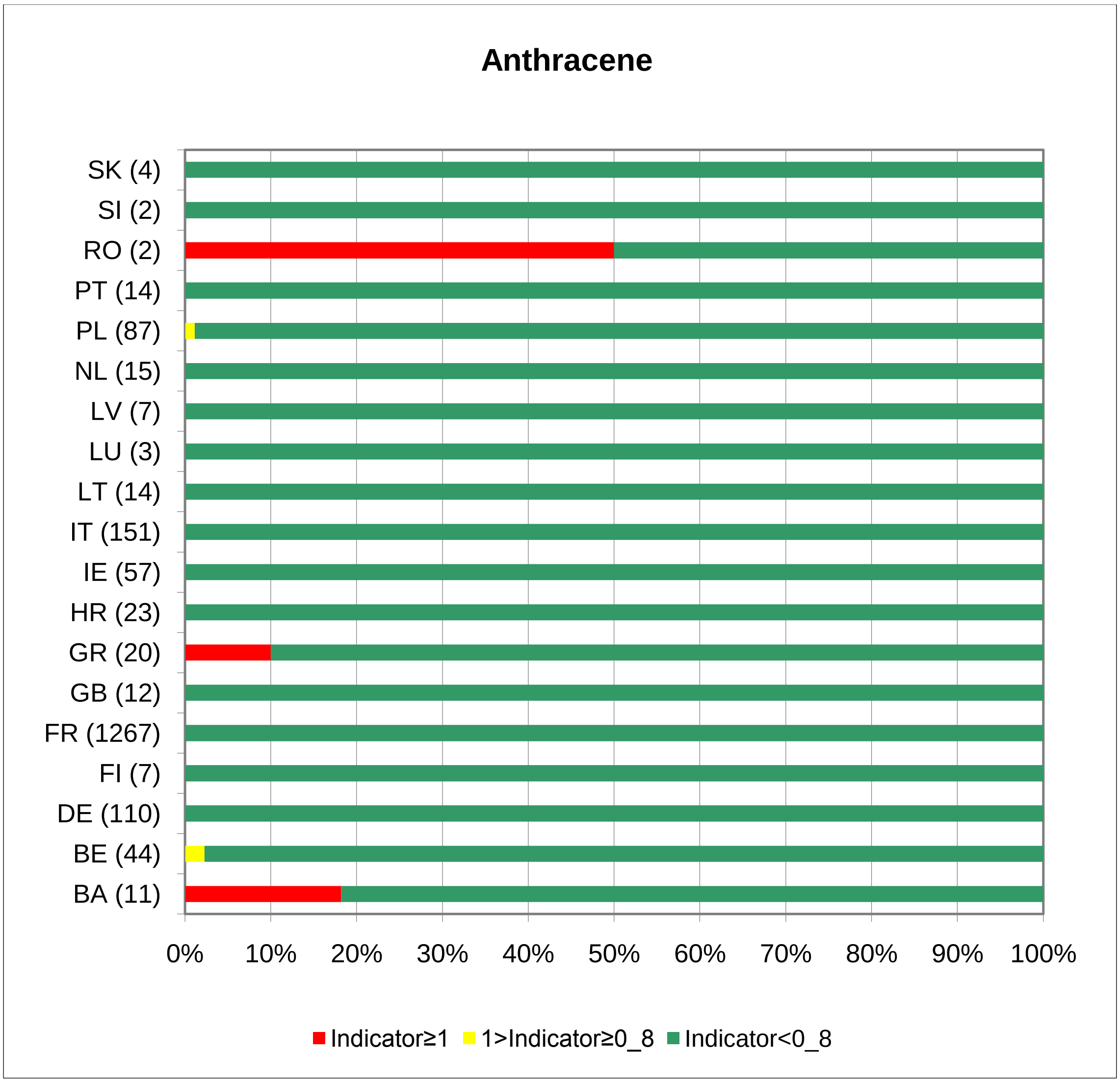


Figure 4.3.2.5c Map of traffic-light indicator for anthracene in rivers in 2008–2009

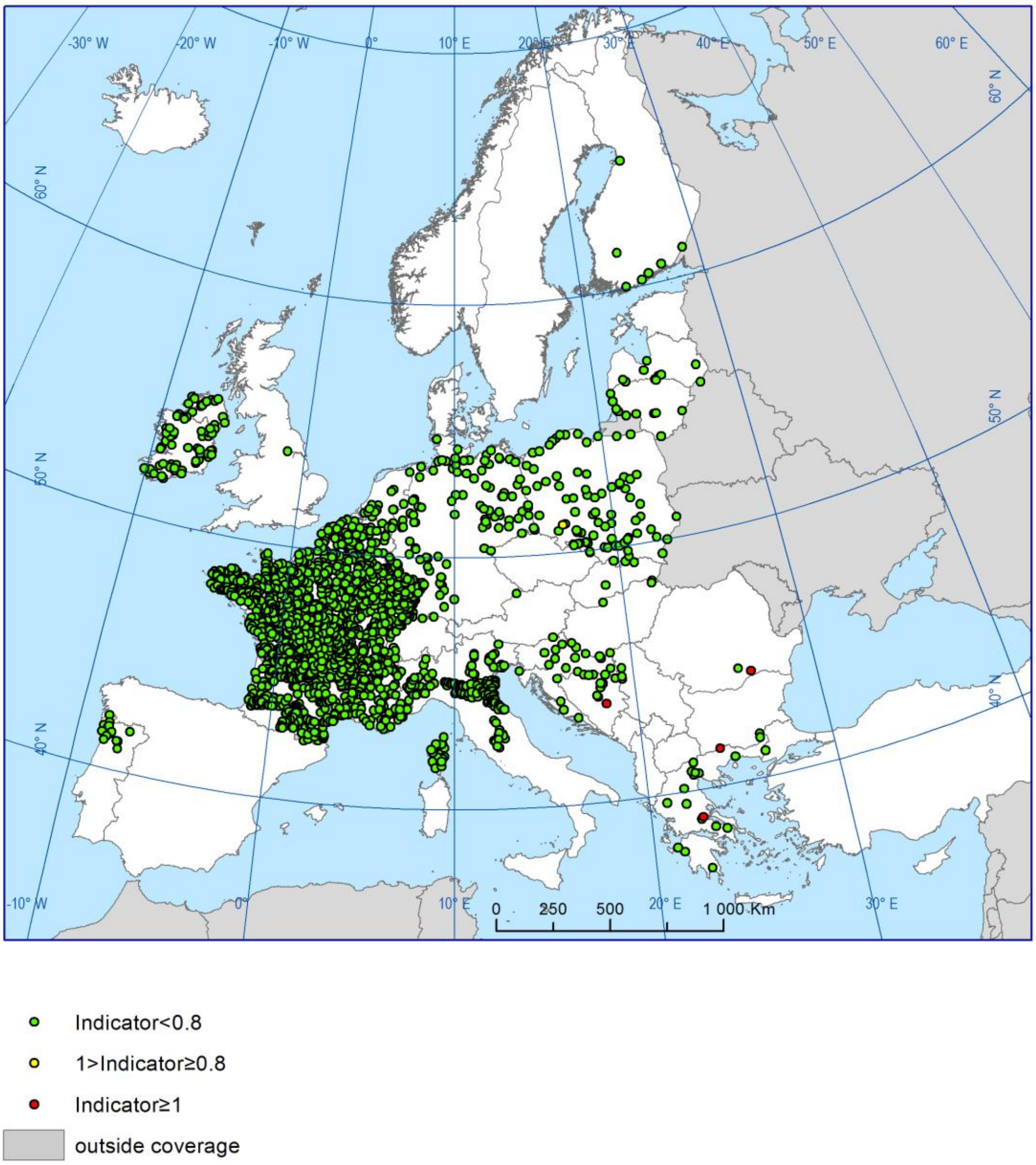


Figure 4.3.2.6a Long-term traffic-light indicator and number of stations for atrazine in rivers

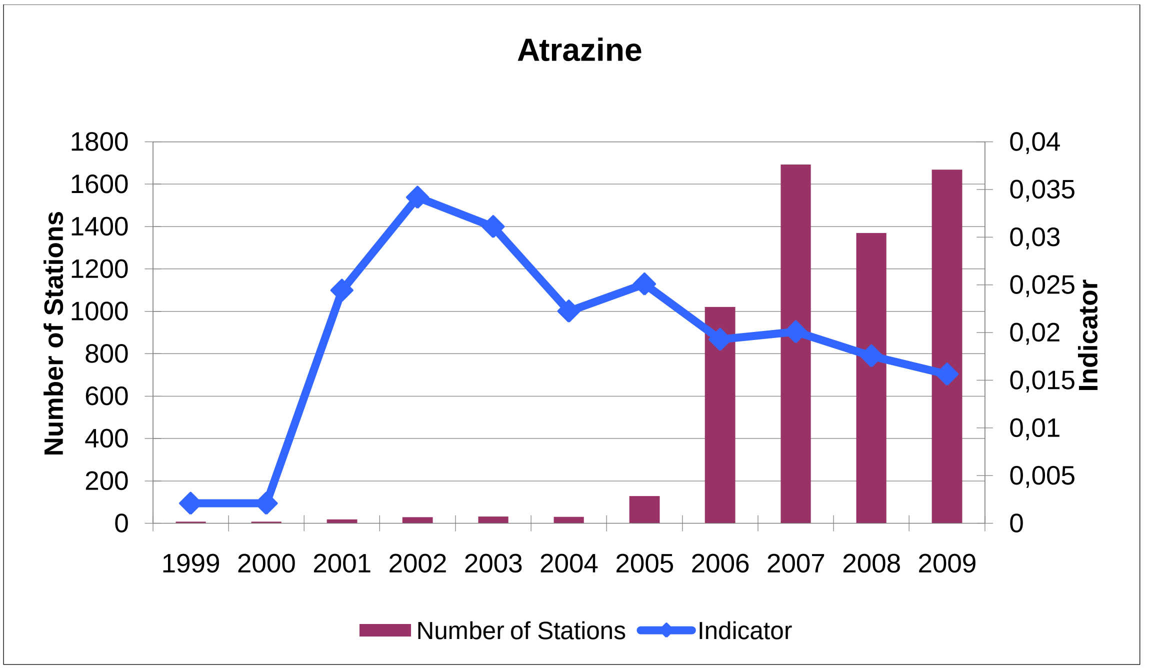


Figure 4.3.2.6b Traffic-light indicator for atrazine in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

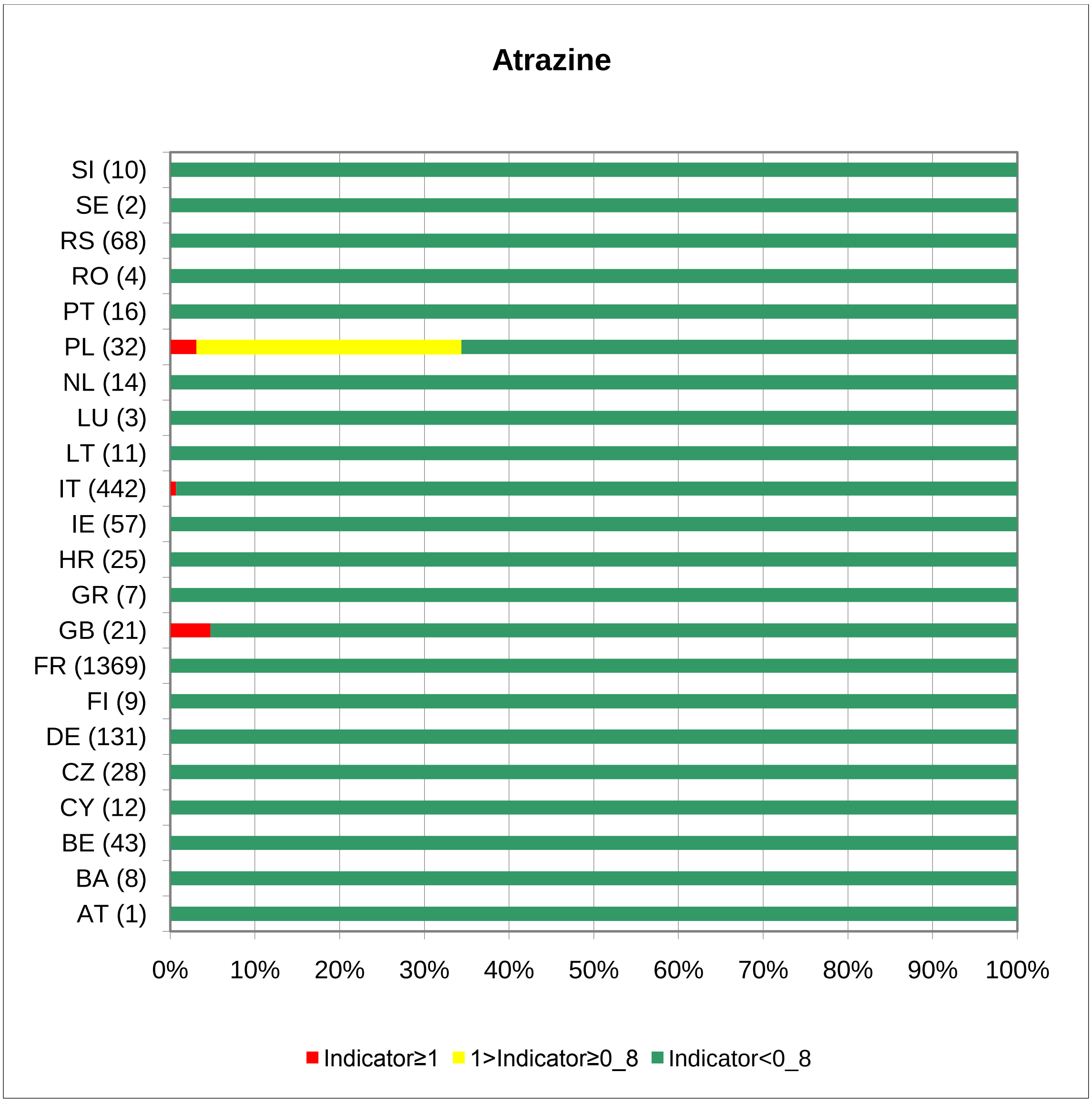
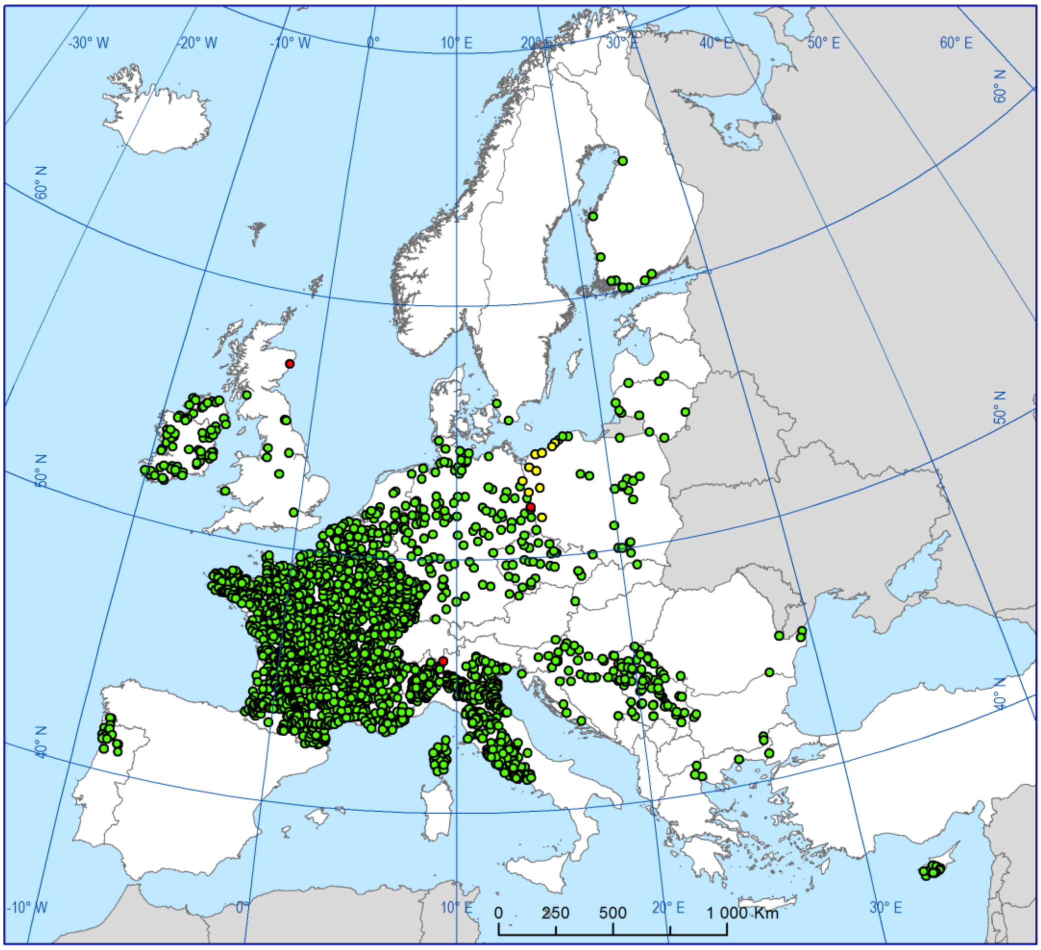


Figure 4.3.2.6c Map of traffic-light indicator for atrazine in rivers in 2008–2009



Indicator<0.8

1>Indicator≥0.8

Indicator≥1

outside coverage

Figure 4.3.2.7a Long-term traffic-light indicator and number of stations for benzene in rivers

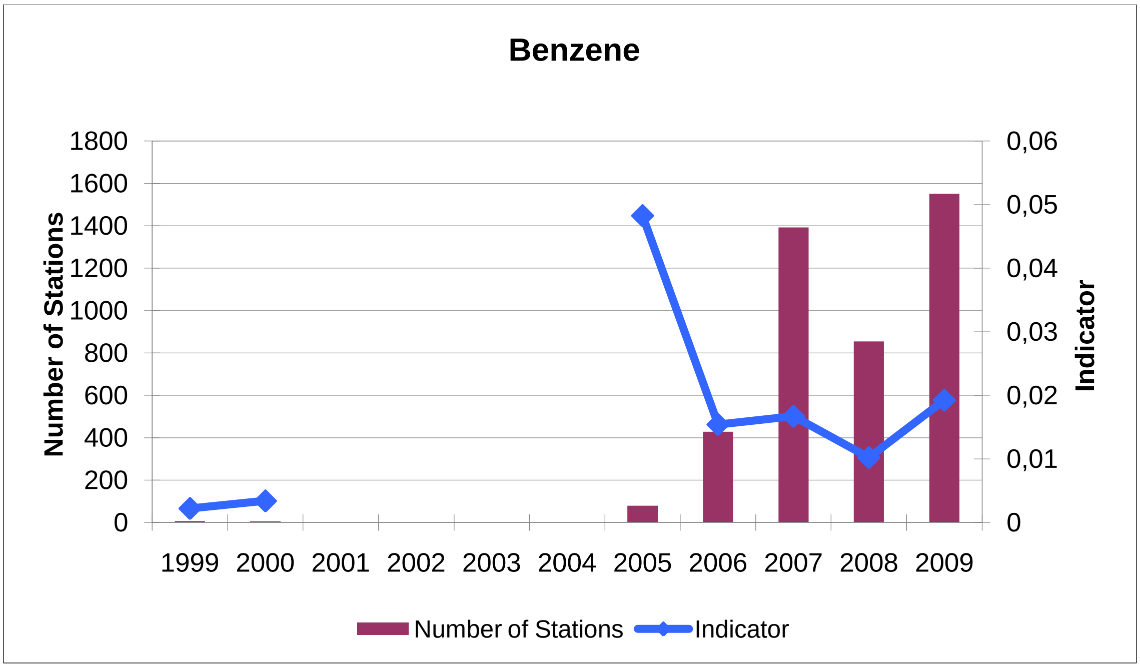


Figure 4.3.2.7b Traffic-light indicator for benzene in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

Figure 4.3.2.7c Map of traffic-light indicator for benzene in rivers in 2008–2009

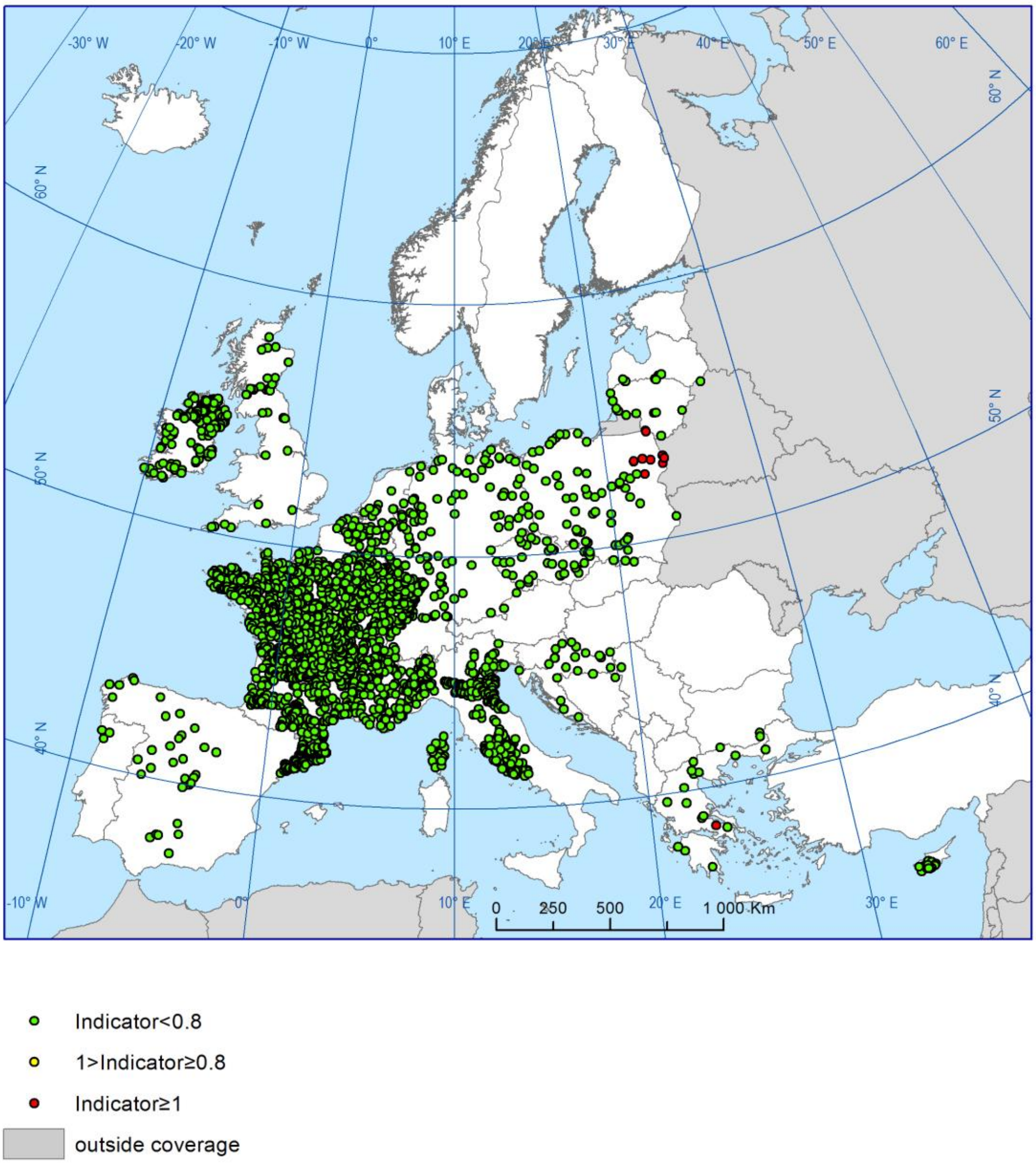


Figure 4.3.2.8a Long-term traffic-light indicator and number of stations for benzo(a)pyrene in rivers

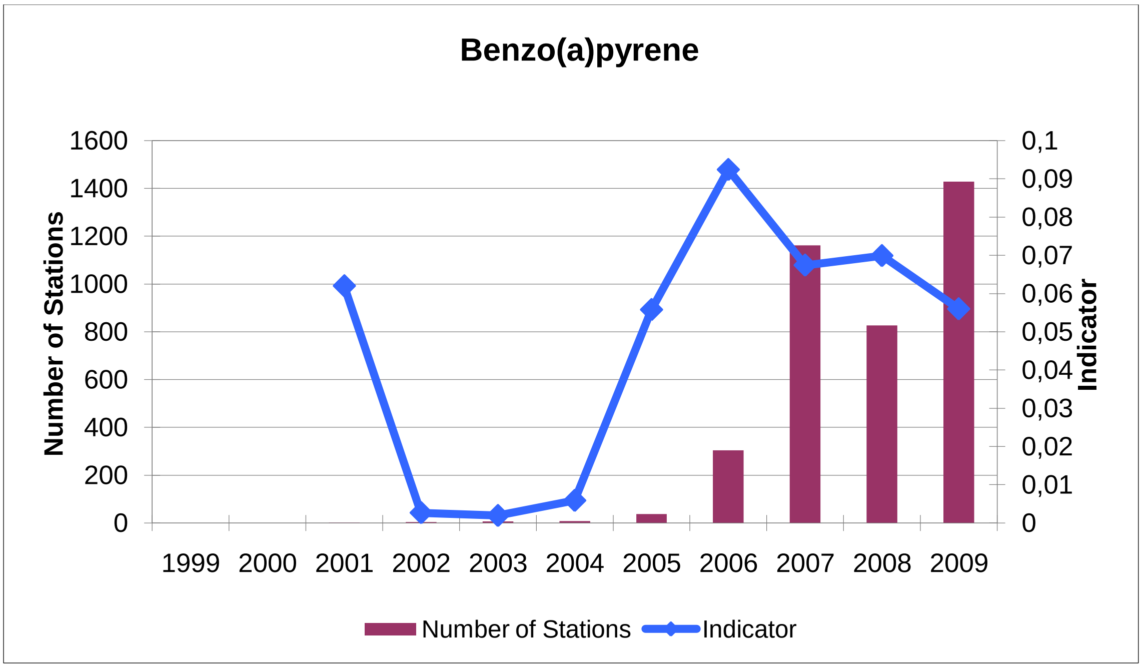


Figure 4.3.2.8b Traffic-light indicator for benzo(a)pyrene in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

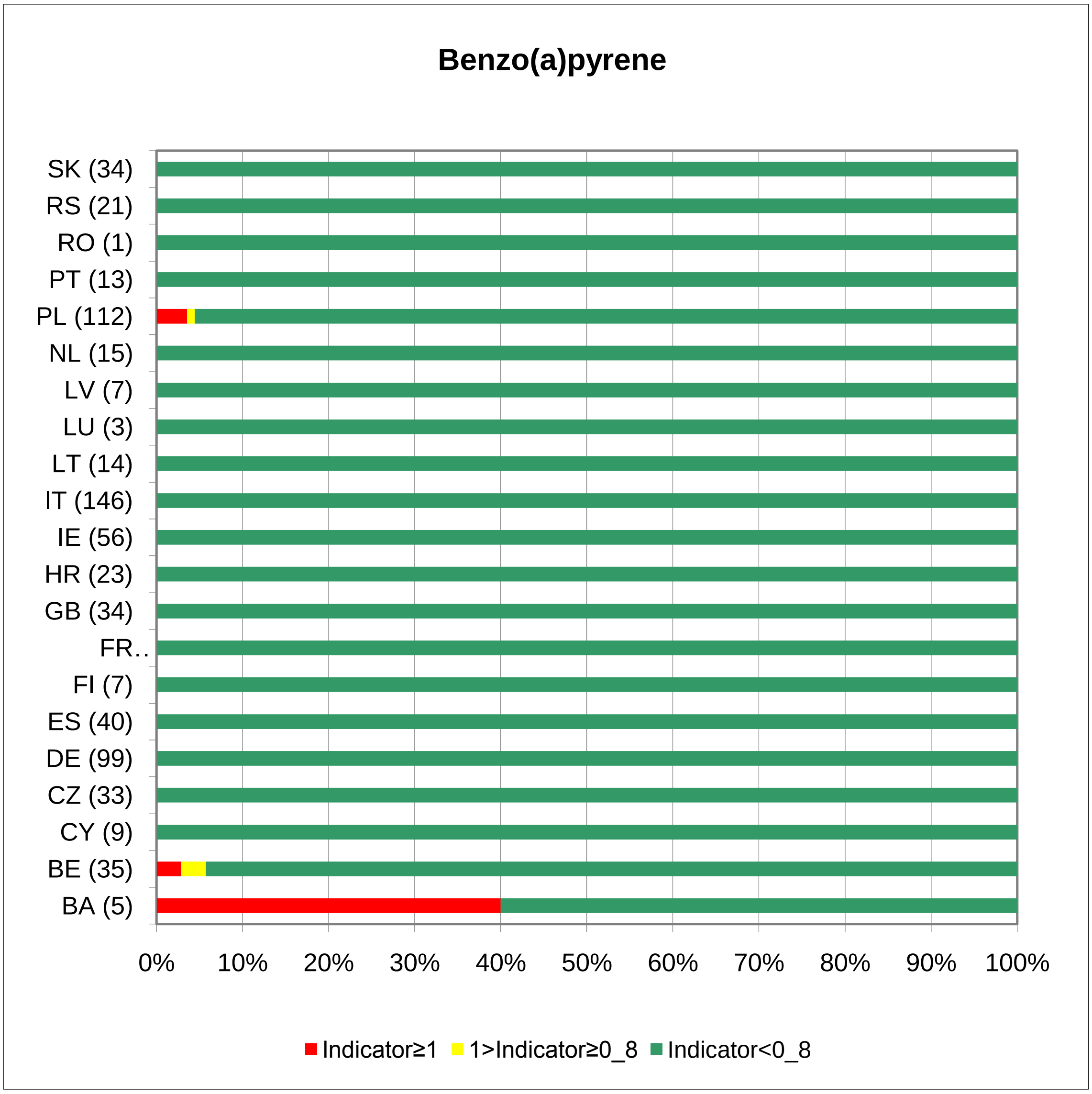


Figure 4.3.2.8c Map of traffic-light indicator for benzo(a)pyrene in rivers in 2008–2009

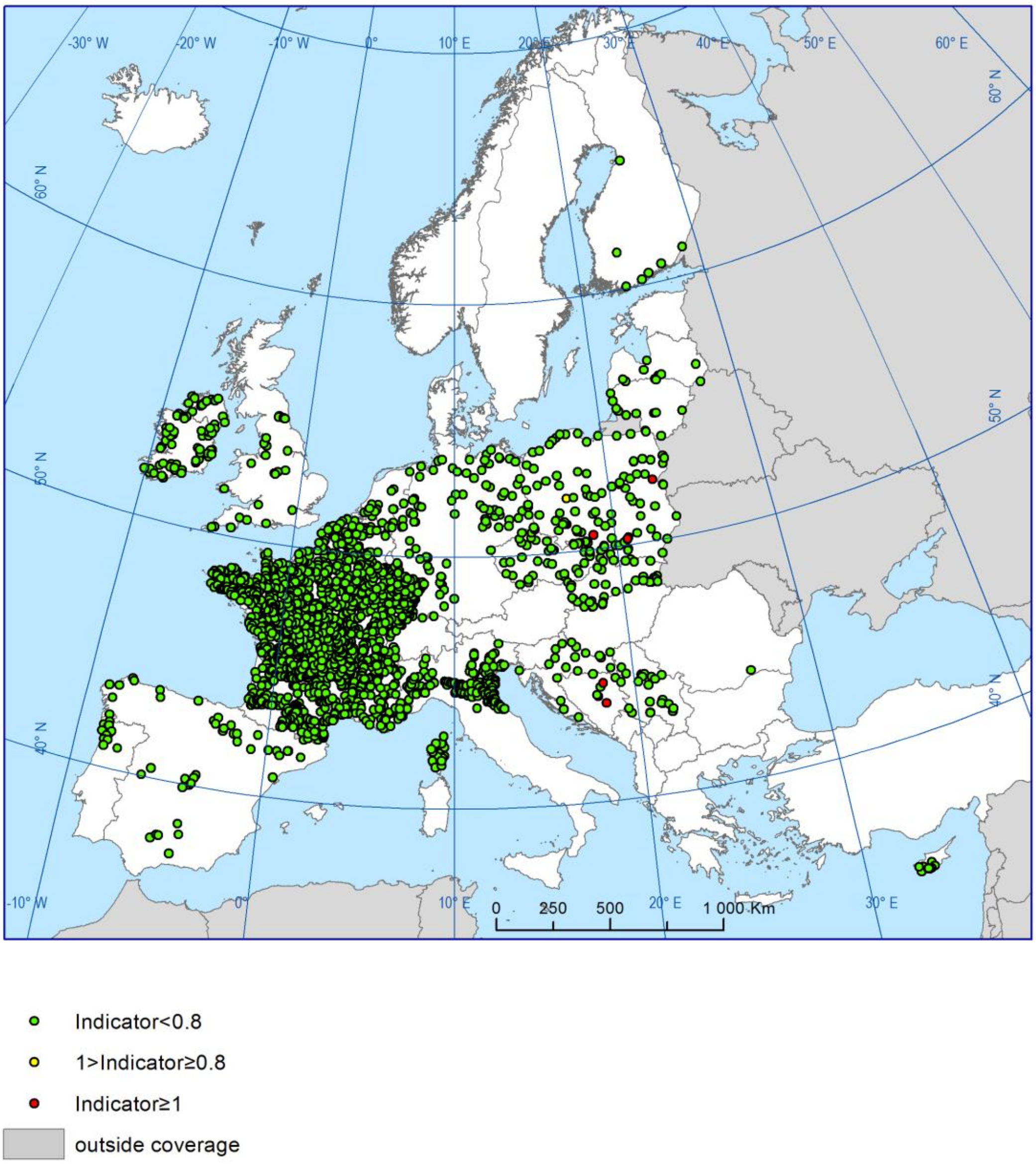


Figure 4.3.2.9a Long-term traffic-light indicator and number of stations for cadmium in rivers

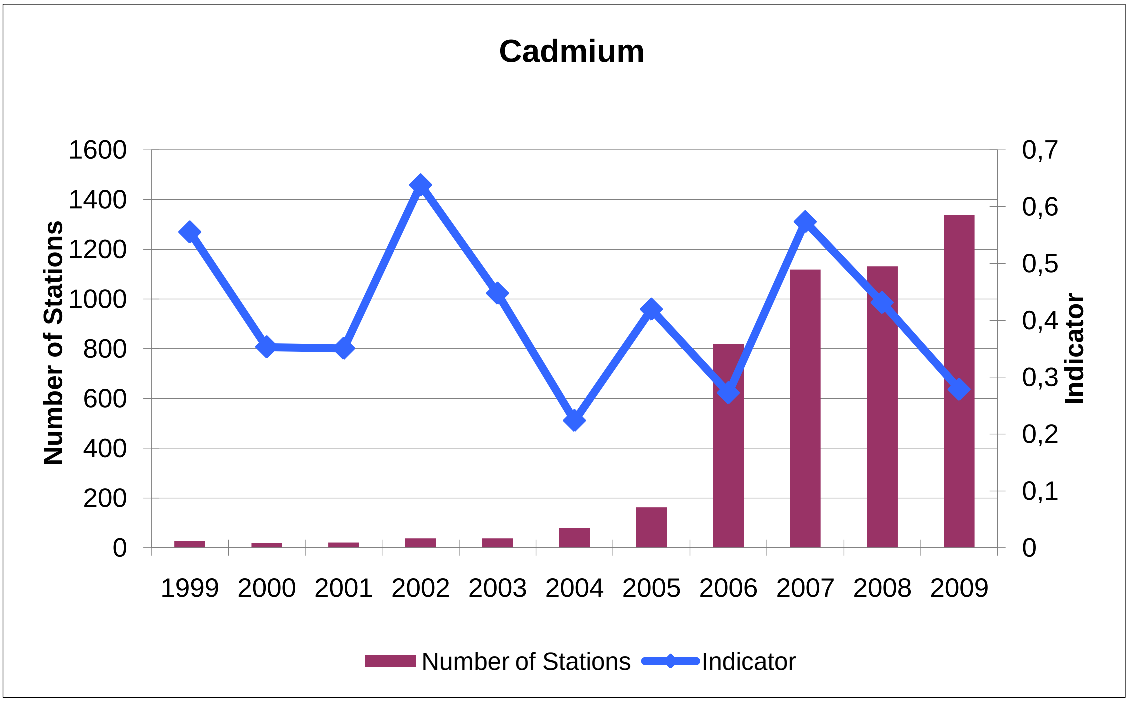


Figure 4.3.2.9b Traffic-light indicator for cadmium in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

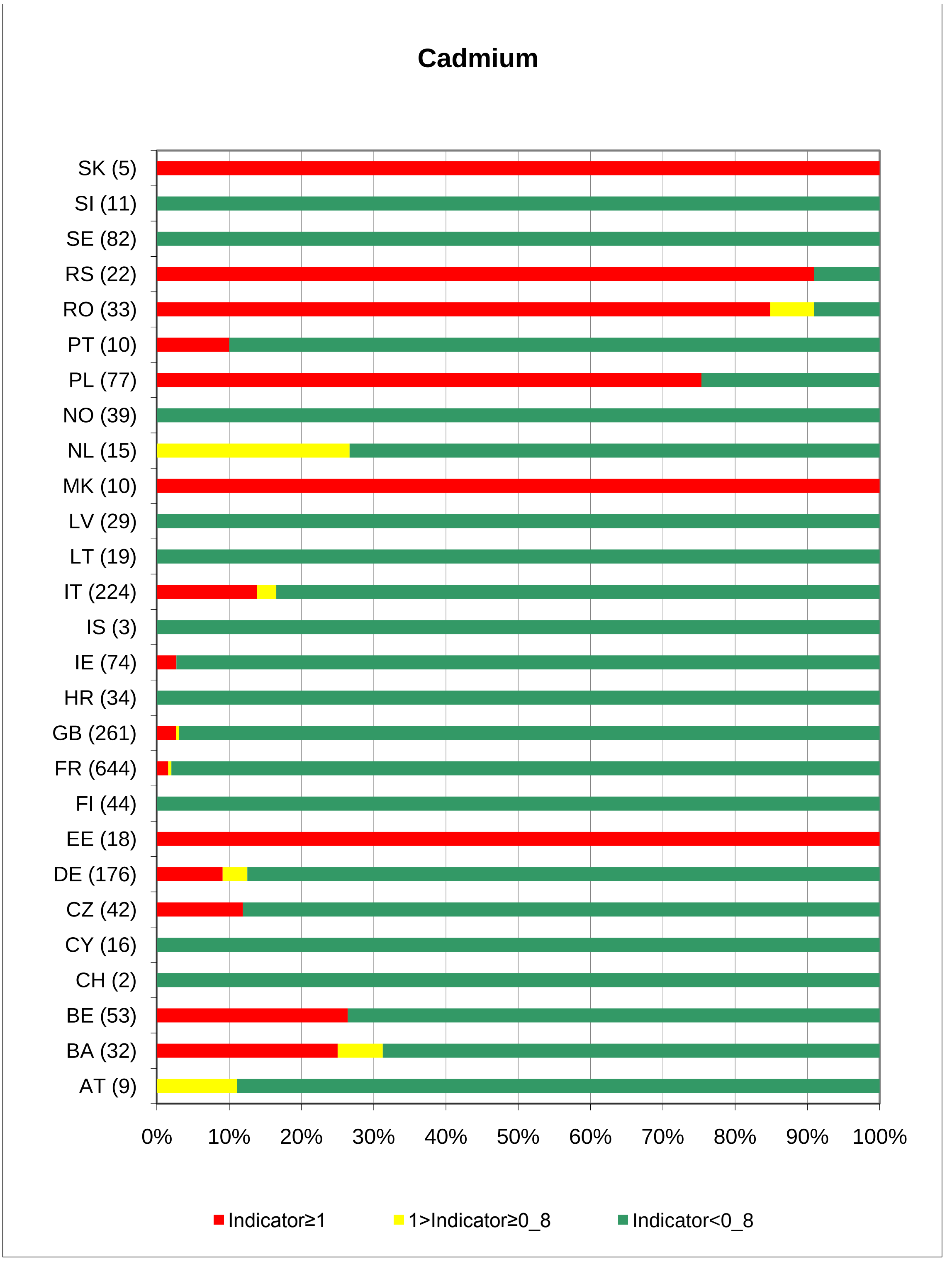
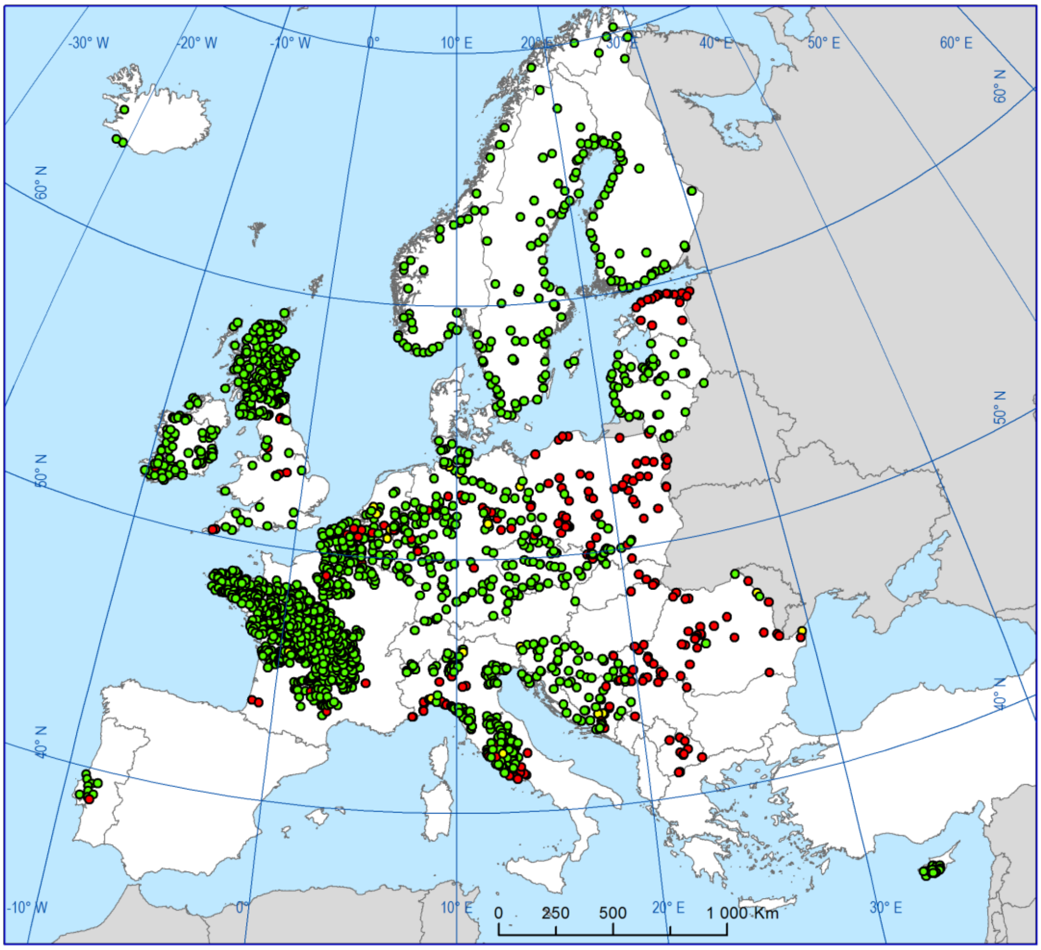


Figure 4.3.2.9c Map of traffic-light indicator for cadmium in rivers in 2008–2009



- Indicator<0.8
- 1>Indicator≥0.8
- Indicator≥1
- outside coverage

Figure 4.3.2.10a Long-term traffic-light indicator and number of stations for dissolved cadmium in rivers

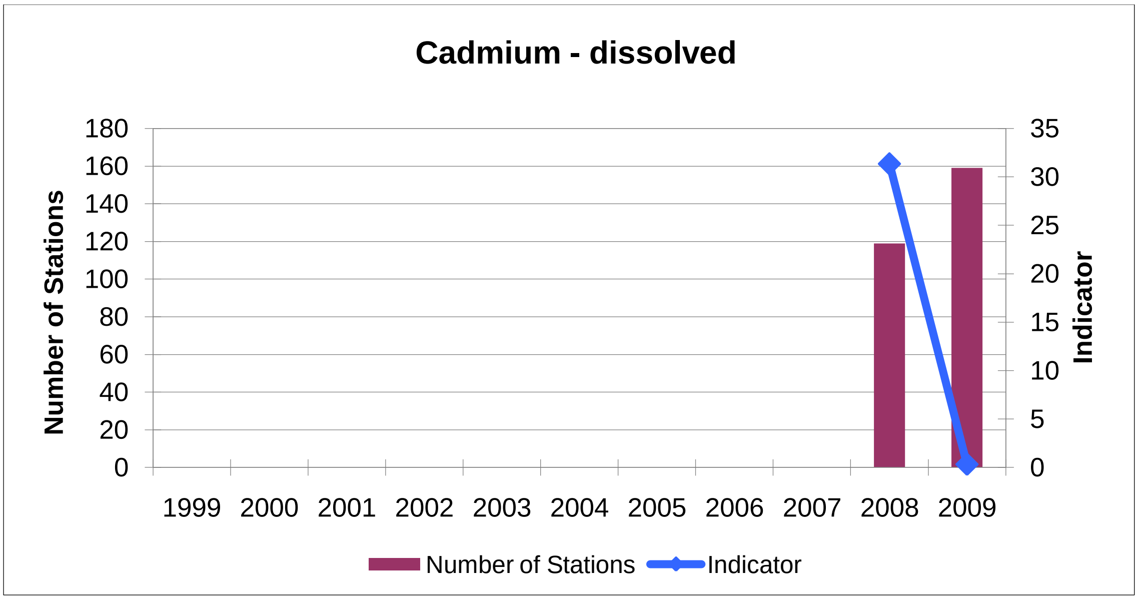


Figure 4.3.2.10b Traffic-light indicator for dissolved cadmium in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

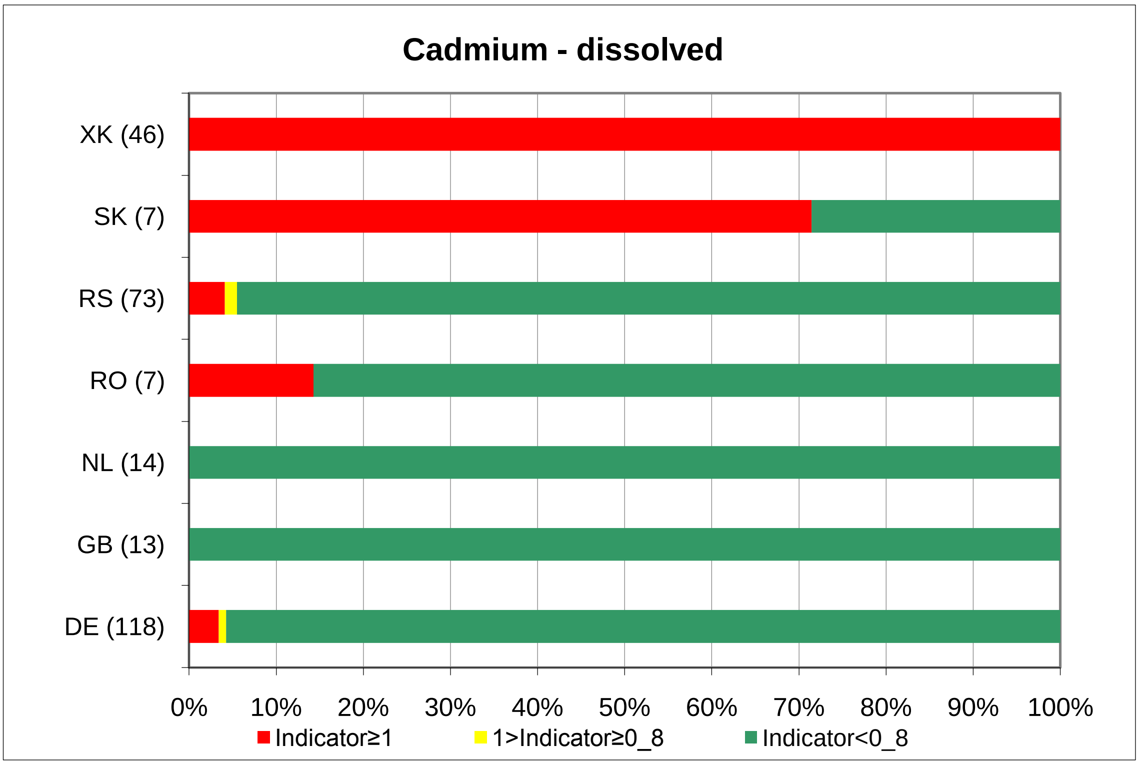


Figure 4.3.2.10c Map of traffic-light indicator for dissolved cadmium in rivers in 2008–2009

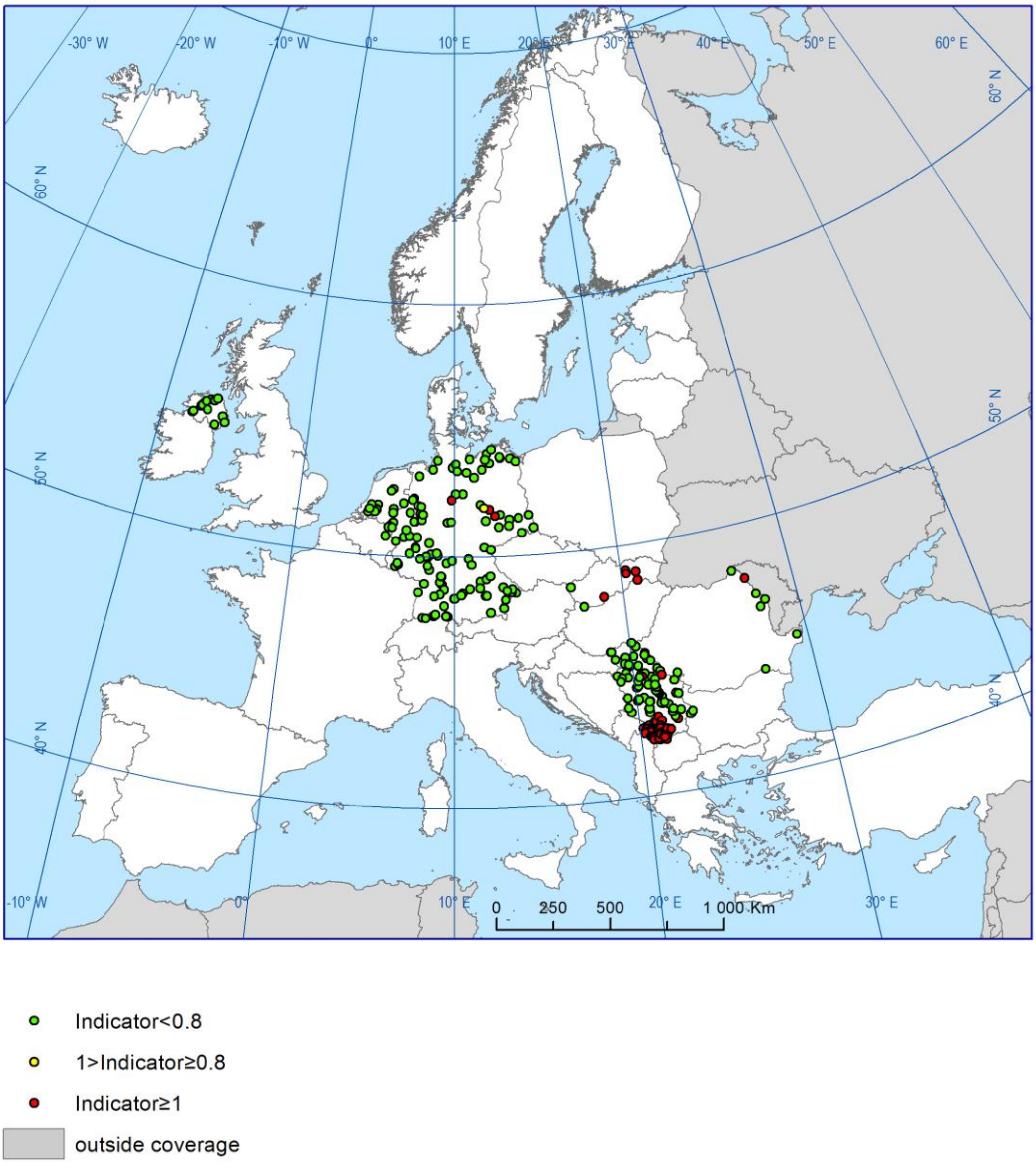


Figure 4.3.2.11a Long-term traffic-light indicator and number of stations for chlorfenvinphos in rivers

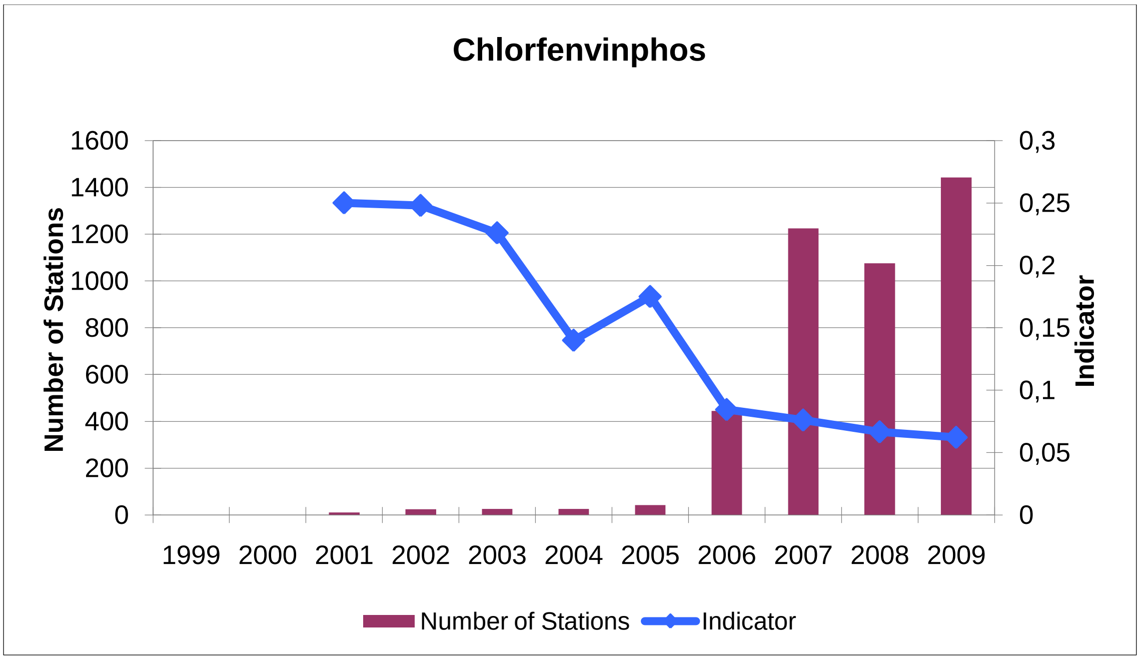


Figure 4.3.2.11b Traffic-light indicator for chlorfenvinphos in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

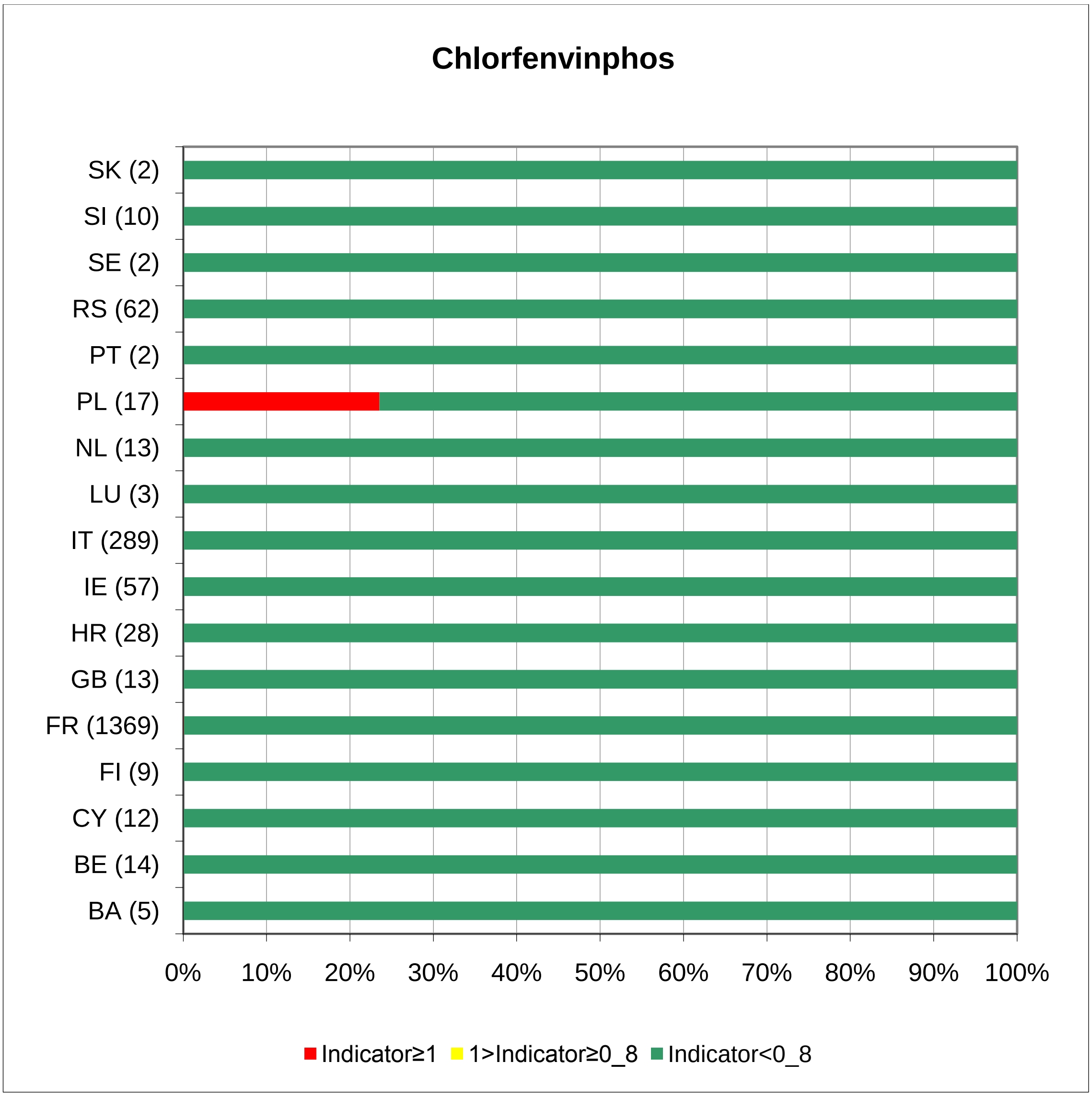


Figure 4.3.2.11c Map of traffic-light indicator for chlorfenvinphos in rivers in 2008–2009

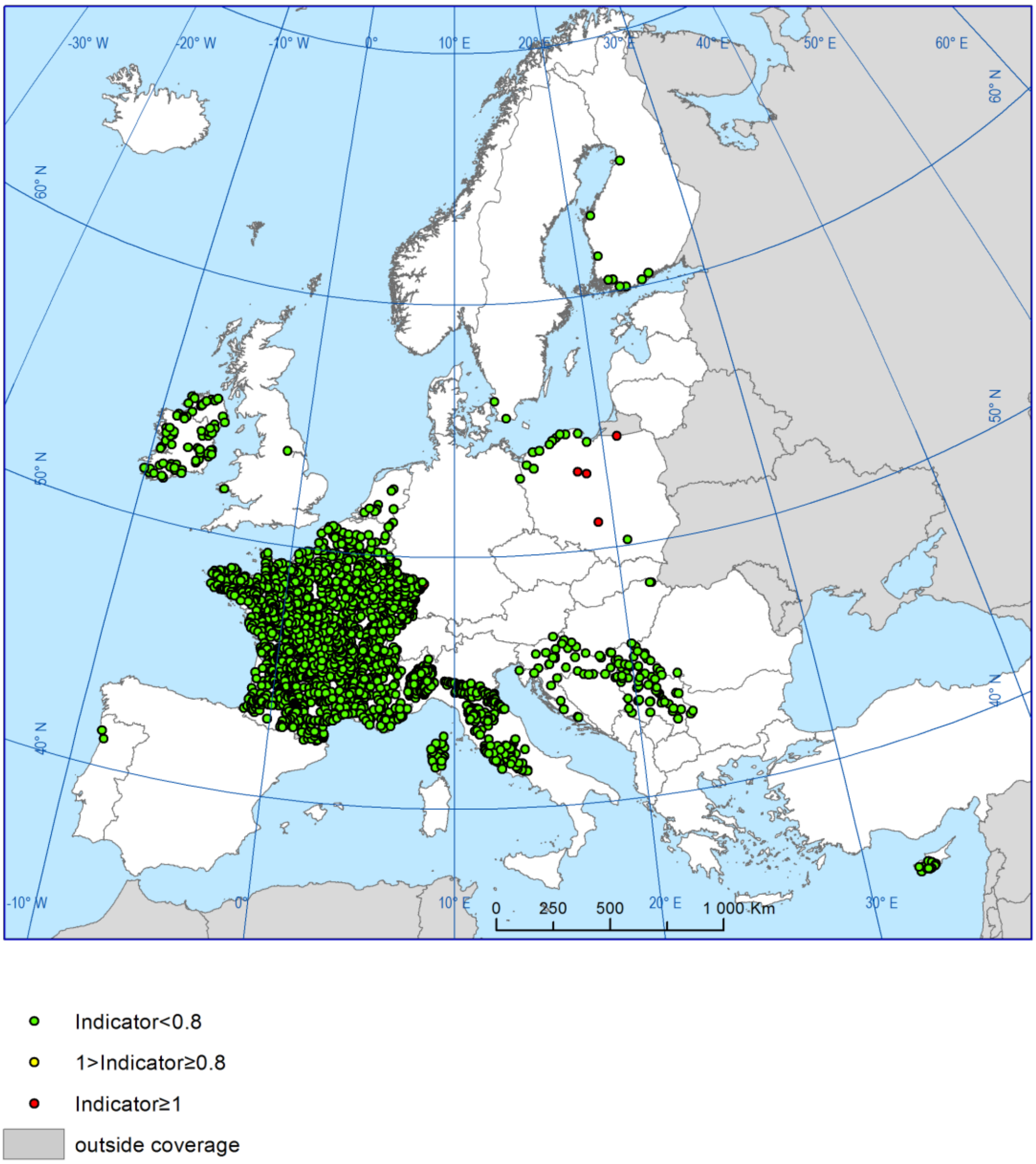


Figure 4.3.2.12a Long-term traffic-light indicator and number of stations for chlorpyrifos in rivers

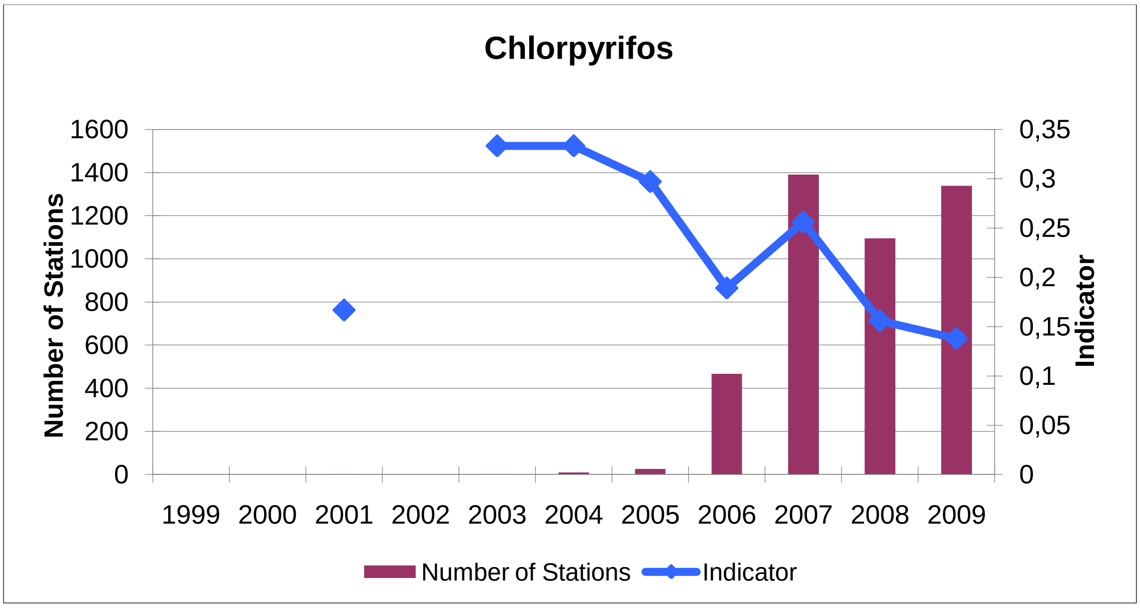


Figure 4.3.2.12b Traffic-light indicator for chlorpyrifos in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

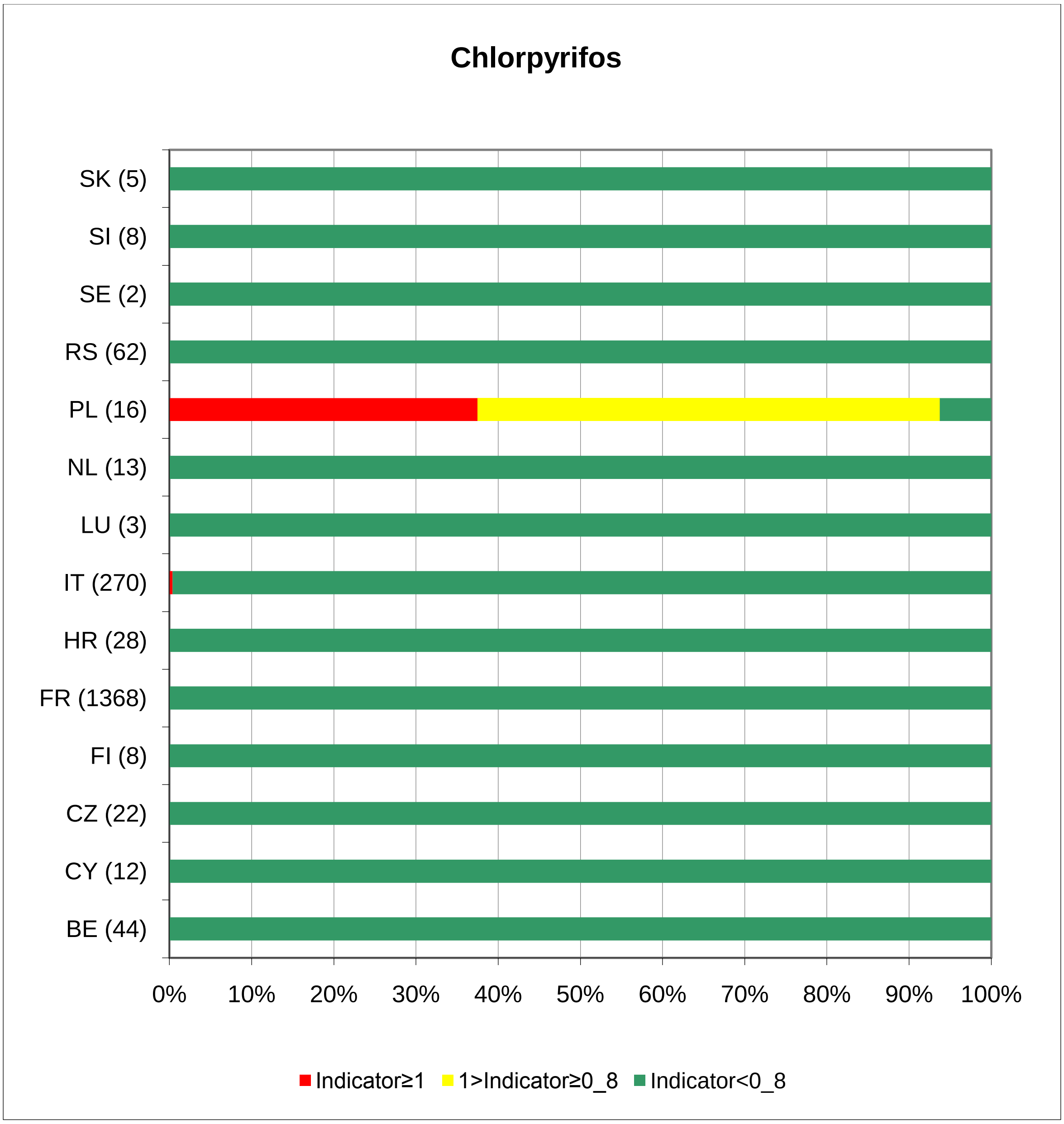


Figure 4.3.2.12c Map of traffic-light indicator for chlorpyrifos in rivers in 2008–2009

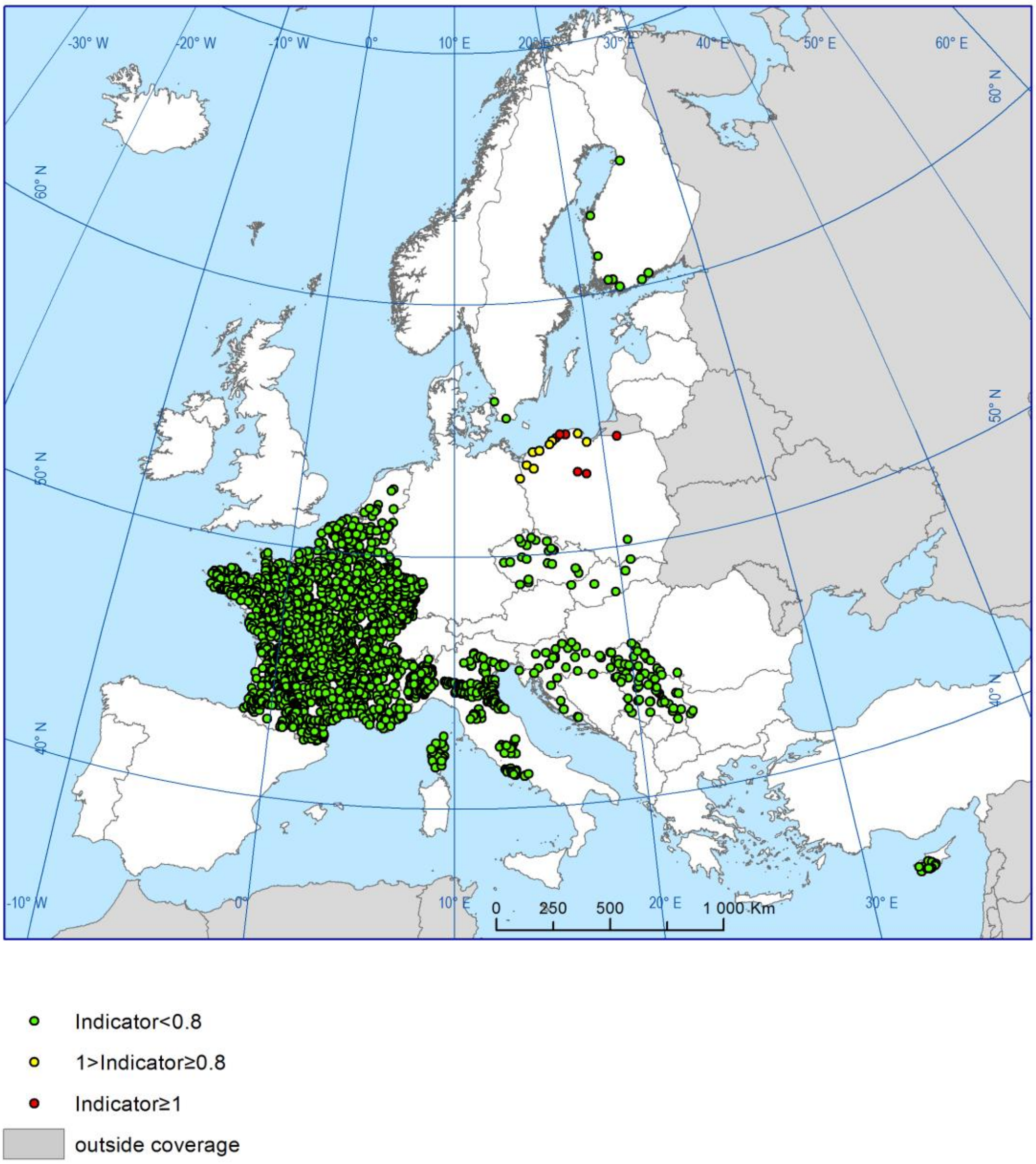


Figure 4.3.2.13a Long-term traffic-light indicator and number of stations for DDT total (p,p'-DDT, o,*p'*-DDT, p,*p'*-DDE, and p,*p'*-DDD) in rivers

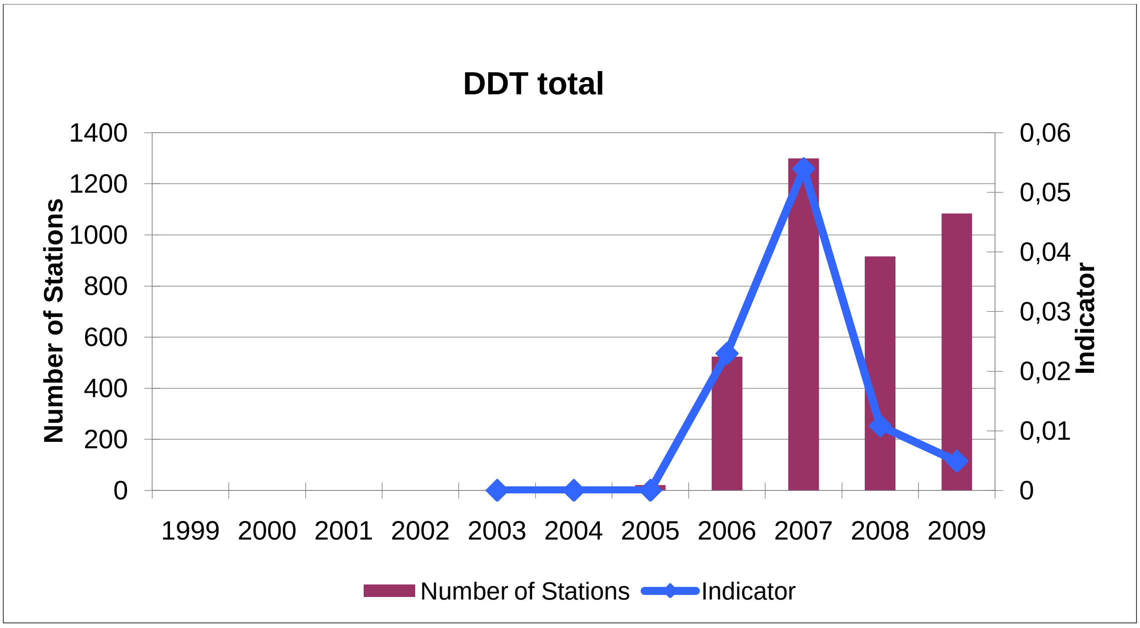


Figure 4.3.2.13b Traffic-light indicator for DDT total (p,p'-DDT, o,*p'*-DDT, p,*p'*-DDE, and p,*p'*-DDD) in rivers from 2008 - 2009 (numbers of stations per country is shown in parenthesis)

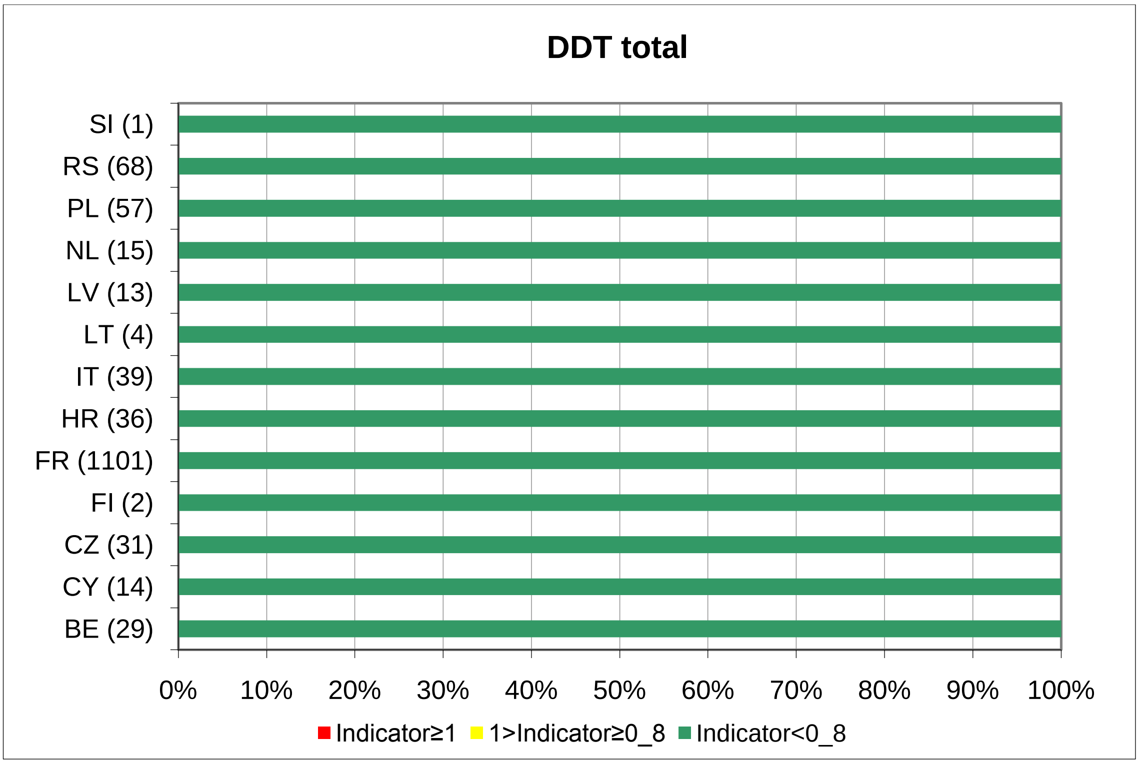
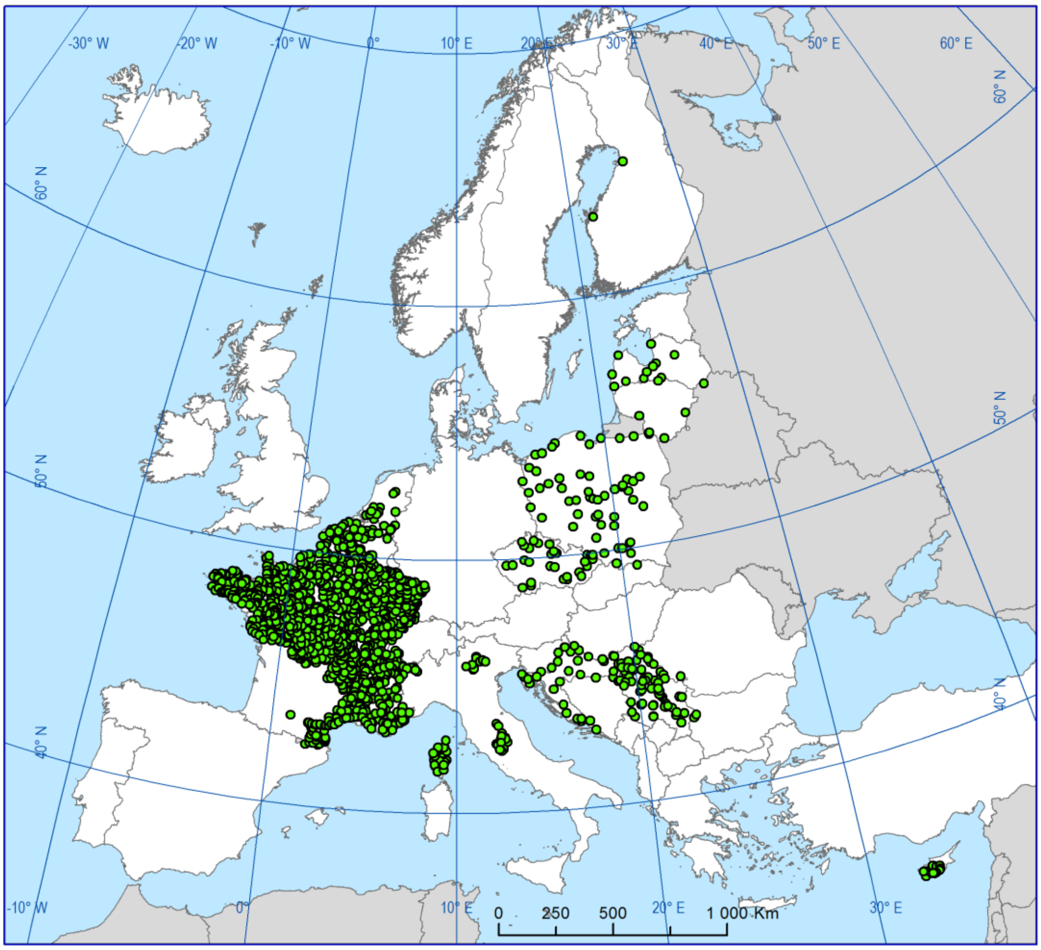


Figure 4.3.2.13c Map of traffic-light indicator for DDT total (p,p'-DDT, o,*p′*-DDT, p,*p′*-DDE, and p,*p′*-DDD) in rivers in 2008–2009



Indicator<0.8

1>Indicator≥0.8

Indicator≥1

outside coverage

Figure 4.3.2.14a Long-term traffic-light indicator and number of stations for DDT p,p' in rivers

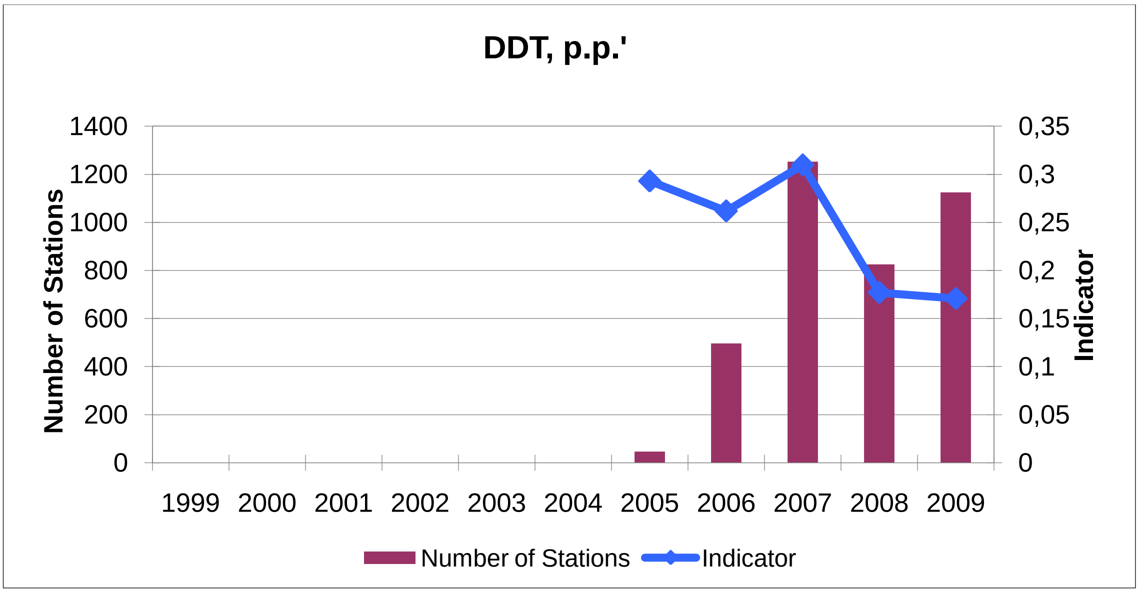


Figure 4.3.2.14b Traffic-light indicator for DDT p,p' in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

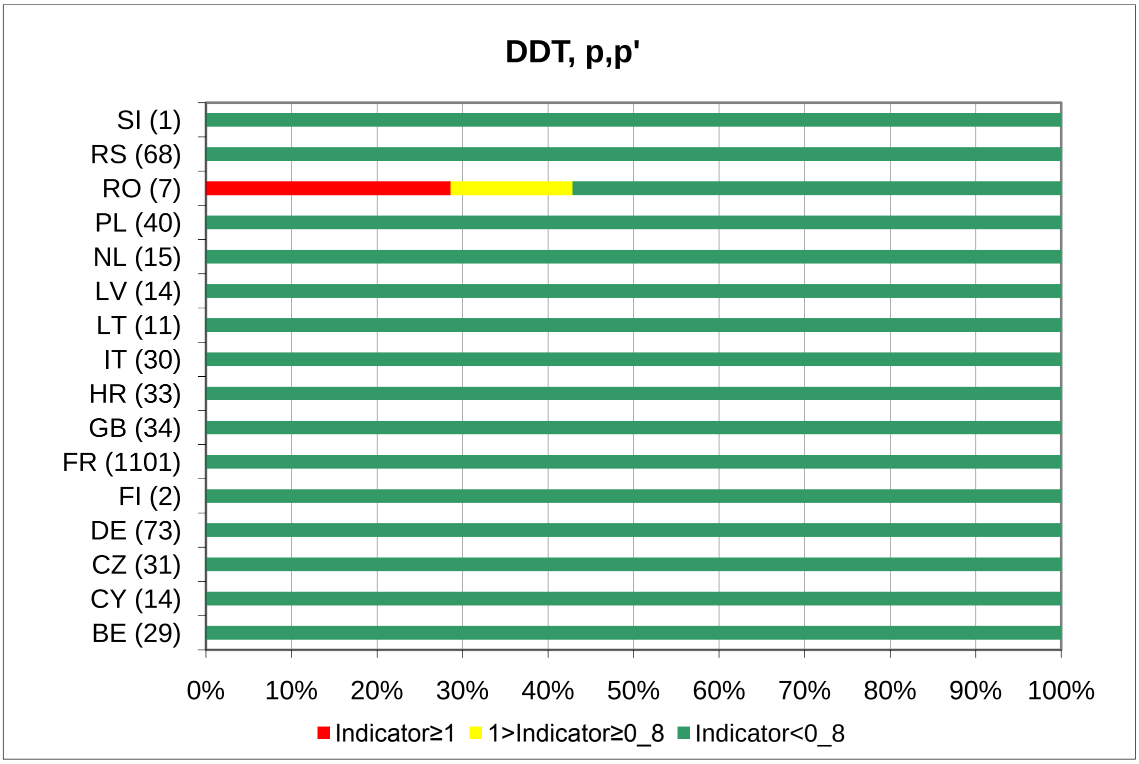


Figure 4.3.2.14c Map of traffic-light indicator for DDT p,p' in rivers in 2008–2009

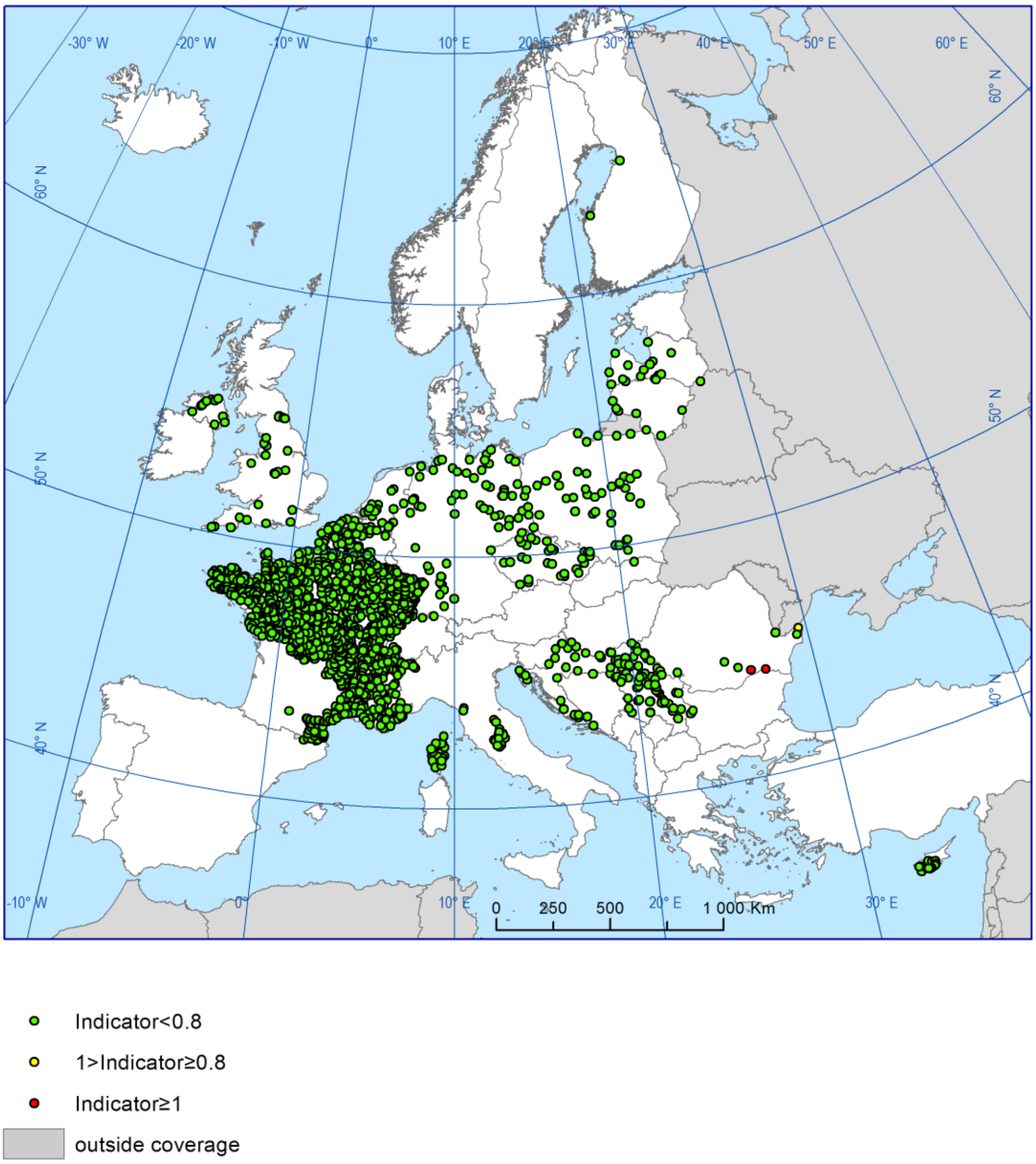


Figure 4.3.2.15a Long-term traffic-light indicator and number of stations for dichloromethane in rivers

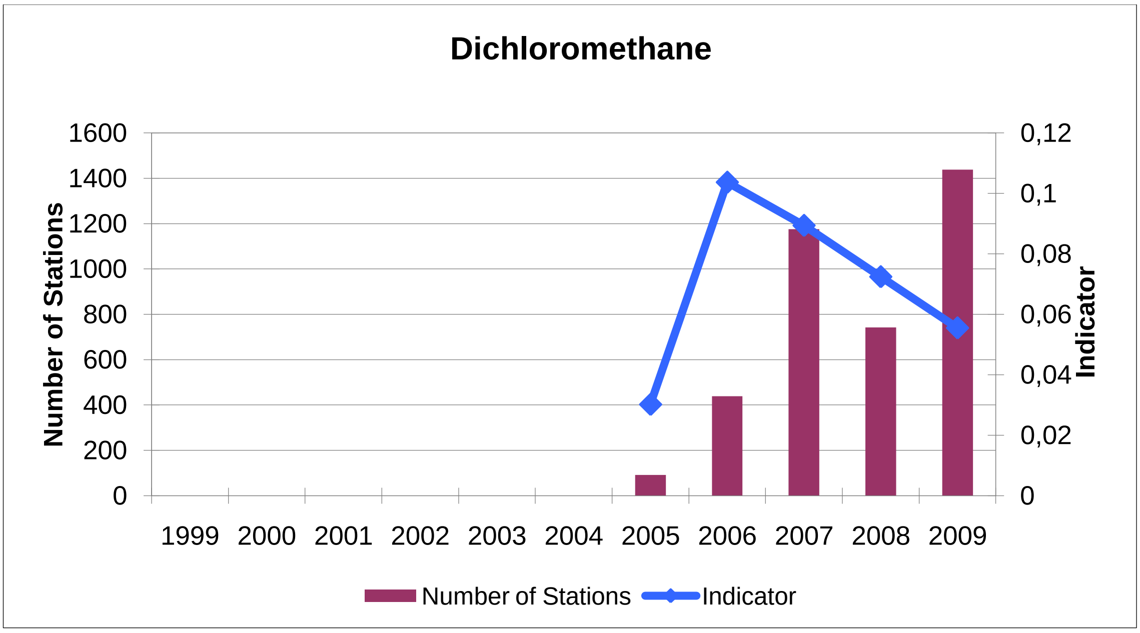


Figure 4.3.2.15b Traffic-light indicator for dichloromethane in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

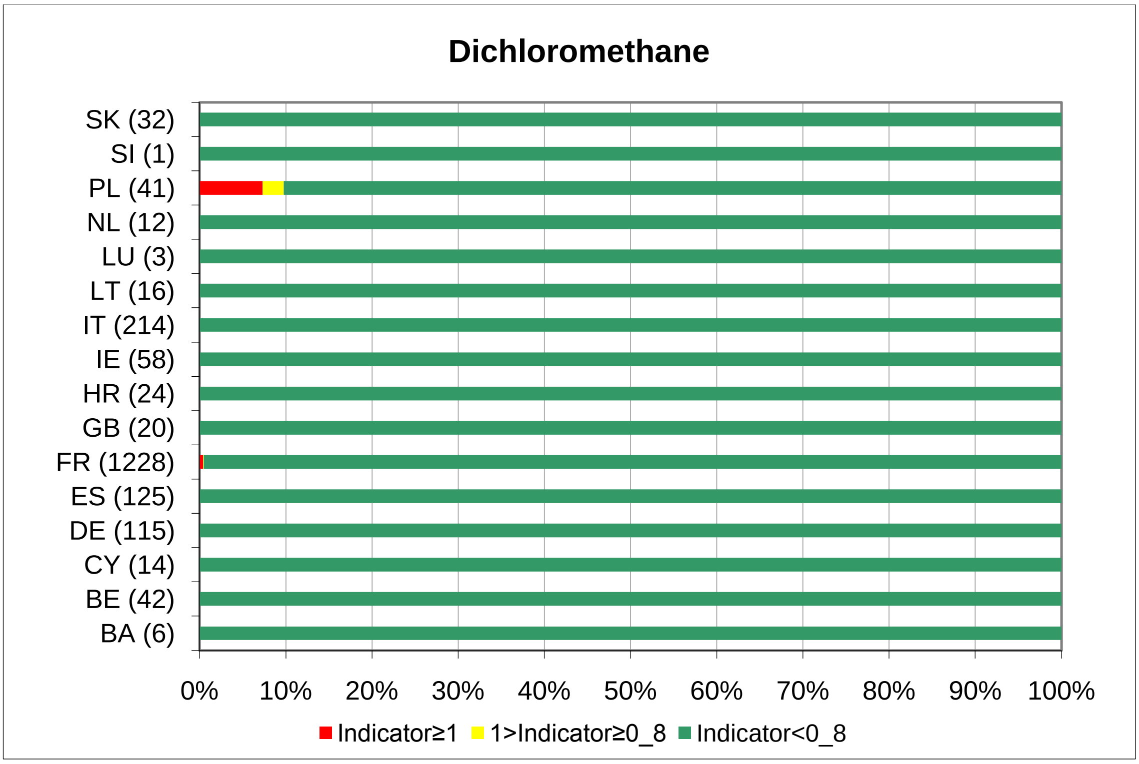


Figure 4.3.2.15c Map of traffic-light indicator for dichloromethane in rivers in 2008–2009

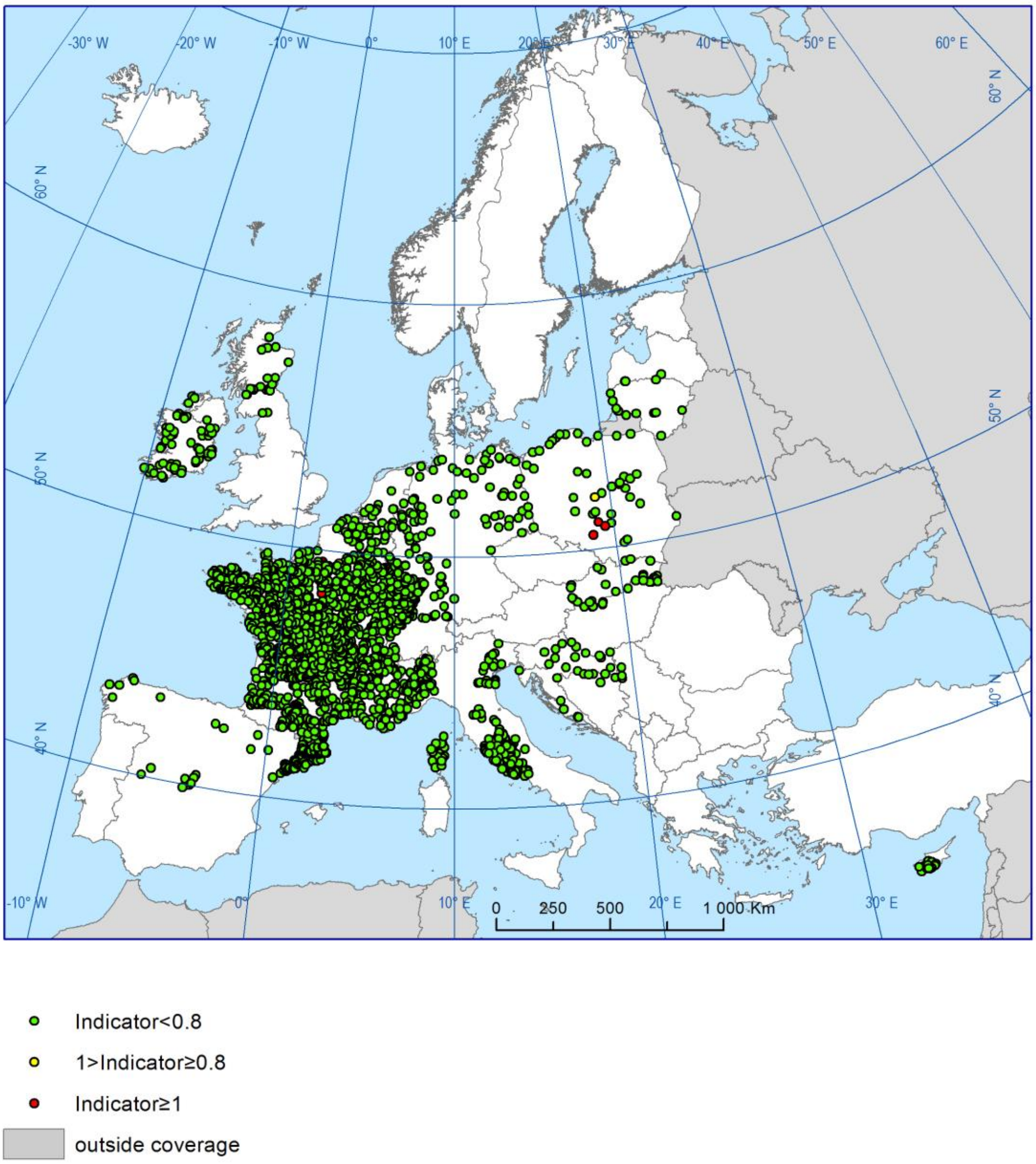


Figure 4.3.2.16a Long-term traffic-light indicator and number of stations for di(2-ethylhexyl) phthalate (DEHP) in rivers

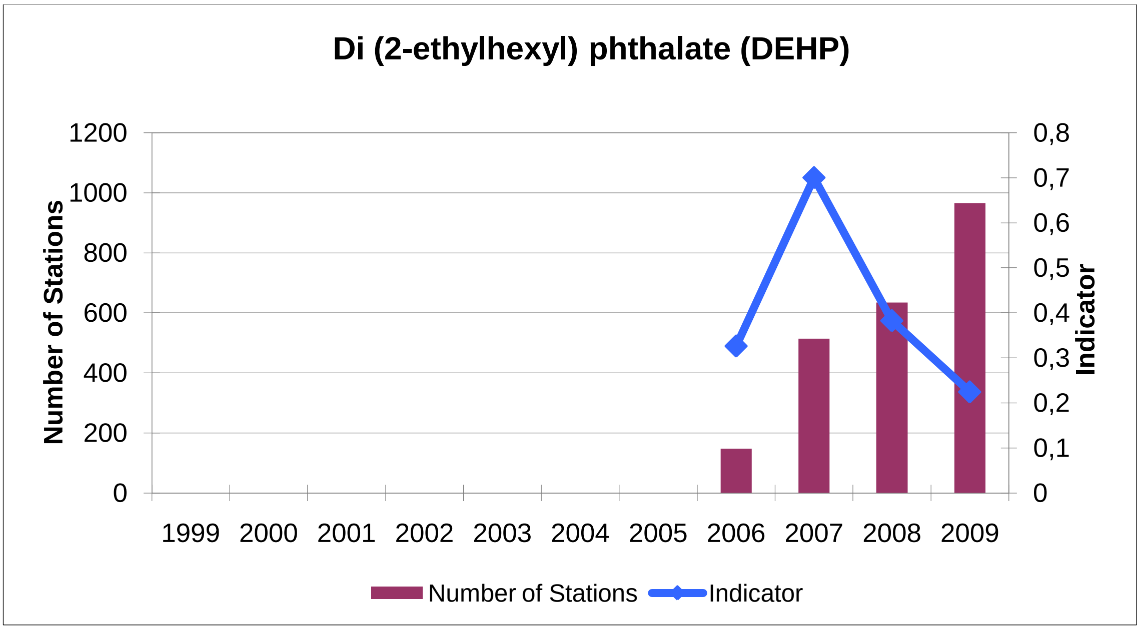


Figure 4.3.2.16b Traffic-light indicator for di(2-ethylhexyl) phthalate (DEHP) in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

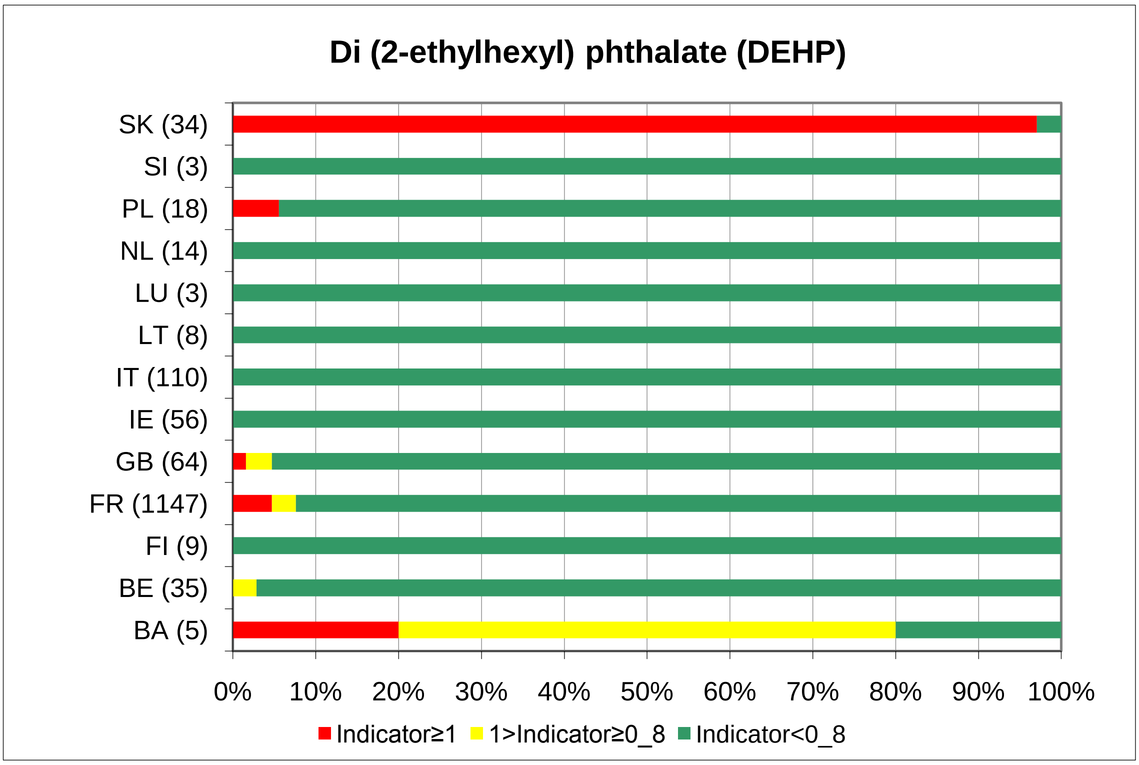


Figure 4.3.2.16c Map of traffic-light indicator for di(2-ethylhexyl) phthalate (DEHP) in rivers in 2008–2009

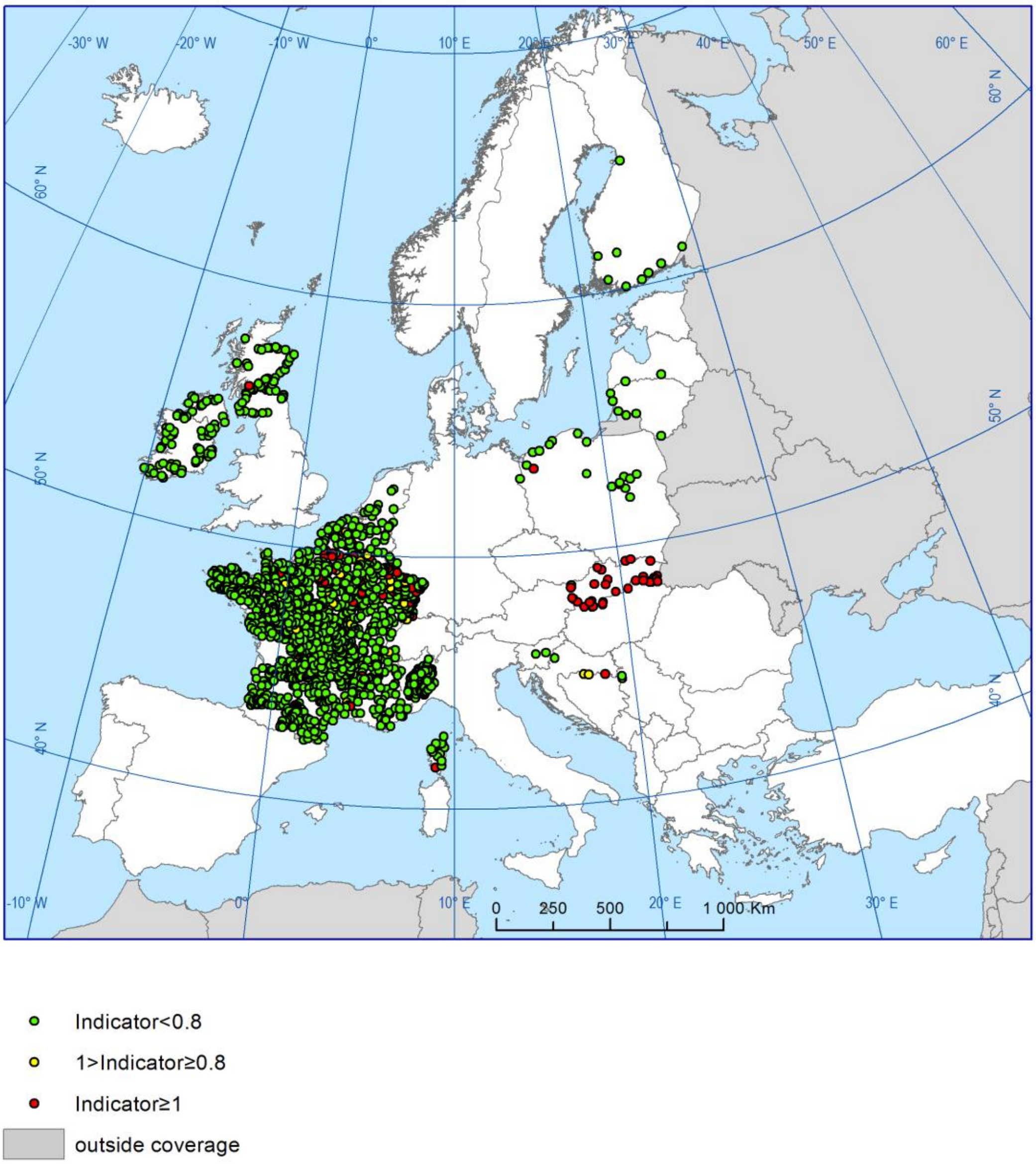


Figure 4.3.2.17a Long-term traffic-light indicator and number of stations for diuron in rivers

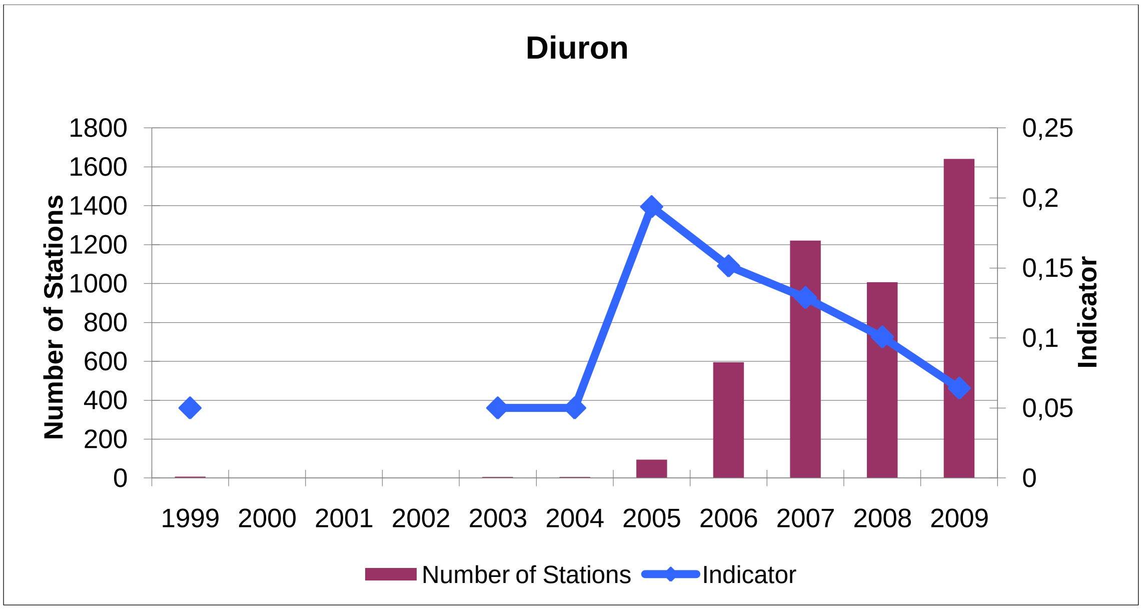


Figure 4.3.2.17b Traffic-light indicator for diuron in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

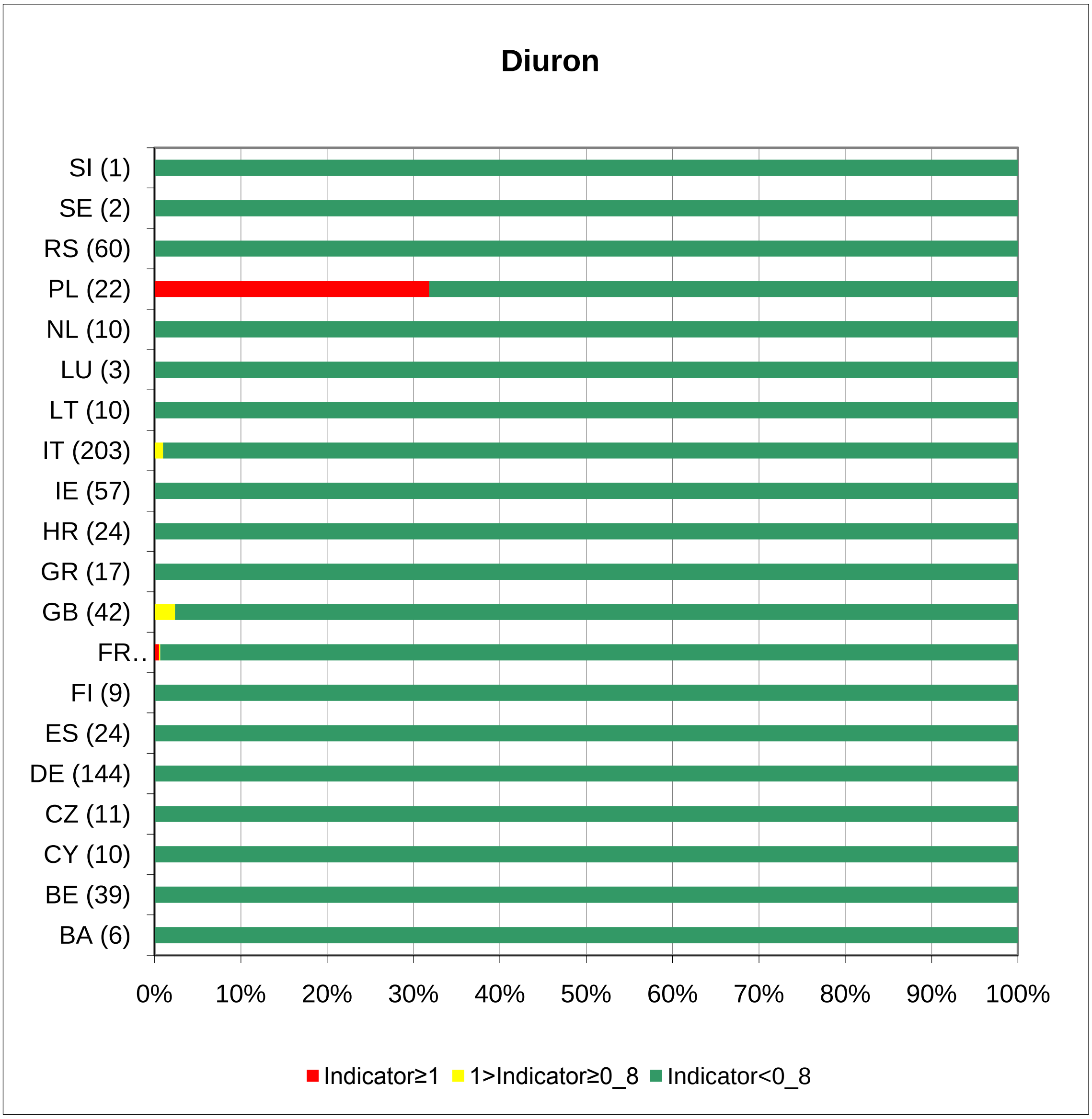


Figure 4.3.2.17c Map of traffic-light indicator for diuron in rivers in 2008–2009

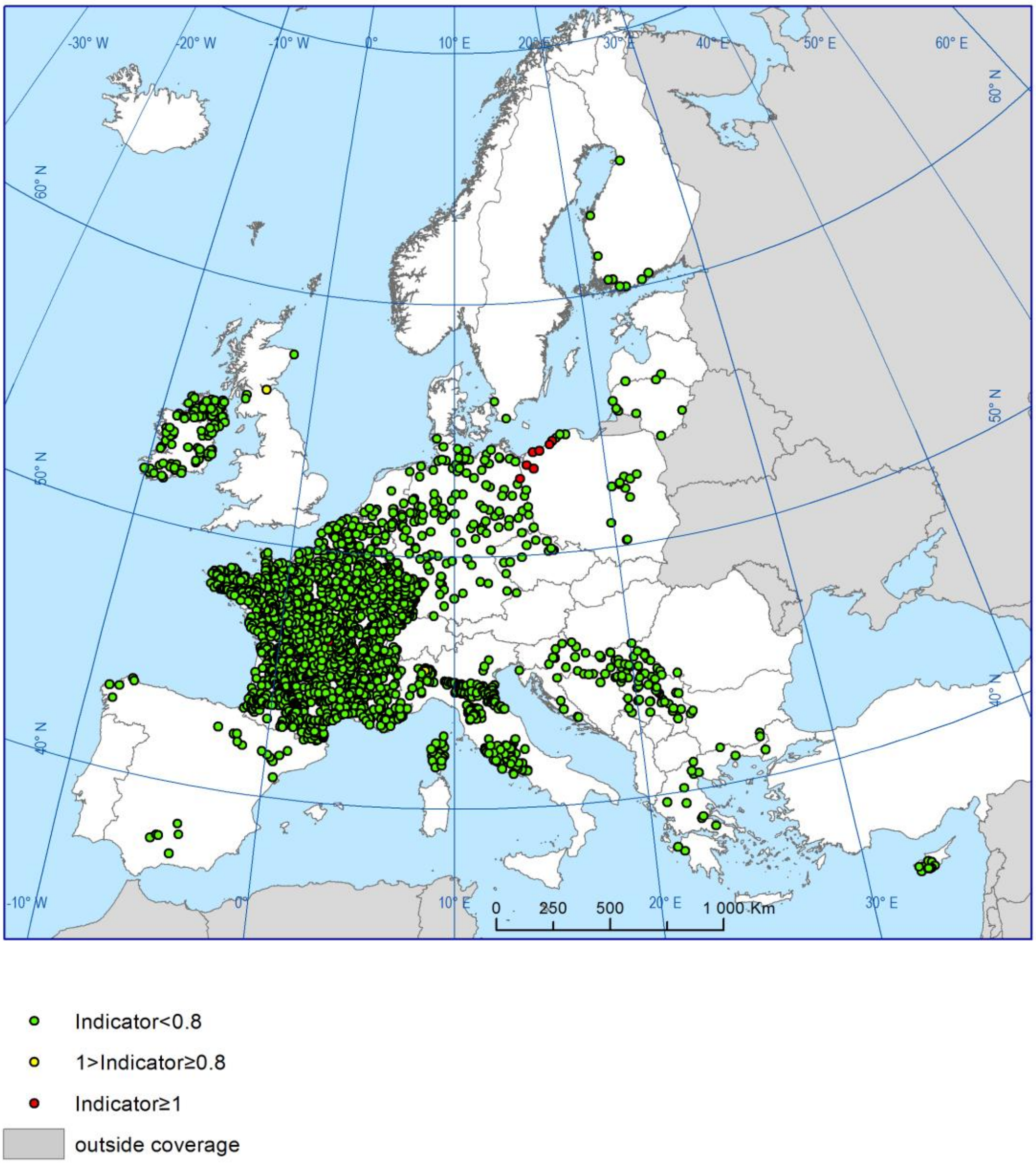


Figure 4.3.2.18a Long-term traffic-light indicator and number of stations for endosulfan in rivers

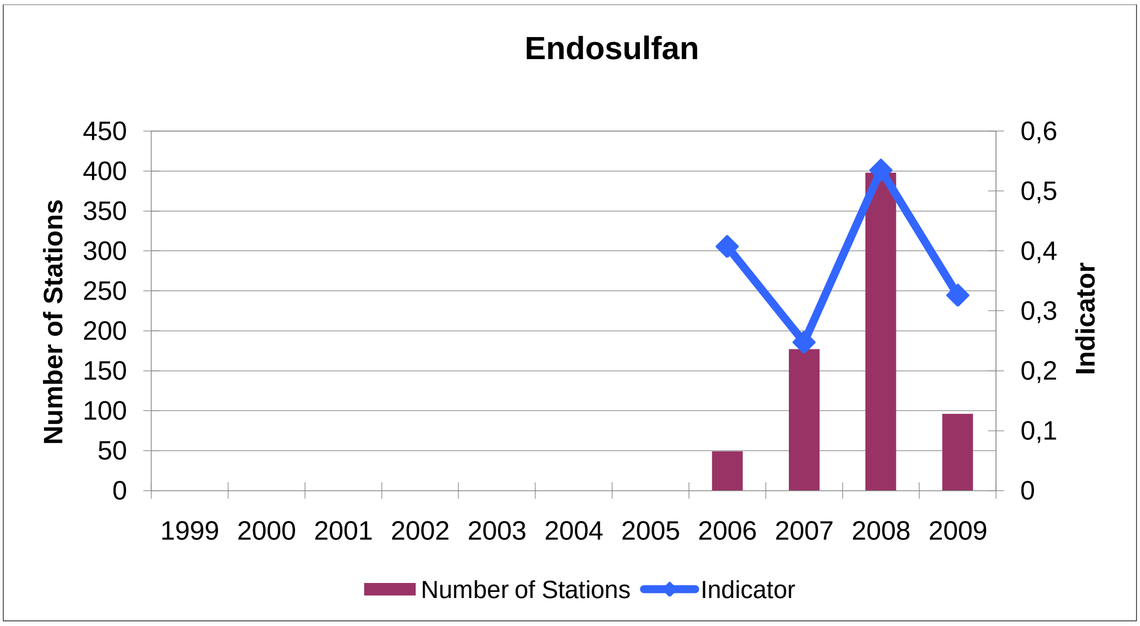


Figure 4.3.2.18b Traffic-light indicator for endosulfan in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

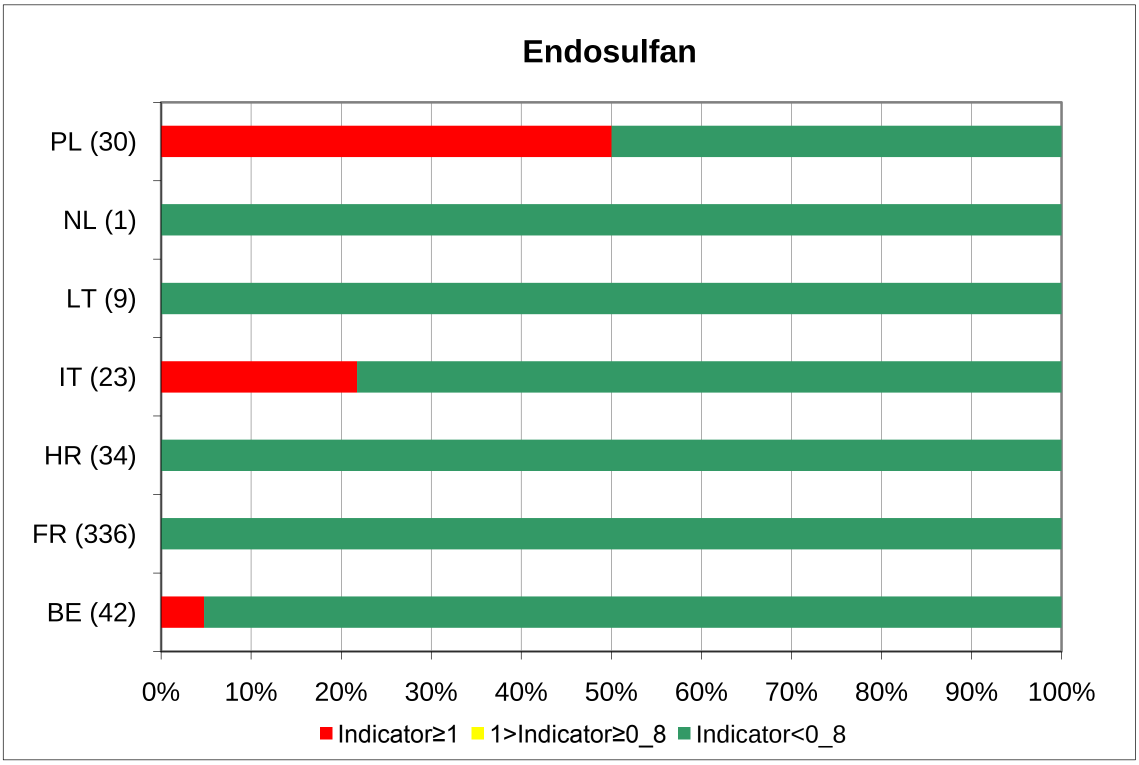


Figure 4.3.2.18c Map of traffic-light indicator for endosulfan in rivers in 2008–2009

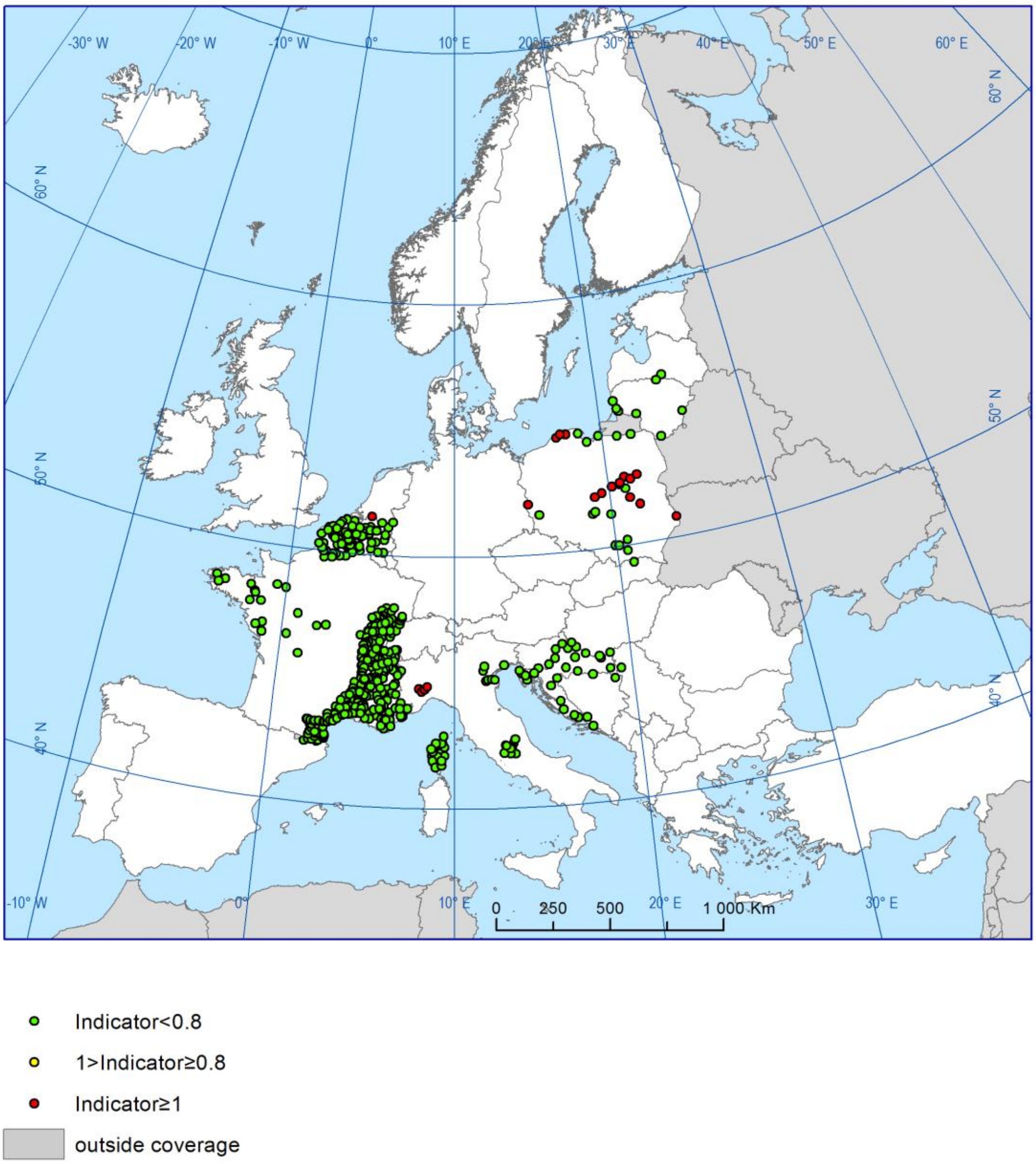


Figure 4.3.2.19a Long-term traffic-light indicator and number of stations fluoranthene in rivers

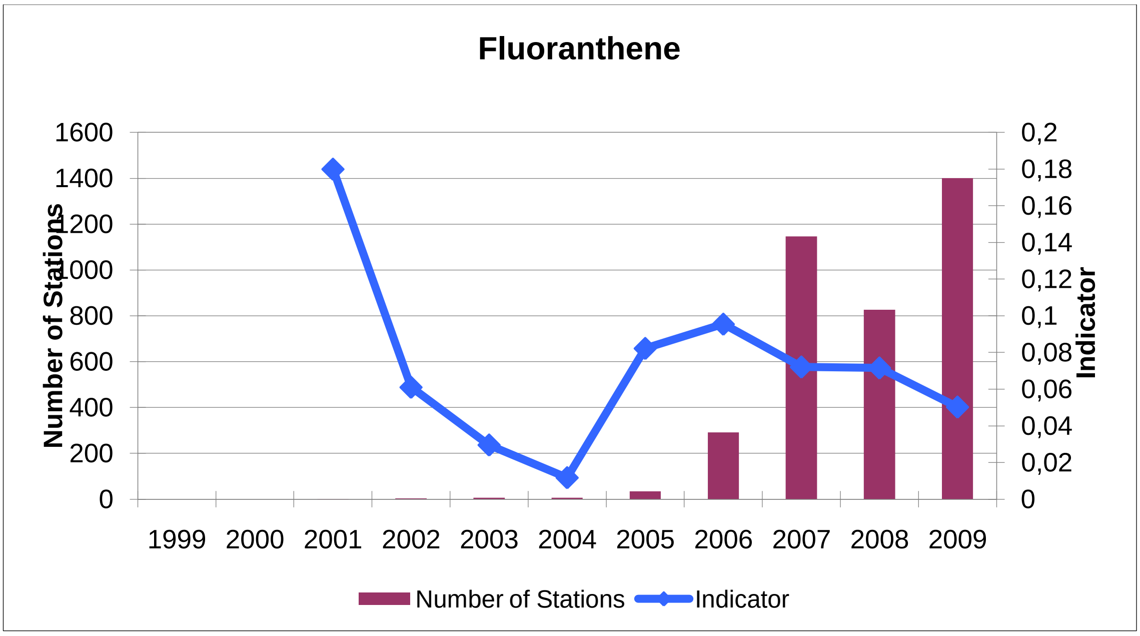


Figure 4.3.2.19b Traffic-light indicator for fluoranthene in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

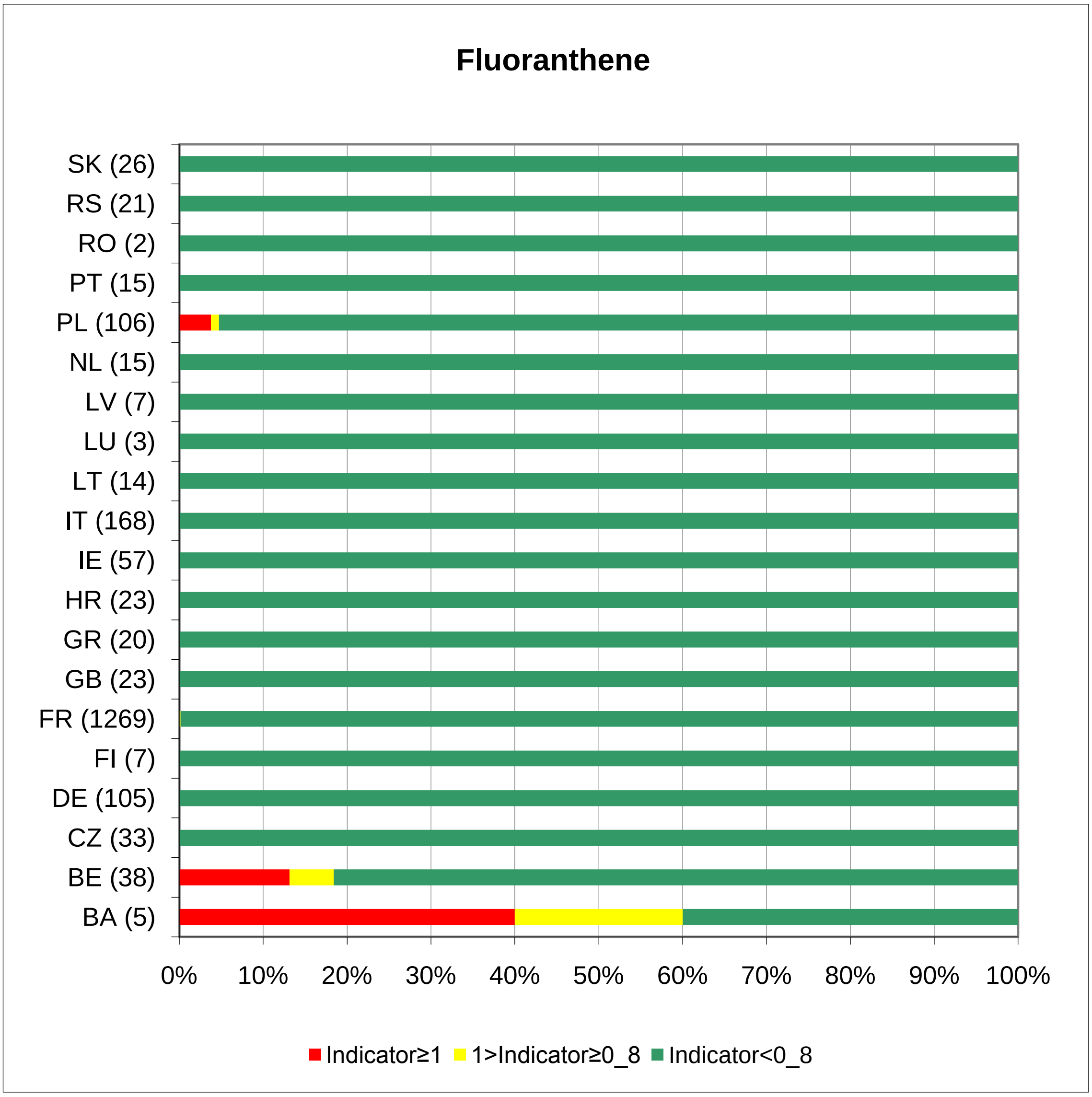


Figure 4.3.2.19c Map of traffic-light indicator for fluoranthene in rivers in 2008–2009

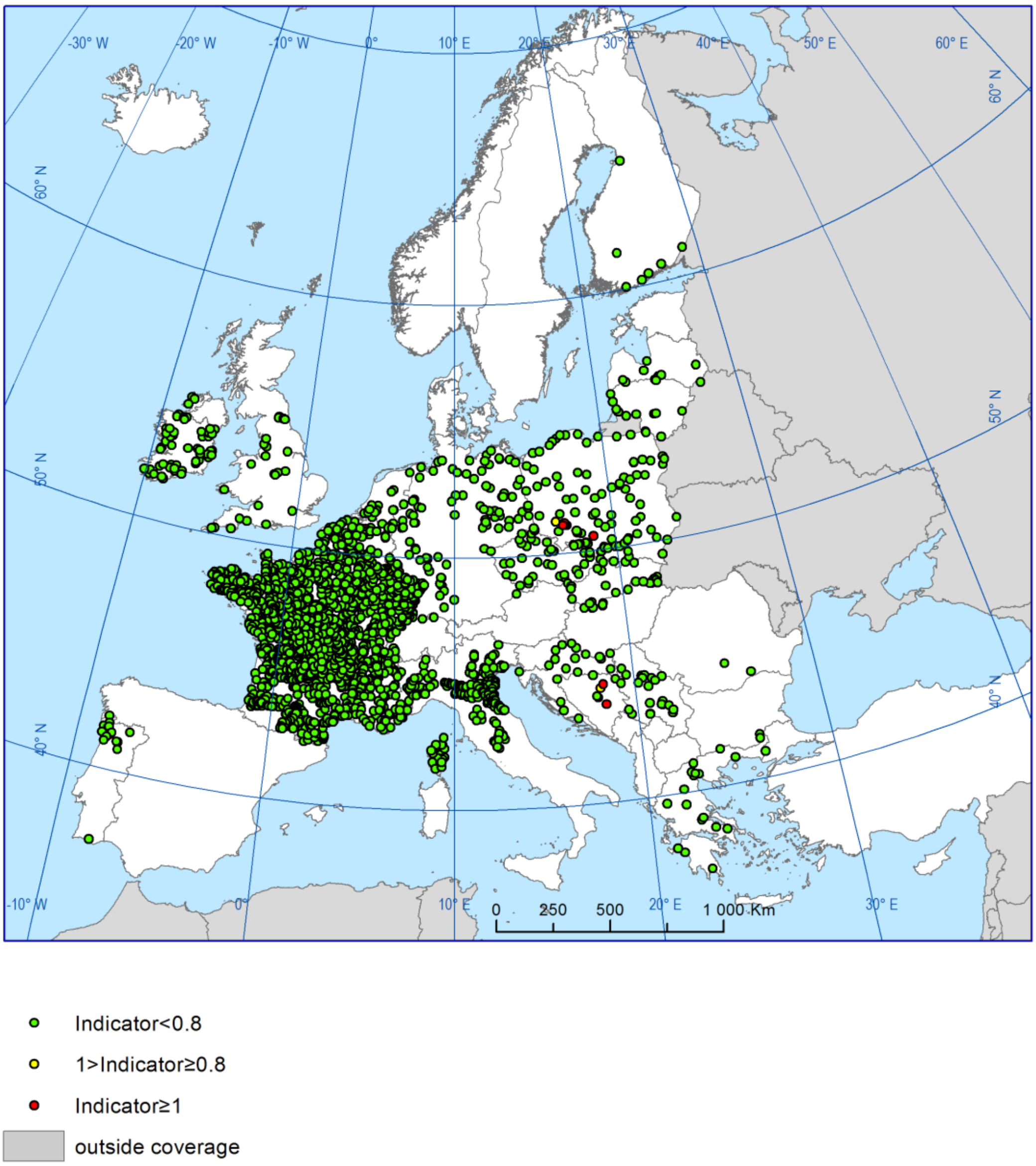


Figure 4.3.2.20a Long-term traffic-light indicator and number of stations for hexachlorobenzene (HCB) in rivers

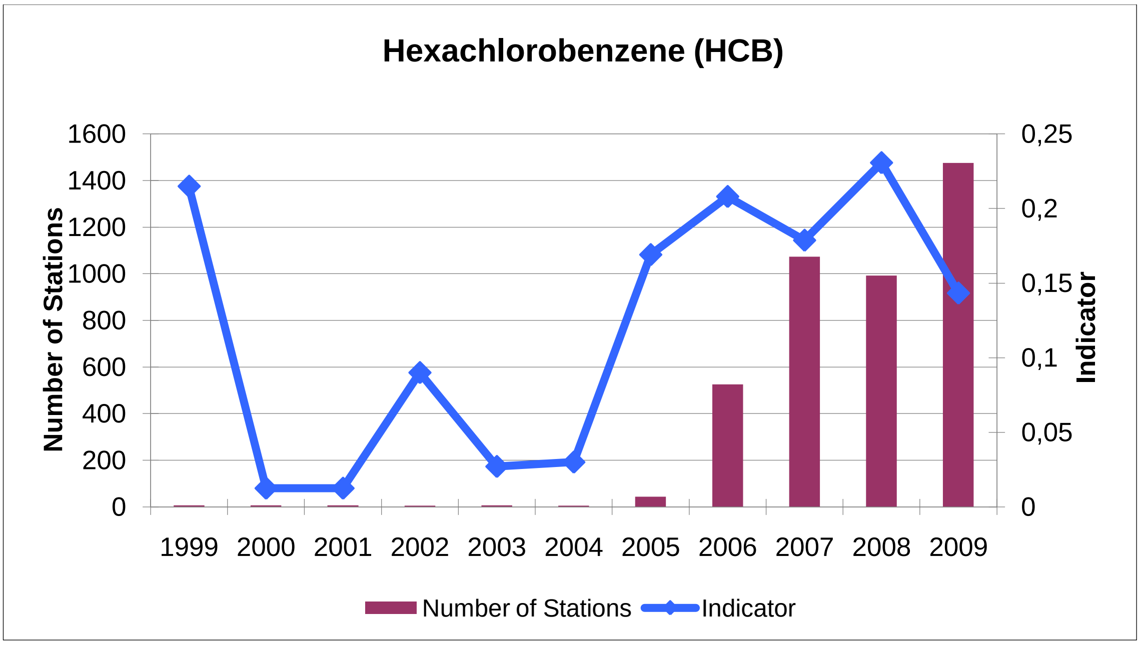


Figure 4.3.2.20b Traffic-light indicator for hexachlorobenzene (HCB) in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

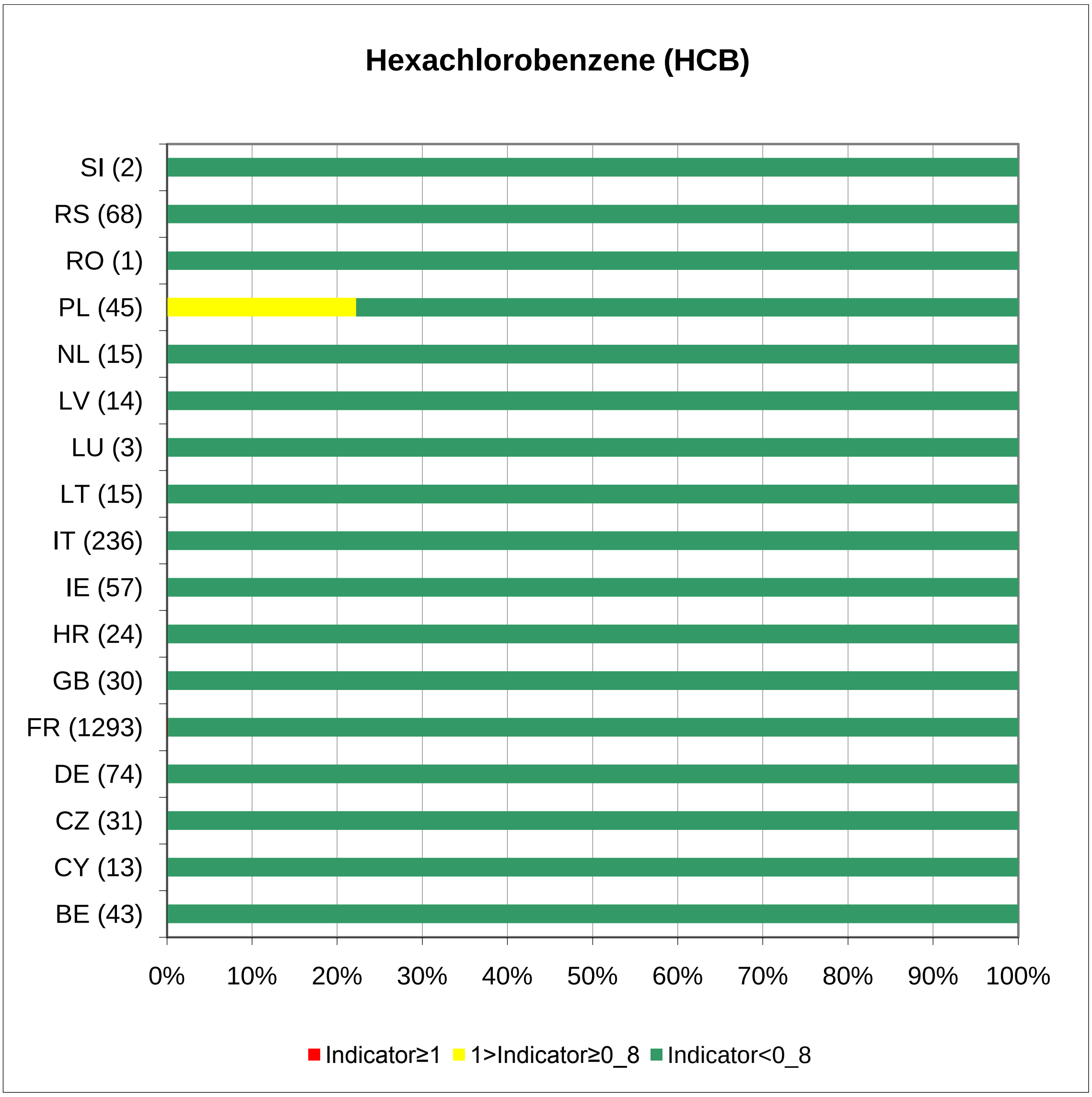


Figure 4.3.2.20c Map of traffic-light indicator for hexachlorobenzene (HCB) in rivers in 2008–2009

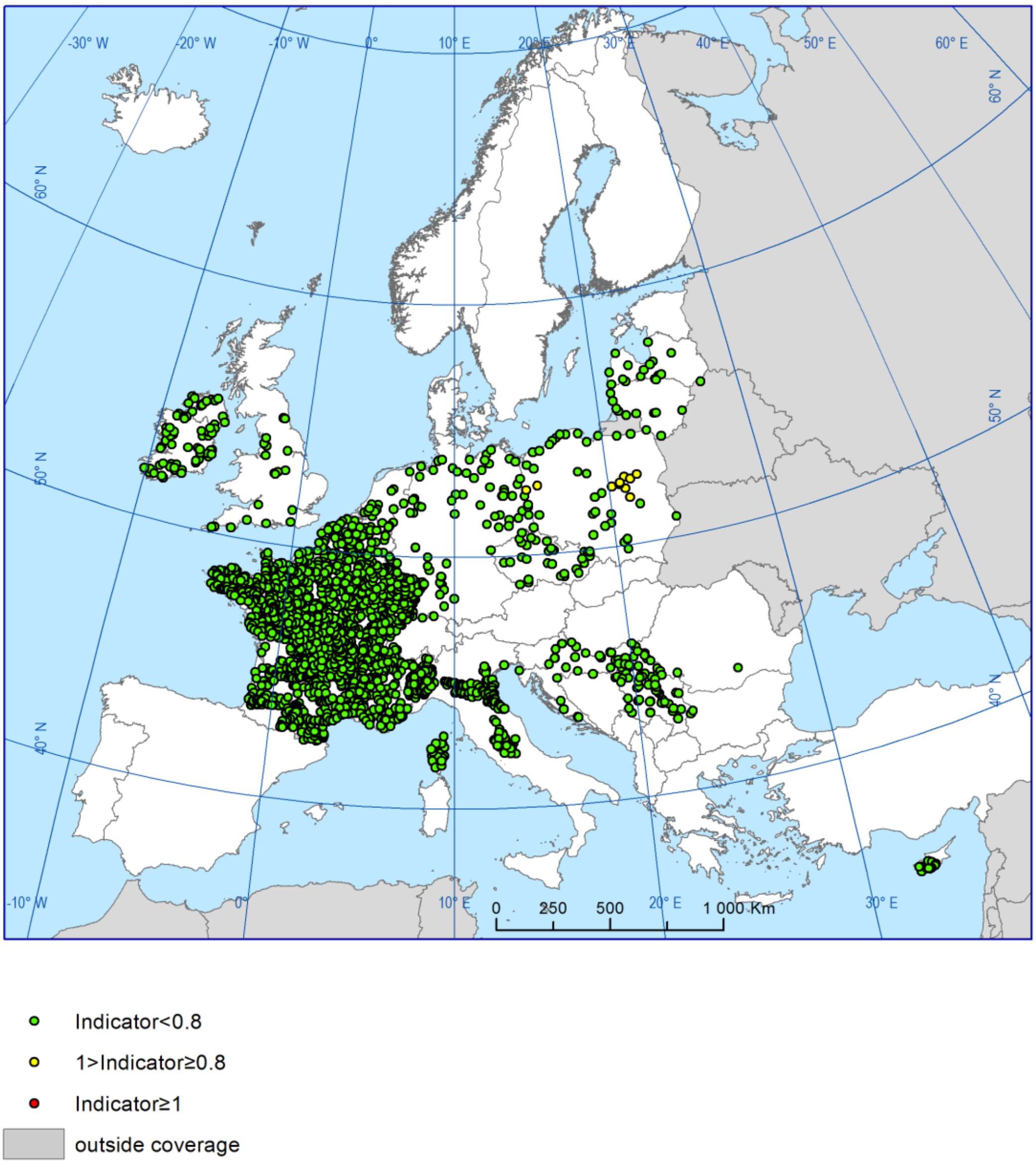


Figure 4.3.2.21a Long-term traffic-light indicator and number of stations for hexachlorobutadiene (HCBD) in rivers

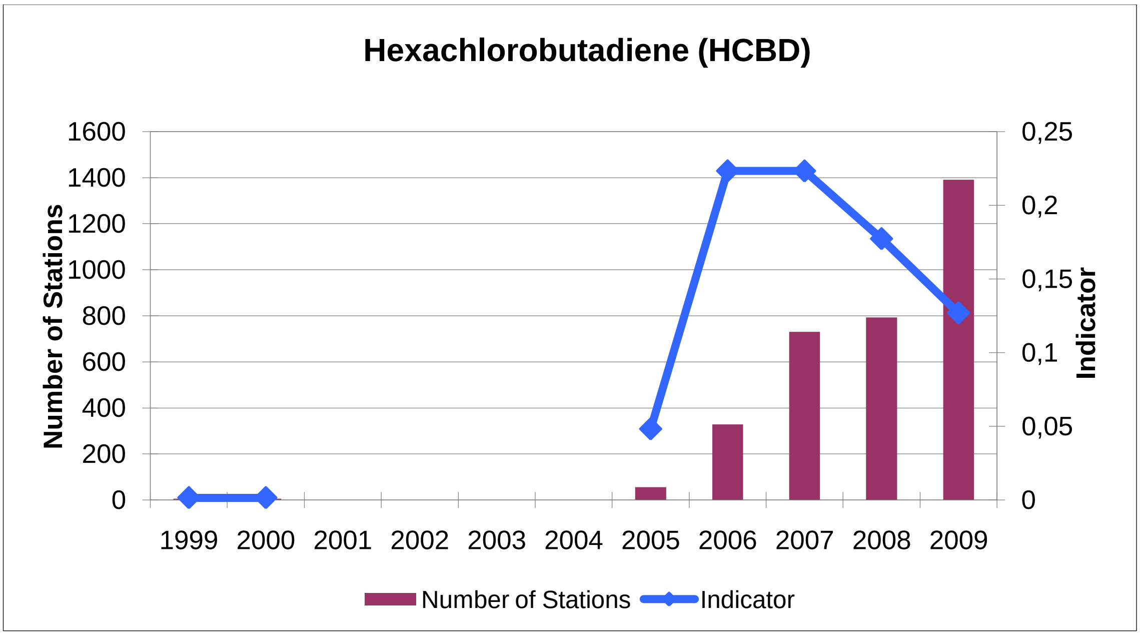


Figure 4.3.2.21b Traffic-light indicator for hexachlorobutadiene (HCBD) in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

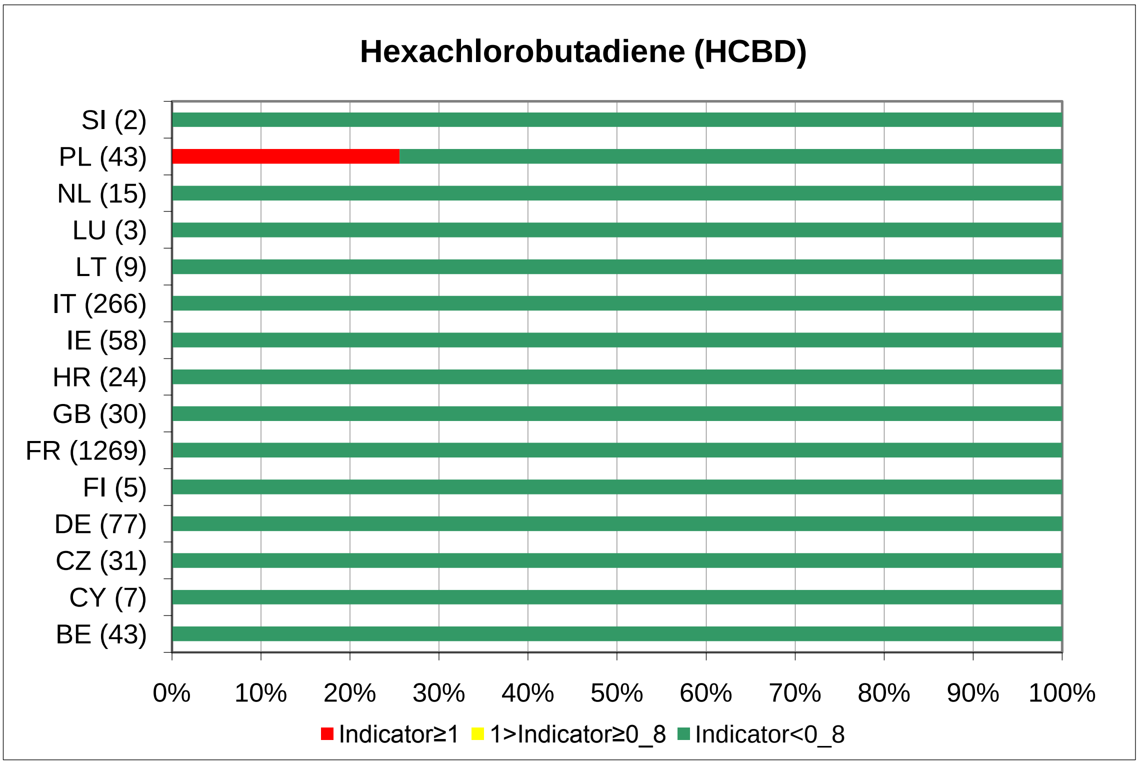


Figure 4.3.2.21c Map of traffic-light indicator for hexachlorobutadiene (HCBD) in rivers in 2008–2009

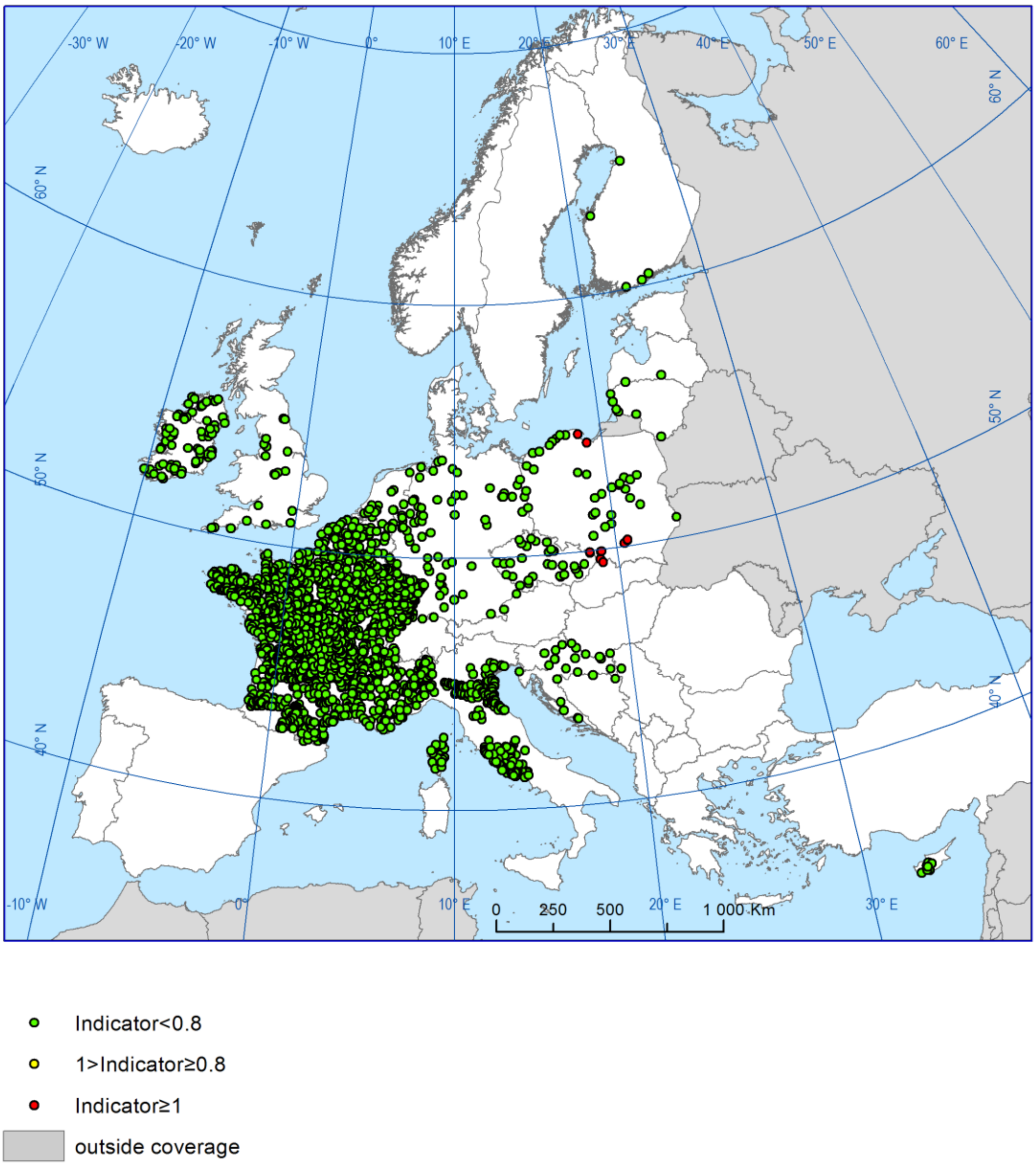


Figure 4.3.2.22a Long-term traffic-light indicator and number of stations for isoproturon in rivers

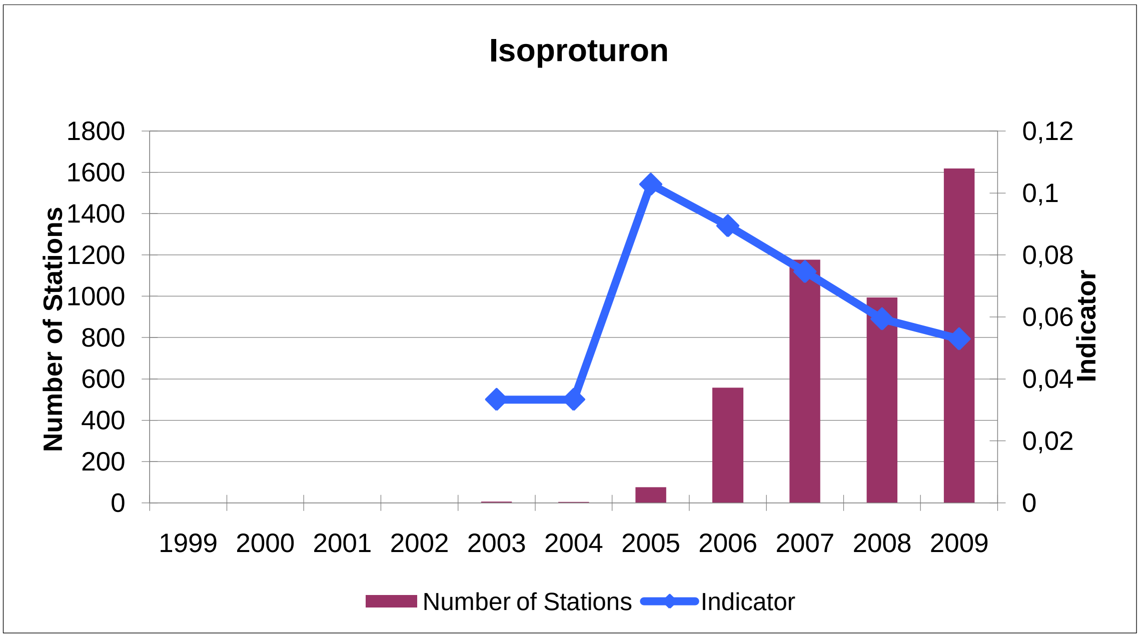


Figure 4.3.2.22b Traffic-light indicator for isoproturon in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

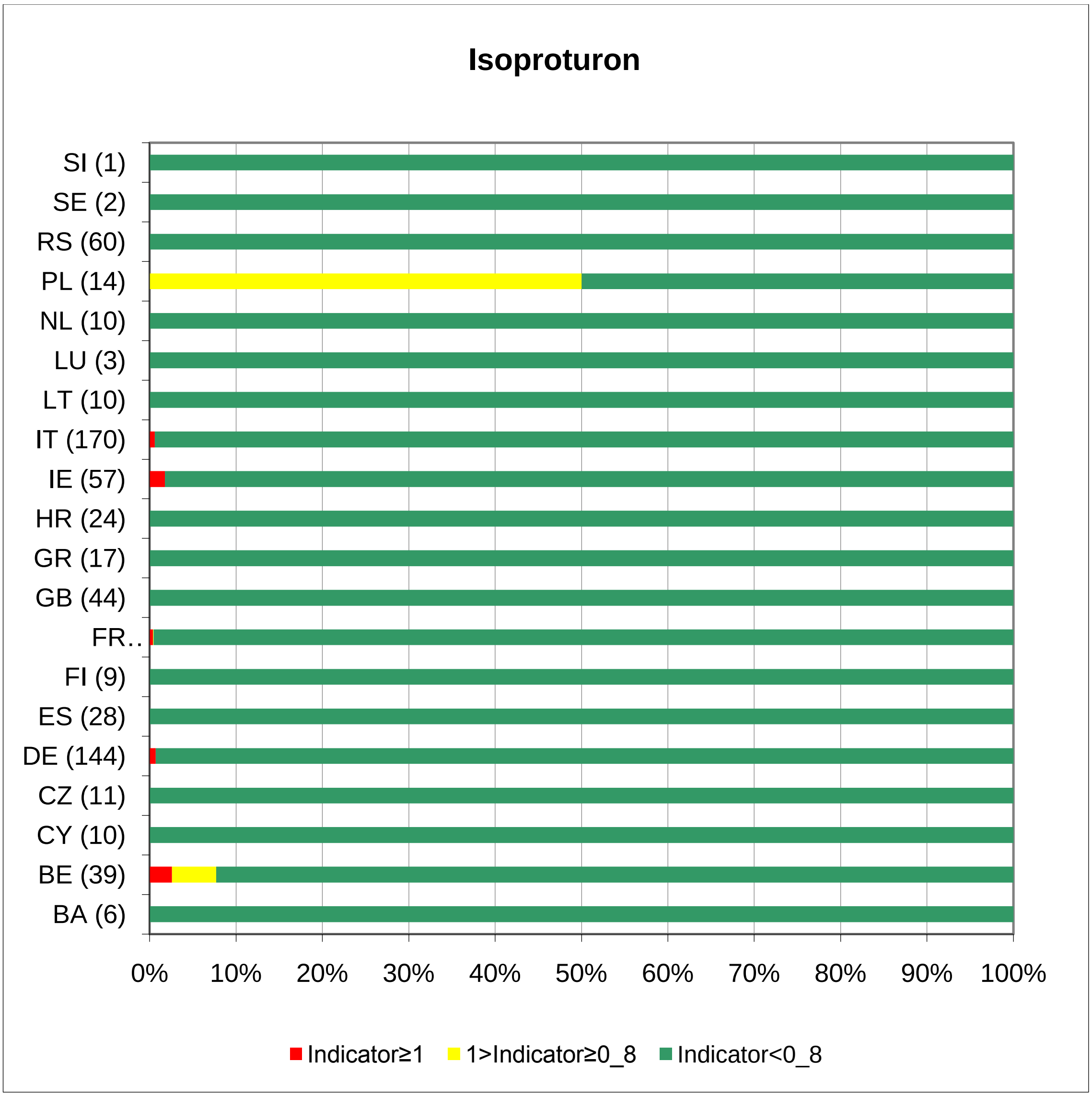


Figure 4.3.2.22c Map of traffic-light indicator for isoproturon in rivers in 2008–2009

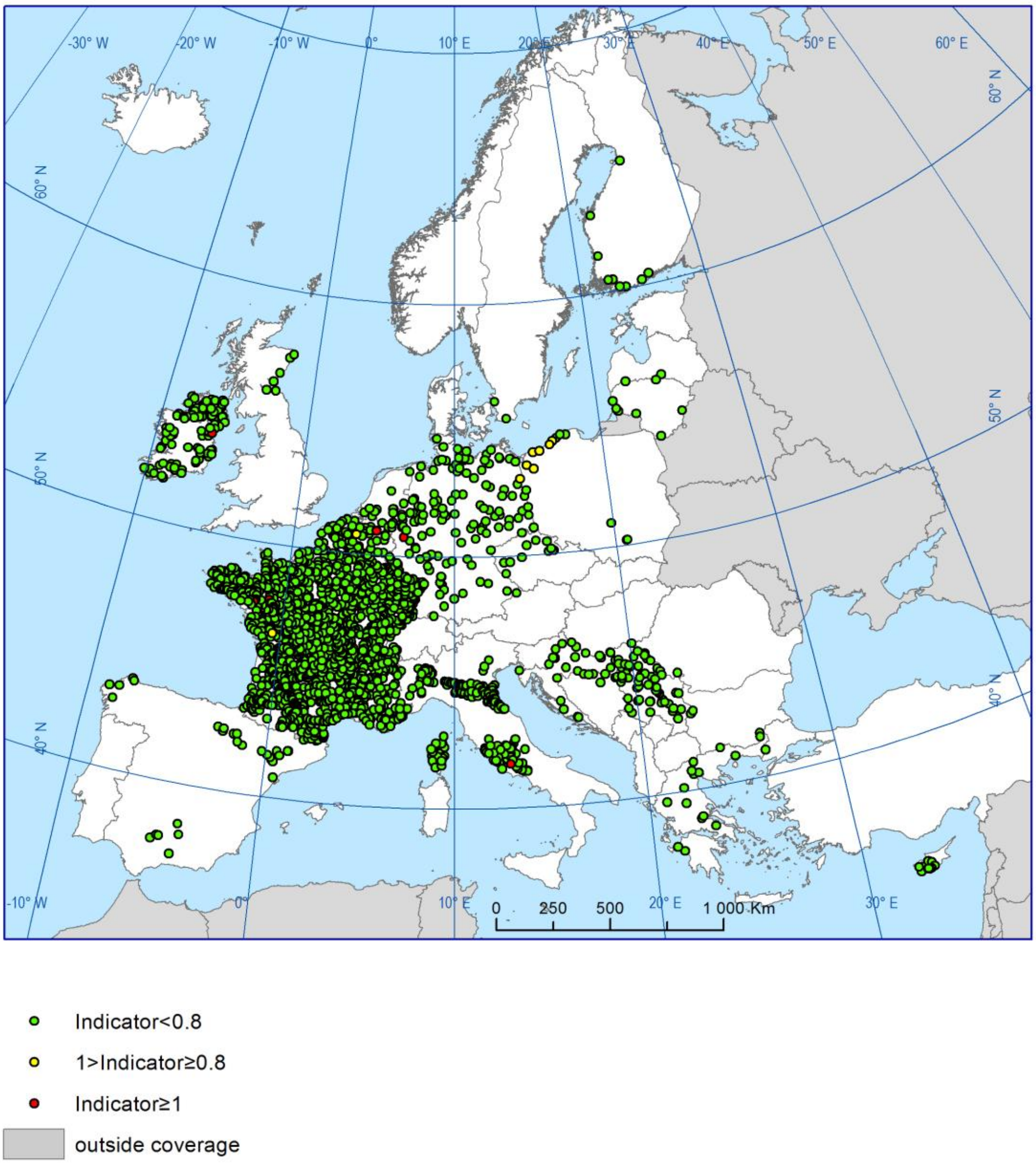


Figure 4.3.2.23a Long-term traffic-light indicator and number of stations for lead in rivers

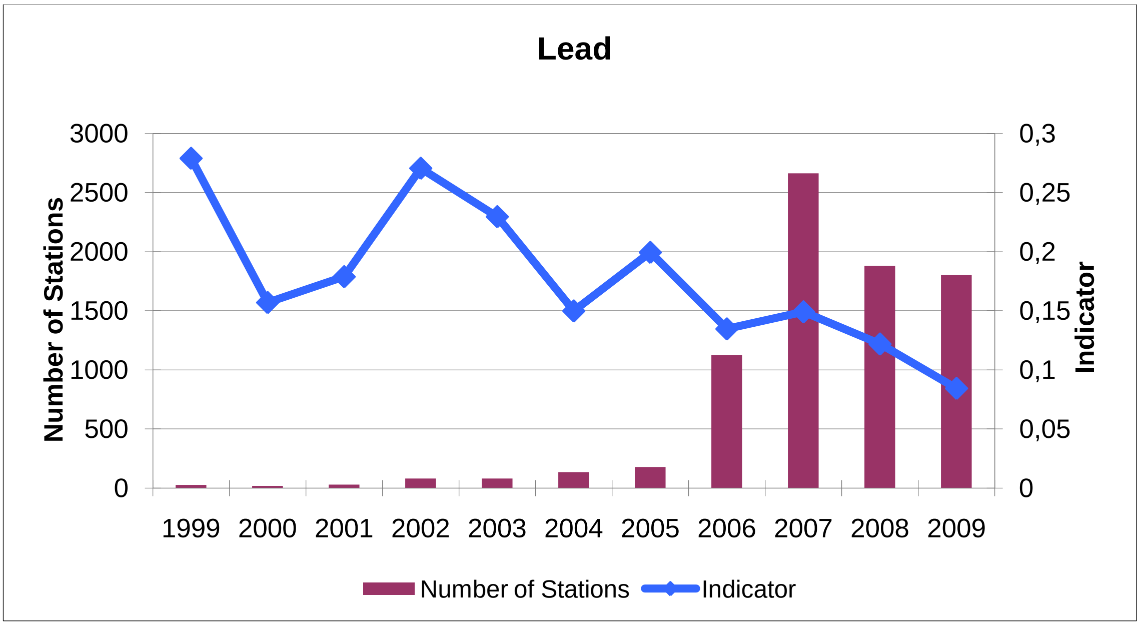


Figure 4.3.2.23b Traffic-light indicator for lead in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

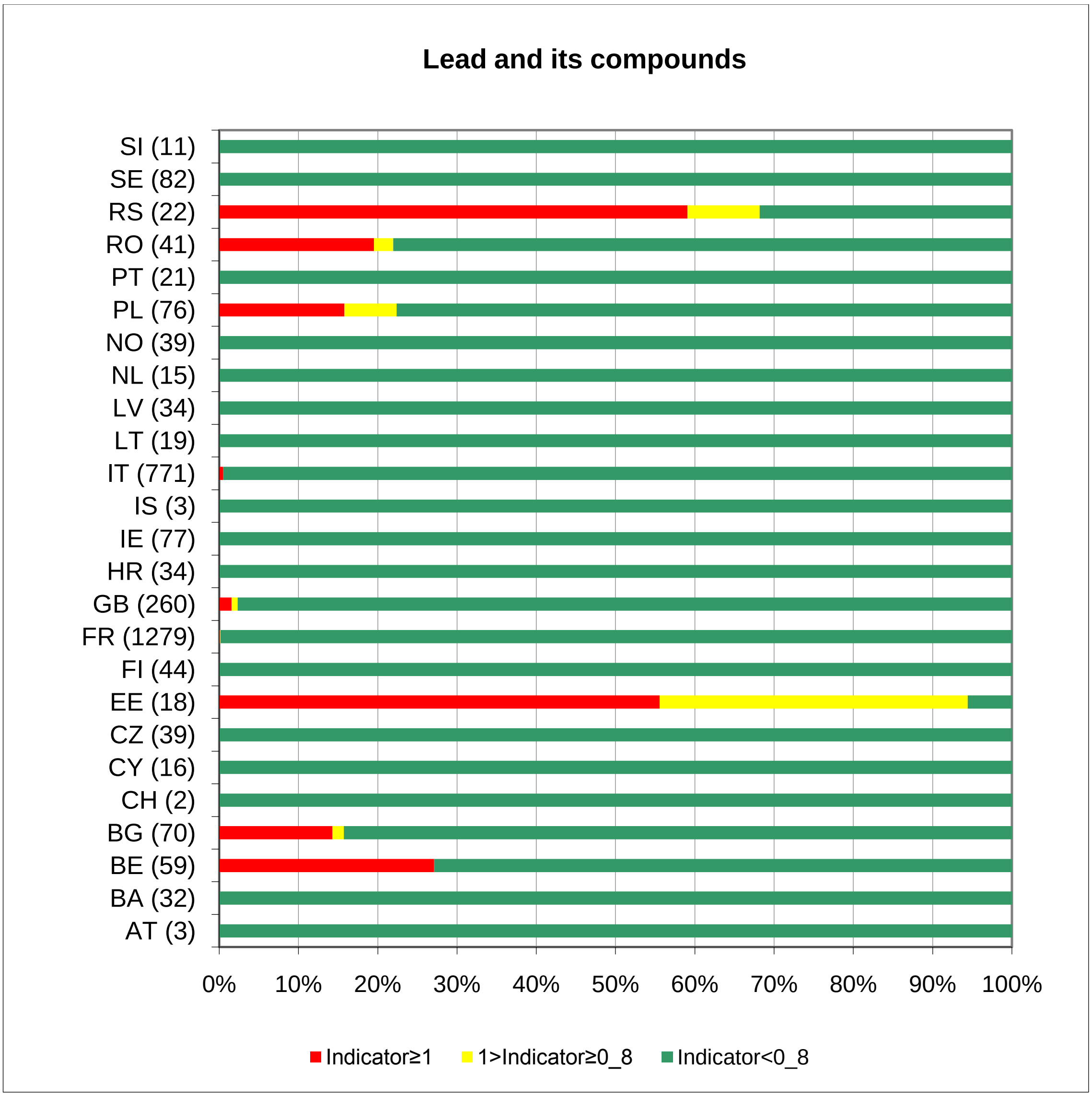


Figure 4.3.2.23c Map of traffic-light indicator for lead in rivers in 2008–2009

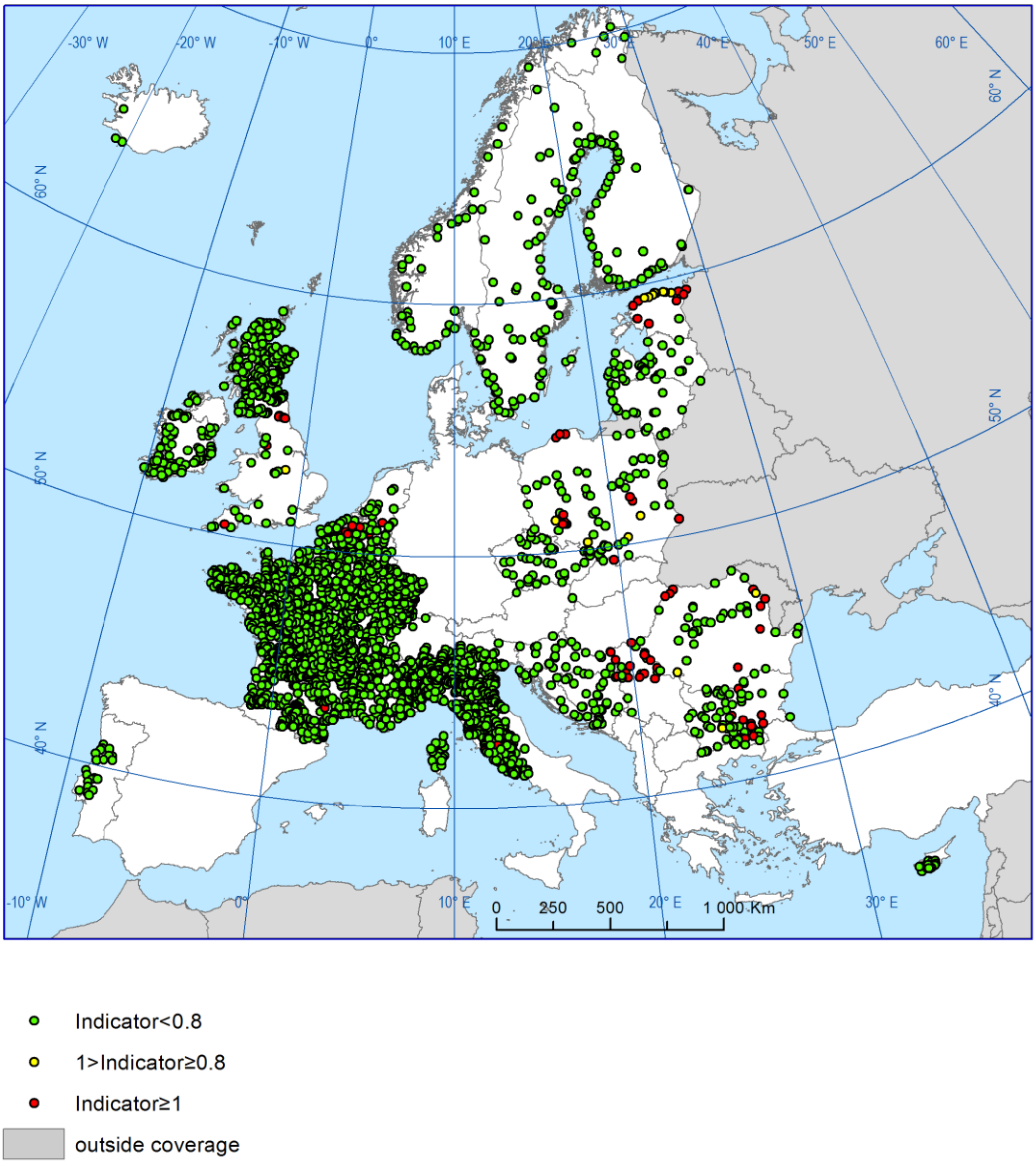


Figure 4.3.2.24a Long-term traffic-light indicator and number of stations for dissolved lead in rivers

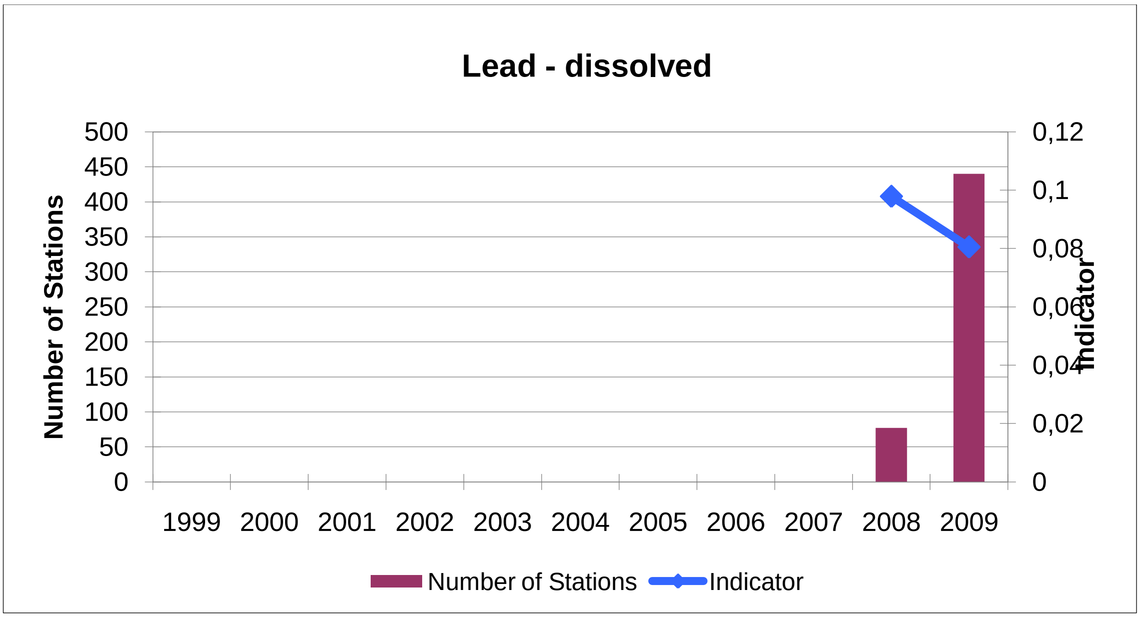


Figure 4.3.2.24b Traffic-light indicator for dissolved lead in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

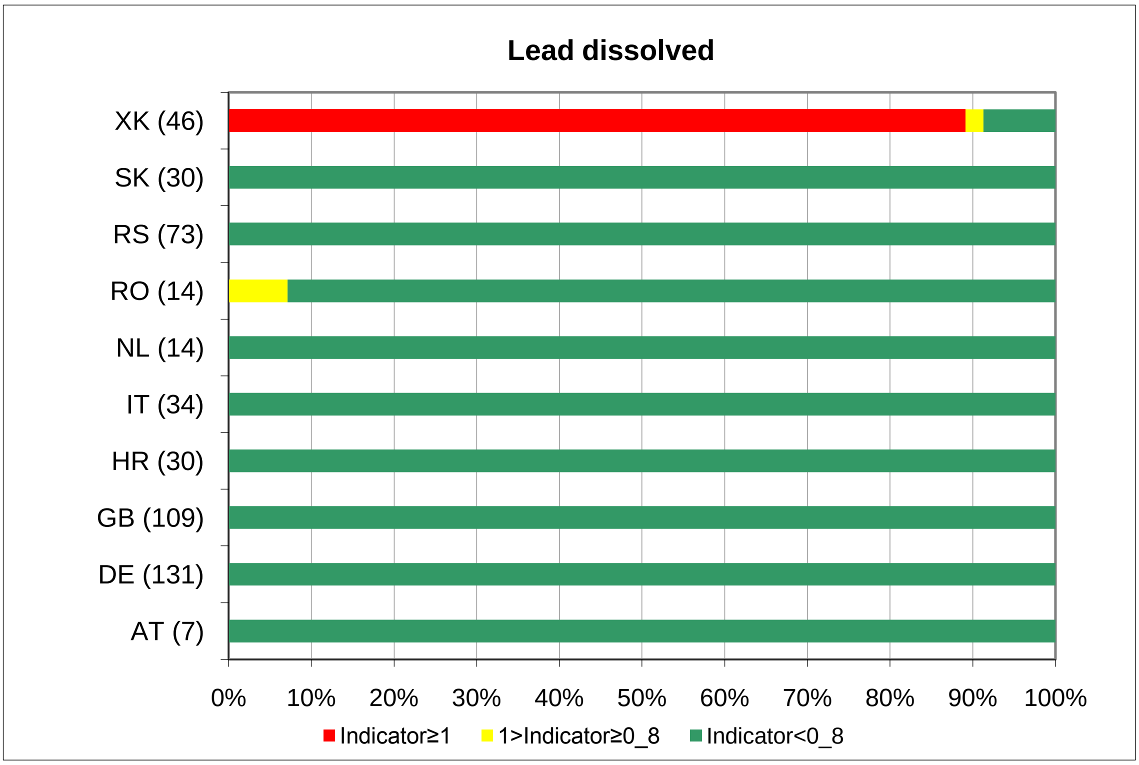


Figure 4.3.2.24c Map of traffic-light indicator for dissolved lead in rivers in 2008–2009

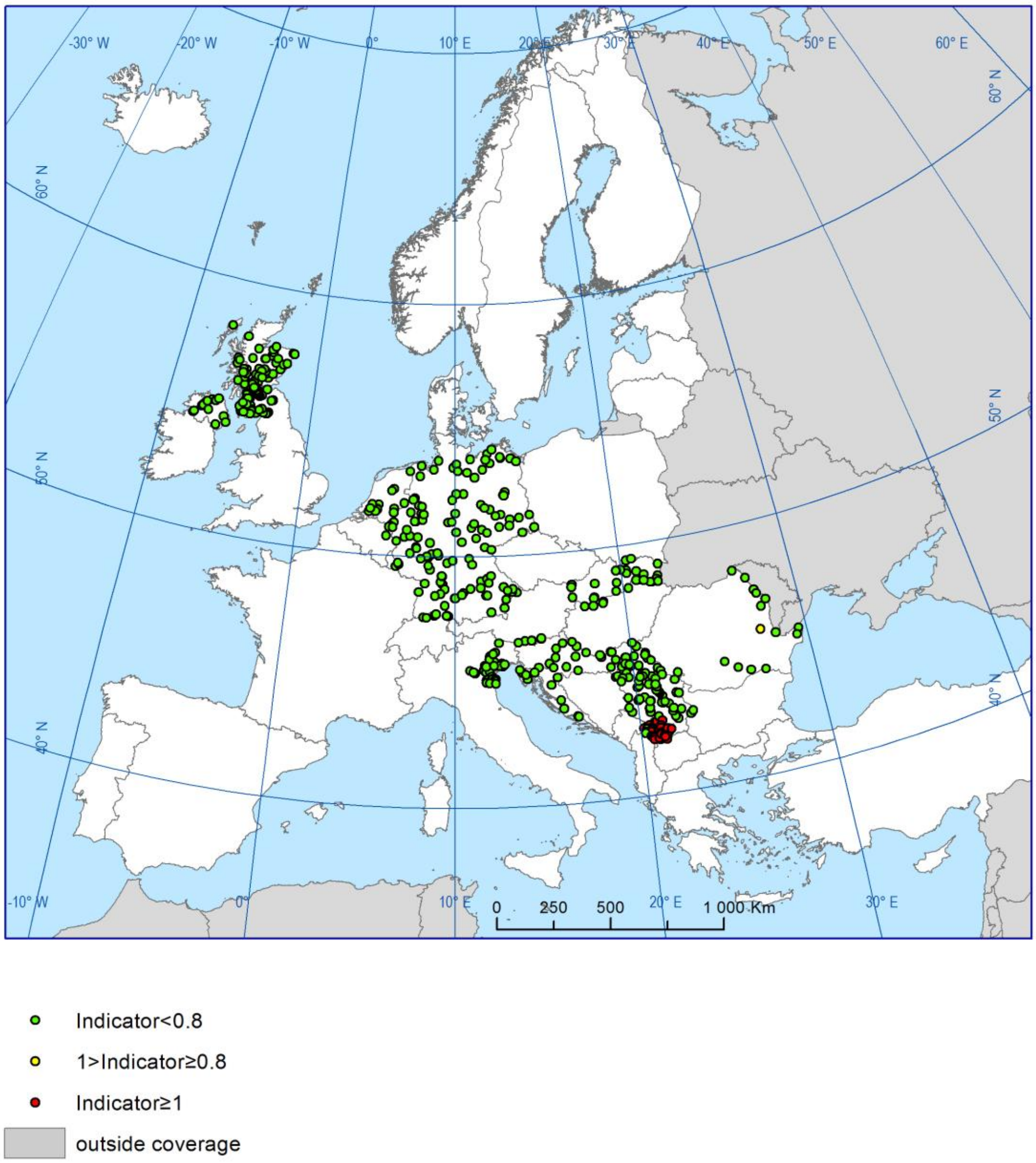


Figure 4.3.2.25a Long-term traffic-light indicator and number of stations for mercury in rivers

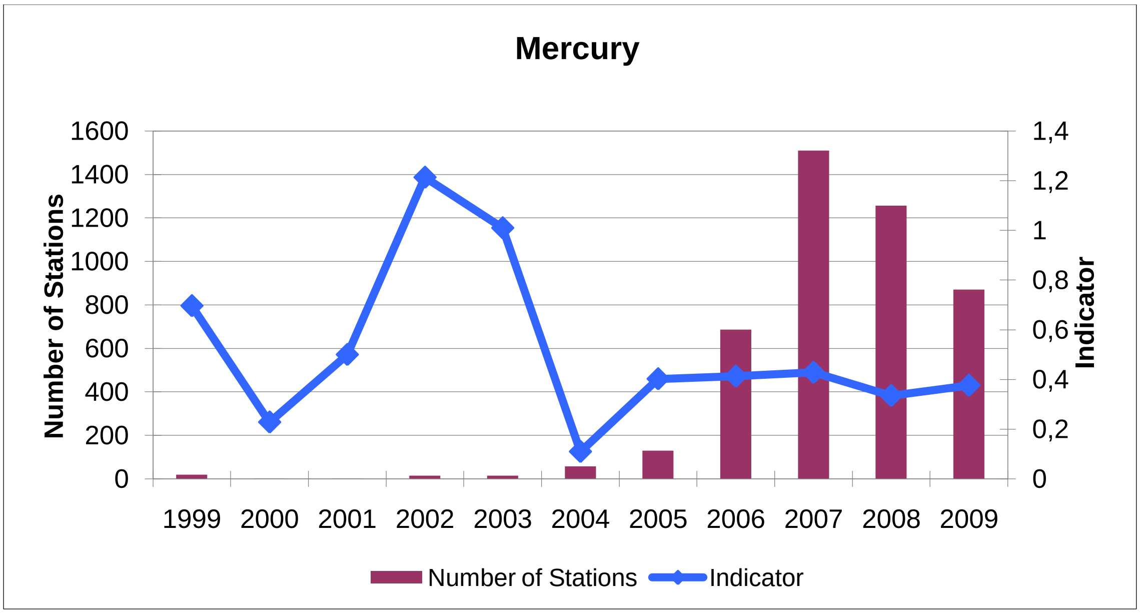


Figure 4.3.2.25b Traffic-light indicator for mercury in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

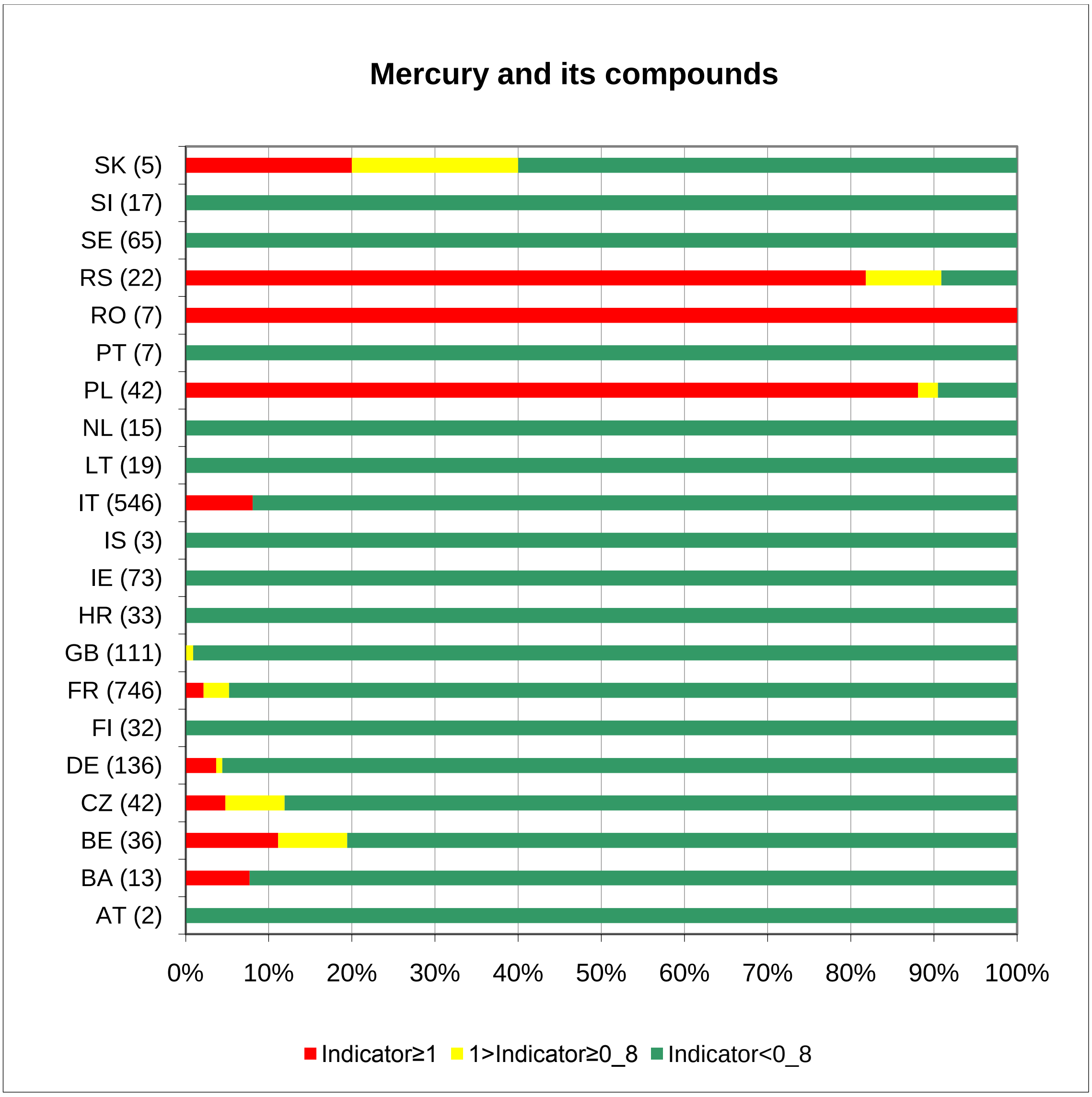


Figure 4.3.2.25c Map of traffic-light indicator for mercury in rivers in 2008–2009

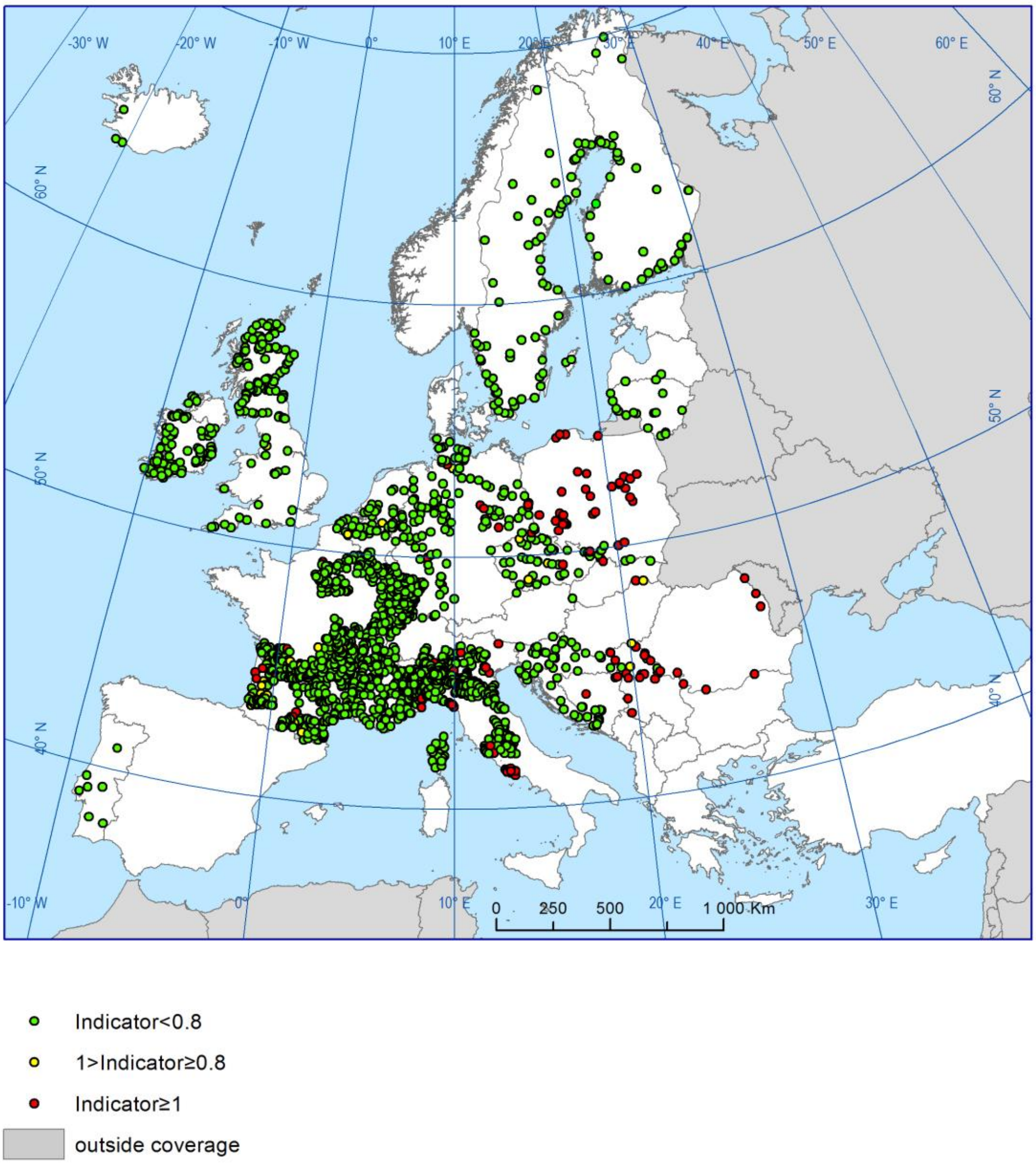


Figure 4.3.2.26a Long-term traffic-light indicator and number of stations for dissolved mercury in rivers

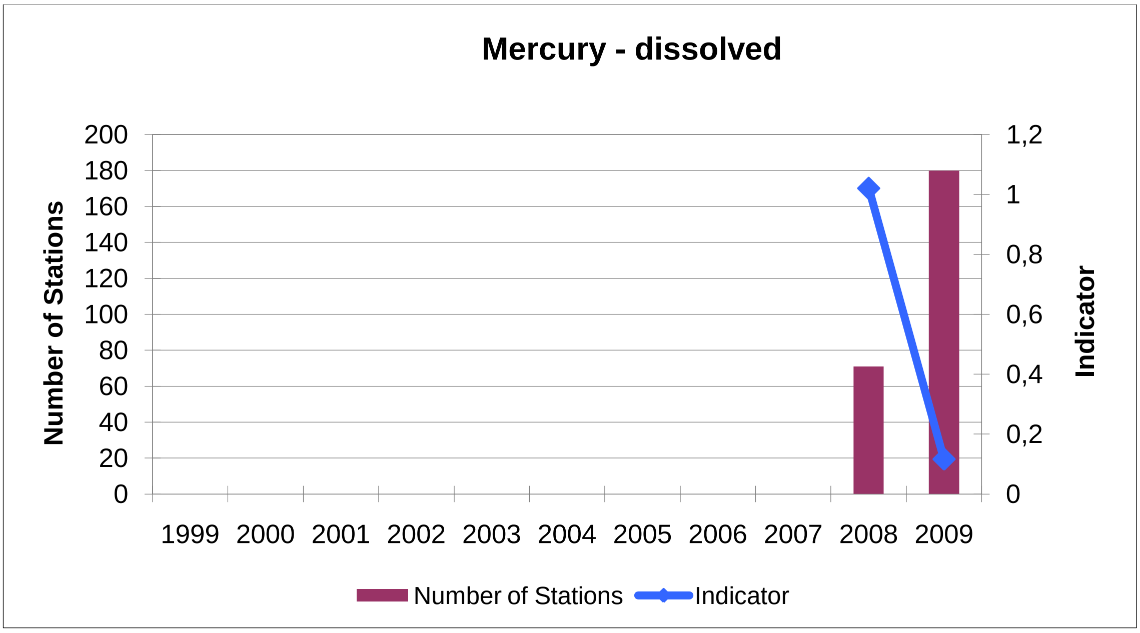


Figure 4.3.2.26b Traffic-light indicator for dissolved mercury in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

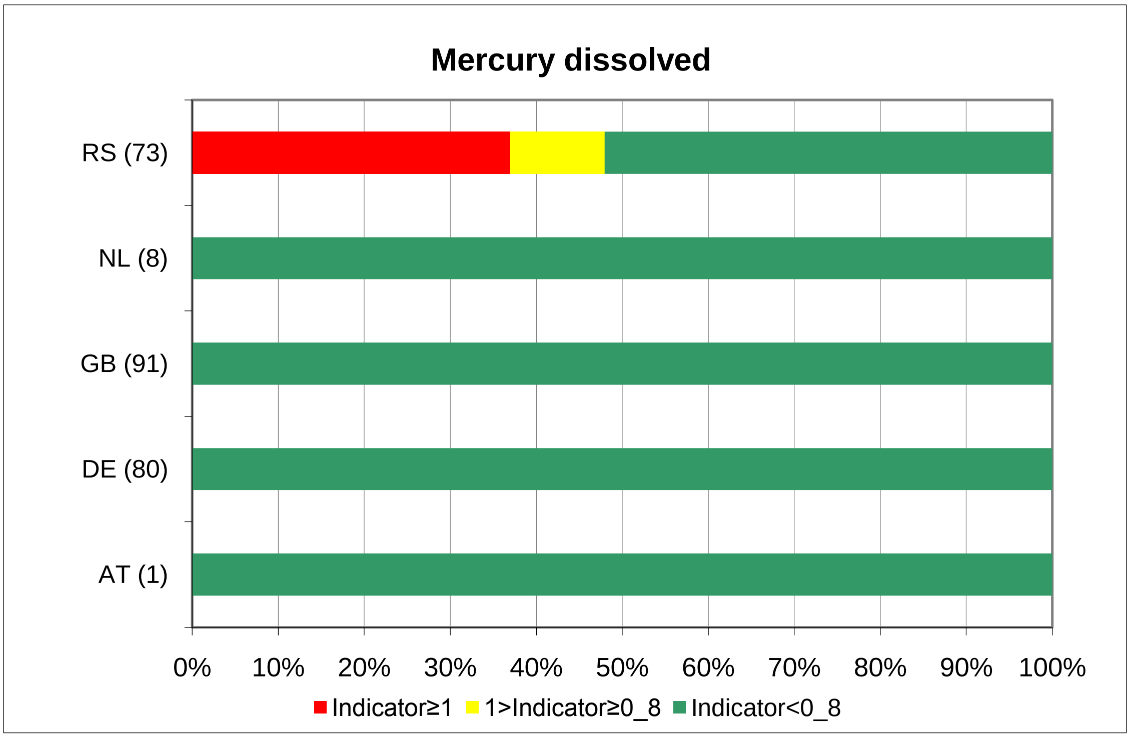
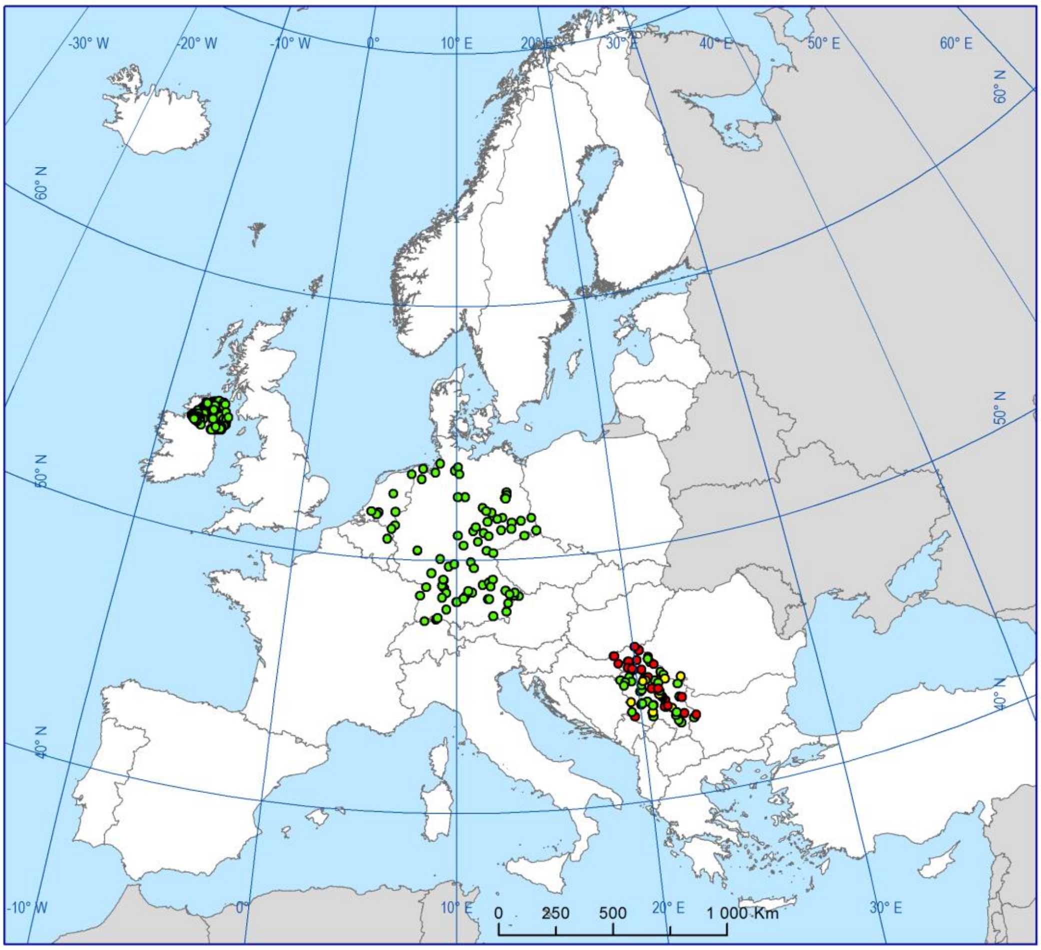


Figure 4.3.2.26c Map of traffic-light indicator for dissolved mercury in rivers in 2008–2009



- Indicator<0.8
- 1>Indicator≥0.8
- Indicator≥1
- outside coverage

Figure 4.3.2.27a Long-term traffic-light indicator and number of stations for naphthalene in rivers

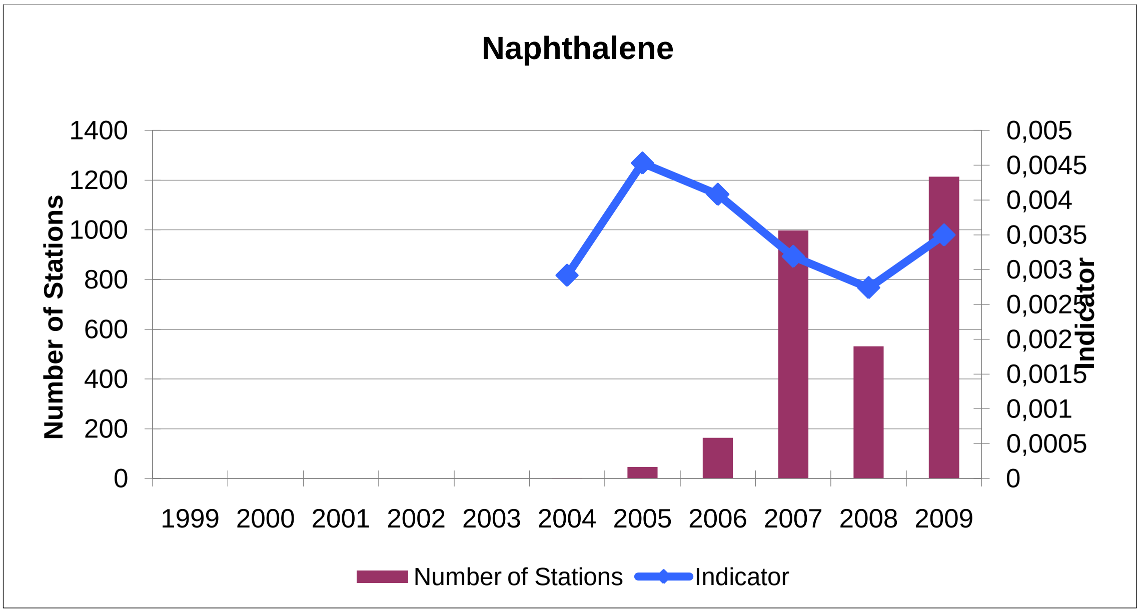


Figure 4.3.2.27b Traffic-light indicator for naphthalene in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

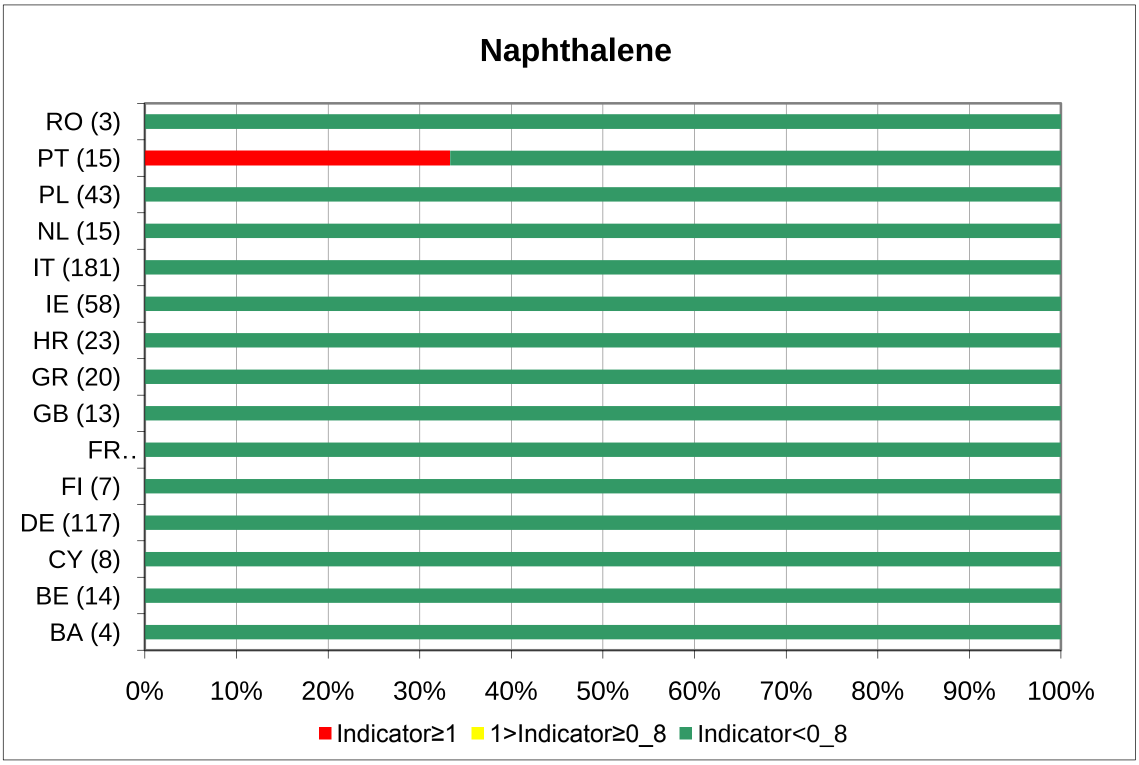


Figure 4.3.2.27c Map of traffic-light indicator for naphthalene in rivers in 2008–2009

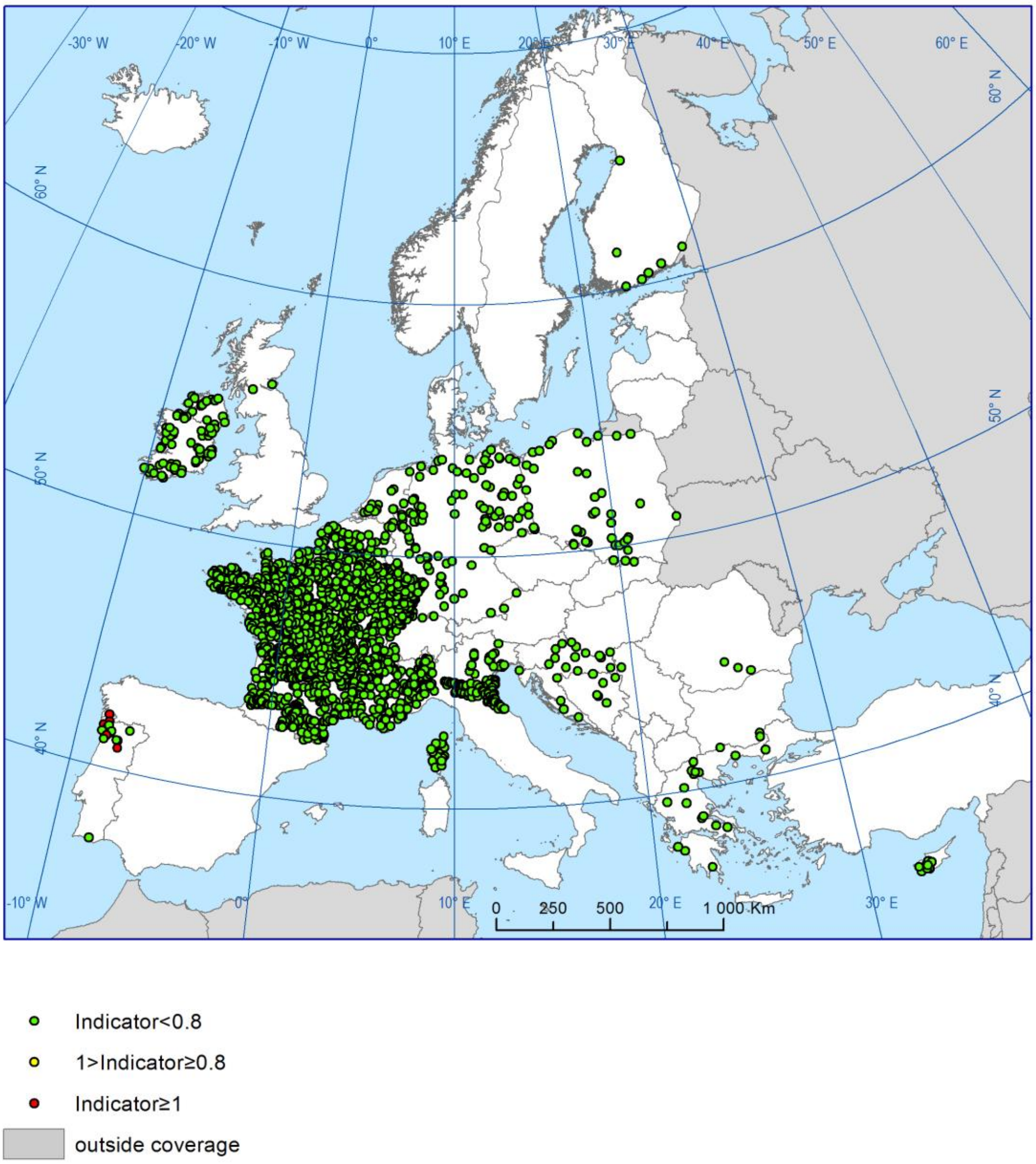


Figure 4.3.2.28a Long-term traffic-light indicator and number of stations for nickel in rivers

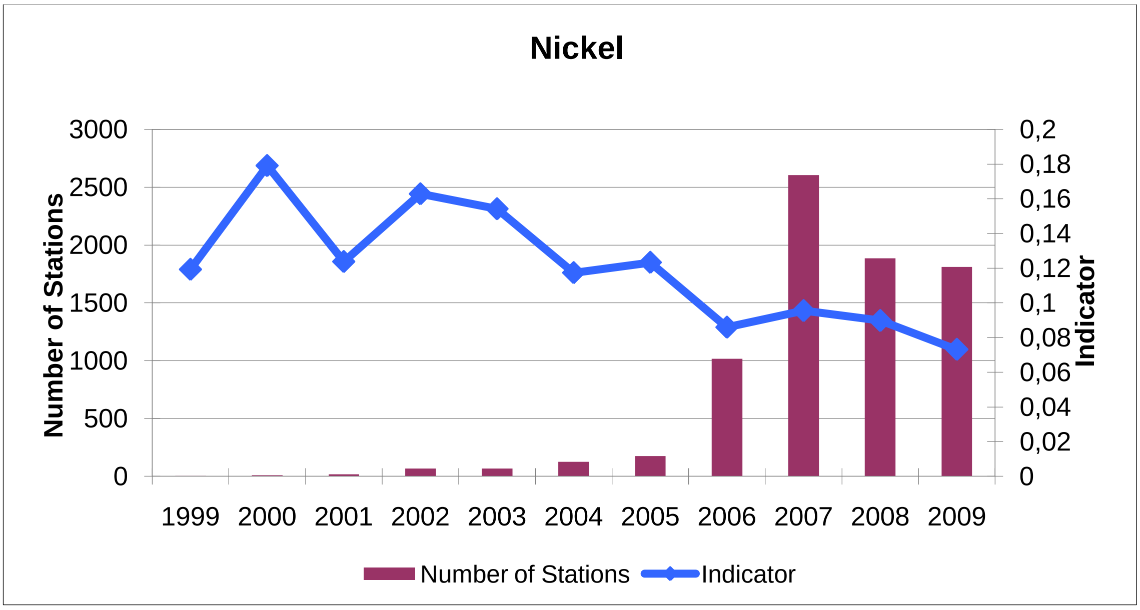


Figure 4.3.2.28b Traffic-light indicator for nickel in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

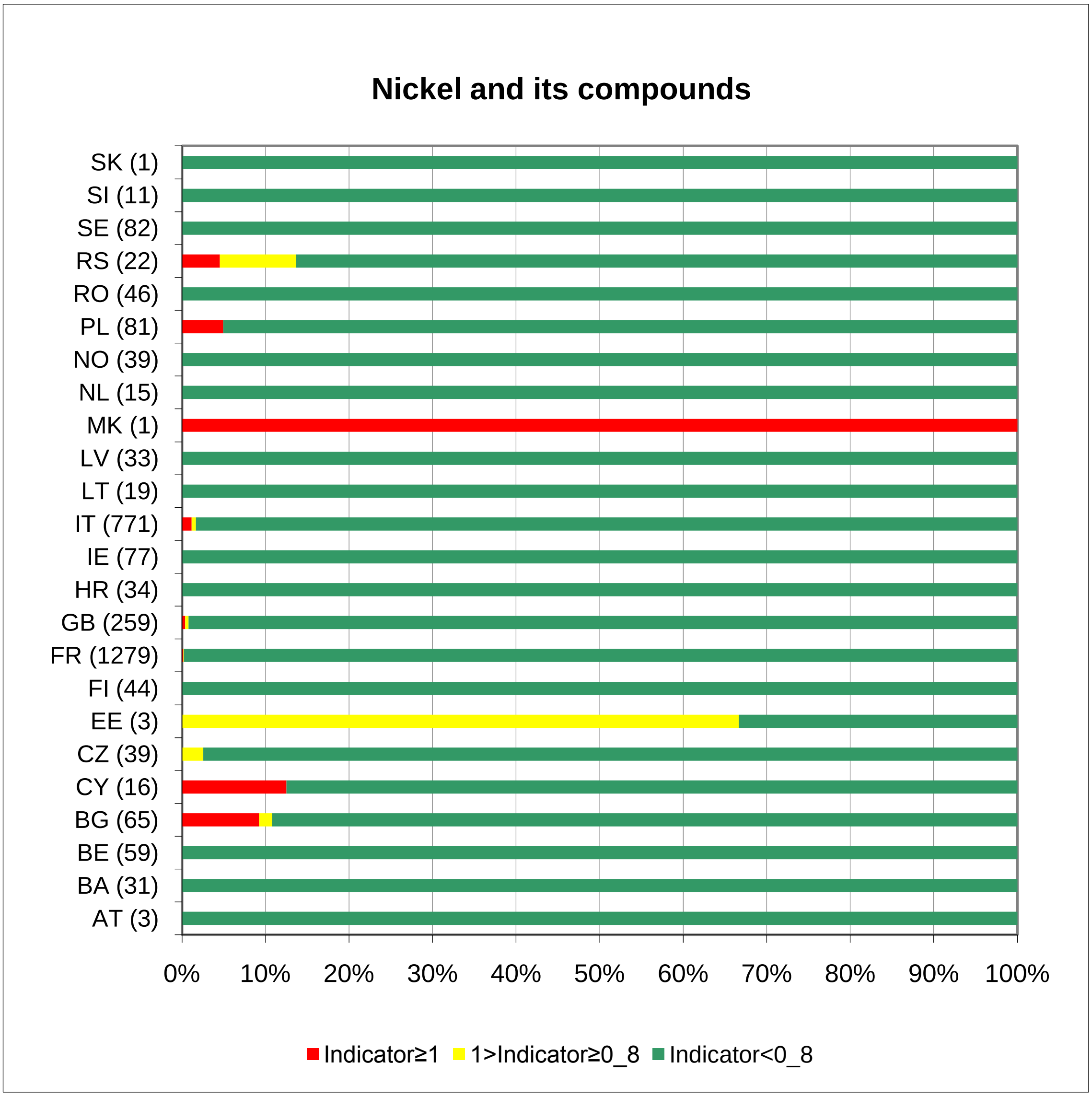


Figure 4.3.2.28c Map of traffic-light indicator for nickel in rivers in 2008–2009

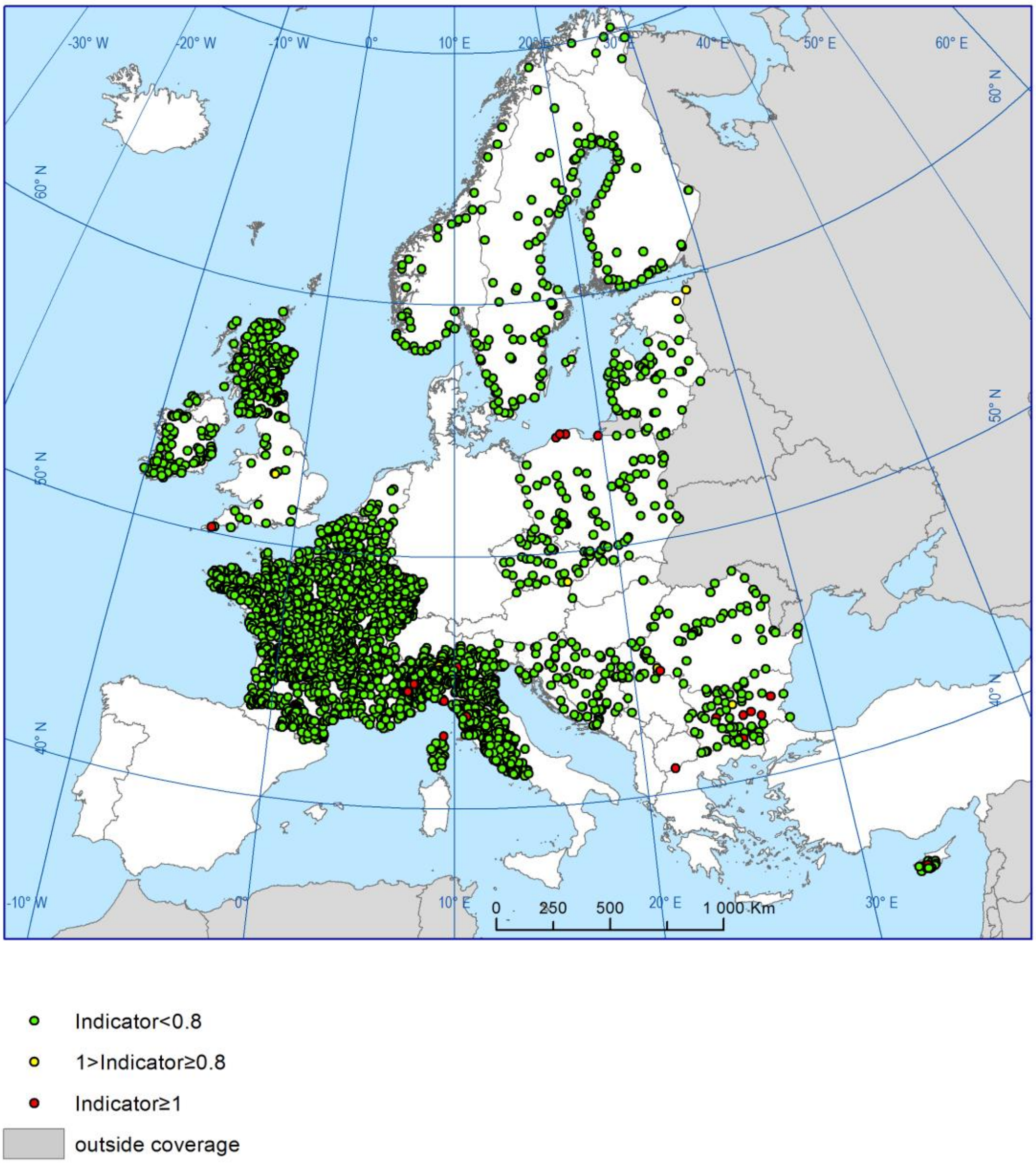


Figure 4.3.2.29a Long-term traffic-light indicator and number of stations for dissolved nickel in rivers

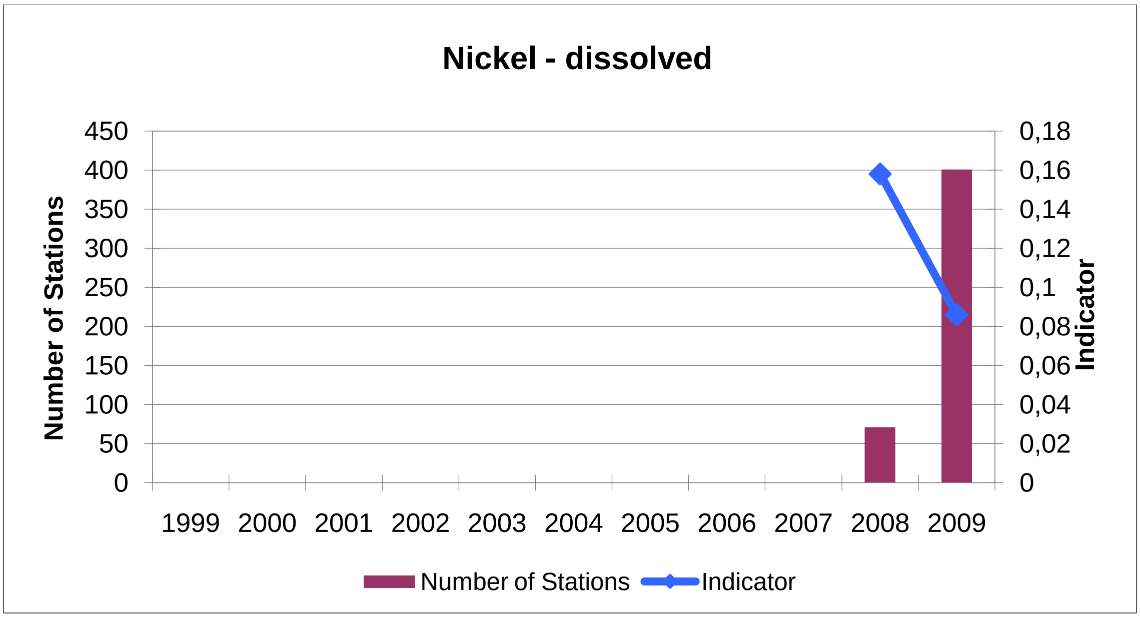


Figure 4.3.2.29b Traffic-light indicator for dissolved nickel in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

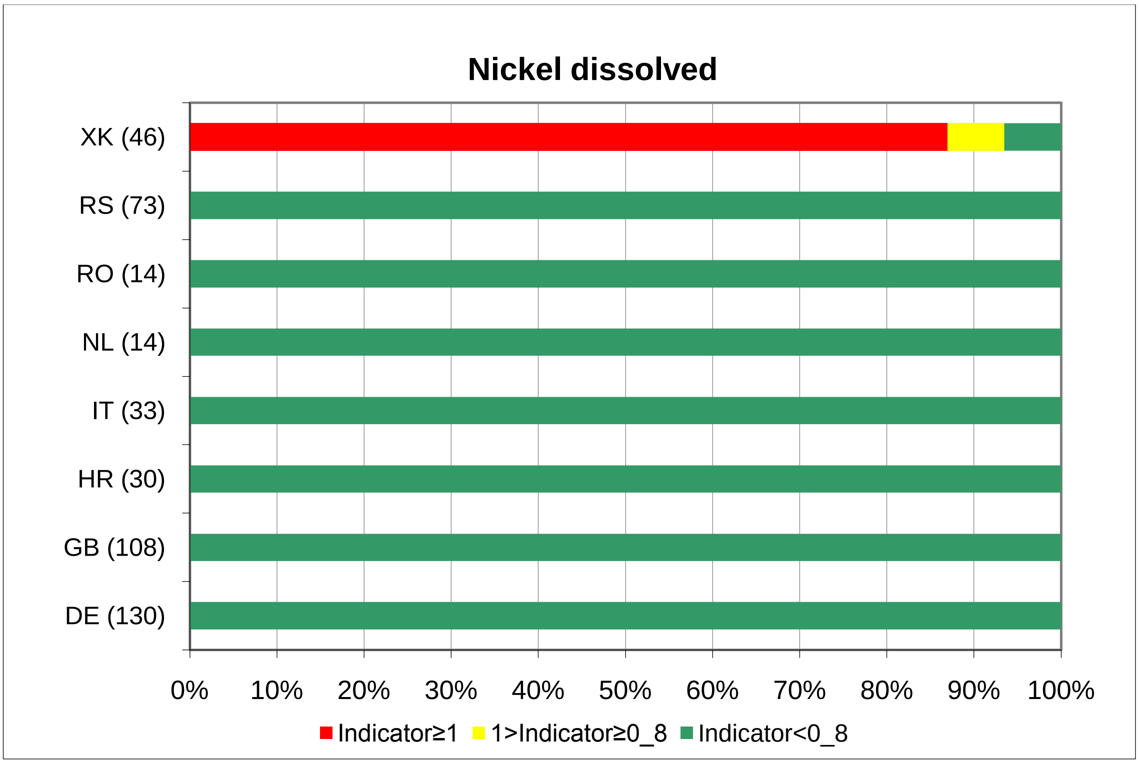


Figure 4.3.2.29c Map of traffic-light indicator for dissolved nickel in rivers in 2008–2009

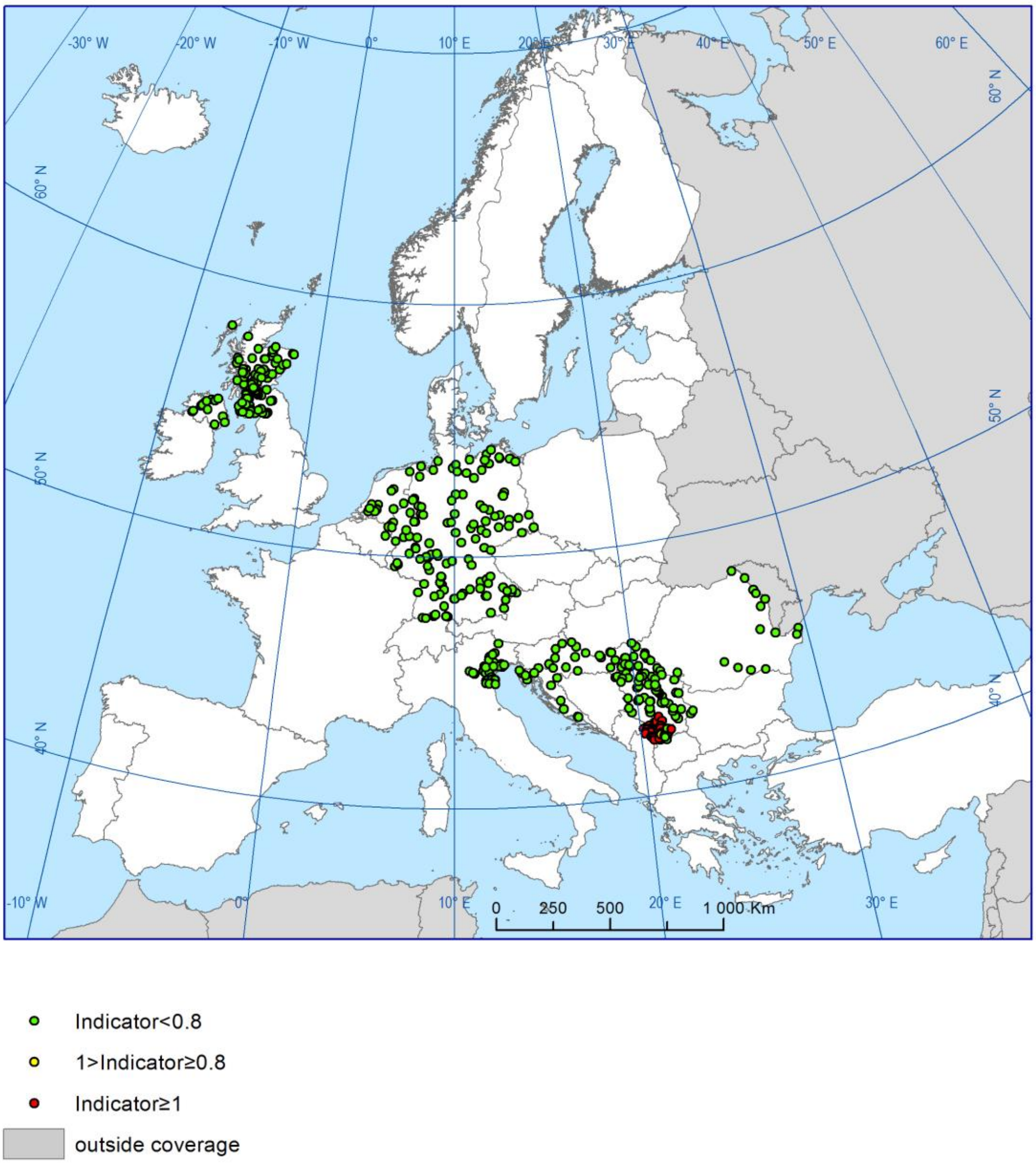


Figure 4.3.2.30a Long-term traffic-light indicator and number of stations for para-tert-octylphenol in rivers

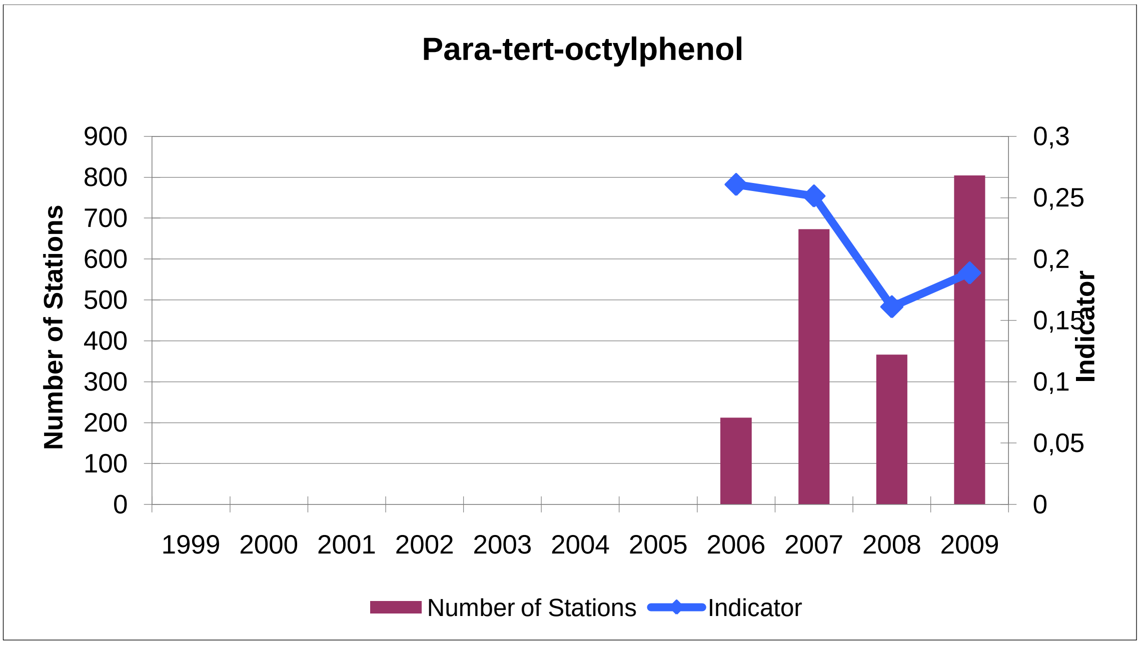


Figure 4.3.2.30b Traffic-light indicator for para-tert-octylphenol in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

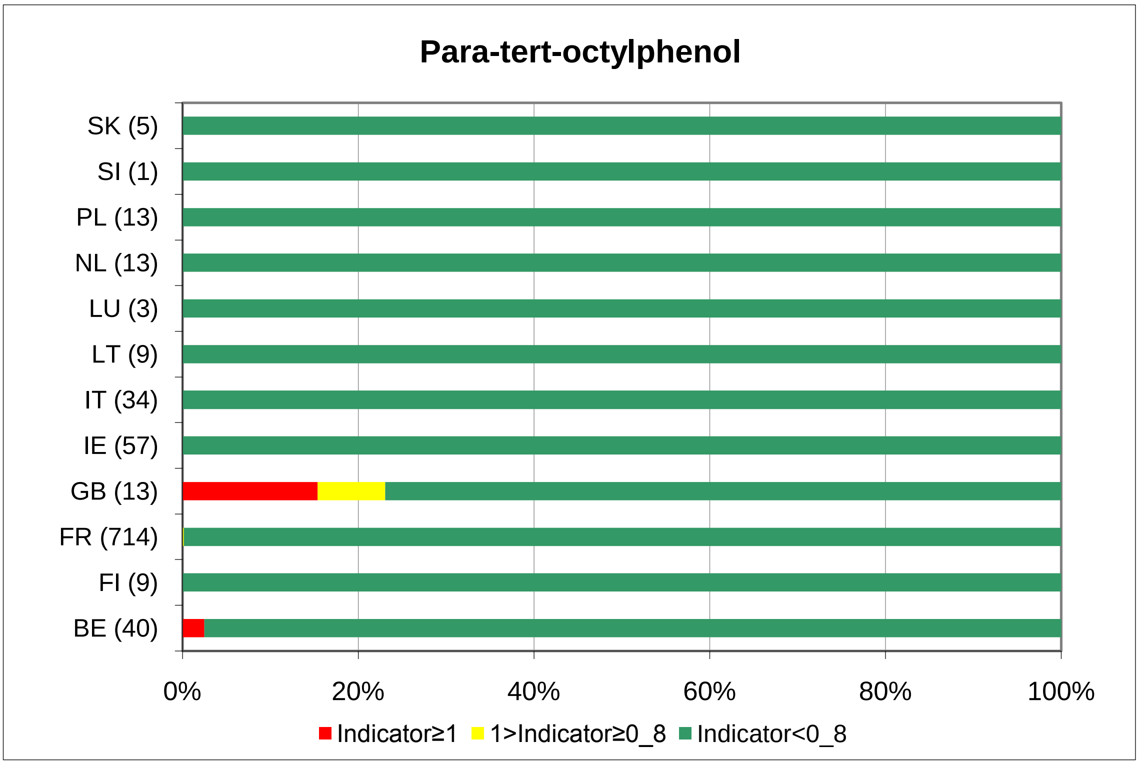


Figure 4.3.2.30c Map of traffic-light indicator for para-tert-octylphenol in rivers in 2008–2009

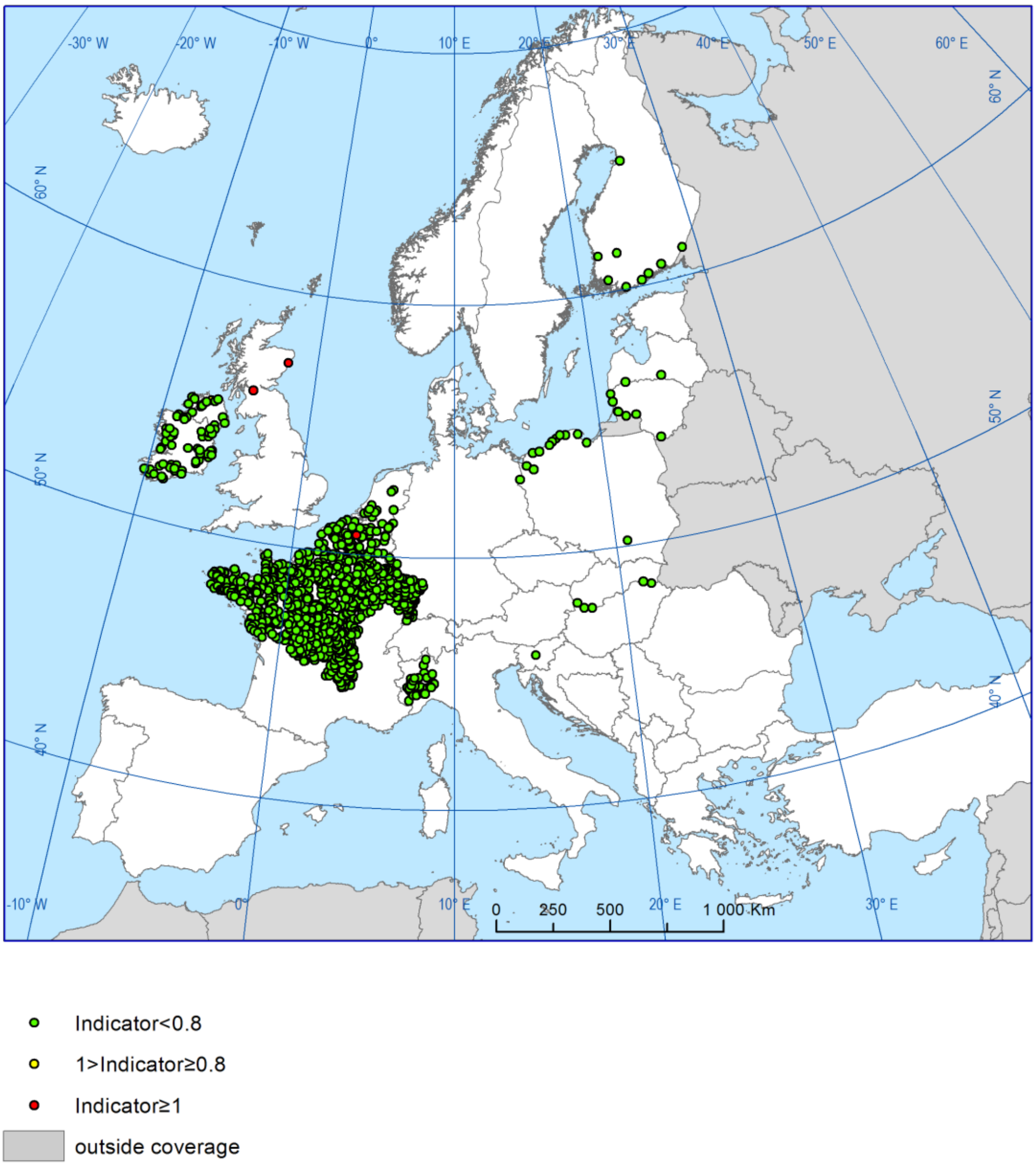


Figure 4.3.2.31a Long-term traffic-light indicator and number of stations for pentachlorobenzene in rivers

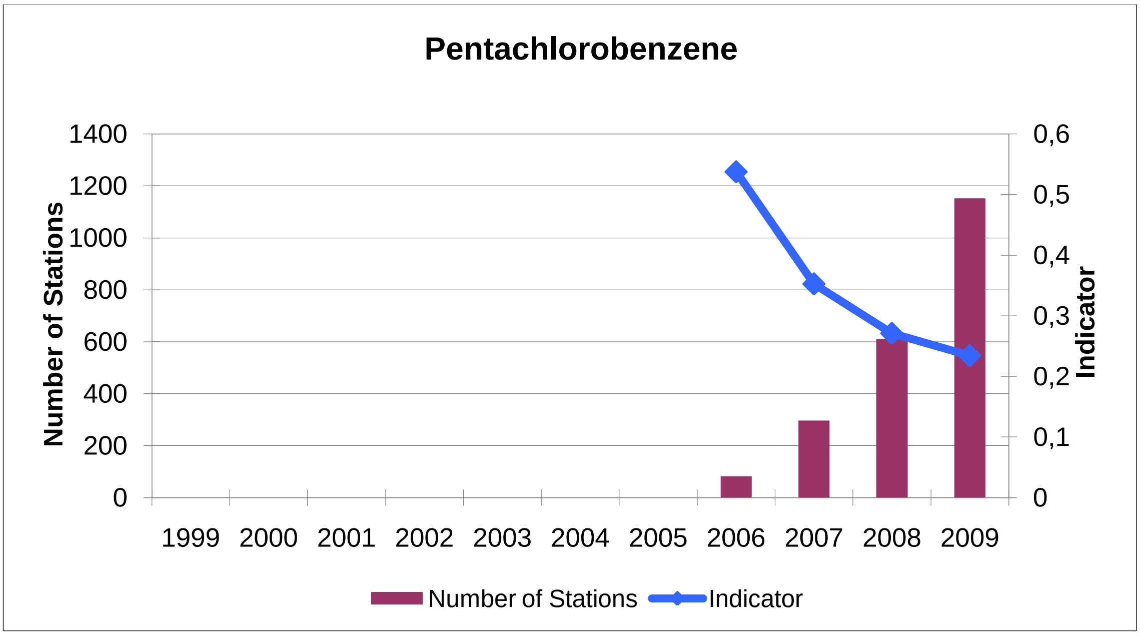


Figure 4.3.2.31b Traffic-light indicator for pentachlorobenzene in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

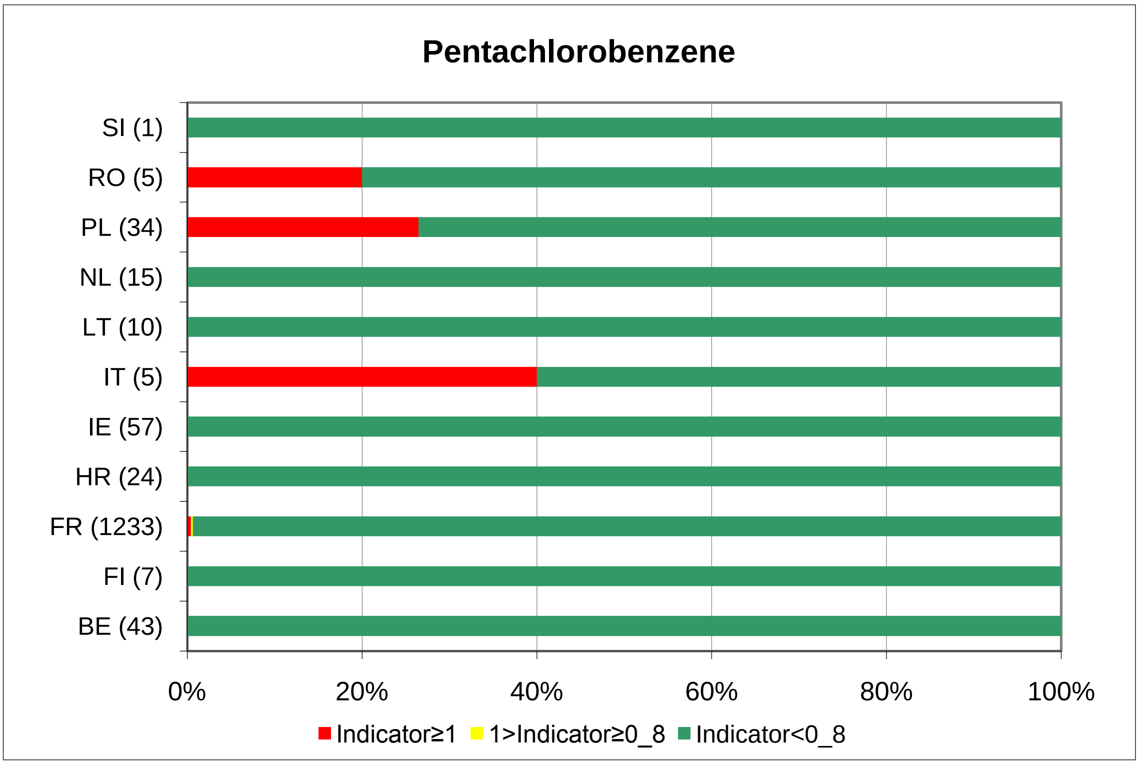


Figure 4.3.2.31c Map of traffic-light indicator for pentachlorobenzene in rivers in 2008–2009

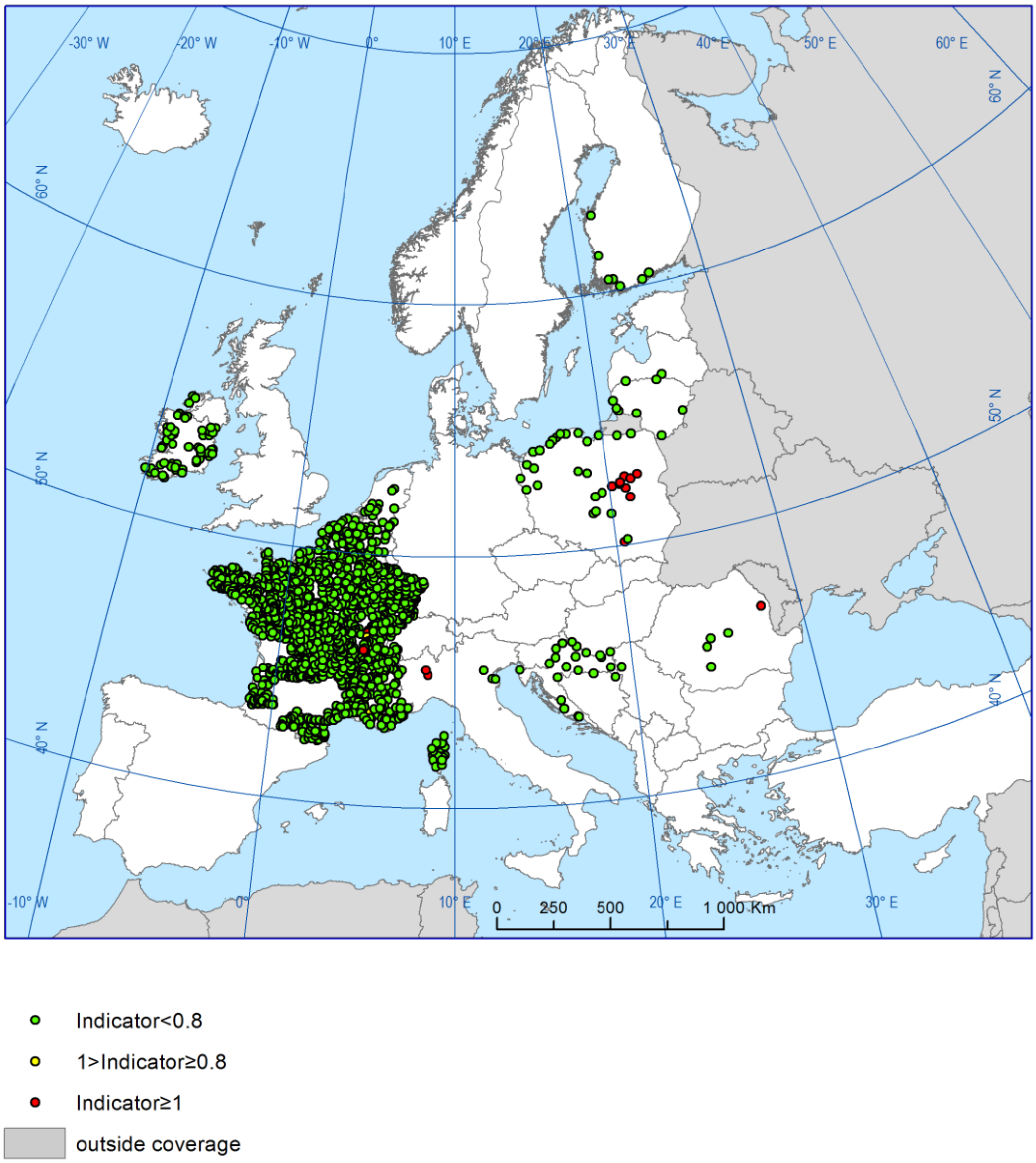


Figure 4.3.2.32a Long-term traffic-light indicator and number of stations for pentachlorophenol in rivers

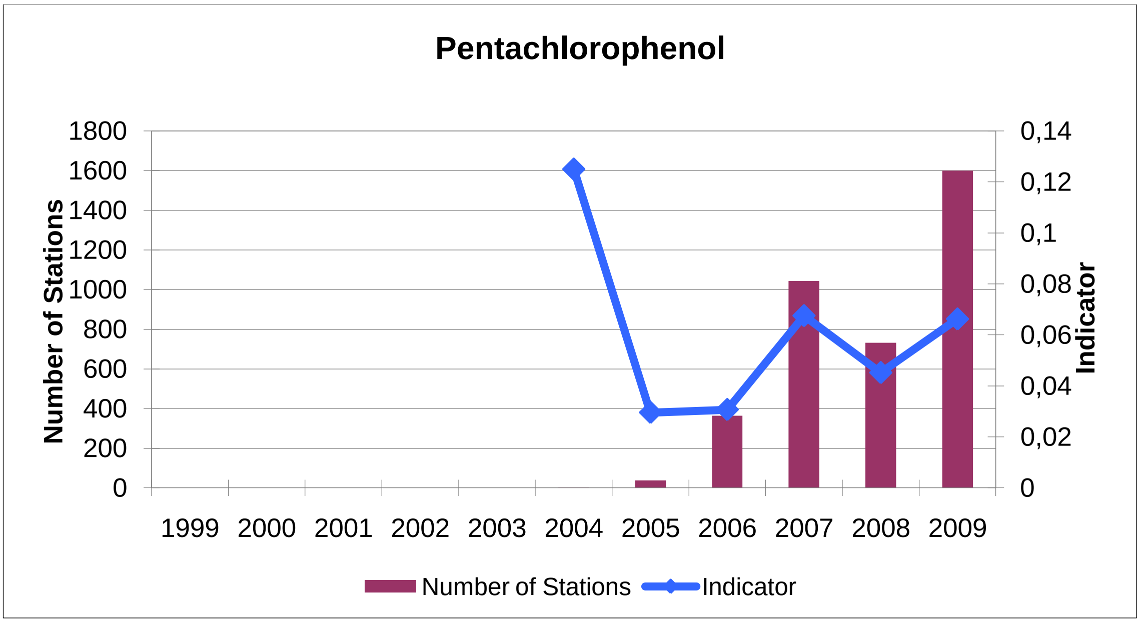


Figure 4.3.2.32b Traffic-light indicator for pentachlorophenol in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

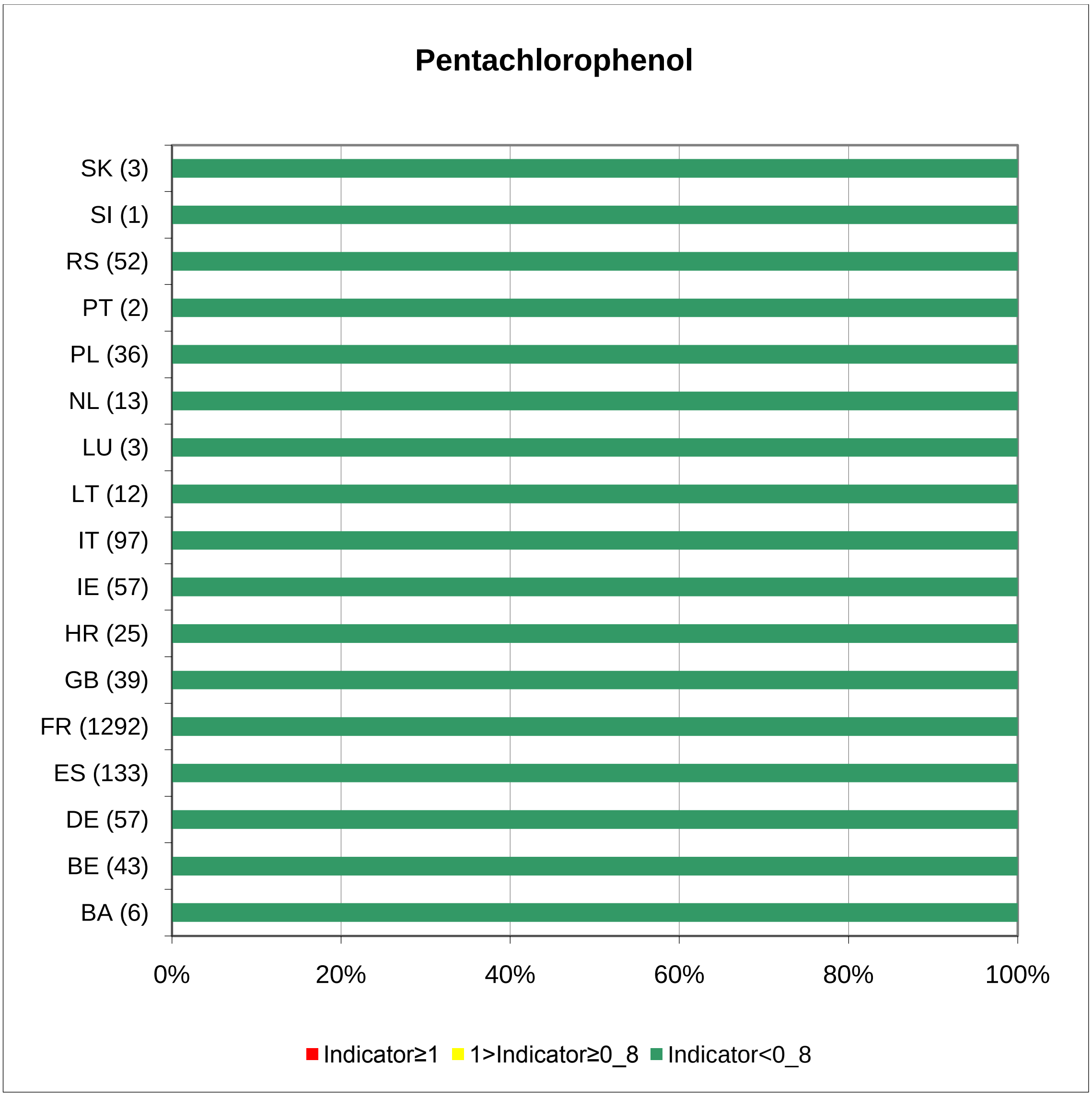


Figure 4.3.2.32c Map of traffic-light indicator for pentachlorophenol in rivers in 2008–2009

Figure 4.3.2.33a Long-term traffic-light indicator and number of stations for simazine in rivers

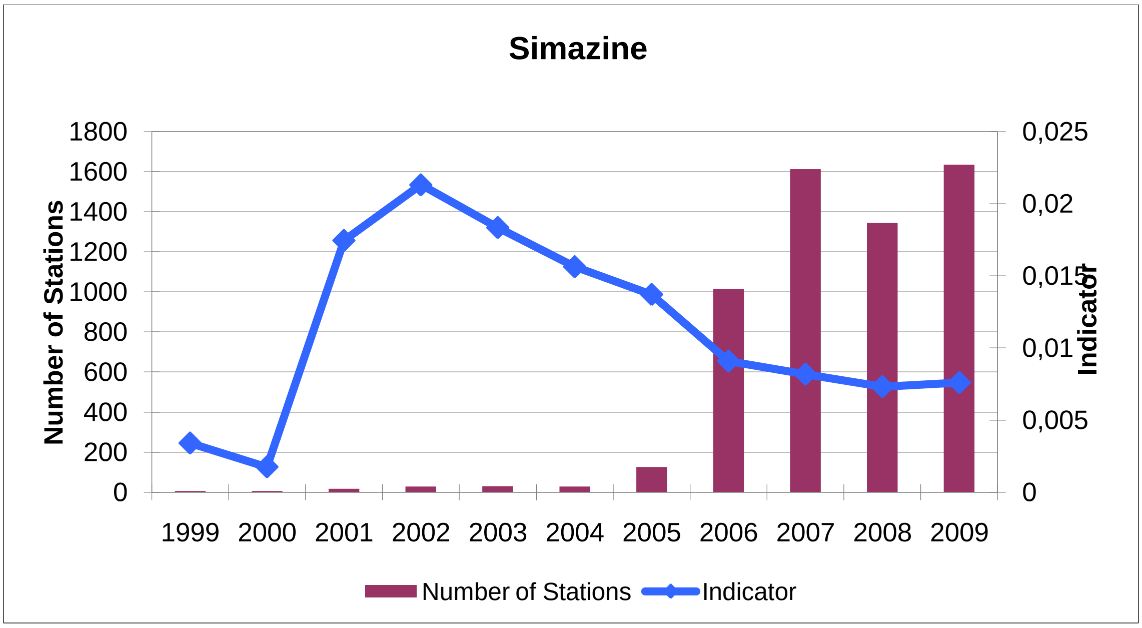


Figure 4.3.2.33b Traffic-light indicator for simazine in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

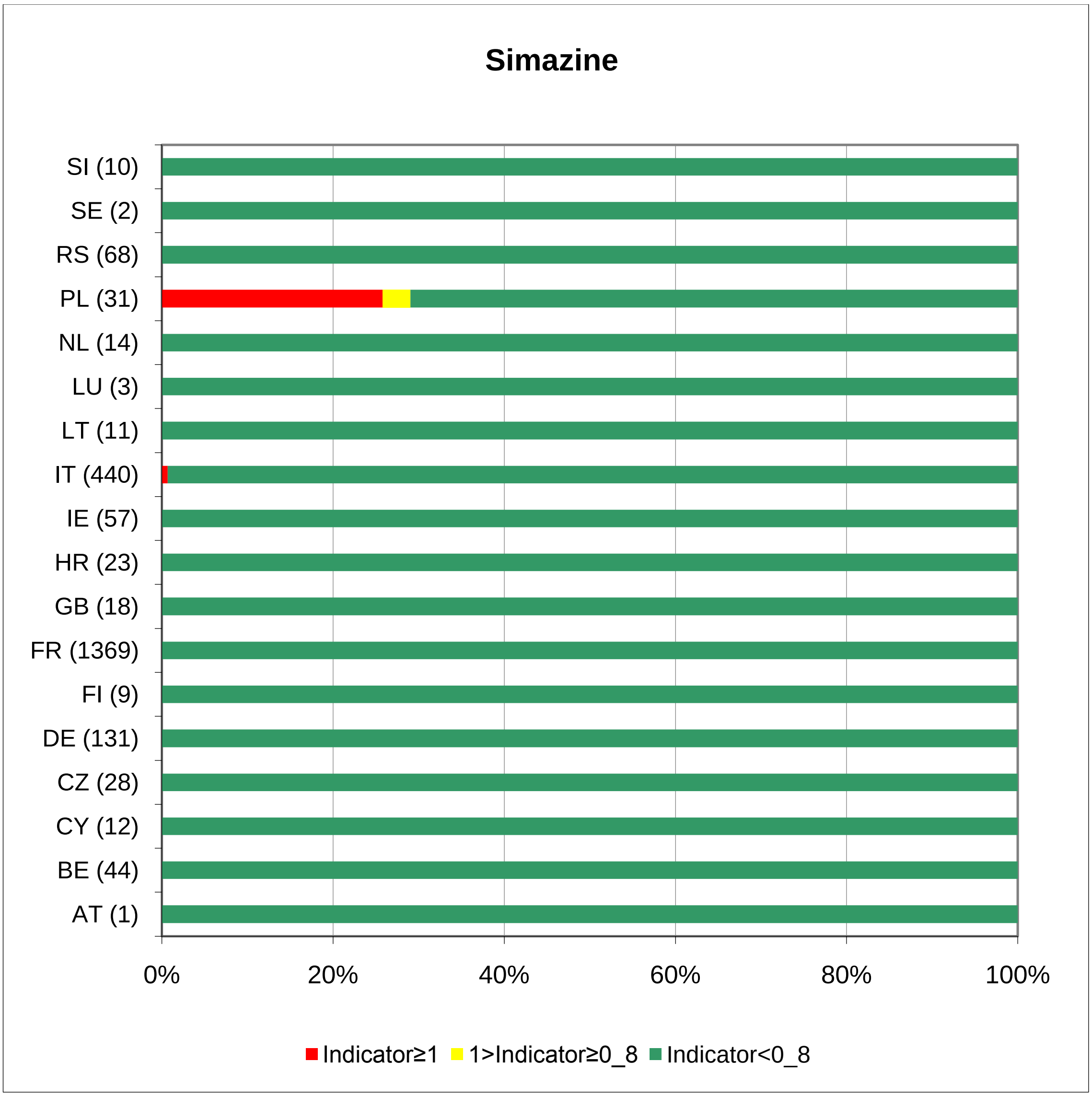
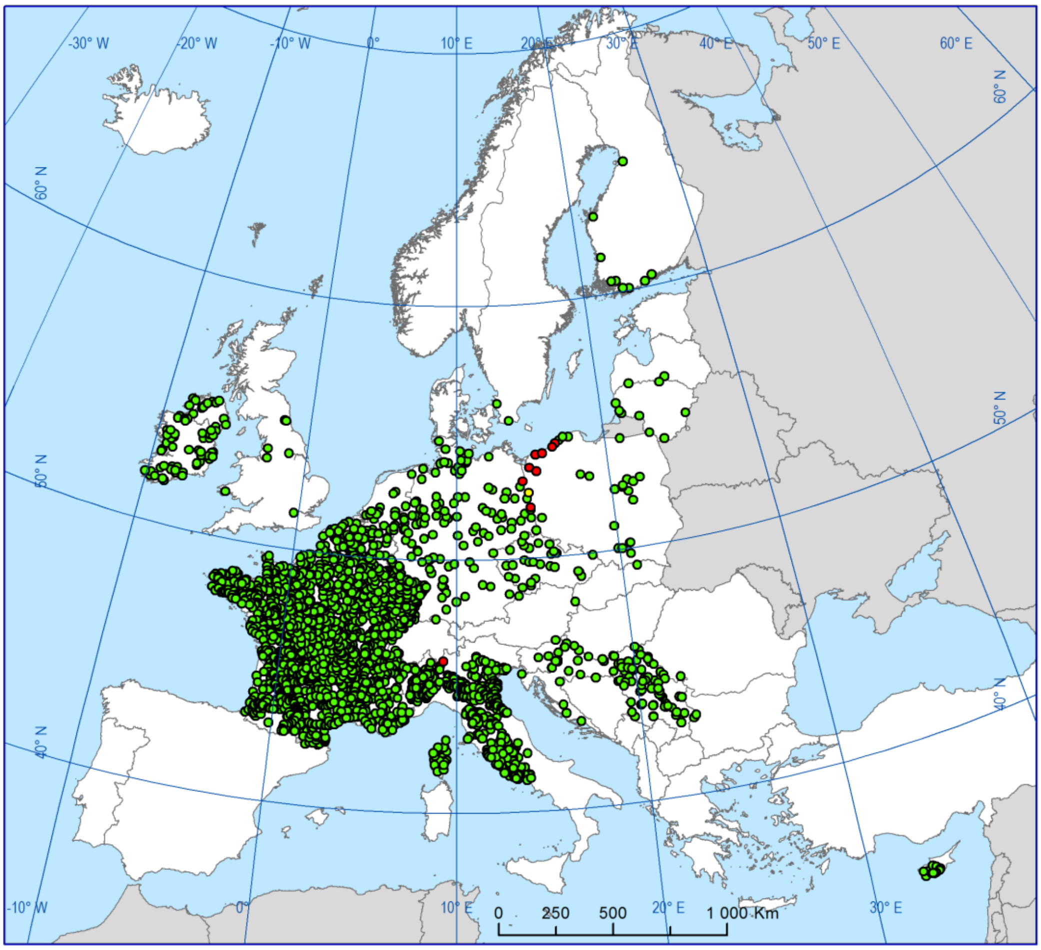


Figure 4.3.2.33c Map of traffic-light indicator for simazine in rivers in 2008–2009



- Indicator<0.8
- 1>Indicator≥0.8
- Indicator≥1
- outside coverage

Figure 4.3.2.34a Long-term traffic-light indicator and number of stations for tributyltin-cation in rivers

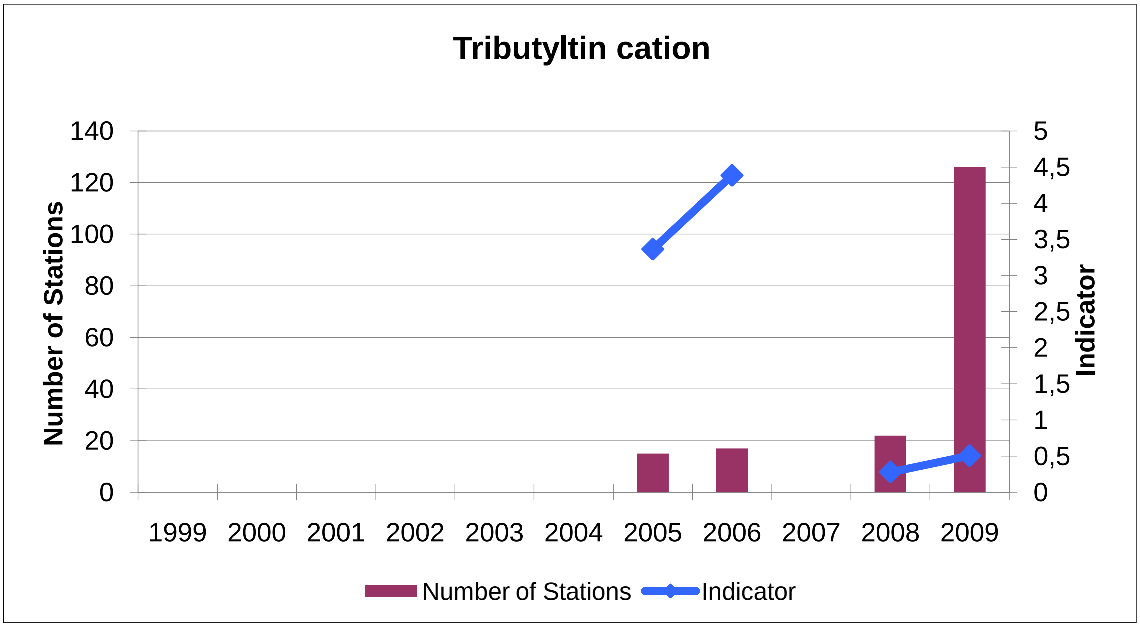


Figure 4.3.2.34b Traffic-light indicator for tributyltin-cation in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

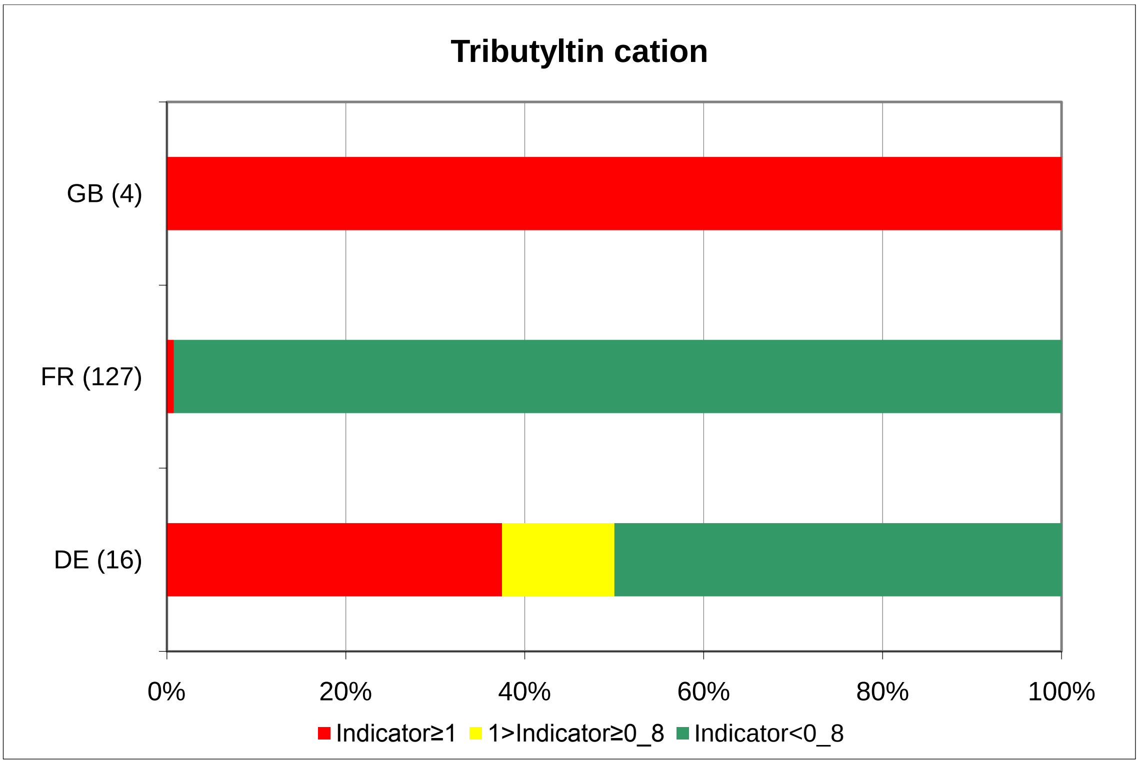


Figure 4.3.2.34c Map of traffic-light indicator for tributyltin-cation in rivers in 2008–2009

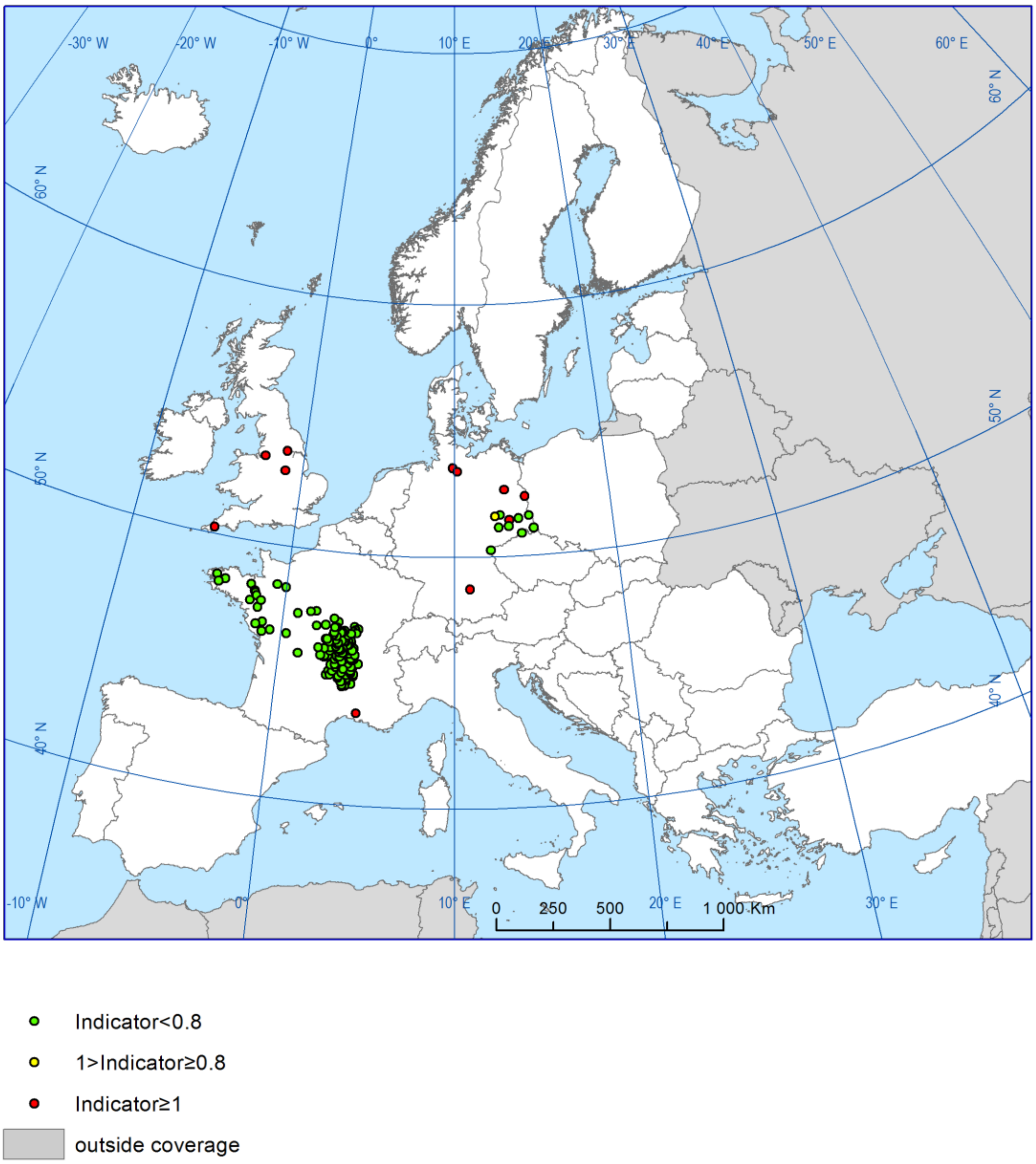


Figure 4.3.2.35a Long-term traffic-light indicator and number of stations for trichloromethane in rivers

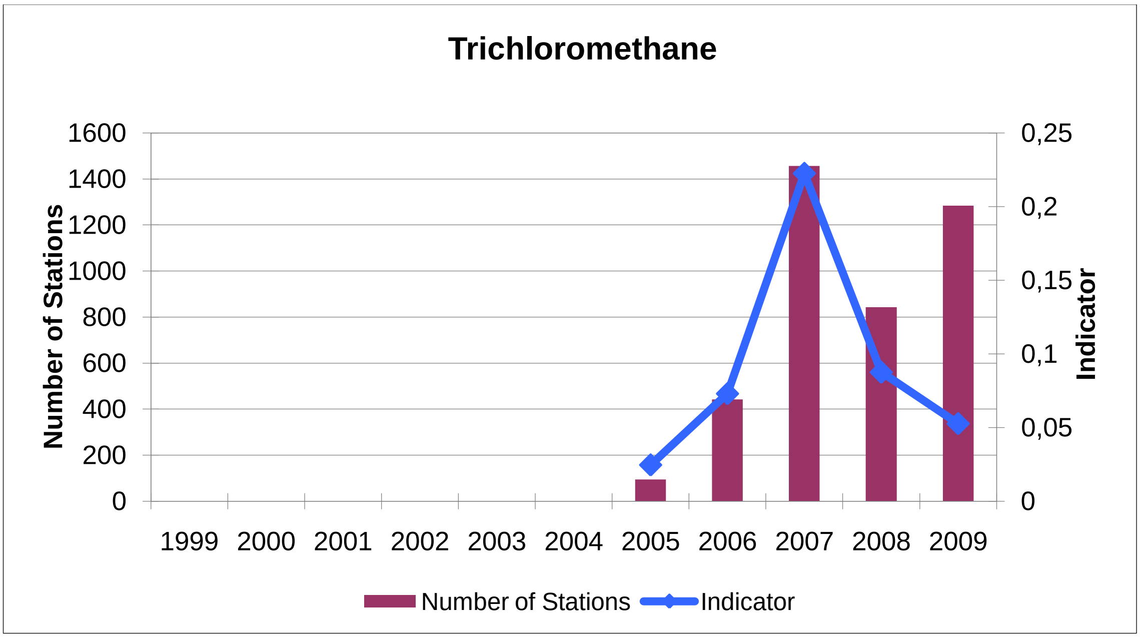


Figure 4.3.2.35b Traffic-light indicator for trichloromethane in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

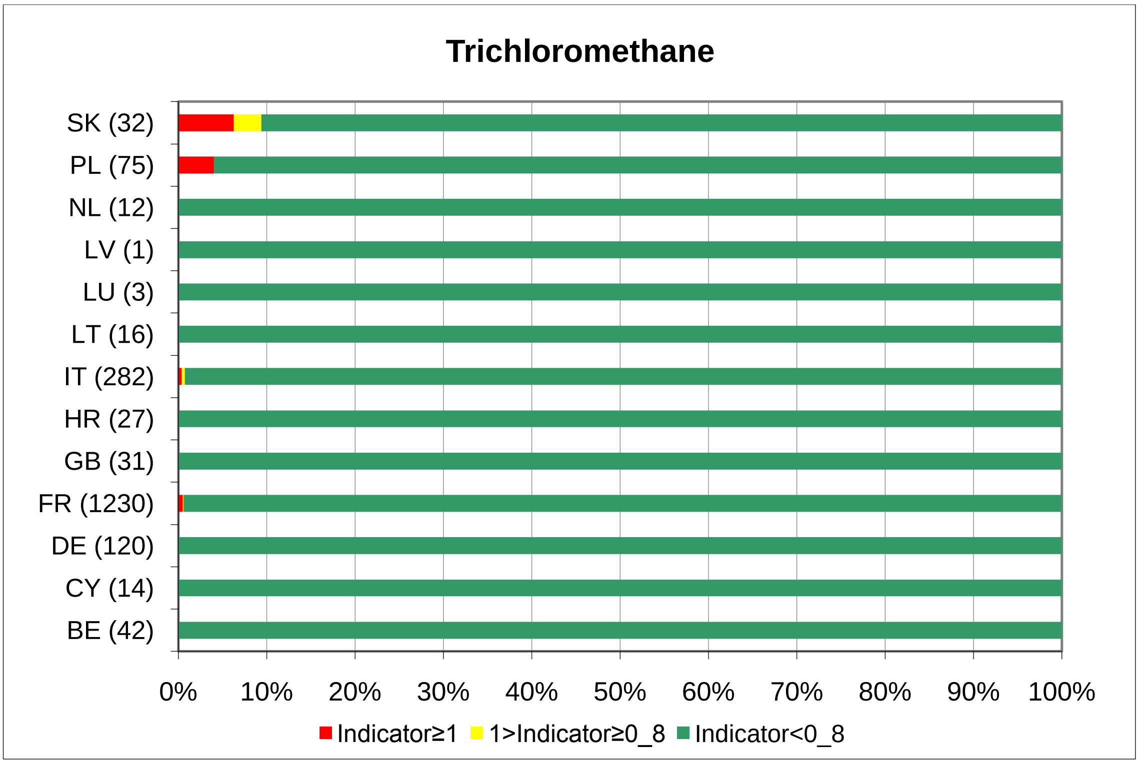


Figure 4.3.2.35c Map of traffic-light indicator for trichloromethane in rivers in 2008–2009

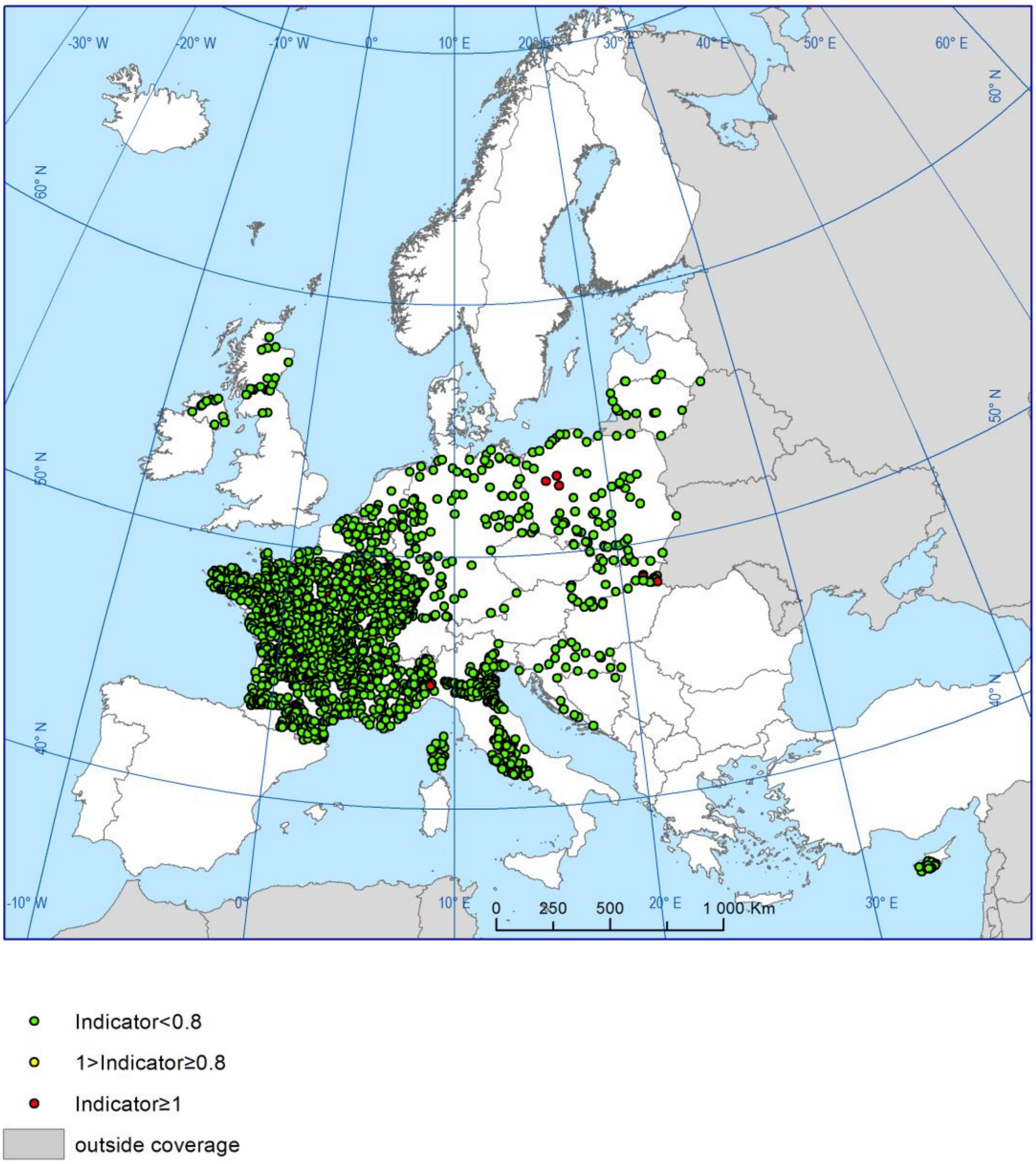


Figure 4.3.2.36a Long-term traffic-light indicator and number of stations for trifluralin in rivers

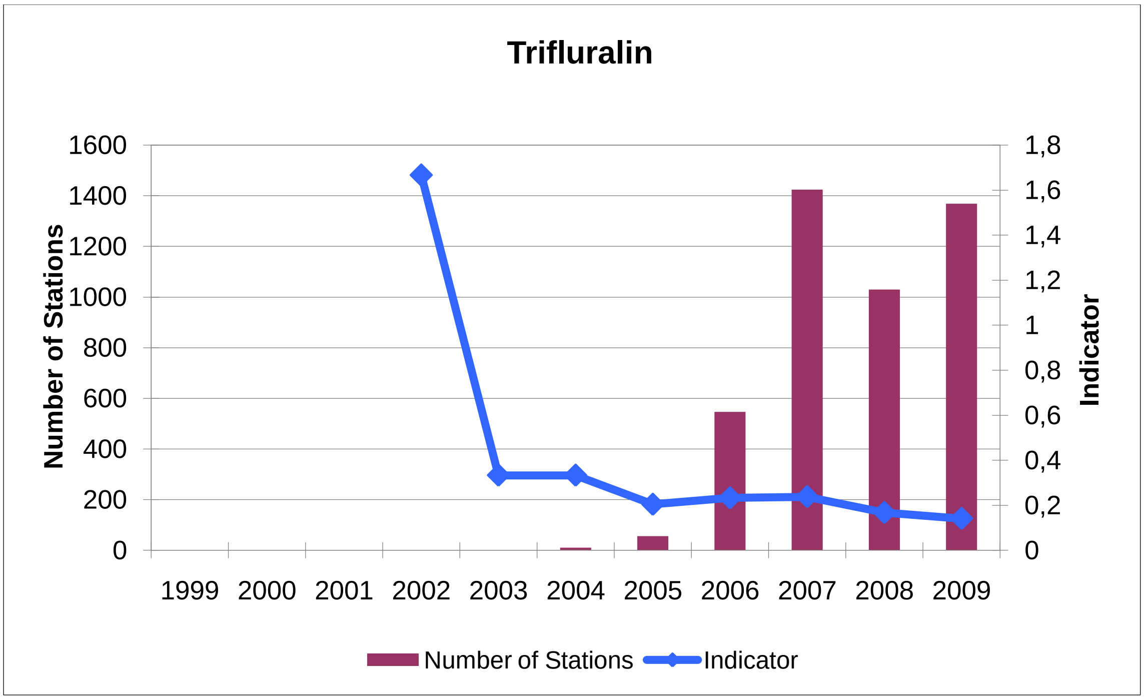


Figure 4.3.2.36b Traffic-light indicator for trifluralin in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

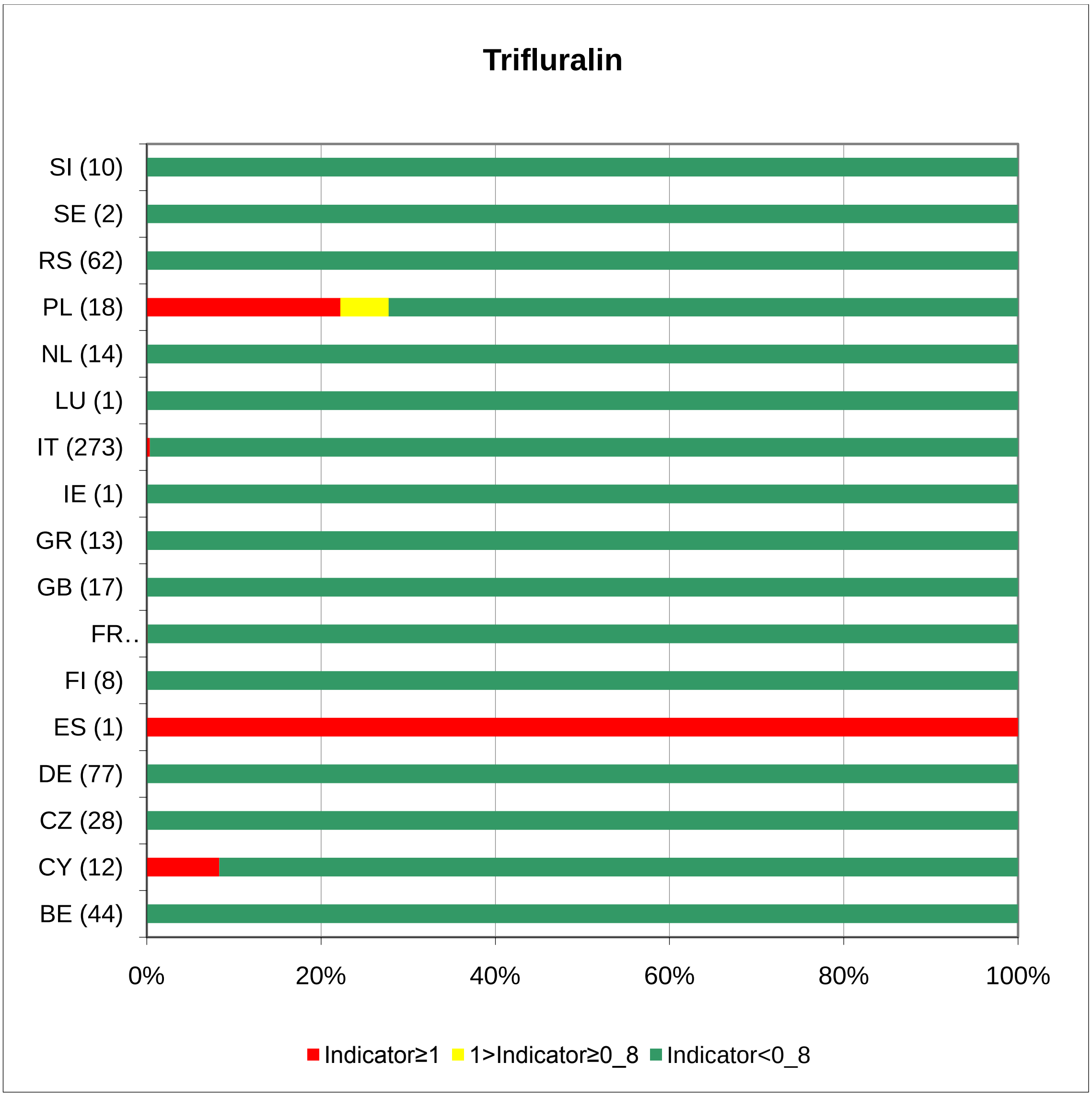


Figure 4.3.2.36c Map of traffic-light indicator for trifluralin in rivers in 2008–2009

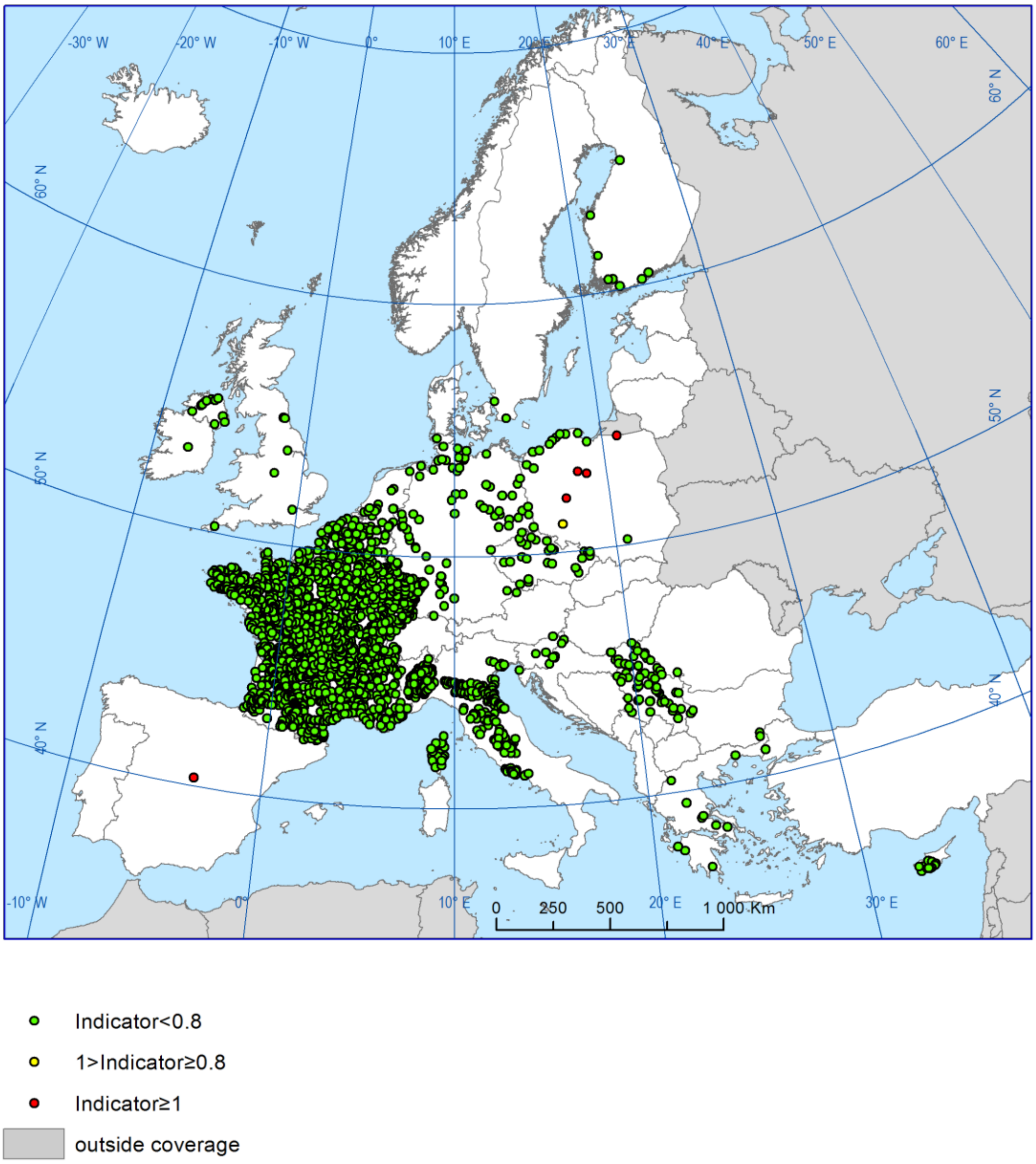


Figure 4.3.2.37a Long-term traffic-light indicator and number of stations for sum of benzo(b)fluoranthene and benzo(k)fluoranthene in rivers

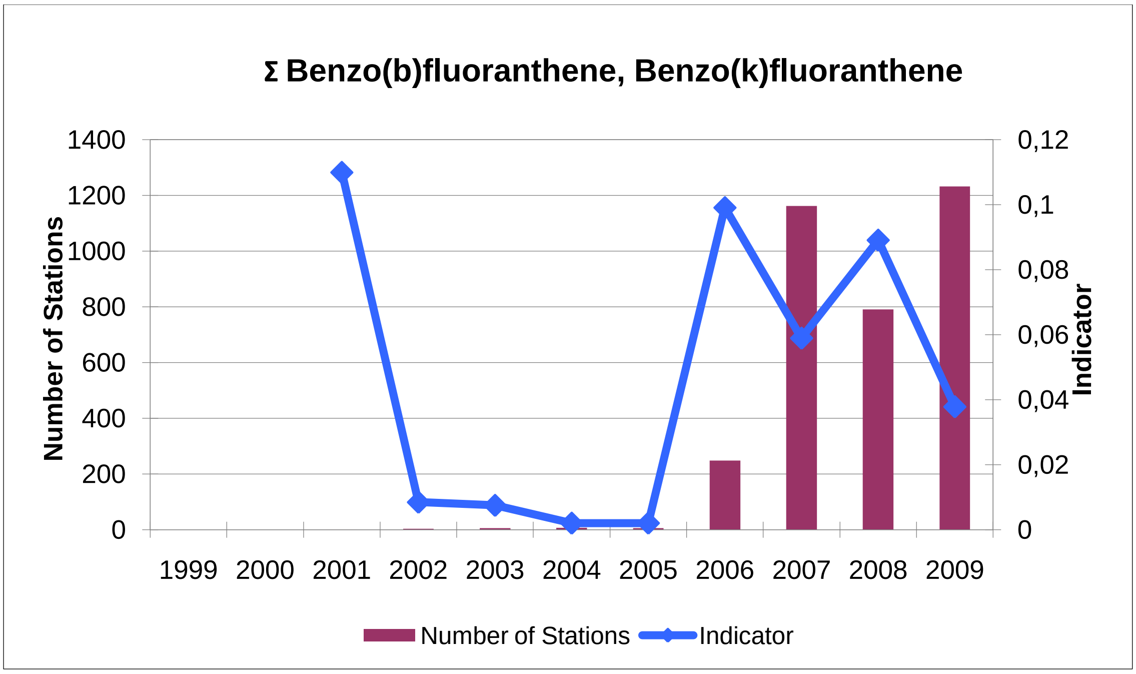


Figure 4.3.2.37b Traffic-light indicator for sum of benzo(b)fluoranthene and benzo(k)fluoranthene in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

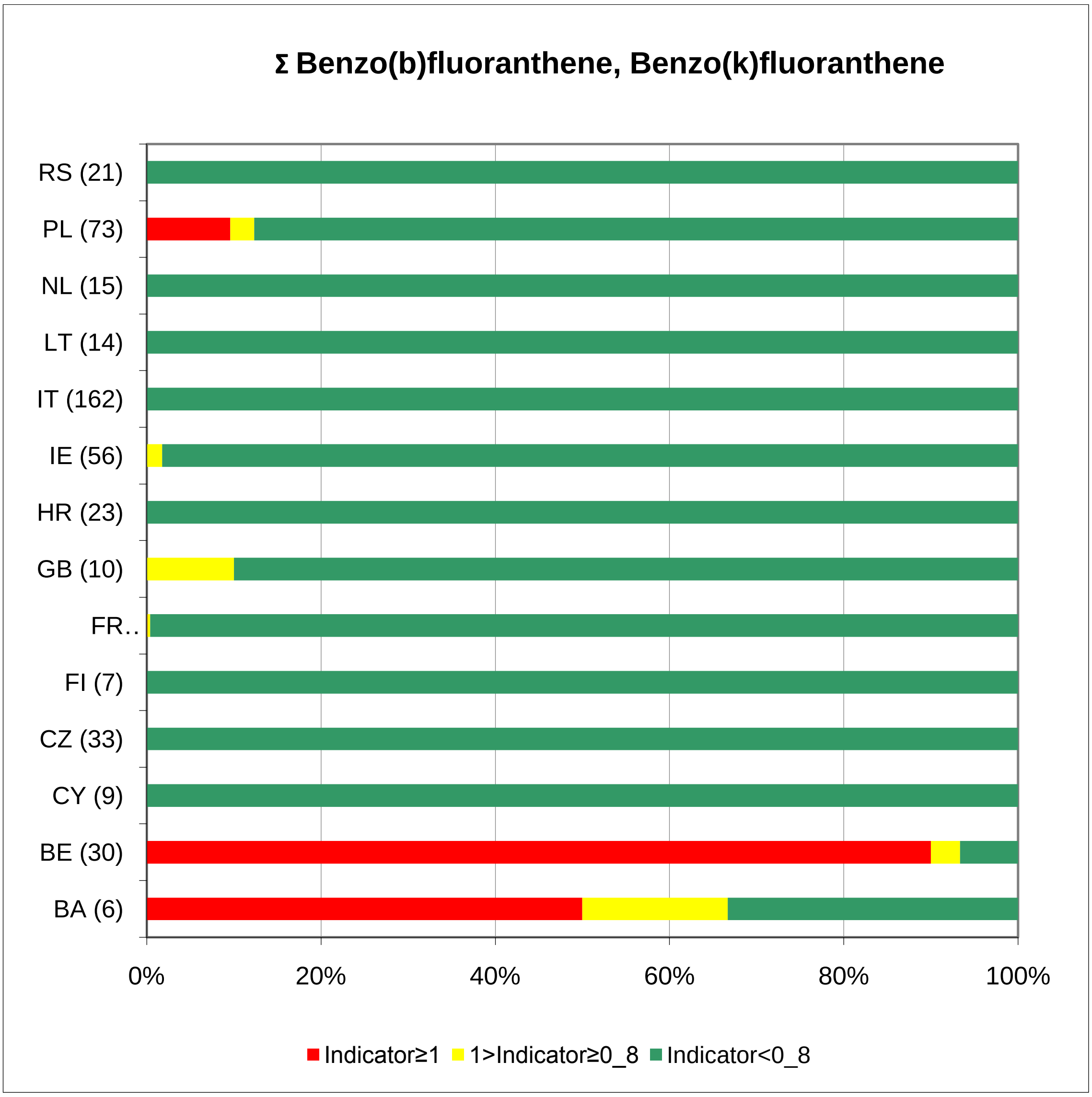


Figure 4.3.2.37c Map of traffic-light indicator for sum of benzo(b)fluoranthene and benzo(k)fluoranthene in rivers in 2008–2009

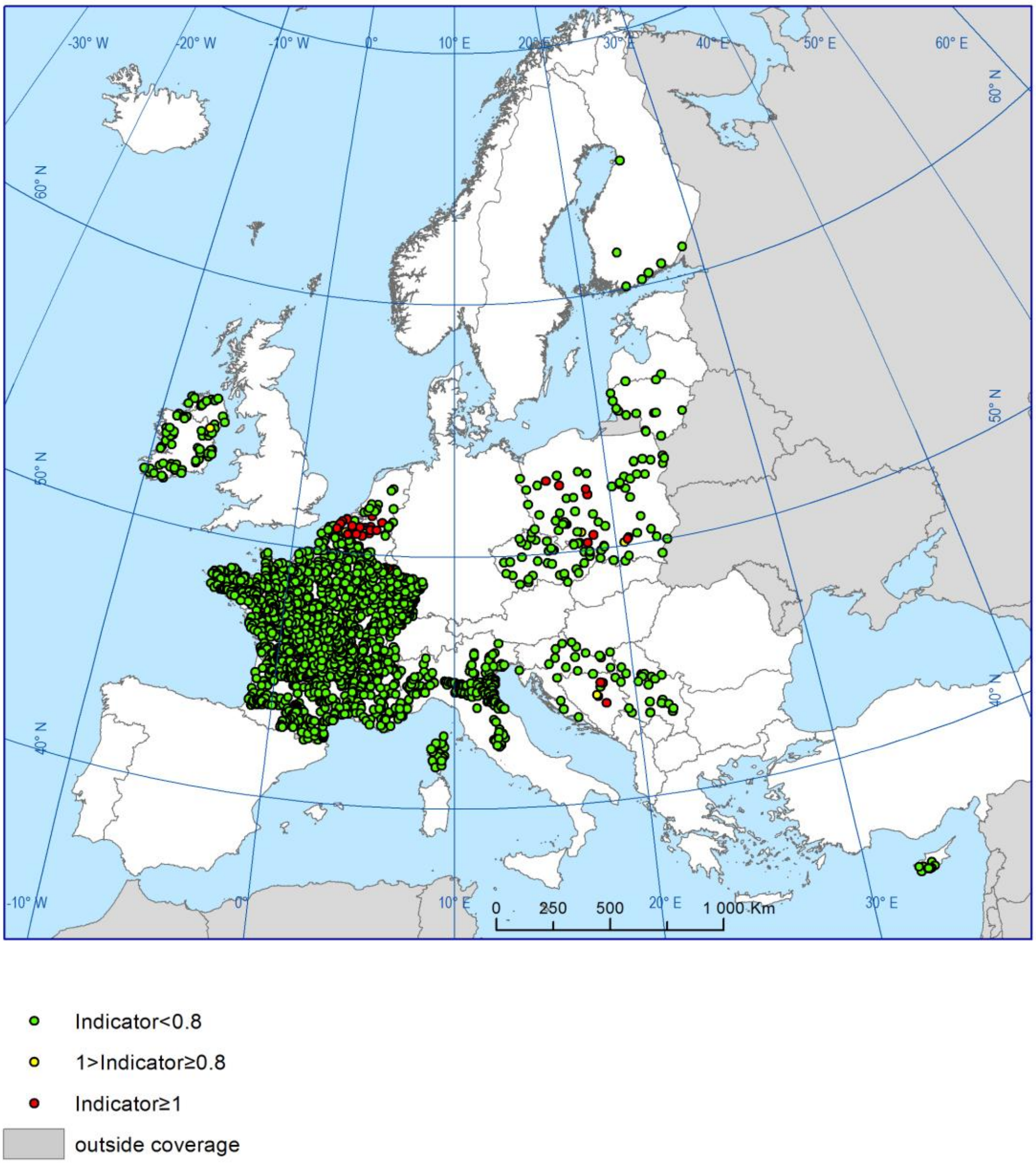


Figure 4.3.2.38a Long-term traffic-light indicator and number of stations for sum of benzo(g,h,i)-perylene and indeno(1,2,3-cd)-pyrene in rivers

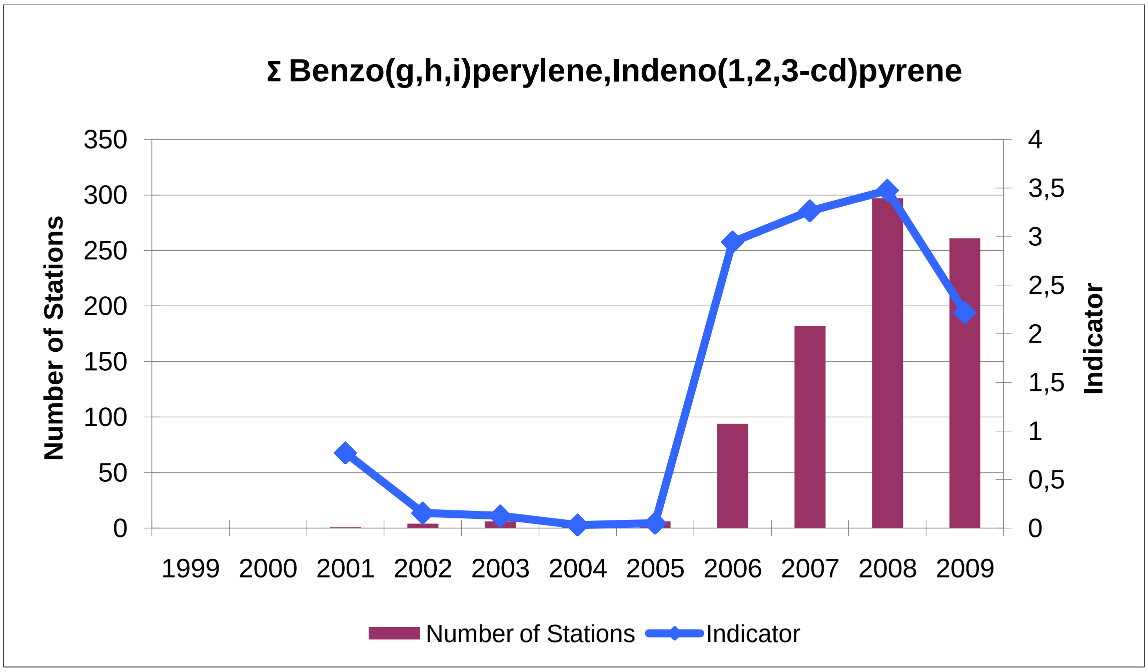


Figure 4.3.2.38b Traffic-light indicator for sum of benzo(g,h,i)-perylene and indeno(1,2,3-cd)-pyrene in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

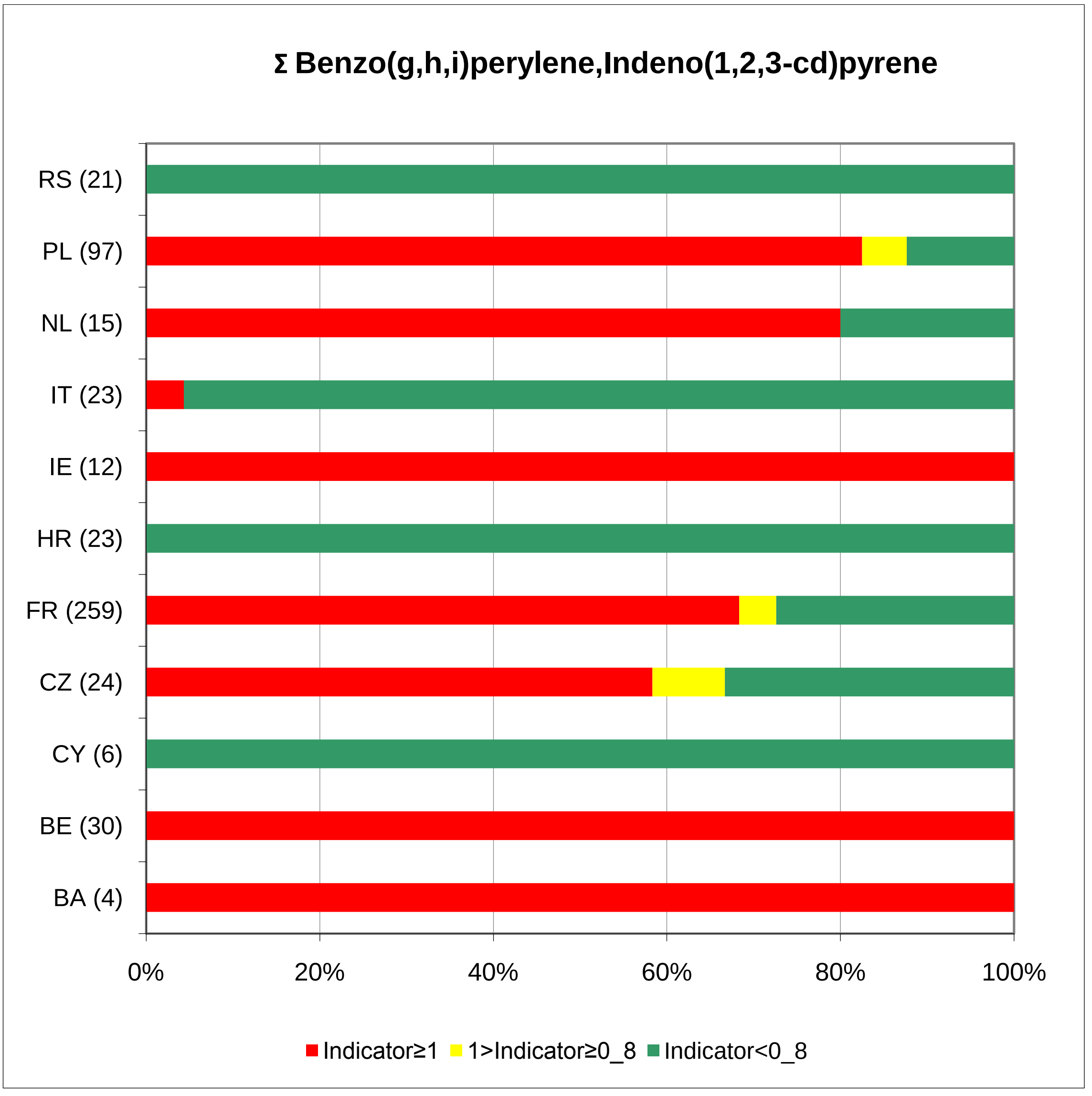


Figure 4.3.2.38c Map of traffic-light indicator for sum of benzo(g,h,i)-perylene and indeno(1,2,3-cd)-pyrene in rivers in 2008–2009

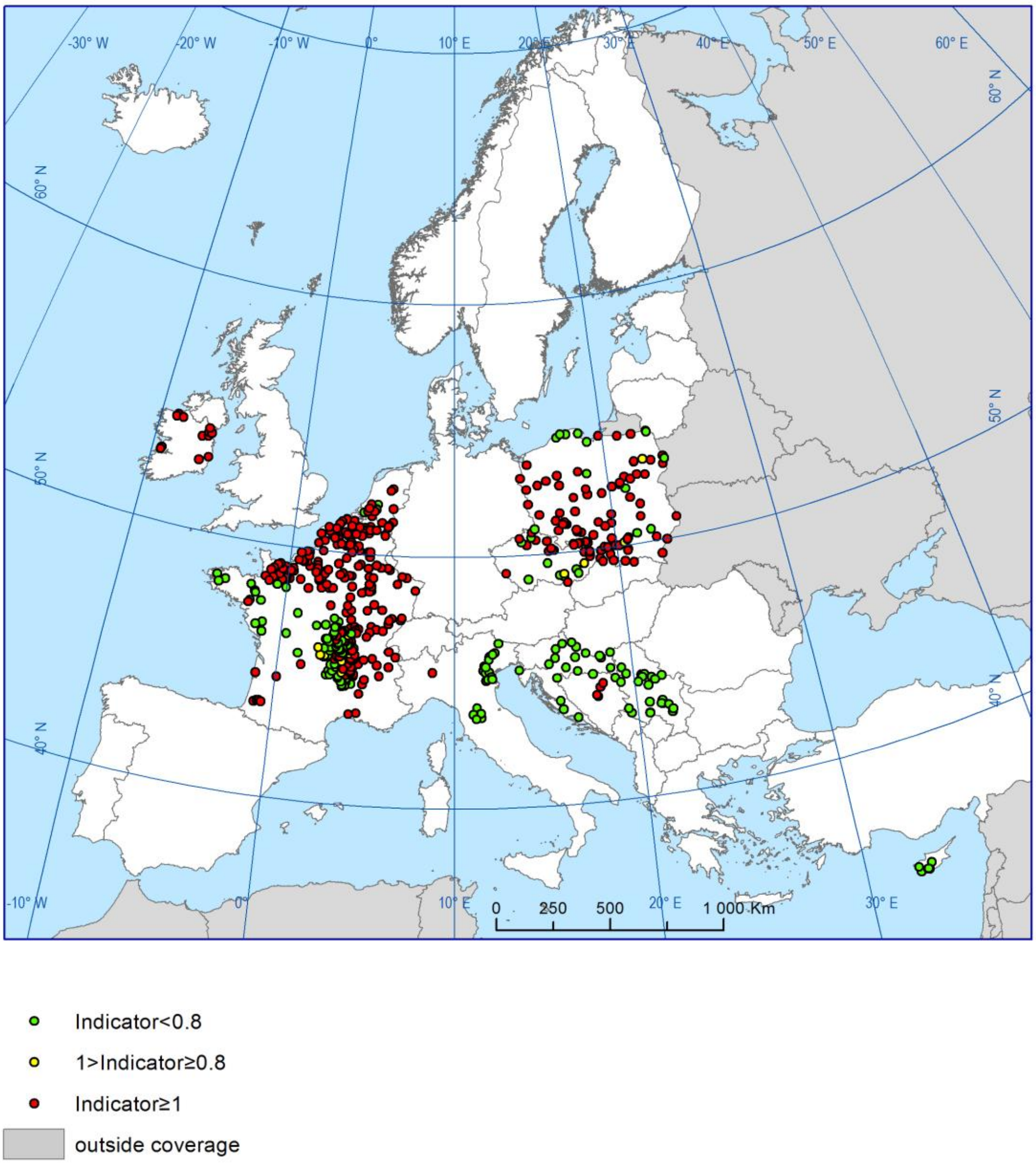


Figure 4.3.2.39a Long-term traffic-light indicator and number of stations for sum of aldrin, dieldrin, endrin, and isodrin in rivers

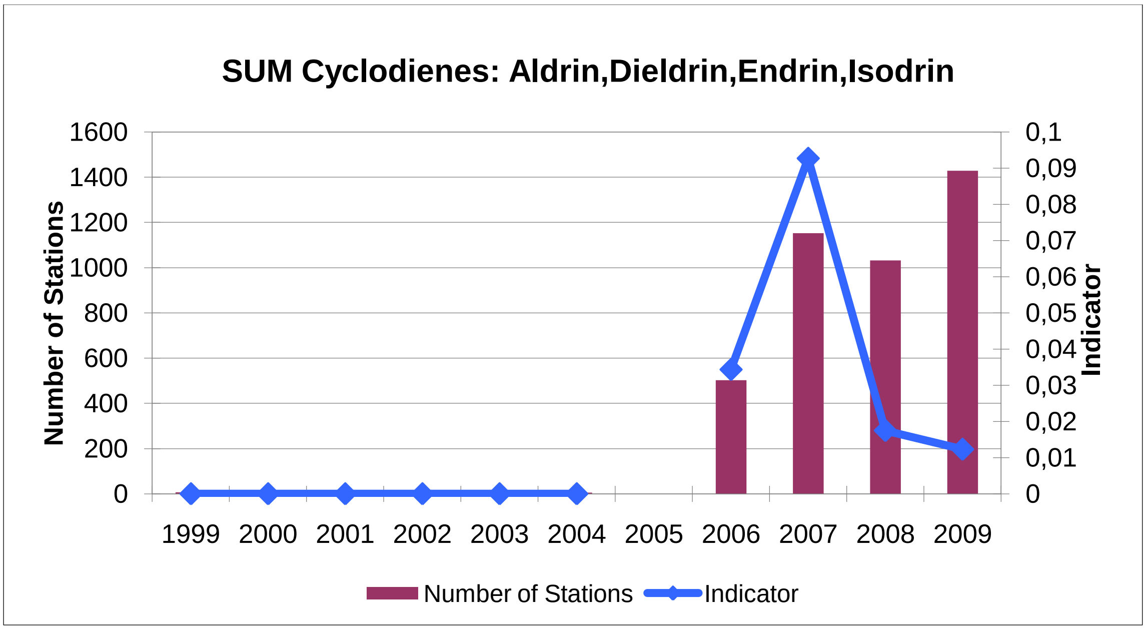


Figure 4.3.2.39b Traffic-light indicator for sum of aldrin, dieldrin, endrin, and isodrin in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

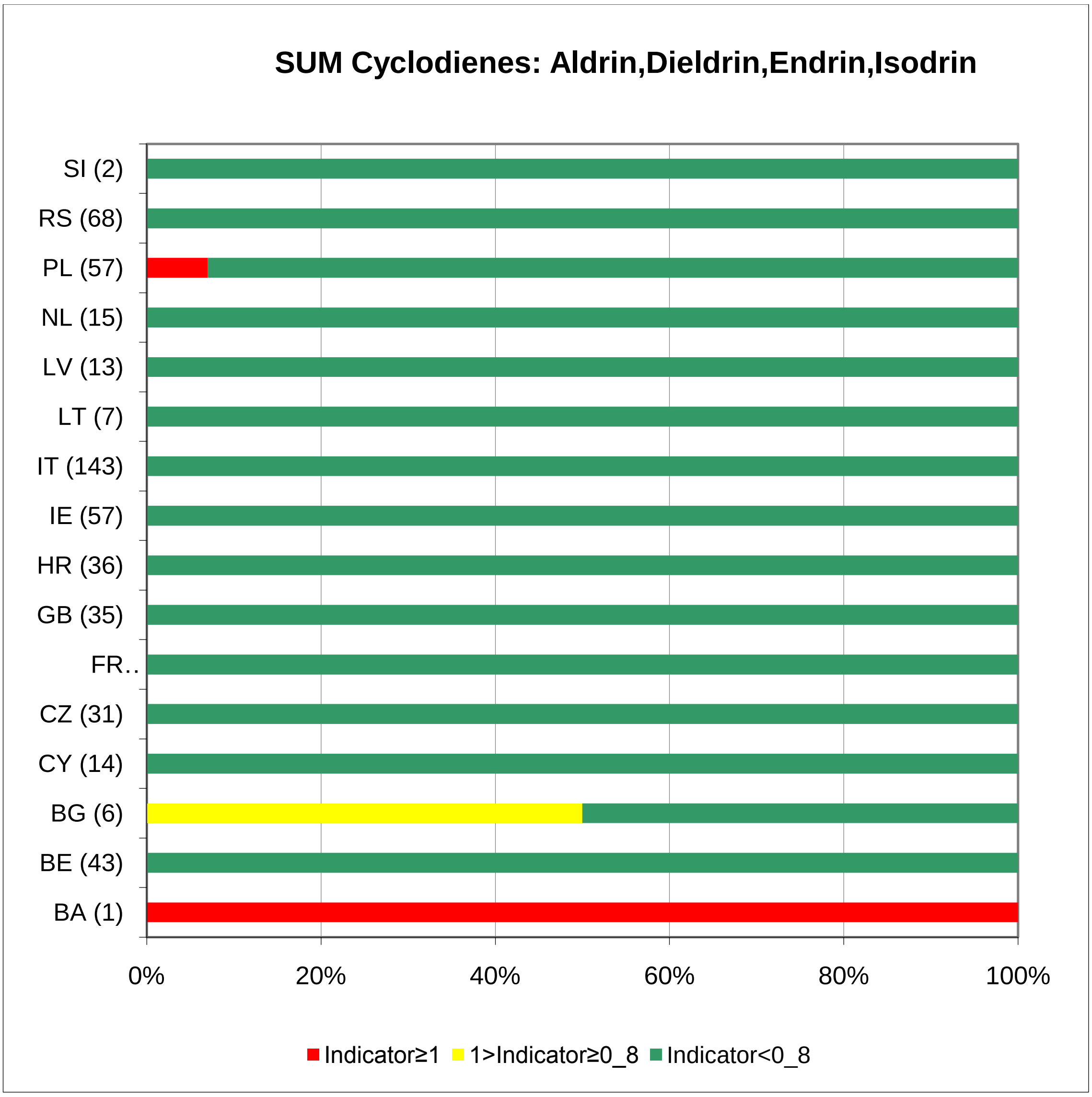


Figure 4.3.2.39c Map of traffic-light indicator for sum of aldrin, dieldrin, endrin, and isodrin in rivers in 2008–2009

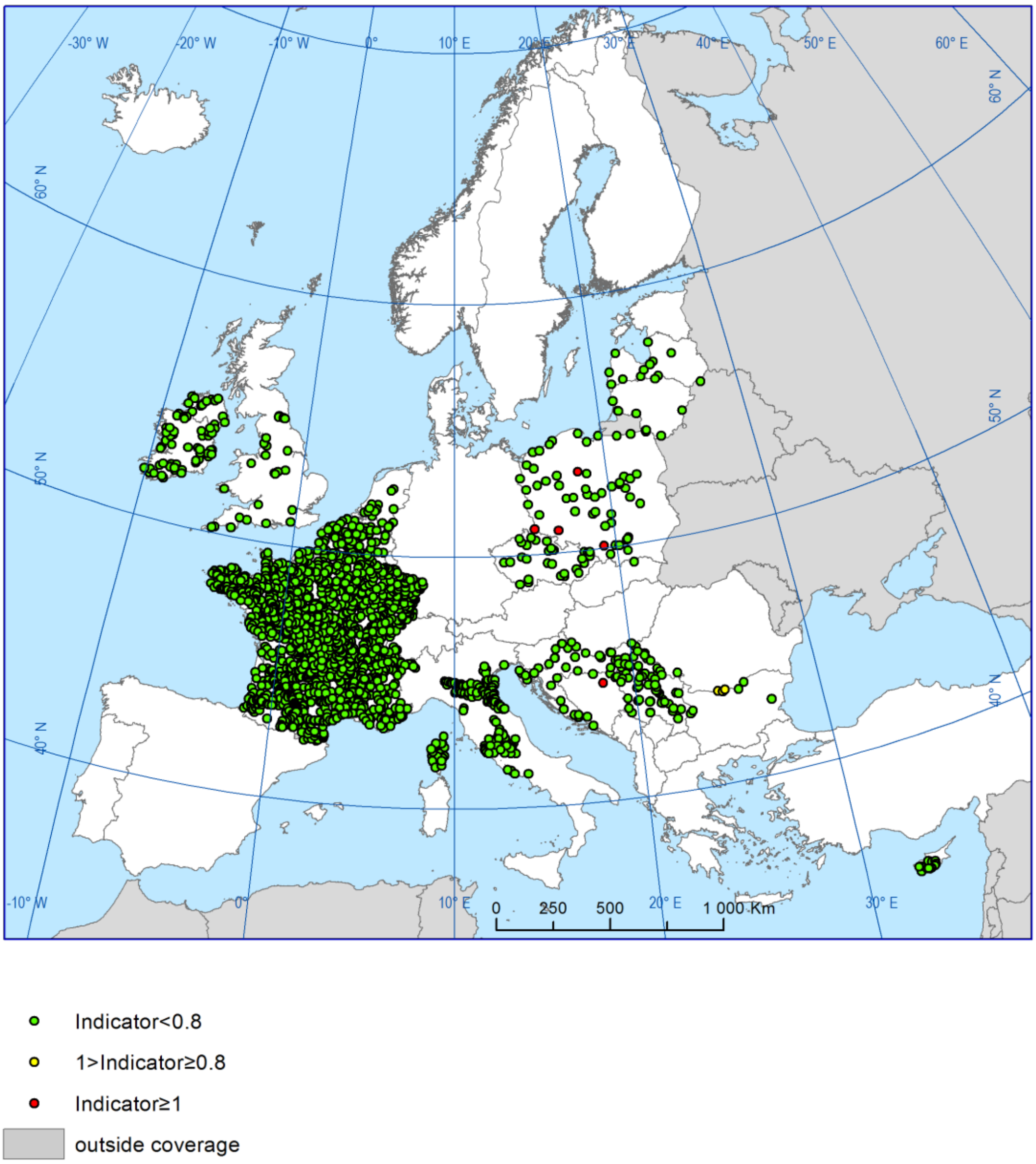


Figure 4.3.2.40a Long-term traffic-light indicator and number of stations for sum of hexachlorocyclohexane (HCH) in rivers

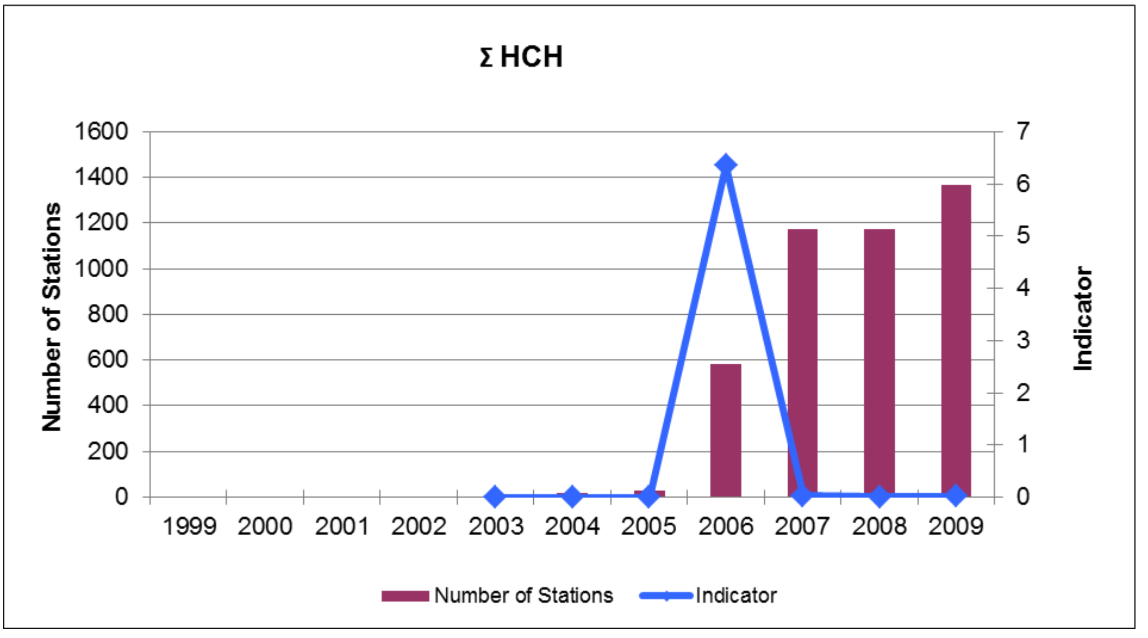


Figure 4.3.2.40b Traffic-light indicator for sum of hexachlorocyclohexane (HCH) in rivers from 2008–2009 (numbers of stations per country is shown in parenthesis)

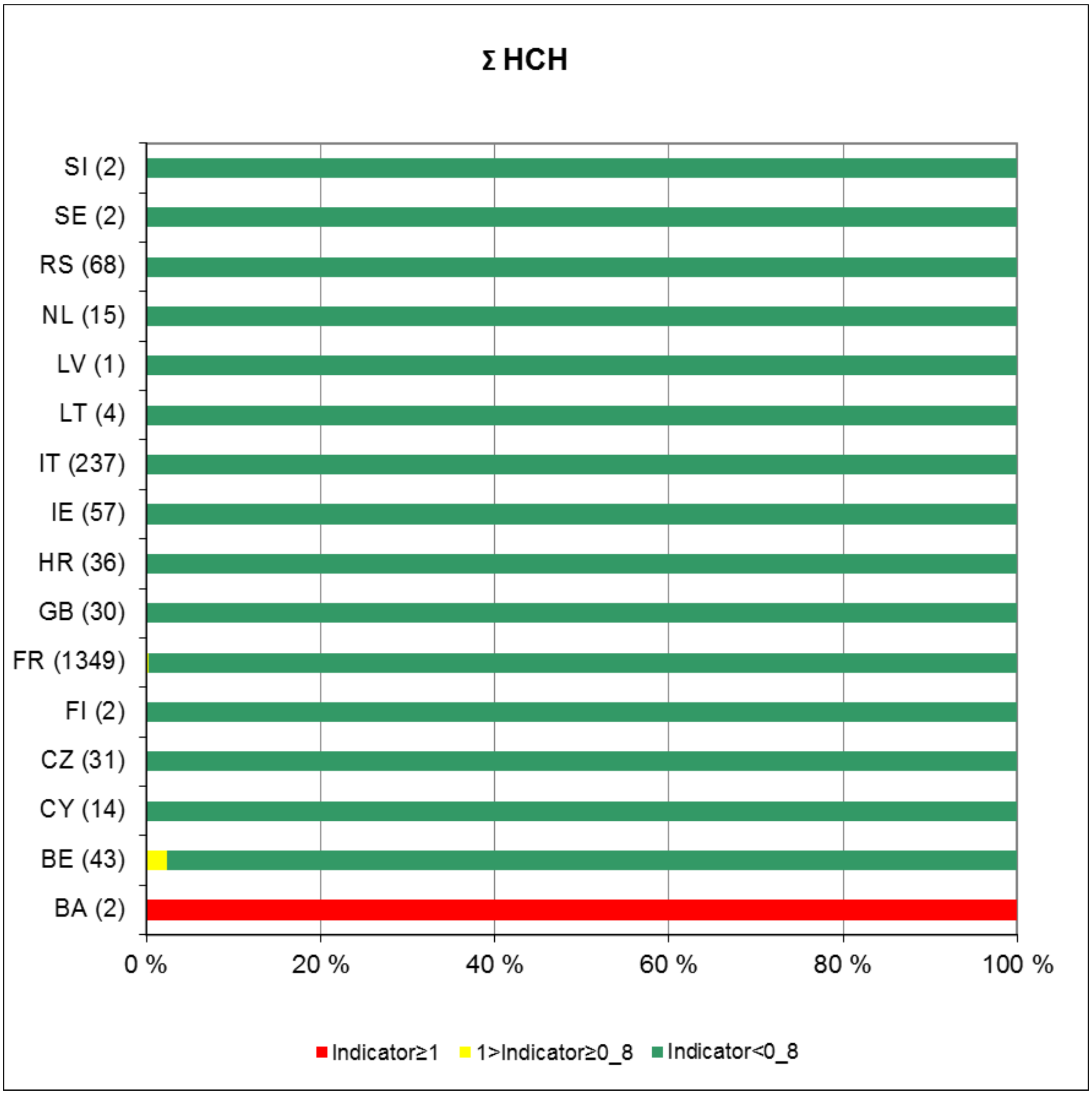
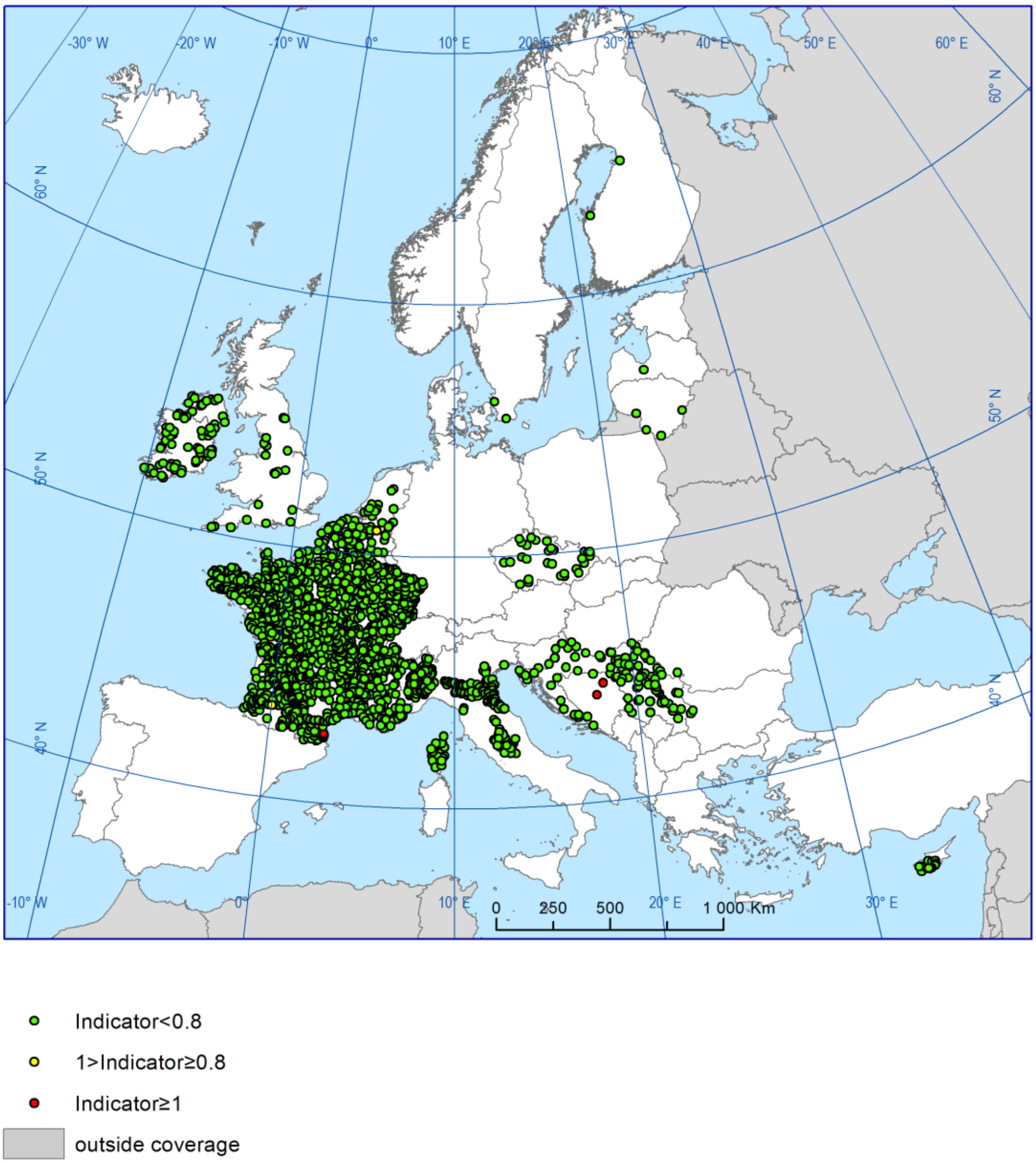


Figure 4.3.2.40c Map of traffic-light indicator for sum of hexachlorocyclohexane (HCH) in rivers in 2008–2009



5 Country review results

The feedback from the contributing countries is very much appreciated. 12 countries participated in commenting in 2013: DE, FI, FR, RO, SE and SI sent comments relating to the rivers section; AT, CH, CY, DE, DK, FR, GR, IE and SI sent comments relating to the groundwater section; DE and SE commented on the marine section of the report. The summary table for all of the country comments and the ETC/ICM replies to them is available at:

http://forum.eionet.europa.eu/nrc-eionet-freshwater/library/country-review-hazardous-substances-water-etc-icm-report-2013/hs-technical-report-country-comments-overview-table.

In general, the compilation of a huge amount of data was appreciated by the EEA member countries and the visualization of data helped some countries to discover errors in the reported data. As a result, countries are willing to update (redeliver) corrected data and some countries have already asked for corrections. This creates a good potential for the future enhancement of European SoE datasets. Streamlining with the WFD assessment principles was required for freshwater categories. Unification of spatial assessment units across water categories is also desirable in the next version of the report.

Groundwater

Countries commented mainly the following issues in the groundwater section of the report:

Terminology

Unclear terminology had been used throughout the groundwater section regarding quality standards. The terminology was unified to the Drinking Water Standard as requested by the contributing countries.

Use of drinking water standards

Concerns were expressed regarding using drinking water standards instead of the threshold values pursuant to the 2006/118/EC Directive. Since the ETC/ICM does not possess national threshold values that were established by countries, it was not feasible to use threshold values in the assessment. If the countries report relevant threshold values, those could be used as limits throughout the report instead of the drinking water standards. The EEA member and cooperating countries outside of the EU should also provide national "quality standards" instead of threshold values. The report will be then based on national quality standards instead of universal drinking water standards.

Maps

Some countries asked for the change of the map legend which was in reaction to comments received in 2012 adjusted, so that it reflected also the density of the network (a separate category for countries with <= 10 stations). Countries considered such a legend somehow misleading and somewhat penalizing the countries reporting a lot of data compared with countries reporting much less data. The plan is to change the assessment from country level to groundwater body level or even station level in the next version of the report, so this should not become an issue anymore.

Rivers

The purpose of the technical report was to elucidate the quality of the data base and to improve its quality in the future. Several of the countries were concerned about the numerous issues in the report, and especially the strict data handling resulting in the exclusion of a substantial amount of data. Below highlights some of the comments to the most relevant issues raised by the NRCs.

Issues related to LOD (limit of detection) and LOQ (limit of quantification)

The purpose of the technical report was to “clean-up” and make visible challenges in the data quality and data submitted, and the overall goal is to improve the data quality.

The Data Dictionary provides parameters, both mandatory and voluntary to be submitted, with the main goal of trying to improve the data quality. It is a continuous change in the requirements regarding parameters to be submitted. One of the essential parameters in the handling of data is the LOD and LOQ, being mandatory from 2008 onwards. We know that countries have reported LOD or LOQ prior to 2008 and in some countries the reported LOD or LOQ varies within that country and even in the year reported. Removing data where LOD, LOQ were missing or the given value = 0 was necessary to depict the challenges we have when we have to compare recent data with former data. In general analytical methods have improved and developed and there has been a reduction in LOD or LOQ from 1999 to 2009. Showing all of the data regardless if LOD or LOQ are included or not (or the given value = 0) could lead to concentrations depicted representing more the analytical challenge with high LOD or LOQ and not the real status within the environment. In addition, applying ½ LOD or ½ LOQ when measured concentrations are below LOD or LOQ would be impossible when LOD or LOQ are missing, or are given a zero value.

Comments from countries also showed that data were missing in the report. After a closer look on data from some countries it was shown that during data extraction, only LOQ had been taken into consideration although countries had reported LOD. In addition flags were lost in some data, depicting concentrations below LOD or LOQ, and values were reported as LOD, LOQ or lost. This issue will be resolved in the next report.

Some countries had reported the concentration of substances as = 0. After correspondence with countries it appeared that the cause for this was due to the measured concentrations being below LOD or LOQ. ½ LOD or ½ LOQ should have been reported as the correct concentration. Data where LOD, LOQ are higher than environmental quality standards (EQS) were also removed from the data set. This was done in order to show that countries should try if possible to use analytical methods that provide LOD or LOQ that are lower than EQS. When the measured and reported concentrations are below LOD or LOQ, and LOQ and LOD are higher than EQS, the value of the submitted data is minor. One obstacle with removing data where the measured concentrations are above LOD and LOQ (and LOD, LOQ > EQS) is that hazardous substances posing a serious threat to the environment are unfortunately lost in the data set.

A discussion has to continue, and we have to decide what to do with former data and data recently submitted. In the future it is important that data is reported in a homogenous way in order to make trend analyses, comparison, and get a correct picture of the environmental status. An overview of excluded data for 2008-2009 is given below, with respect to substances and country. Compared to Tables 2.3.2-2.3.3 in this report we see in general that less data are excluded for 2008-2009 compared to 1999-2009, due to LOD, LOQ having been submitted since it was mandatory to do so, but also that there has been an improvement in the quality of the data submitted.

Table 5.1 Number of samples excluded per substance due to missing coordinates, LOD, LOQ given value 0 or no value, and LOD, LOQ > EQS. Data from 2008–2009.

Substance	Not excluded	Excluded	Coordinates missing	LOD,LOQ = 0 or empty	LOD,LOQ > EQS
1,1,2,2-tetrachloroethene	2174	9	9	0	0
1,2-dichloroéthane	2263	84	38	0	46
4-nonylphenol	933	57	57	0	0
Alachlor	2921	118	117	0	1
Anthracene	2218	145	76	1	68
Atrazine	3082	163	105	1	57
Benzene	2443	41	34	0	7
Benzo(a)pyrene	2310	49	28	2	19
Cadmium	2497	1968	81	38	1849
Cadmium dissolved	272	29	0	0	29
Chlorfenvinphos	2519	126	80	0	46
Chlorpyrifos	2438	269	21	0	248
DDT, p,p'	1950	140	30	0	110
Di (2-ethylhexyl) phthalate (DEHP)	1648	50	1	0	49
Dichloromethane	2191	12	2	0	10
Diuron	2698	115	82	0	33
Endosulfan	490	435	1	0	434
Fluoranthene	2292	149	72	2	75
Hexachlorobenzene (HCB)	2470	413	75	0	338
Hexachlorobutadiene (HCBD)	2173	271	66	0	205
Hexachlorocyclohexane (HCH)	183	177	1	0	176
Isoproturon	2655	82	66	0	16
Lead	3834	368	161	78	129
Lead dissolved	560	1	0	0	1
Mercury	2159	1276	25	17	1234
Mercury dissolved	253	9	0	0	9
Naphthalene	2032	223	3	55	165
Nickel	3800	441	163	42	236
Nickel dissolved	520	2	0	1	1
Para-tert-octylphenol	1171	139	57	0	82
Pentachlorobenzene	1765	323	56	1	266
Pentachlorophenol	2344	113	57	0	56
Simazine	3015	165	112	0	53
∑ Cyclodienes	2462	574	102	0	472
DDT Total	2001	173	36	0	137
HCH	2540	295	90	0	205
∑ Benzo(b)fluoranthene, Benzo(k)fluoranthene	2055	140	24	0	116
∑ Benzo(g,h,i)perylene, Indeno(1,2,3-cd)pyrene	418	1825	8	0	1817

Table 5.2 Number of samples excluded per country due to missing coordinates, LOD, LOQ given value 0 or not reported, and LOD, LOQ > EQS. Data from 2008–2009.

Country Code	Not excluded	Excluded	Coordinates missing	LOD, LOQ = 0 or empty	LOD, LOQ > EQS	% excluded
AT	44	12	0	0	12	21
BA	231	61	0	0	61	21
BE	1887	292	0	0	292	13
BG	212	76	2	0	74	26
CH	6	0	0	0	0	0
CY	496	144	0	0	144	23
CZ	703	192	181	0	11	21
DE	2774	169	0	2	167	6
EE	39	0	0	0	0	0
ES	814	1289	0	0	1289	61
FI	500	53	0	0	53	10
FR	49780	3525	0	0	3525	7
GB	2893	484	0	0	484	14
GR	133	5	0	1	4	4
HR	1068	3	0	0	3	0
IE	1598	1032	952	0	80	39
IS	9	0	0	0	0	0
IT	10102	3807	748	0	3059	27
LT	510	109	0	0	109	18
LU	88	20	0	0	20	19
LV	227	232	130	0	102	51
MK	11	49	0	0	49	82
NL	921	1	0	0	1	0
NO	117	21	21	0	0	15
PL	1742	56	0	56	0	3
PT	146	66	0	1	65	31
RO	182	189	0	152	37	51
RS	1948	8	0	0	8	0
SE	554	0	0	0	0	0
SI	210	0	0	0	0	0
SK	348	86	0	27	59	20

Missing coordinates

Since the reports contain maps it is essential that coordinates are submitted.

Dissolved vs. total concentrations of metals

The types of metals sampled that have been submitted into the database has not been done in a homogenous way. Basically the concentration of the total and dissolved metals and any information about the types of metals that are found in the database is not present in the database. It is well known that several metals show a high affinity towards organic carbon in the water phase and form strong associations, while other metals are more or less present as dissolved. In addition factors like pH, water hardness, ionic strength, and type of organic matter and concentrations are important factors with respect to defining the type of metal. For comparison of trends and status it is of uttermost importance that the countries report the handling of the sample, filtered or not. In the Data Dictionary the phrase “metal and its compound” is not well defined, e.g., in the Directive 2008/105/EC (“EQS-Directive”), the separation of a metal’s fraction in total and dissolved concentration is done by filtering them through a 0.45 µm filter, is provided (Annex 1, Part B (3)).

The purpose of the separation of metals as “metal and its compound” and “metal dissolved” was done to reflect the available data in the database. From the comments from Member States we know that “metal and its compound” contain both filtered (dissolved) and non-filtered (total concentration) samples.

A harmonization with regard to the submission of metal data has to be discussed. Water hardness and the reporting of Cd concentration was not mentioned here, but this is also an important topic to follow, since water hardness is missing in most of the submitted data.

Marine environment

The queries and comments from Sweden and Germany are quite relevant and we will try to answer these with respect to the classification of hazardous substance concentrations as follows:

EU classification

What can be relevant for the EEA/ETC MAR001 indicator (Hazardous Substances in Marine Organisms) are the environmental quality standards (EQS, current and proposed) and the foodstuff limits for marine organisms. In our opinion, the following questions remain:

1. Should we only use the current EQS (i.e. Hg, HCB and HCBD in "prey tissue", 2008/105/EC art.3 §2a) or also consider the proposed EQS which can be ratified later this year?

2. If we choose to use the EU’s EQS, how should we interpret "prey tissue", as used in the current EQSD, or "fish" as used in the proposed EQSD, taking into consideration that concentrations are submitted for a particular tissue like the muscle or liver? HELCOM assessment criteria for their core indicators uses both the current and proposed EQS directly. In contrast, OSPAR currently does not use the EU’s EQS as part of the assessment criteria in that "Eco-toxicological Assessment Criteria (EACs) provide an adequate level of protection, and demonstrate where relevant that these can be equivalent to the level of protection associated with the attainment of the WFD EQS" (MIME 2012 summary record). We are not aware of any assessment criteria for the Mediterranean Sea or the Black Sea regions. In this regard, there is perhaps a reason to have a common agreement as to how the EQS should be applied on a European scale. Furthermore, there is merit in having Regional Sea specific assessment criteria, but for the time being this would only apply to the OSPAR and HELCOM regions. It should be kept in mind that the MAR001 is open for improvements taking into account developments in EU and Regional Sea Convention (RSC) policy.

Critical look at the applicability of available BACs

Germany points out that HELCOM has found OSPAR Background Assessment Criteria (BAC) useful for some organisms but not others. This points towards a need for region-specific criteria. In our opinion this should be a Regional Sea Convention task where a consensus can be reached by the contracting parties. That said, it should be an ETC task to keep updated on the Regional Sea Convention agreement and endeavour to apply them when revising the MAR001. This will be one of the issues to address when the MAR001 methodology is updated this year.

Regional assessment

There is some merit in having an assessment for each water body instead of the MAR001 approach where there is a simple Regional Sea assessment based on a station by station analyses. However, the water bodies only cover a small part of the sea regions of Europe. Should MAR001 be revised to only cover Water Framework Directive (WFD) water bodies?

Use of foodstuff standards

Germany is correct in that these standards cannot be used to assess the hazard to the environment and perhaps such standards should not be used in a Pan European indicator such as MAR001. HELCOM and MAR001 use foodstuff standards but OSPAR does not. Sweden considers the standards useful and gives as an example of a standard for a sum of six PCBs. Using a sum in this regard would break with how PCB is otherwise assessed having CB-specific BAC and EACs to distinguish "Low" and "High", respectively. We think this sum would complicate MAR001 unnecessarily. There are pros and cons to the use of foodstuff standards and this points towards the need for a discussion and to reach a consensus on this issue in a common forum.

EAC

Germany is correct in that MAR001 incorrectly defined the "E" in EAC as "ecotoxicological" (from the old definition) and not as it should be, i.e. "environmental".

Data used

Improvements in the MAR001 methodology will permit more data to be included. This is basically a result of extending the species list. However, other screening criteria, such as time period or availability of preferred basis data, may restrict the amount of data available.

6 References

98/83/EC: COUNCIL DIRECTIVE 98/83/EC of 3 November 1998 on the quality of water intended for human consumption (Drinking Water Directive)

2000/60/EC: 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 (Water Framework Directive)

2006/118/EC: DIRECTIVE 2006/118/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2006 on the protection of groundwater against pollution and deterioration (Groundwater Directive)

2008/105/EC: 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 (EQS Directive)

2009/90/EC: COMMISSION DIRECTIVE 2009/90/EC of 31 July 2009 laying down, pursuant to Directive 2000/60/EC of the European Parliament and of the Council, technical specifications for chemical analysis and monitoring of water status (QA/QC Directive)

OSPAR, 2009: CEMP 2008/2009 Assessment of trends and concentrations of selected hazardous substances in sediments and biota. OSPAR Publication Number: 390/2009. ISBN 978-1-906840-30-3.

EEA, 2011: Hazardous substances in Europe's fresh and marine waters. EEA Technical report 8/2011, European Environment Agency, ISBN 978-92-9213-214-9

European Topic Centre on Inland, Coastal and Marine Waters
CENIA, Czech Environmental Information Agency
Vršovická 1442/65
100 10 Prague 10
Czech Republic
Tel: +420 267 225 338
Web: water.eionet.europa.eu

ISBN 978-80-85087-15-4