

Comprehensive Study on Riverine Inputs and Direct Discharges (RID):

Overview of the RID 2005 Data and an Analysis of the Reliability, Accuracy, Comparability and Completeness of the Data



**OSPAR Commission
2007**

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède et la Suisse et approuvée par la Communauté européenne et l'Espagne.

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Executive Summary

This report presents the results of monitoring undertaken by OSPAR Contracting Parties for the Comprehensive Study of Riverine Inputs and Direct Discharges (RID) during 2005. Under the RID Principles, Contracting Parties are committed to monitor, on a mandatory basis, the loads of a range of heavy metals, organic contaminants, suspended particulate matter and nutrient species which are directly discharged or transported by rivers into the OSPAR maritime area.

In the series of OSPAR's annual reports publishing the monitoring results reported by Contracting Parties under the RID Principles, the present report is the first to assess in more detail the compliance by Contracting Parties with the requirements of the RID Principles relating to monitoring and reporting and provides an initial step towards presenting the annual RID data in a more accessible way. While the national data and explanatory text reports are reported in two addenda, the main report focuses on analysing the reliability, accuracy, comparability and completeness of national data reported under RID.

The report shows that there are a number of factors that may influence the accuracy, reliability and comparability of RID data reported by Contracting Parties. This includes for example the sampling method applied (frequency, distance from river mouth, site in river); the coverage and way of reporting (direct monitoring, estimation and/or modelling) of losses from land areas/sources; calculation methods used; etc. The two major issues identified by this report requiring further attention by the OSPAR Working Group on Inputs to the Marine Environment (INPUT) which oversees the implementation of the RID Study are:

- a. quality assurance procedures;
- b. transparency in the use by Contracting Parties of limits of detection (LODs) and limits of quantification (LOQs), and the way estimates are reported in cases where measurements are below those limits.

Chapter 4 especially illustrates the impact on the RID 2005 data of the differences in LODs/LOQs achieved by Contracting Parties and the way "less-than" values are reported. The reader of this report should be aware that a direct comparison of the inputs of one Contracting Party with another is difficult due to the differences in national reporting practices. The main reason for presenting the charts and tables on the individual determinands in this report is to demonstrate the factors interfering with comparability. The purpose is to highlight the importance of the way in which national data are reported and are supplemented by information which allows their interpretation. The charts shown in chapter 4 are intended to raise awareness for the kind of information that is needed to accompany RID data with a view to improving their utility in assessments. The charts must not be used on their own but must be seen in the context of the specific analysis and its purpose presented in this report.

1. Introduction

1. This report describes the results of the national RID studies carried out by Contracting Parties across the OSPAR Convention area (see Figure 1) under the Comprehensive Study on Riverine Inputs and Direct Discharges (agreement 1998-5, update 2005).¹

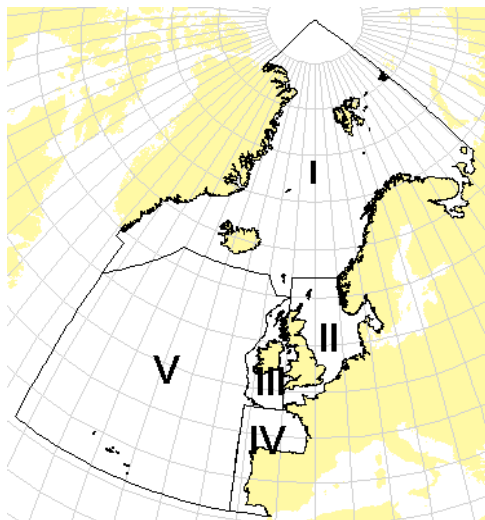


Figure 1. OSPAR maritime area and regions. I: Arctic waters, II: Greater North Sea, III: Celtic Seas, IV: Bay of Biscay, V: Wider Atlantic

2. The RID Study forms one element within the wider Joint Assessment and Monitoring Programme of OSPAR. The purpose of the RID Study is to assess, as accurately as possible, all riverborne and direct inputs of selected pollutants to Convention waters on an annual basis. The RID Principles set out the monitoring regime to be employed for generating and reporting input data and to this end describes for example the relevant substances and river systems covered; sampling approach, locations and frequency; detection limits; calculation methodologies; and quality assurance.

3. Under the RID Principles, Contracting Parties should aim to monitor, on a regular basis, 90 % of the inputs of each selected parameter.

4. The following determinands are to be monitored on a mandatory basis:

- Total Mercury (Hg)
- Total Cadmium (Cd)
- Total Copper (Cu)
- Total Zinc (Zn)
- Total Lead (Pb)
- Gamma-HCH (lindane)
- Ammonia expressed as N
- Nitrates expressed as N
- Orthophosphates expressed as P
- Total N
- Total P
- Suspended particulate matter (SPM)
- Salinity (in saline waters)

5. The following determinands are recommended for monitoring on a voluntary basis:

- a. Hydrocarbons, in particular PAHs² and mineral oil³ (strongly recommended);
- b. PCBs (the following congeners: IUPAC Nos 28, 52, 101, 118, 153, 138, 180);
- c. Other hazardous substances (particularly organohalogen compounds - in order to determine which organohalogen compounds should be included in future input studies)⁴.

¹ At its Tenth Meeting (Lisbon, 1988) the Paris Commission¹ (PARCOM) adopted the Principles of the Comprehensive Study on Riverine Inputs (PARCOM 10/10/1, § 4.25 (e)). Such a comprehensive study was conducted for the first time in 1990. The RID Principles were reviewed in 1998 and 2005.

² These are as follows: phenanthrene, anthracene, fluoranthene, pyrene, benzo[a]anthracene, chrysene, benzo[a]pyrene, benzo[ghi]perylene, indeno[1,2,3-cd]pyrene.

³ Provided that a suitable method is available.

⁴ INPUT November 1995 agreed not to advocate routine monitoring of riverine inputs of pesticides Convention wide but to address specific requests from SIME or DIFF* on a case by case basis. (* Secretariat note: DIFF was discontinued

6. Contracting Parties are requested to report the relevant data annually (by 30 September, and 30 November for Denmark) and to provide, for a selection of their main rivers, information on the annual mean/median concentration of selected pollutant.
7. Sources for monitoring and reporting of direct discharges under the RID Principles include sewage effluents, industrial effluents and mariculture. As far as practicable, estimate inputs from unmonitored areas (including diffuse sources, and minor direct sources and rivers) should complement the percentage monitored to 100 %.
8. Contracting Parties are requested to report their annual RID data together with an explanatory text report using the reporting format appended to the RID Principles. The results of annual RID data reporting are published by OSPAR each year on the OSPAR web site.
9. RID data are to be reviewed periodically with the objective of determining temporal and long-term trends of contaminant concentrations and inputs as a basis for trend assessment. Such an assessment of data collected under RID in 1990 – 2002 was carried out by the Environmental Assessment and Monitoring Committee (ASMO) in 2005 (publication number: 2005/233). A further assessment is being prepared for 2009.
10. In the course of the regular review of the RID Principles, ASMO 2005 endorsed arrangements for a review of the limits of detection and the procedures for quality assurance set out in the RID Principles with a view to determining whether a revision is needed. To assist this further review of the RID Principles and to provide an example how annual RID data reports could be improved, Norway had offered to prepare in a one-off exercise this report on RID 2005 data.
11. In addition to the presentation of the RID data reported for 2005, Norway prepared an analysis of the reliability, accuracy, comparability and completeness of the reported data. The analysis is based on information submitted by Contracting Parties as part of their RID data reports and in response to a questionnaire, circulated by Norway, to specially collect information on data generation and reporting for the purposes of this report.
12. The purpose of this report is to pinpoint some of the challenges which need to be faced in order to improve the usefulness of the results of the RID Programmes. These challenges include: uncertainties, knowledge gaps, and lack of documentation on harmonised practises, approaches and methodologies among Contracting Parties.
13. This report provides an overview of compliance by Contracting Parties with their reporting requirement for RID 2005 data and its completeness (chapter 2), an analysis of the generation and reporting of RID 2005 data by Contracting Parties (chapter 3) and, in the light of this analysis, an overview of the riverine inputs and direct discharges reported for 2005 (chapter 4). A summary with conclusions and recommendations is given in chapter 5.

2. RID data reporting for 2005

14. For the 2005 RID study, RID data reports were submitted by Belgium, Denmark, France, Germany, Ireland, Netherlands, Norway, Spain, Sweden and the UK. Portugal did not report 2005 data. Data submitted by France are provisional. All national RID data reports are presented in Addendum 1 to this report.

15. Iceland reported for the first time under the RID Principles. The reported data for 1997 – 2005 are mainly data on riverine inputs of NH₄-N, NO₃-N, PO₄-P, total N and total P for the two Icelandic main rivers Þjórsá and Ölfusá. The Icelandic data and text report is presented in Addendum 2 to this report.

16. The national data reported by Contracting Parties have been summarised in the overview tables at Annex 1. The data have in many cases been rounded to one significant number for data reported less than the unit in which they appear and to two significant numbers for data reported greater than one unit. Statistical information on river catchment areas covered by the national RID 2005 data reports is presented in the Appendix to Annex 1.

17. Table 1a at Annex 1 gives an overview of data reported by Contracting Parties in 2005 for the categories direct discharges (sewage effluents, industrial effluents), riverine inputs (main and tributary rivers) and coastal areas. This information is summarised in Table 2.1 below. The table only shows if information has been reported, and not if the RID Principles regarding sampling frequency have been followed. The general coverage of the OSPAR maritime area by RID 2005 data reported by Contracting Parties shows significant gaps for the Atlantic (Regions IV and V). For a number of regions, Contracting Parties reported “no information” (NI) on coastal areas, i.e. from areas downstream of river sampling points (see section 3.5 for discussion).

Table 2.1 Overview of information for 2005 reported by Contracting Parties on inputs to the OSPAR maritime area (based on overview table 1a at Annex 1) (green = data reported; red = no information)

OSPAR regions	Country	Sewage effluents	Industrial effluents	Coastal areas	Main rivers	Tributary rivers
North Sea main body	Belgium	NA	NA	*		
	Denmark			*		***
	Germany			*		
	Netherlands			*		
	Norway			**		
	UK East coast					***
Kattegatt	Denmark			*		***
	Sweden			*		
Skagerrak	Denmark			*		***
	Norway			**		
	Sweden			*		
Channel	France ¹					
	UK					***
Irish Sea	Ireland	**	**			
	UK					***
Celtic Sea	Ireland	**	**			
	UK					***
Norwegian Sea	Norway			**		
Barents Sea	Norway			**		
Atlantic	France ¹					
	Ireland	**	**			
	Portugal ²					
	Spain					
	UK					***

¹ France reported provisional data. No totals for inputs were submitted where input data were incomplete.

² Portugal has not submitted any data for 2005 or updated table 1a at Annex 1. This is reflected here as “no information” status.

* included in other data sets

** 1990 data since the basis for calculation remained unchanged. At ASMO 2004, Ireland stated that they planned to update its data on direct discharges in time for the next reporting cycle.

*** Reported as main rivers

18. The determinands reported by Contracting Parties are detailed in Table 1b at Annex 1 which also indicates the precision of the estimate where the relevant data was provided. The coverage of mandatory determinands in the OSPAR maritime area by the RID 2005 data reports differs for riverine inputs and direct discharges and shows some important gaps (Table 2.2 below).

Table 2.1. Overview of mandatory determinands reported by Contracting Parties in 2005 for riverine inputs and direct discharges (red: no information; yellow: data for riverine inputs but not for direct discharges; green: data fully reported), based on overview table 1b at Annex 1

Country	Cd	Hg	Cu	Pb	Zn	μ-HCH	NH4-N	NO3-N	PO4-P	total N	total P	SPM	% completion RID reporting (parameters)*
Belgium ¹													100 %
Denmark													42 %
France ²													21 %
Germany													100 %
Ireland													75 %
Netherlands													88 %
Norway													96 %
Portugal													0 %
Spain													100 %
Sweden													75 %
United Kingdom													100 %

* % of data reported in relation to 12 substances for each riverine inputs and direct discharges (24 = 100%), based on overview table 1b at Annex 1.

¹ Belgium does not report direct discharges as this is not applicable.

² France reported provisional data including riverine data on metals and lindane for some main and tributary rivers. In the absence of complete information (e.g. concentration or flow), no total inputs were reported for those determinands. France reported no direct discharges for any determinand.

19. Table 2, therefore, give an overview of which parameters are measured by each CP, but as for Table 1, it does not show the frequency with which each parameter has been sampled and analysed, nor the number of rivers each determinand is measured in.

20. In summary:

- only three countries, Germany, Spain and United Kingdom, are reporting all mandatory determinands for both rivers and direct discharges;
- Belgium reports all mandatory determinands for rivers, but does not report direct discharges as this is not applicable;
- The Netherlands and Norway report all determinands for rivers, but for direct discharges neither country reports lindane, and the Netherlands does not report ammonia and orthophosphate;
- Sweden does not report lindane or SPM at all, and does not report nitrate or orthophosphate in direct discharges;
- Ireland does not report lindane at all, and does not cover mercury and three nutrient species in direct discharges. Mercury in direct discharges is not reported since all samples were below the detection limit of 0.15 µg/l;
- Denmark only reports nutrients in rivers and direct discharges, and no metals or SPM are reported neither in direct nor in riverine inputs.

21. On voluntary parameters, Belgium, Germany, Spain and the UK reported data for PCBs as well as France for some of their main and tributary rivers. No other voluntary parameter has been reported.

22. A number of additional parameters (Cr, Ni, As, TOC) not covered by the RID Principles were reported by Norway. These parameters are not included in the overview tables at Annex 1.

23. In general, determinands in direct discharges (especially for nutrients parameters) are less well reported than those in riverine inputs. France, for example, has not reported any direct discharges. There are significant gaps in the reporting of metals for both riverine inputs and direct discharges, especially for mercury in direct discharges for which one third of Contracting Parties did not report (36 %). Significant gaps

exist for lindane with only 6 Contracting Parties reporting riverine inputs of lindane (55%); direct discharges are only reported by one third of Contracting Parties, leaving a gap in data coverage of 64%. A number of CPs did not report direct discharges of nutrient parameters.

24. In terms of geographic coverage, the OSPAR Region II (Greater North Sea), especially the main body of the North Sea, is the maritime area that is covered best, although even here gaps still exist. There are substantial gaps for Region IV (Bay of Biscay/Iberian coast), especially for metals and lindane and for all parameters in Region V.

3. Assessment of the data

3.1 Overview of the information obtained

25. The following analysis of RID data reported by Contracting Parties for 2005 is based on information submitted by Contracting Parties in their text report supplementing their national RID data (presented in Addendum 1) and in response to a questionnaire prepared by Norway to collect information on the generation and reporting of RID data (Table 3.1). This information is not only relevant for RID 2005 data but reflects, in more general terms, the national practice of Contracting Parties in monitoring and reporting under the RID Principles.

Table 3.1 Overview of information submitted by Contracting Parties on their RID data for 2005

Country	RID data text report	Questionnaire filled in
Belgium	Yes	Yes
Denmark	Yes*	No
France	Yes	No
Germany	Yes	No
Iceland	Yes	Yes
Ireland	Yes	Yes
Netherlands	Yes	Yes
Norway	Yes	Yes
Portugal	No	No
Spain	Yes	Yes
Sweden	Yes	Yes
United Kingdom	Yes	Yes

* Report came in too late to be fully taken into account in this document. The data are included in the tables and charts.

26. Tables 3.2 and 3.3 summarise the information submitted by Contracting Parties and supplement the information received on inputs to the OSPAR maritime area in 2005 (overview table 1a and statistical information on river catchments (Appendix 1) at Annex 1). The information in tables 3.2 and 3.3 address the following issues:

Table 3.2:

- Number of rivers monitored
- Number of maritime areas per country
- Size of convention area for the country
- Whether one or more laboratories have been involved in the analyses of the water samples
- Whether monitoring has been carried out by one or many institutes

Table 3.3:

- The number of samples per year in the main rivers
- The number of samples per year in the tributary rivers
- What is measured and/or calculated downstream of the riverine sampling points
- Which strategy is taken to include direct discharges to the maritime areas
- And whether or not all parameters have been analysed, in compliance with the RID principles.

Table 3.2: Compilation of submitted information on data quality - A

Country	Number of rivers	Number of areas	Size of Convention Area (for the country)	One or many labs	Monitoring carried out by many or one institute
Belgium	2 main rivers, 9 tributaries	1 (North Sea) (Again divided into Scheldt estuary and Belgian Coastal zone; again divided into 5 sub-areas)	Surface area covered by RID river's catchment: 15.392 km ² 100% of the Belgian area drains into Convention Area. 50% drains directly into it through the Scheldt estuary and the coastal basins and is represented by the RID reportings. The other 50% drains indirectly into the Area through the Meuse and Rhine basins and contributes to the Netherlands inputs.	Source of data for all analyses: Vlaamse Milieu Maatschappij (VMM), A. Van De Maelestraat 96, B-9320 Erembodegem.	One and the same organisation (VMM – Vlaamse Milieu Maatschappij) A. Van De Maelestraat 96, B-9320 Erembodegem coordinates the sampling and does the analyses for all rivers.
Denmark	25 rivers	3 (North Sea, Kattegat, and Skagerrak.)	Total catchment area in Denmark to OSPAR is 27.500 km ² , which constitutes 64% of the Danish land area.	NI	NI
France	9 main rivers, 29 tributaries and 13 unmonitored areas.	2 (Channel/North Sea and Atlantic, again divided into four sub-regions.	382.162 km ² , hence 70% of the total land area of France with 319.822 km ² monitored	Several labs but all have to be registered by the French Ministry of the Environment	Different river basin districts: Loire-Bretagne, Seine-Normandie, Artois-Picardie, Adour-Garonne
Germany	4 main rivers	1 (North Sea)	NI	NI	NI
Iceland	2	1 (Atlantic)	100% Monitored area: 13.000 km ² of total 103.000 km ²	One lab for nutrients. Change from 1998 for total P. After 1998, P = ICP-MS (SGAP). Some discrepancies were observed at the transition period.	One University
Ireland	17 main rivers; of which 4 to the Irish Sea, 10 to the Celtic Sea and 3 to the Atlantic. . Several tributaries.	3 (Irish Sea, Celtic Sea and the Atlantic)	98 %	All samples are analysed in the EPA's regional laboratory in Richview, Clonskeagh, Dublin.	Sampling is organized and carried out by Environmental Protection Agency staff.
Netherlands	4 main rivers (Rhine, Ems, Schelde, Maas)	1 (North Sea).	100%	Samples from main rivers analysed by RIZA, from tributary rivers by other laboratories.	In main rivers sampling is organised by RIZA, in tributaries by other water administrations.
Norway	10 main rivers and 36 tributaries	4 (Skagerrak, North Sea, Norwegian Sea, Barents Sea)	The river basin register system has classified the Norwegian river basins into 20.000 units, or 252 main catchments areas. According to this system, 247 of the 252 Norwegian rivers are draining into coastal areas. 100% drain into Convention	Same laboratory for all analyses	One institute responsible for the monitoring, but many people are sampling.

Country	Number of rivers	Number of areas	Size of Convention Area (for the country)	One or many labs	Monitoring carried out by many or one institute
Spain	43 main rivers and 9 tributaries	1 (Atlantic. Again divided into 8 areas: País Vasco and Norte III; Norte II, Galicia costa; Norte I, Guadiana and Guadalquivir are controlled by Spain; Duero and Tajo controlled by Portugal.	61,56% of the surface of Spain drains into the Convention Area, but 34,96% is controlled by Spain and 26,61% (Duero and Tajo) by Portugal	Each River Basin District has its own laboratory or laboratories. In some cases monitoring is carried out by contracts with private laboratories	Different River Basin Districts. CH Norte, CH Guadiana, CH Guadalquivir, País Vasco, Galicia Costa, Junta de Andalucía
Sweden	12 rivers; (10 major and 7 minor) No tributaries.	2 (Kattegat and Skagerrak) Divided into 10 coastal areas.	72 700 km ² , corresponding to 15 % of the total land area of Sweden. Of this, 88.7 % is monitored, the rest is estimated.	One laboratory except for Hg analyses, which are performed by a sub-contractor.	One institute responsible for the monitoring within the National programme. Several persons perform the actual sampling (generally made by local/regional authorities). Some smaller rivers are monitored by regional authorities.
UK	233 rivers aggregated into 29 sampling regions	6 (North Sea North, North Sea South, North Sea Channel, Celtic Sea, Irish Sea, Atlantic.)	100% of the UK, as all rivers drain into Convention Waters. Riverine inputs: 80 % of the land mass Direct discharges: 10 %. The remaining 10 % is not estimated (in order to assure comparability with former years)	9 different laboratories	3 regions which do the sampling. The same sampling protocols are used by all regional offices <i>within a particular region</i> .

Table 3.3: Compilation of submitted information on data quality -B

Country	Number of samples/ year main rivers	Number of samples/ year tributary rivers	Downstream sampling points – what is measured/ calculated?	Direct discharges	All parameters included?
Belgium	24 for Scheldt; 12 for IJzer	12	The only areas that could be qualified as “unmonitored” in Belgium are situated in a very narrow (no more than a few hundred metres and mostly less) fringe along the coast. In those areas a seepage and diffuse runoff go straight into the sea. These are not materially measurable, of very little impact and do not have to be covered in the RID reporting. All other downstream areas and polders are covered by monitoring and thus quantified in RID.	Since 1996 there are no longer direct inputs in convention waters under Belgian jurisdiction. No industrial effluents are discharged directly to Belgium’s convention waters. No urban run-off or storm water overflows discharge to Convention Waters under Belgian jurisdiction.	All parameters are monitored
Denmark	Varies from 9-27(34) times a year. On average for all 25 main rivers: 16 times a year.	None		Wastewater treatment plant outflow are sampled from 2-24 times a year. All point sources larger than 30 PE are monitored, even if they are situated in an unmonitored part of the river.	Metals and PCBs not included, except Gudenå and Skjernå (for metals).
France	12 measures per year – at least.	Main tributary rivers: 12/yr. Others, at least 4/yr.	For main rivers, the part of the river downstream the monitoring station is considered as an OSPAR coast.	No reporting of direct discharges, either for sewage effluents, industry or fish farming.	All mandatory and some voluntary parameters are monitored but no totals for inputs were reported where input data were incomplete
Germany	Elbe and Eider: 25-26/yr Eider 13/yr for other parameters than nutrients. Weser and Ems: 12/yr.	For Elbe tributaries 2 to 13/yr (heavy metals, nutrients and SPM). Weser and Ems: No measurements in the tributaries. Eider: 26/yr for nutrients and 13/yr for all other parameters. Sampling based on representative random samples.	Within the Eider catchment area the loads of the unmonitored part were determined by extrapolating the loads of the monitored parts of the catchment area.	Sewage & industry: Elbe, direct discharges of sewage effluents determined downstream of the measurement site. Weser and Jade: estimates based on population equivalents & industry. Ems: partly measured (major discharges), partly estimated. Eider: included in the riverine inputs.	In the river Elbe and its tributaries as well as in the river Eider no measurements for PCBs (in water) were carried out, because the concentrations are mostly below the detection limit. This is also the case for γ-HCH measurements in water in the Elbe tributaries.
Iceland	7 samples/yr in 2005.	None	Nothing is calculated downstream of sampling points.	Seems as if direct discharges are not included at all. Only discharges in the two monitored rivers are included. No discharges from industrial plants along the coast.	NI
Ireland	In general between 6-7 sampling runs are made for each river in the January to March and	NA	Loads for unmonitored areas are estimated by extrapolation from those calculated for relevant main rivers on the basis of catchment	NI	Mercury not measured (all concentrations have been less than the detection limit of 0.15 ug/l). It should be noted that this value is used to give an upper estimate of

Country	Number of samples/ year main rivers	Number of samples/ year tributary rivers	Downstream sampling points – what is measured/ calculated?	Direct discharges	All parameters included?
	October to December periods. Sampling also takes place in May. Sampling frequency is less than 12 times per annum but is concentrated in the period of expected higher river flows (October to May). The reason for the non-compliance is the lack of resources.		areas.		loading to the receiving water. Lindane is not being measured due to lack of resources.
The Netherlands	For Noordzeekanaal, IJsselmeer and Haringvlietsluizen 12-13 samples per year. For Maassluis 24-25 samples per year. Loads calculated following each flow weighed concentration method. Calculations for PCBs not included due to lack of measurements.	Monthly or bimonthly (at Maassluis).	Generally sampling sites are so far downstream that this is not necessary. Except for Maassluis, where some direct discharge are reported downstream of sampling point,	Information is collected from <ul style="list-style-type: none"> Environmental annual reports of (larger) industries in which discharges are reported Annual questionnaire to administrators of rivers on annual direct and indirect loads from smaller industries An annual questionnaire send out by the Netherlands Central Bureau of Statistics to the administrators of Sewage treatment plants for annual loads Used methodology is : product of annual flow and flow weighted concentrations. Industry Sewage treatment plants Fish farming	No PCBs and lindane in sewage effluents; instead an estimate of total national load in all sewage effluents available. No SPM in industrial effluents in 2005, but usually this is included.
Norway	12 / yr, two large rivers in Southern Norway 16 /yr	Four times a year in 36 tributaries	See details in 3.7. The calculation model TEOTIL is used for estimating losses of nutrients, direct discharges are monitored.		All, except lindane which is not monitored in tributaries or direct discharges.
Spain	Basically 12 a year, but it differs for each discharge area and parameter.	Basically 12 a year.	Loads for unmonitored areas not calculated	Industrial effluents based on industries' discharge declarations, regional discharge registries, direct control measurements, discharge permits, concentration values from previous years when effluents were similar and data were not available, and fixed values when measurements were below detection limits. The number of samples varies among different discharge sites. Fish farming is included Annual reporting is restricted to municipal treatment plants designed for more than 2000 "population equivalents" and "the most important" industrial point sources	All mandatory parameters are monitored and some voluntary parameters in some areas
Sweden	Rivers: Generally 12/yr. Point sources: Tot-N, Tot-P, BOD7 and CODCr are sampled (in proportion to flow) 12 – 52 times annually. Metals are sampled 1 – 12 times annually, on the largest	No samples.	Quantified by the area specific loss from the monitored parts and the loads are included in the amounts given for the monitored areas. Generally, the monitored parts of the rivers cover some 95-100% of the total areas. Two exceptions: Rivers Enningdalsälven and Rönneån cover	Industries: Varies. Emissions generally reported above certain threshold values, mostly well below those applied in the EPER register. Water flows are often not reported. A	Rivers: Lindane and Suspended particulate matter are not measured. Metals are not measured in all rivers (will be measured in all rivers within the National monitoring program from 2007 and onwards).

Country	Number of samples/ year main rivers	Number of samples/ year tributary rivers	Downstream sampling points – what is measured/ calculated?	Direct discharges	All parameters included?
	plant even 52 times.		only 80 and 51 %, respectively, of the total areas.	few facilities discharge very large (unreported) water amounts, mostly cooling water	
United Kingdom	Generally 12 samples are collected per year at approximately monthly intervals from sampling points at the various rivers in a designated sampling region.	NA	Riverine inputs cover some 80% of the landmass. When adding monitoring of direct inputs downstream the stations, it is considered that the 90% coverage target has been met.	Direct discharges downstream monitoring points measured	Yes, but where previous monitoring has shown that levels are consistently below the detection limit (e.g. PCBs) monitoring may be discontinued or reduced.

3.2 Coverage of monitored areas

27. It proved difficult to provide an overview of the extent of the area covered by the RID programme in each Contracting Party, as compared to the total land area of that country draining into the OSPAR maritime area. This is due to lack of clarity of the understanding and practice of Contracting Parties relating to the concept of “unmonitored areas”:

- What is understood by the concept “unmonitored areas”?
- How are the inputs from these areas treated by the different countries (e.g. ignored, estimated, or modelled)?
- If the inputs from the unmonitored areas are estimated or modelled, are these areas then covered or not by the RID programme?

28. Instead of attempting a comprehensive answer to these questions, this report focussed on clarifying the definitions of those concepts (see section 3.5). For some Contracting Parties, preliminary answers to the question of area coverage by the RID Programme are recorded in Table 3.2.

29. In addition to the above, some countries have made an effort to evaluate the distance from the RID sampling points to the coast. This is useful information as it indicates the area of unmonitored land between the RID sampling point and the sea. An example from the Belgian rivers is included in Table 3.4 below, for demonstration purposes.

Table 3.4 Example of distance between river sampling points and coast reported by Belgium

River sampling point	Distance to coast	Comments
Scheldt (main river):	60 km	(=distance along streamline to sea mouth of the estuary). Note that the sampling point is situated in tidal brackish convention waters
Gent-Terneuzen canal (tributary)	12 km	distance along canal (fresh water reach) to sluices giving into the Scheldt estuary
Yzer (main river)	4 km	situated in fresh water reach; distance to sluice complex at the receiving Yzer estuary
Langeleed (tributary)	9 km	situated in fresh water reach; distance to receiving Yzer estuary sluice complex
Beverdijk (tributary)	3 km	situated in fresh water reach; distance to receiving Yzer estuary sluice complex
Vladslovaart (tributary)	6 km	situated in fresh water reach; distance to receiving Yzer estuary sluice complex
Gent-Oostende canal (tributary)	500m	situated in fresh water reach, distance to sluices of the receiving harbour canal open to the sea
Noordede (tributary)	1 km	situated in fresh water reach, distance to sluices of the receiving open harbour canal open to the sea
Blankenbergse vaart (tributary)	1 km	situated in fresh water reach, distance to receiving harbour canal open to the sea
Leopold canal (tributary)	1 km	situated in fresh water reach, distance to receiving harbour canal open to the sea
Schipdonk canal (tributary)	10 km	situated in fresh water reach, distance to receiving harbour canal open to the sea

30. This example shows that there are quite large differences in the distance from the riverine RID sampling points to the coastline within one and the same country. It should also be noted that some rivers are sampled at the border to the next Contracting Party, and not at the coast.

3.3 Sampling, laboratory analyses and detection limits

Sampling

31. It is not clear whether all Contracting Parties have standard procedures for sampling and whether these are used consistently within each country. Since, in general, several persons are involved in the sampling of rivers, such standards should be considered important by the Contracting Parties. In the UK, three different regions are responsible for the sampling, and the same sampling protocols are used by all regional offices within a particular region. In Norway, local observers are carrying out the sampling based on

a common sampling protocol; they represent a network of fieldworkers and professional staff administered by the Norwegian Water Resources and Energy Directorate (NVE). Norway also states that it is an advantage to use local observers and samplers, since they were familiar with their local rivers and were aware of anomalies or special events. In Spain, the monitoring and calculations are carried out by different River Basin Districts and Autonomous Communities, and methodologies may vary. In Belgium, one and the same organisation co-ordinates the sampling and does the analyses for all rivers. In the Netherlands, the sampling in the main rivers is organised by RIZA (Ministry of Waterways and Public Works); whereas the tributaries are sampled by other water administrations.

32. Sampling of point sources by Contracting Parties is usually administered by the owners, i.e. sampling of effluents from industry is carried out by employees at the plant. The same is true for sewage treatment plants and fish farming plants. This also means that methodologies for sampling may differ significantly from point-source to point-source.

Laboratory analyses and detection limits

33. For chemical analysis of samples, several countries use different laboratories both for riverine inputs and direct discharges. However, Belgium, Iceland, Ireland, Norway, and Sweden (except for mercury) use the same laboratory for all rivers monitored.

34. Concerning detection limits, Contracting Parties had been invited to report with their RID 2005 data the limits of detection (LODs) or limits of quantification (LOQs) achieved to clarify what approach (LOD or LOQ) they used and which values they achieved, with a view to supporting a review by INPUT of the LOD examples in the RID Principles.

35. For the purpose of the present report, LODs and LOQs and their role for chemical analysis is understood as follows, based on a description prepared by Germany for INPUT 2007:

"According to the definitions (IUPAC, IS/TR 13530), the limit of detection (LOD) is, in broad terms, the smallest amount or concentration of an analyte in the test sample that can be reliably distinguished from zero. The limit of quantification (LOQ) is the smallest amount or concentration of analyte in the test sample which can be determined with a fixed precision, e.g. relative standard deviation $s_{rel} = 33,3\%$. This means in other words, that a substance can only be correctly qualified from LODs, while it only can be quantified from LOQs."

"Usually the LOQ is understood to be a fixed multiple of the LOD ($LOQ = LOD \times 3$). The factor of 3 corresponds to the relative standard deviation $s_{rel} = 33.3\%$. On this basis, the LOQ can be calculated from the LOD. In terms of quantification, concentrations above the LOQ can be considered to produce reliable load results. Concentrations below the LOQ tend to lose reliability the closer they get to the LOD. As a consequence, compliance with the LOQ adds reliability to the input figures established for OSPAR."

36. The information of LODs/LOQs achieved by Contracting Parties, as far as reported by them, is presented in Tables 3.5 and 3.6 below, drawing on a compilation prepared by Germany for INPUT 2007. Not all Contracting Parties submitted information: information on LODs/LOQs is missing from Portugal entirely and from Belgium, Denmark, France, Norway and Sweden for analysis of direct discharge samples. Information submitted by some Contracting Parties is incomplete. For Icelandic data, see detailed information in Addendum 2 to this report.

37. It is not always clear from the information submitted by Contracting Parties to which extent the values in Tables 3.5 and 3.6 reflect LODs or LOQs. In some cases, the national values may include both. For instance, Spain has submitted an overview showing that LOD is used in País Vasco and Guadalquivir, whereas LOQs are used in Galicia, Guadiana and the North region. Spain has earlier informed ASMO 2005 that they propose to replace detection limits (LOD) with quantification limits (LOQ) for loads as a more suitable approach, in particular for the measurement of heavy metals in riverine inputs. However, other countries prefer for various reasons to use LODs.

38. Most Contracting Parties who submitted information on LODs/LOQs reported a range. The reason for this is in most cases that different detection limits are achieved by the laboratories involved in national data generation and reporting in different regions. It is noted that detection limits for analysis of riverine inputs will be lower and more challenging than those used for direct discharges, as these can be handled in different ways by different laboratories. Most countries have good overviews of the regional laboratories and the detection limits achieved by them. For instance, the different detection limits for Spanish laboratories are reflected in table 8 of the national Spanish RID data report at Addendum 1 to this report. The national RID data report of the UK specifies that the detection limits are different in Scotland, England and Wales, and Northern Ireland, but that the limits achieved within each of the three regions are consistent. The situation is

different in Belgium: there had been no change in laboratories since 1993, and the span in detection limits reported reflects the span within this same laboratory.

39. As Tables 3.5 and 3.6 show, some countries have rather high LODs/LOQs for some substances, and especially for substances that are found in small quantities, such as the metals cadmium and mercury. For instance, the recommended detection limit of cadmium is 0,01 µg/l, but there are examples of detection limits of 1, 4.9, 20 and even in one case 100 µg/l in the tables. This leads to striking differences in RID data results for some substances when either upper or lower estimates are used. This is exemplified on the data submitted by Contracting Parties for 2005 in Chapter 4.

40. According to the RID Principles, it is necessary to choose an analytical method which gives at least 70 % of positive findings (i.e. no more than 30% of the samples below the detection limit). It has not been possible to produce a table showing the results for all Contracting Parties, but Table 3.7 shows the results for Norway in 2005, where thirteen parameters analysed had more than 30% of the samples below the detection limit. Most of these parameters belong to the PCB compounds and Lindane. The rest of these parameters were three metals (Cd, Cr and Hg) and two nutrients (Orthophosphate and Ammonia). Since the detection limit of the analytical method used is within the acceptable limits of the RID Principles, this reflects that the concentrations of these parameters were relatively low in river waters. Table 3.7 also shows the analytical method applied for each parameter. Evidently, many of these methods have national standard references, and can therefore not be readily compared between the Contracting Parties.

Table 3.5 Limits of Detection or Quantification achieved by Contracting Parties, as far as reported, for river sample analysis

Parameter	Recommended	Belgium	Denmark*	France	Germany	Ireland**	Netherlands	Norway	Spain	Sweden	UK
Cd	0.01 (µg/l)	0.06 - 0.6	NI	0.1 - 4.9	0.02 - 0.05	0.1	0.01 - 0.2	0.005	0.2 - 20	0.003	0.008 - 0.11
Hg	0.005 (µg/l)	0.01 - 0.03	NI	0.02 - 0.5	0.001- 0.005	0.15	0.001- 0.02	0.001	0.005 - 6.8	0.0001	0.002 - 0.02
Cu	0.1 (µg/l)	0.6 - 5	NI	2.0 - 6.6	0.1 - 0.5	1	0.1 - 5.0	0.01	0.4 - 20	0.004	0.05 - 0.6
Pb	0.01 (µg/l)	0.35 - 11	NI	4.4 - 5.8	0.2 - 0.5	1	0.1 - 5.0	0.005	3.0 - 20	0.02	0.03 - 0.2
Zn	0.1 (µg/l)	2 - 13	NI	1.5 - 20	0.1 - 1.0	1	0.05 - 10	0.05	0.01 - 50	0.2	0.79 - 4.0
γ-HCH	0.5 (ng/l)	2 - 6	NI	1.0 - 2190	0.08 - 0.5	NI	1.0 - 50	0.2	0.7 - 10	--	0.1 - 1.0
PCB	-- (ng/l)	1 - 12	NI	5.0	1.8	NI	--	0.2	0.7 - 40	--	1.0
NH4-N	0.01 (mg/l)	0.06 - 0.5	>0.01	0.007 - 0.077	0.01 - 0.05	NI	0.01 - 0.2	0.005	0.004 - 0.06	0.001	0.003 - 0.03
NO3-N	0.05 (mg/l)	0.1 - 0.77	>0.02	0.14 - 0.68	0.05 - 0.5	0.01	0.01 - 0.05	0.001	0.023 - 0.11	0.001	0.0014 - 0.1
PO4-P	0.005 (mg/l)	0.1	>0.005	0.003 - 0.038	0.005 - 0.03	0.005	0.005 - 0.05	0.001	0.001 - 0.26	0.001	0.0012 - 0.008
Total N	0.05 (mg/l)	--	>0.06	1.4 - 8.6	0.05 - 1.0	0.01	0.1	0.01	0.02 - 1.46	0.05	0.021 - 0.1
Total P	0.005 (mg/l)	0.07 - 1	>0.01	0.02 - 0.07	0.01 - 0.1	NI	0.02 - 0.1	0.001	0.01 - 0.1	0.005	0.003 - 4.0
SPM	2.0 (mg/l)	2.4 - 4.7	>2.0	2.0	1.0 - 20	10	5.0 - 8.0	0.1	0.5 - 3.0	--	2.0

* Derived from the Danish RID Data Report

** Reported by Ireland in response to the questionnaire.

NI: no information

Table 3.6 Limits of Detection or Quantification achieved by Contracting Parties, as far as reported, for analysis of direct discharge samples

Parameter	Recommended	Germany	Netherlands	Spain	UK
Cd	0.5 (µg/l)	0.1 - 0.5	1.0	1.0 - 100	0.02 - 0.11
Hg	0.5 (µg/l)	0.1 - 0.5	0.1	0.1 - 5.0	0.005 - 0.02
Cu	10.0 (µg/l)	1.0 - 30	1.0	1.0 - 100	0.05 - 20
Pb	1.0 (µg/l)	1.0	30	1.0 - 200	0.03 - 10
Zn	5.0 (µg/l)	10	1.0	1.0 - 100	0.31 - 40
γ-HCH	-- (ng/l)	--	50	50	0.1 - 10
PCB	-- (ng/l)	1.0	--	50	1.0
NH4-N	0.05 (mg/l)	0.05	0.1	0.02 - 1.0	0.003 - 0.04
NO3-N	0.1 (mg/l)	0.1	0.01	0.1 - 6.0	0.0014 - 0.15
PO4-P	0.1 (mg/l)	0.01	0.01	0.02 - 0.20	0.0012 - 0.08
Total N	1.0 (mg/l)	1.0	0.1	0.5 - 10	0.021 - 0.1
Total P	0.05 (mg/l)	0.02 - 0.05	0.2	0.05 - 0.5	0.003 - 4.0
SPM	-- (mg/l)	--	10	1.0 - 2.5	2.0

Table 3.7 A Norwegian Example of Analytical Methods Applied and Proportion of analyses below detection limits. Norwegian RID Report 2005, all parameters included in the sampling programme

Parameter	Analytical Method Applied	% samples below detection limit	Total no. of samples	No. of samples below detection limit
pH	NS ⁵ 4720	0	272	0
Conductivity (mS/m)	NS-ISO 7888	0	271	0
Suspended particulate matter (S.P.M.) (mg/L)	NS 4733 modified	0,4	272	1
Total Organic Carbon (TOC) (mg C/L)	EPA number 415.1 and 9060A STD.	0	272	0
Total phosphorus (µg P/L)	NS 4725 – Peroxidisulphate oxidation method	1,8	272	5
Orthophosphate (PO ₄ -P) (µg P/L)	NS 4724 – Automated molybdate method	51,1	272	139
Total nitrogen (µg N/L)	NS 4743 – Peroxidisulphate oxidation method	0	272	0
Nitrate (µg N/L)	NS-EN ISO 10304-1	0,7	272	2
Ammonia (NH ₄) (µg N/L)	NS-EN ISO 14911	33,1	272	90
Silicate (SiO ₂) (Si/ICD; mg/L)	ICP-AES and ISO 11885 + NIVA's accredited method E9-5	0	272	0
Lead (Pb) (µg Pb/L)	ICP-MS; NIVA's accredited method E8-3	2,6	272	7
Cadmium (Cd) (µg Cd/L)	ICP-MS; NIVA's accredited method E8-3	30,5	272	83
Copper (Cu) (µg Cu/L)	ICP-MS; NIVA's accredited method E8-3	0	272	0
Zinc (Zn) (µg Zn/L)	ICP-MS; NIVA's accredited method E8-3	0	272	0
Arsenic (As) (µg As/L)	ICP-MS; NIVA's accredited method E8-3	15,1	272	41
Mercury (Hg) (ng Hg/L)	ICP-MS; NIVA's accredited method E8-3	71	272	193
Chromium (Cr) (µg Cr/L)	ICP-MS; NIVA's accredited method E8-3	52,2	272	142
Nickel (Ni) (µg Ni/L)	NS-EN 1483 and NIVA's accredited method E4-3	1,5	272	4
Lindane (ng/L)	NIVA's accredited method H3-2 (PCB)	72,5	40	29
PCB (CB28) (ng/L)	NIVA's accredited method H3-2 (PCB)	100	40	40
PCB (CB52) (ng/L)	NIVA's accredited method H3-2 (PCB)	100	30	30
PCB (CB101) (ng/L)	NIVA's accredited method H3-2 (PCB)	100	40	40
PCB (CB118) (ng/L)	NIVA's accredited method H3-2 (PCB)	100	39	39
PCB (CB138) (ng/L)	NIVA's accredited method H3-2 (PCB)	100	40	40
PCB (CB153) (ng/L)	NIVA's accredited method H3-2 (PCB)	100	40	40
PCB (CB180) (ng/L)	NIVA's accredited method H3-2 (PCB)	100	40	40

3.4 Number of samples per year

41. The frequency of river sampling required by the RID Principles differs for main and tributary rivers. The RID Principles define “main river” as a river to be monitored at least once a month (12 datasets) every year in accordance with the objectives of the RID Study as set out in its paragraph 1.4. Main rivers should be major load bearing rivers. “Tributary river” is defined as a river with separate catchment from a main river and with an outlet directly to the maritime area or to a main river downstream of a river monitoring point. A tributary river should be a minor load bearing river and can be sampled at a frequency determined by each Contracting Party.

42. The data and supplementary information reported by Contracting Parties for 2005 suggest that different approaches are used by Contracting Parties in classifying rivers as main or tributary rivers and in reporting related inputs.

Main rivers

43. Contracting Parties have very different river patterns. Whereas some countries report on a few, large rivers (such as Germany), others have a large set of smaller rivers draining into the coastal areas (e.g. UK, Ireland, Norway, Denmark and Sweden). This necessarily also reflects the number of samples annually collected from each river. However, most countries sample a minimum of 12 samples a year from the main rivers, but there are exceptions (e.g. Ireland and Iceland). Whereas most Contracting Parties report that

⁵ NS: Norwegian Standard

these samples are distributed as once per month (e.g. Norway, UK) or more often (e.g. Belgium, the Netherlands), Germany reported that the sampling is based on “representative random sampling”. It is not clear what this ‘representativeness’ is based on. No country seems to report that event-based sampling is carried out (e.g. sampling during flood events).

Tributary rivers

44. It follows from the information submitted by Contracting Parties that their interpretation of what is meant by ‘tributary rivers’ varies widely. Some countries (e.g. Germany, the Netherlands) seem to define “tributaries” true to the word – i.e. rivers which are tributaries to the main rivers entering the sea. In countries such as Norway, where altogether 247 rivers are entering the sea, rivers directly discharging into the OSPAR maritime area are treated as “tributary rivers” either because they are smaller rivers or because these rivers carry less pollutant loads to the sea. Thus, in order to monitor this large number of rivers within reasonable costs, Norway had identified under the RID Principles 10 rivers as “main rivers” and 36 rivers as “tributaries”. In Iceland, where population is scarce, only two rivers are monitored and none is a tributary. Some countries do not report on tributary rivers at all (e.g. Iceland, the Netherlands), and others, like the UK and Ireland, report all rivers without any distinction of type.

45. For those countries reporting ‘tributaries’, the sampling frequency varies. Germany samples their tributaries up to 26 times a year (e.g. Elbe tributaries), whereas in France the frequency for sampling tributaries varies between 4 and 12 times a year. In Spain and Belgium the tributaries are mainly sampled 12 times a year. In Norway, “tributary rivers” entering the sea are sampled 4 times a year, but an effort is made to sample during different climatic conditions (such as snow melt season, summer low flow, autumn rains).

46. INPUT 2007 considered a proposal for arriving at a more common understanding of tributary rivers by using the sampling frequency rather than riverine channel patterns as determining feature. A possible definition could be that main rivers are those monitored frequently (at least monthly) and tributaries are rivers monitored less frequently than monthly. The proposed definition is attached to this report (Annex 2). It should be noted that a change of definition of main and tributary rivers as suggested in Annex 2 would have implications for the current classification of national rivers under the RID Principles and that some Contracting Parties would have to change the status of some rivers from tributaries to main rivers, and *vice versa*.

3.5 Sources included downstream sampling points

47. Monitoring downstream of river sampling points is covered by the RID Principles relating to:

- a. “direct discharges” defined by the RID Principles as the mass of a determinand discharged to the maritime area from point sources (sewage effluents, industrial effluents or other) per unit of time at a point on a coast or to an estuary downstream of the point at which the riverine estimate of input is made, and;
- b. “unmonitored area” defined by the RID Principles as any sub-catchment(s) located downstream of the riverine monitoring points within catchments and any areas between catchments. The unmonitored areas may contribute to the losses/discharges of substances downstream of the monitoring point or directly to the sea (OSPAR Maritime Area).

48. The data and supplementary information reported by Contracting Parties for 2005 suggest that the concept of “unmonitored areas” is treated differently by Contracting Parties and that different approaches are taken to report direct discharges.

Unmonitored areas

49. Practice of Contracting Parties seems to vary considerably concerning the calculation or measurement, downstream of the river sampling point, of inputs from unmonitored areas, and their reporting to OSPAR.

50. In France, the area downstream of the river sampling points is regarded as “OSPAR Coast” for main rivers only. All other areas downstream of the sampling points are included as tributaries or unmonitored areas. Only direct discharges along the OSPAR coast are not monitored under RID. In Iceland, pollution sources downstream of the two monitored rivers are not included in the reporting. The same is true for the Netherlands, where, with one exception, losses from unmonitored areas are generally not reported as most sampling points are at sluices and river mouths. The exception is Maassluis, where some direct discharges downstream of the sampling points are reported. In Germany calculations are done for the Eider catchment; here, the loads of the unmonitored parts are determined by extrapolating the loads of the monitored parts of the catchment area. Similar extrapolation exercises are done in Sweden and Ireland for the unmonitored

areas. In Norway, modelling is used to determine the inputs from the unmonitored areas; the model is based on estimated inputs from diffuse sources (natural background values; agricultural land; sewage from scattered dwellings) and point sources (industry; water treatment plants; fish farming).

51. INPUT 2007 considered the proposal, included and illustrated at Annex 2, for a definition to promote a common understanding of “unmonitored area”. It is suggested that the concept of unmonitored areas should include all areas that are not upstream a RID sampling point, i.e. including:

- areas downstream the sampling point in monitored rivers;
- coastal unmonitored areas;
- catchment area of all unmonitored rivers (rivers without a RID sampling station).

Direct discharges

52. A number of Contracting Parties has reported data from such point sources as industries, sewage treatment plants and fish farming. Some countries, however, do not seem to include such data at all in their reporting. This includes e.g. France and Iceland. In Sweden, annual reporting of direct discharges is restricted to municipal treatment plants designed for more than 2000 “population equivalents” and the most important industrial point sources. In Spain, the industrial effluents reported are based on industries’ discharge declarations, regional discharge registries, direct control measurements, discharge permits, concentration values from previous years when effluents were similar and data were not available, and fixed values when measurements were below detection limits. Belgium reported that no point sources exist outside the monitored rivers. This area is estimated to be around 30 km² and mainly discharges inputs through seepage.

53. For all point sources it is believed that the number of samples varies among the different discharge sites, but no specific information has been made available.

3.6 Calculation practices

54. The RID Principles require that the load of a specific determinand transported by a river should be estimated by taking the product of the mean flow-weighted concentration and the total flow, expressed by the following formula:

$$Load = Q_r \frac{\sum_{i=1}^n (C_i \cdot Q_i)}{\sum_{i=1}^n (Q_i)}$$

where

C_i = measured concentration in sample i

Q_i = corresponding flow for sample i

Q_r = mean flow rate for each sampling period (i.e., annual flow)

N = number of samples taken in the sampling period

55. It seems that most countries use this formula. There are, however, variations for some rivers and countries, due to e.g. lack of flow data for the sampling date. Thus, for some rivers, annual average concentration calculated with annual average flow is used. Other Contracting Parties reported that they used linear interpolation. An overview and details of different formula used by Contracting Parties are given in Annex 2. The use of different calculation practices may give significant differences in the resulting calculated loads.

3.7 Quality Assurance

56. Most Contracting Parties reported that the quality assurance procedures were available only in national languages and not in English, making their assessment more difficult. To support a review of the QA arrangements under the RID Principles in the light of national practice, Norway prepared proposals for possible QA steps based on their QA procedures for the Norwegian RID Report. This covers some main aspects of QA relating to sampling strategies, analytical methods, detection limits, technical and historical quality assessment, load calculation and some general considerations. INPUT 2007 agreed that the proposal at Annex 4 should be used as a starting point for the review of section 10 of the RID Principles by INPUT 2008.

3.8 Conclusions from the RID 2005 data

57. It follows from the foregoing analysis that there is a whole host of possible sources of errors that are attached to RID data and might influence their accuracy, reliability and comparability. This includes for example different practices in:

- sampling methodology (frequency, distance from river mouth, site in river);
- pollutant losses covered by direct monitoring, by estimation and/or modelling, as well as land areas/sources not covered at all;
- direct discharges and how they are accounted for;
- which parameters are analysed;
- calculation practises;
- quality assurance procedures; and
- the number of institutions involved per country in the various parts of the programme.

58. Therefore, RID data reported by Contracting Parties must be seen and assessed against this background.

4. Total inputs to OSPAR maritime area in 2005

59. This chapter summarises and visualises national RID data reported for 2005. Ideally, charts like those shown in this chapter should reflect actual differences in inputs between Contracting Parties, both in terms of the compounds measured and in terms of the two different sources (riverine inputs and direct discharges). The inputs should, furthermore, properly reflect the anthropogenic and natural sources in each country, and thereby give indications and guidance as to how to reduce the inputs in the future. For the reasons set out in Chapter 3, this is, however, not always the case.

Difficulties in comparing the inputs reported by Contracting Parties

60. In the following, the national RID data are presented to illustrate the findings of Chapter 3 relating to uncertainties attached to RID data. This chapter intends to specially exemplify how differences in achieved limits of detection and the reporting of upper and lower estimates can influence the results of the RID Study and data comparability.

61. The reader of this report should be aware that a direct comparison of the inputs of one Contracting Party with another is difficult due to the differences in national reporting practices. The main reason for presenting the charts and tables in the following sections on the individual determinands is to demonstrate the factors interfering with comparability. The purpose is to highlight the importance of the way in which national data are reported and are supplemented by information which allows their interpretation. The charts shown in this chapter are intended to raise awareness for the kind of information that is needed to accompany RID data with a view to improving their utility in assessments.

A key issue arises from the fact that in many cases, the concentration values of the various samples taken over the year by Contracting Parties are below the detection limit. To account for this, an upper and a lower value are reported for the annual input value. The RID Principles state that in those cases where the results recorded are less than the limits of detection, two load estimates should be supplied, one assuming that the true concentration is zero and the other assuming that the true concentration is the limit of detection. This will provide minimum and maximum concentrations within which the true estimate will fall. However, it is not clear from the national RID reports that this is followed by all Contracting Parties.

62. This chapter is intended to help identifying issues that need to be given attention in future RID data reporting. For example, when considering the data for direct discharges there are significant differences in national RID data which indicate different reporting practices of Contracting Parties:

- a. Why, for example, are the direct inputs reported by Spain so much higher than those reported by other Contracting Parties?
- b. Are there Contracting Parties other than Norway with extensive discharges from fish farming industry that might have high direct discharges of copper and include these in their RID data?
- c. Are urban discharges from large cities located close to the coast included in data reported for direct discharges?
- d. If direct discharges are covered differently by Contracting Parties' RID data, may the data still be compared?

4.1 Overview of RID 2005 data

63. The national RID data reported by Contracting Parties are presented in Addendum 1 to this report. They are aggregated in the overview tables at Annex 1. This does not include the data reported by Iceland for riverine inputs of nutrient species for two main rivers (see Addendum 2). Based on the overview tables at Annex 1, Tables 4.1 and 4.2 have been compiled to give the total inputs to the OSPAR maritime area of five metals, lindane, PCBs, five nutrient species and suspended particulate matter. The total inputs reported by Contracting Parties are presented as upper estimates in Table 4.1 and lower estimates in Table 4.2. The reason for this differentiation is discrepancies in the way Contracting Parties report upper and lower values. The concept of upper and lower values derives from the detection limits of each parameter and the reported data should be read in the light of the LODs/LOQs reported in section 3.3. The general idea is that for the *lower* estimates, the analytical results below the detection limit will be reported as *zero*; whereas for the *upper* estimates, the analytical results below the detection limit may either be reported as *equal to* the detection limit; or as *half the value of* the detection limit.

64. It should also be noted that whereas most Contracting Parties report their values in upper and lower estimates, some countries do not. To make the charts on total loads presented here more readable, they have been organised so that *all* countries are listed both for upper and lower values. This means that the same values are reported for upper and lower values for Denmark and Sweden in the diagrams.

65. In the following, charts have been prepared to visualise the RID data reported on cadmium, lead, mercury, copper, zinc, total nitrogen, total phosphorus and suspended particulate matter. The charts are based on Tables 4.1 and 4.2. When considering those data and related charts, it should be noted that data reported by Contracting Parties were not always complete and the totals reported may not reflect the true totals (see Tables 2.1 and 2.2). The following information on national RID data needs to be noted:

- Denmark has only reported their data as lower values. The reported nutrient data seem to be very low as compared to the amount of agriculture in the country. There is, therefore a risk that the reported numbers are of an order of magnitude too low. Since this report is finalised before Denmark has verified their data, no comments are given below on the Danish datasets.
- Sweden's data are only shown as upper estimates, since they only reported the upper limit of LOQ for metals. For nutrients, Sweden reported the result of the laboratory analyses, regardless of whether or not this result is above or below the detection limit. For this reason, Sweden is only listed with its upper values, although the definition of upper values (=the detection limit) is not quite true.
- France has reported upper and lower values. The values are often identical for macropollutants but not for micropollutants. The data reported by France for 2005 are provisional because not all data were available in time. No total inputs have been reported where data was incomplete. Sums may be underestimated. The nutrient input to Region IV (the Atlantic part of France) is reported to be zero. For these reasons no comments are given below on the French datasets.
- Spain reported upper and lower estimates. Some regions (Galicia, Costa, Norte and Guadiana) work with LOQs. The limits reported for those regions assume LOQ values and so do the upper estimates. The LOQs are higher (approximately x3) than LODs. This explains that upper estimates reported by Spain for heavy metals are so high compared to estimates from other Contracting Parties.

Table 4.1². Upper estimates of the sum of Direct and Riverine Inputs to the OSPAR Maritime Area reported by Contracting Parties in 2005.

Country	Cd tons	Hg tons	Cu tons	Pb tons	Zn tons	g-HCH kg	PCBs kg	NH4-N kt	NO3-N kt	PO4-P kt	Total N kt	Total P kt	SPM kt
Belgium	3	0.3	46	42	249	32	77	3.9	30	1.4	42	3.1	323
France	-	-	-	-	-	-	-	15.5	63	2.2	0	2.5	217
Germany	5.4	2.7	227	137	1061	23	32	8.9	146	2.4	189	9	1701
Ireland	4.88	7.03	94	65	372	-	-	1.76	83	2.14	124	5.8	746
Netherlands	5.4	1.4	205	109	825	82	-	7	176	5.1	240	10	1192
Norway	2.74	0.48	461	37.5	629	0	-	33	37	5.4	100	8.7	1291
Spain	82	5	162	187	521	76	238	18	32	4.1	66	5.1	789
Sweden	0.62	0.07	44.9	12.6	161.5	-	-	2.49	14.4	0.31	29.1	0.87	*
UK	8	1.4	397	304	1639	162	157	48	211	20	290	24	2249

* not determined

Table 4.2. Lower estimates of the sum of Direct and Riverine Inputs to the OSPAR Maritime Area reported by Contracting Parties in 2005.

Country	Cd tons	Hg tons	Cu tons	Pb tons	Zn tons	g-HCH kg	PCBs kg	NH4-N kt	NO3-N kt	PO4-P kt	Total N kt	Total P kt	SPM kt
Belgium	0.8	0.3	31	21	193	4.5	0.32	3.2	25	1.2	31	1.3	250
Denmark	-	-	-	-	-	-	-	0.08	0.19	0.37	0.39	0.43	0
France	-	-	-	-	-	-	-	15.5	63	2.2	0.0	2.50	217
Germany	5.1	2.6	226	136	1056	23	4.3	8.8	146	2.3	189	9	1655
Ireland	0.26	0.06	67	23	368	-	-	1.68	83	2.09	124	5.8	745
Netherlands	3.8	1.3	204	105	815	14	-	6	176	5.1	231	10	1190
Norway	2.44	0.38	461	37.50	629	0.00	-	32.93	36.83	5.31	99.9	8.68	1291
Spain	1.6	0.2	15	7	280	2.6	0.0	15	18	2.7	60	4.2	701
UK	4.9	0.60	388	272	1611	19.6	0.7	47	210	20.0	281	24	2212

4.2 Cadmium Inputs

66. Total cadmium inputs to the OSPAR maritime area reported by Contracting Parties for 2005 ranged from 0 to 8 tons, except for Spain.

67. Spain reported 82 tons using the upper (LOQ based) estimates (c.f. Figure 4.1). A check on former years confirms that the Spanish loads were of similar magnitude in 2003 and 2004. Figure 4.1 is a very explicit example how the use of upper and lower estimates and related national reporting practices can distort RID results and make comparison between Contracting Parties impossible. Inputs reported as lower estimates would suggest that inputs are highest from Germany, the UK and the Netherlands with a contribution of 27%, 25% and 19 % to total inputs, respectively. In this scenario, the contribution of Spain to total inputs would be 8% whilst it would be 73% if the upper estimates were used.

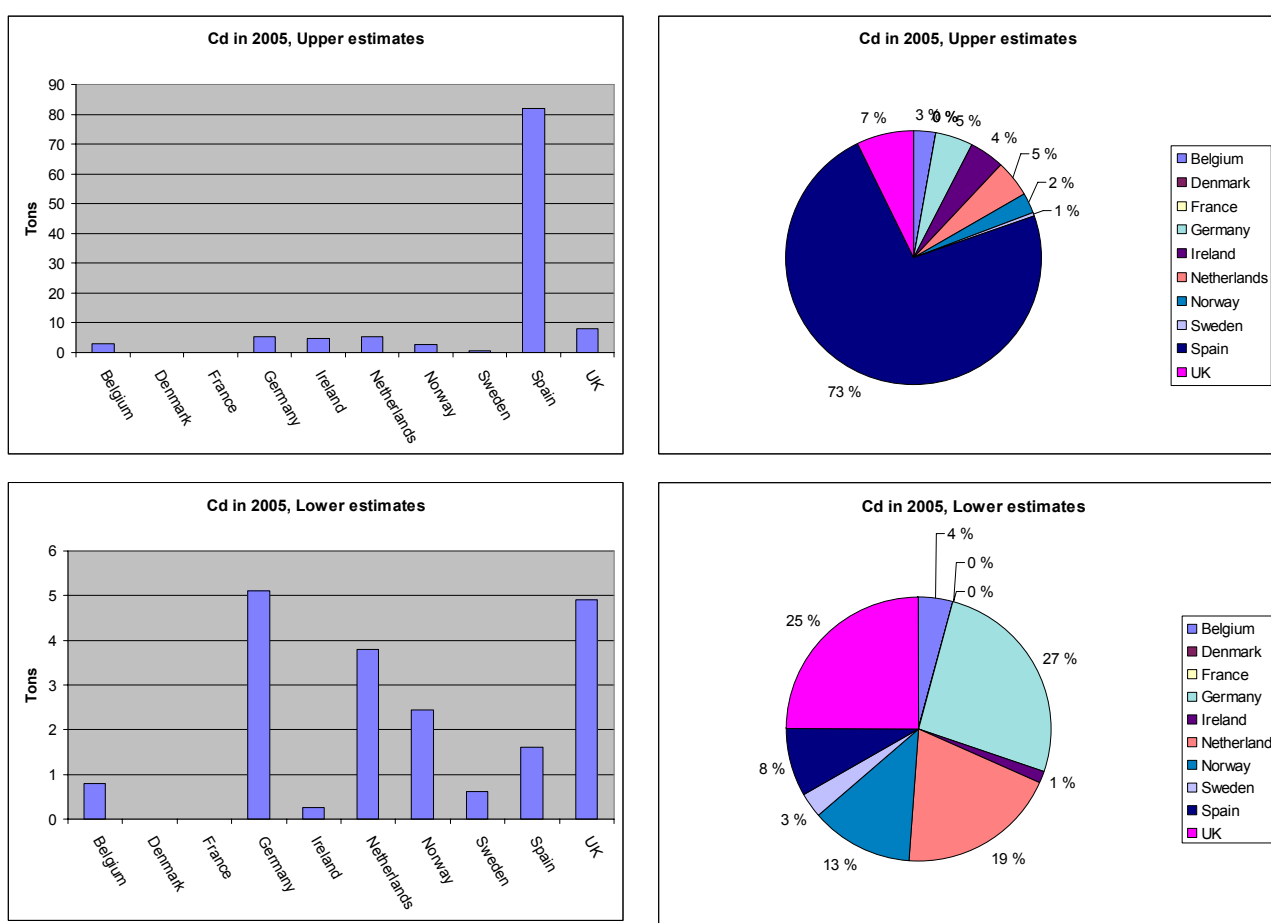


Figure 4.1: Illustration of cadmium inputs (in tons) reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability and relative contributions (%). No data reported by Denmark, France and Portugal.

68. When segregating the data by input sources (Figure 4.2), riverine inputs are significantly larger than the direct discharges when using upper estimates. The difference between the two sources is less explicit when using lower estimates.

69. The inputs reported by Spain are highest for both riverine and direct discharges when using the upper estimates. This is not the case for riverine inputs when using lower estimates.

70. The inputs reported by Germany and the UK are highest for riverine inputs when measured with the method of lower estimates.

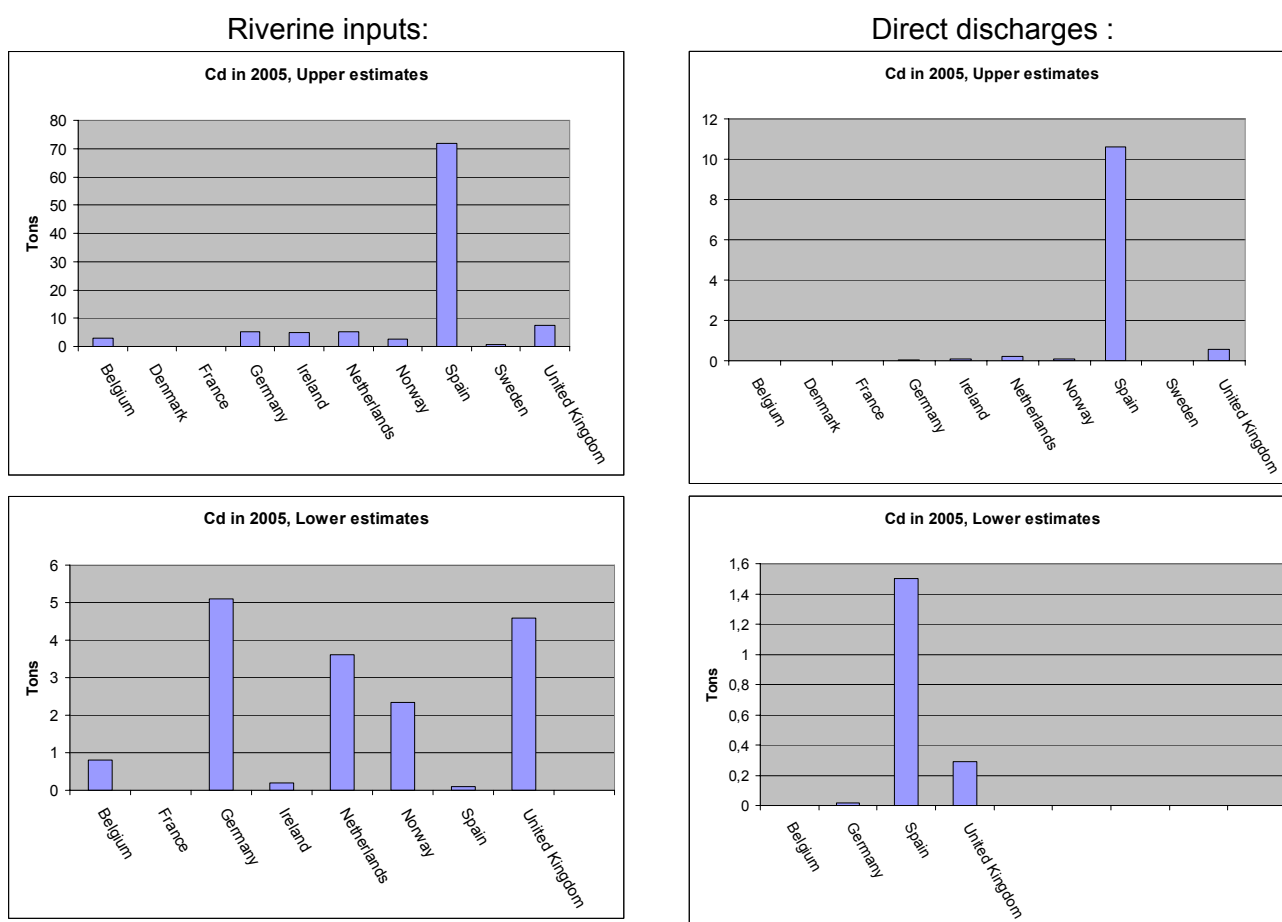


Figure 4.2. Illustration of riverine inputs (in tons) and direct discharges (in tons) reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability. No data reported by Denmark, France and Portugal. Direct discharges not applicable for Belgium. Swedish data too small to show in chart.

4.3 Mercury Inputs

71. Total mercury inputs reported by Contracting Parties range in general from 0.07 to 2.5 tons (c.f. Figure 4.3).

72. The input data for mercury reported by Contracting Parties provide another striking example of different RID results depending on the use of lower or upper estimate. If lower estimates are used, Germany and the Netherlands would have reported the highest inputs of mercury to the OSPAR maritime area in 2005, representing 47% and 24% of the total, respectively. When the upper estimates are used, Ireland and Spain would be the Contracting Party with the highest proportion of reported inputs (37% and 27%, respectively) referring German and Netherlands' contributions to 15% and 8%, respectively. Ireland reported a detection limit for mercury at 0.15 µg/l, which is rather high and may explain the difference in Irish data.

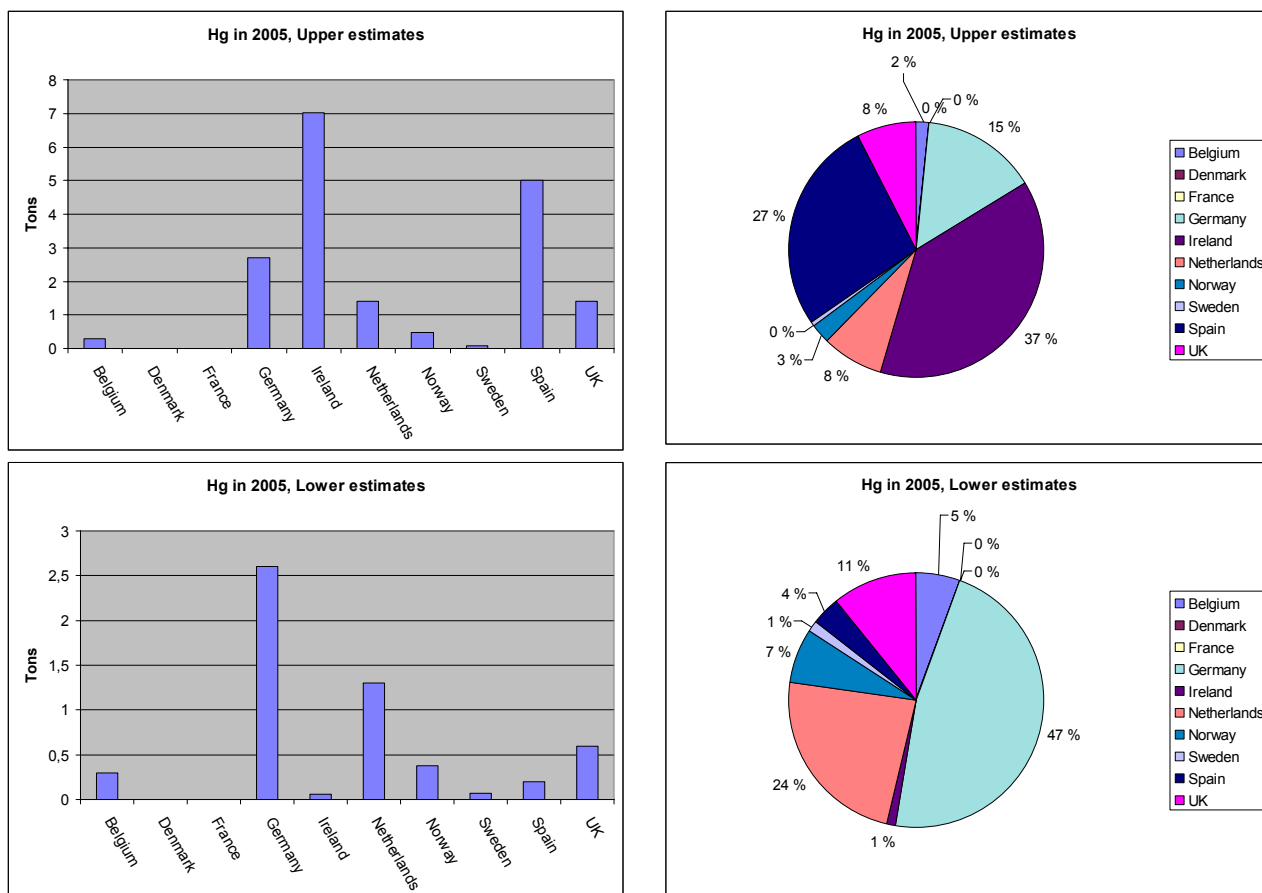


Figure 2.3. Illustration of mercury inputs (in tons) reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability and relative contributions (%). No data reported by Denmark, France and Portugal.

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73. When comparing the data reported by Contracting Parties for riverine inputs and direct discharges, loads carried by rivers are significantly larger than those from direct discharges (Figure 4.4).

74. Figures reported for Ireland (upper estimates) and Germany (lower estimates) are highest for riverine inputs. The detection limit of less than 0.15 µg/l for mercury reported by Ireland may explain their high riverine inputs in the upper estimates.

75. Direct discharges reported by Spain are highest irrespective of the estimate used. This could be explained by the high detection limit for mercury for these analyses, ranging from 0.1-5 µg/l.

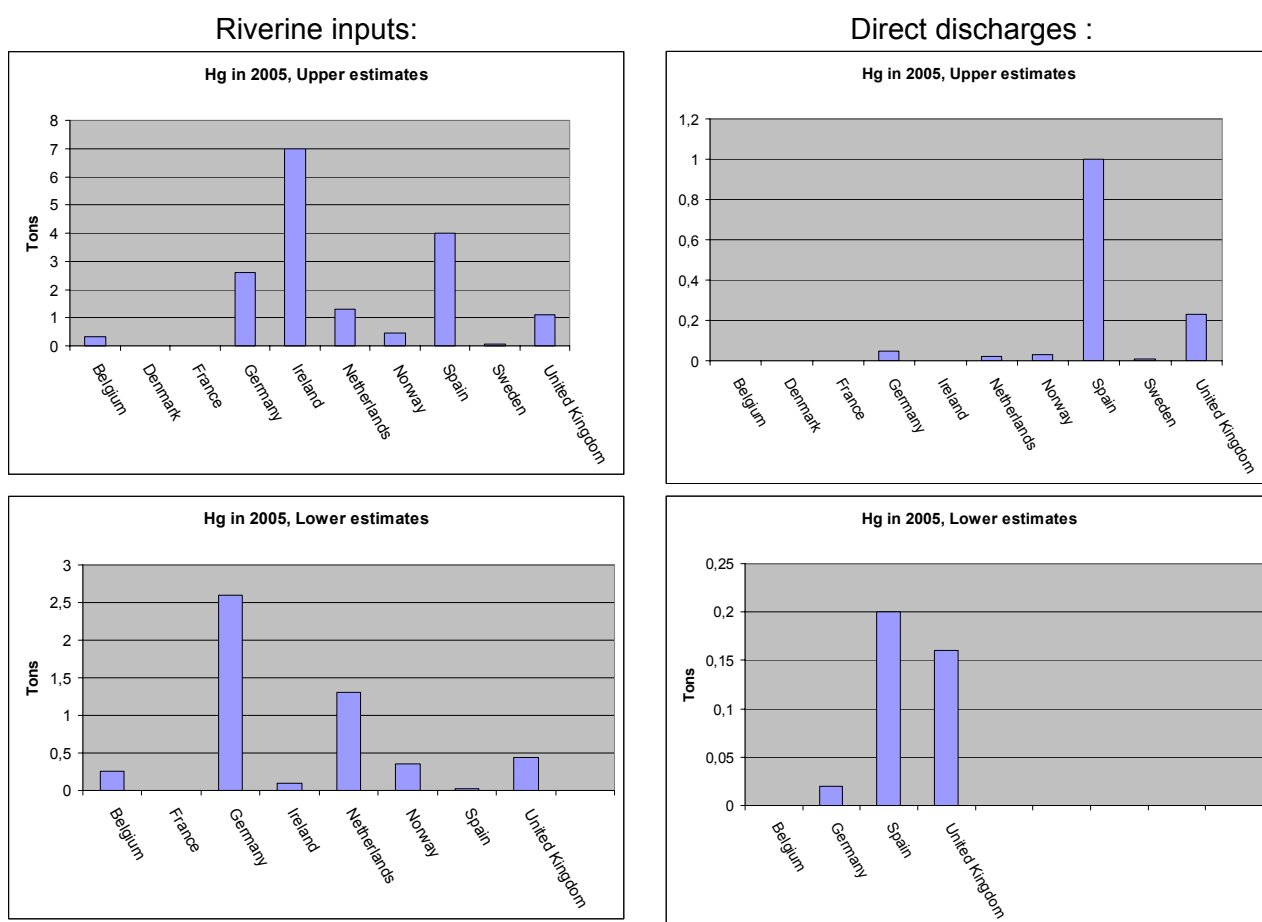


Figure 4.4. Illustration of riverine inputs (in tons) and direct discharges (in tons) of mercury reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability. No data reported by Denmark, France and Portugal. No direct discharges reported by Ireland. Direct discharges not applicable for Belgium.

4.3 Lead Inputs

76. The total inputs of lead to Convention Waters in 2005 reported by Contracting Parties vary from 7 tons to around 300 tons (c.f. Figure 4.5).

77. Also here the picture depends on whether the lower or upper estimates are used. The differences in results are however less explicit than for cadmium and mercury. The reason for the comparably more “stable” situation is probably that the concentrations of lead, compared to cadmium and mercury, are found in much higher concentrations. This reduces the uncertainty linked to detection limits.

78. The inputs reported by the United Kingdom seem to represent the largest contribution to total inputs of lead to Convention Waters at a magnitude ranging between 35% (upper estimate) and 45% (lower estimates). For contributions of other Contracting Parties, the picture differs when using lower estimates (Germany and the Netherlands would follow the UK with 22% and 17% respectively) and upper estimates (Spain and Germany would follow the UK with 21 % and 15%, respectively). Again, these differences in scenarios are probably due to differences in detection limits.

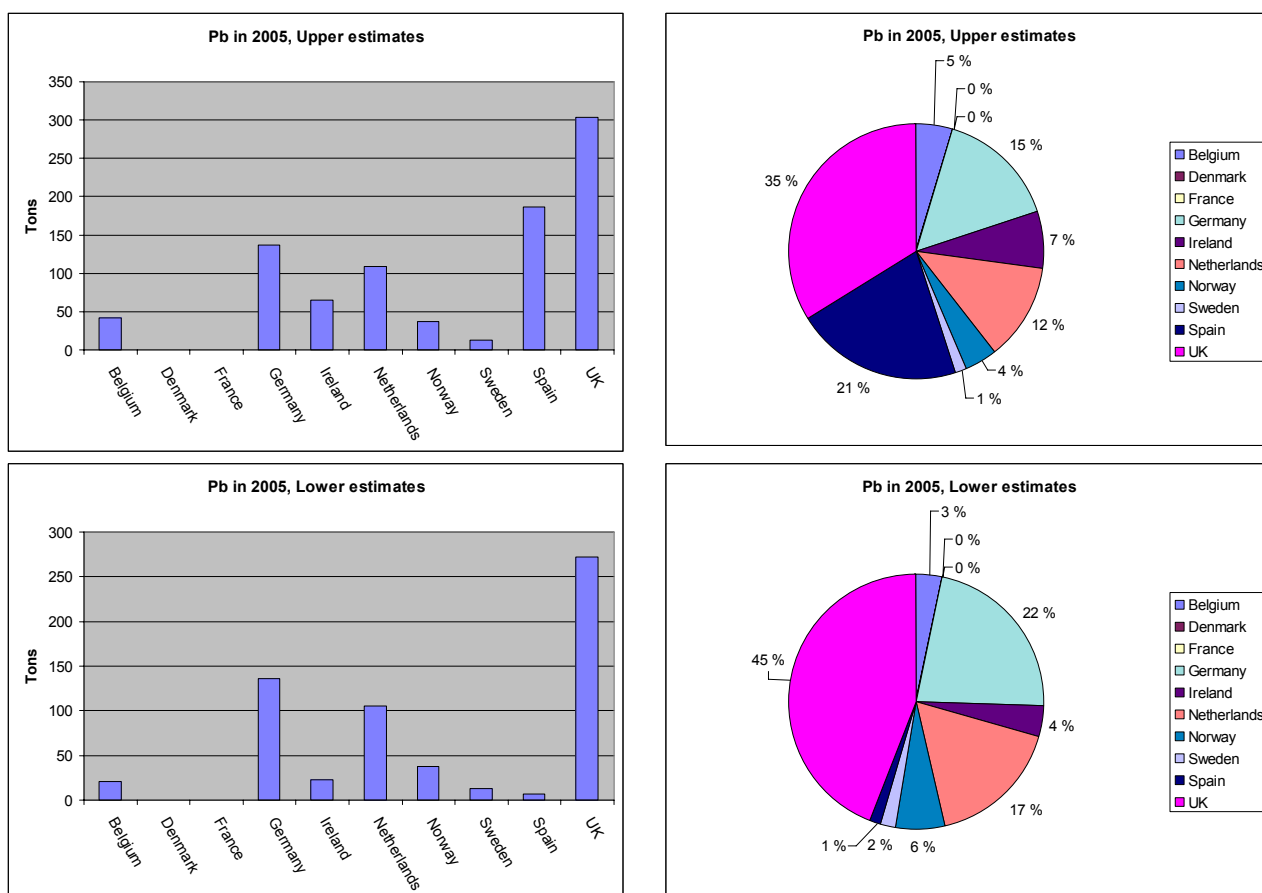


Figure 4.5: Illustration of lead inputs (in tons) reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability and relative contributions (%). No data reported by Denmark, France and Portugal.

79. The highest inputs derive from the rivers, with direct discharges being significantly lower (Figure 4.6).

80. Regardless of the estimate method used, the riverine inputs reported by the United Kingdom were highest. For direct discharges, the UK reported fairly consistent upper and lower estimates. The differences in upper and lower estimates reported by Spain for direct discharges are considerable, suggesting that Spain would be the biggest contributor to direct discharges if upper (LOQ based) estimates were used. Under lower estimates, the direct discharges reported by the UK would be the highest to the OSPAR maritime area.

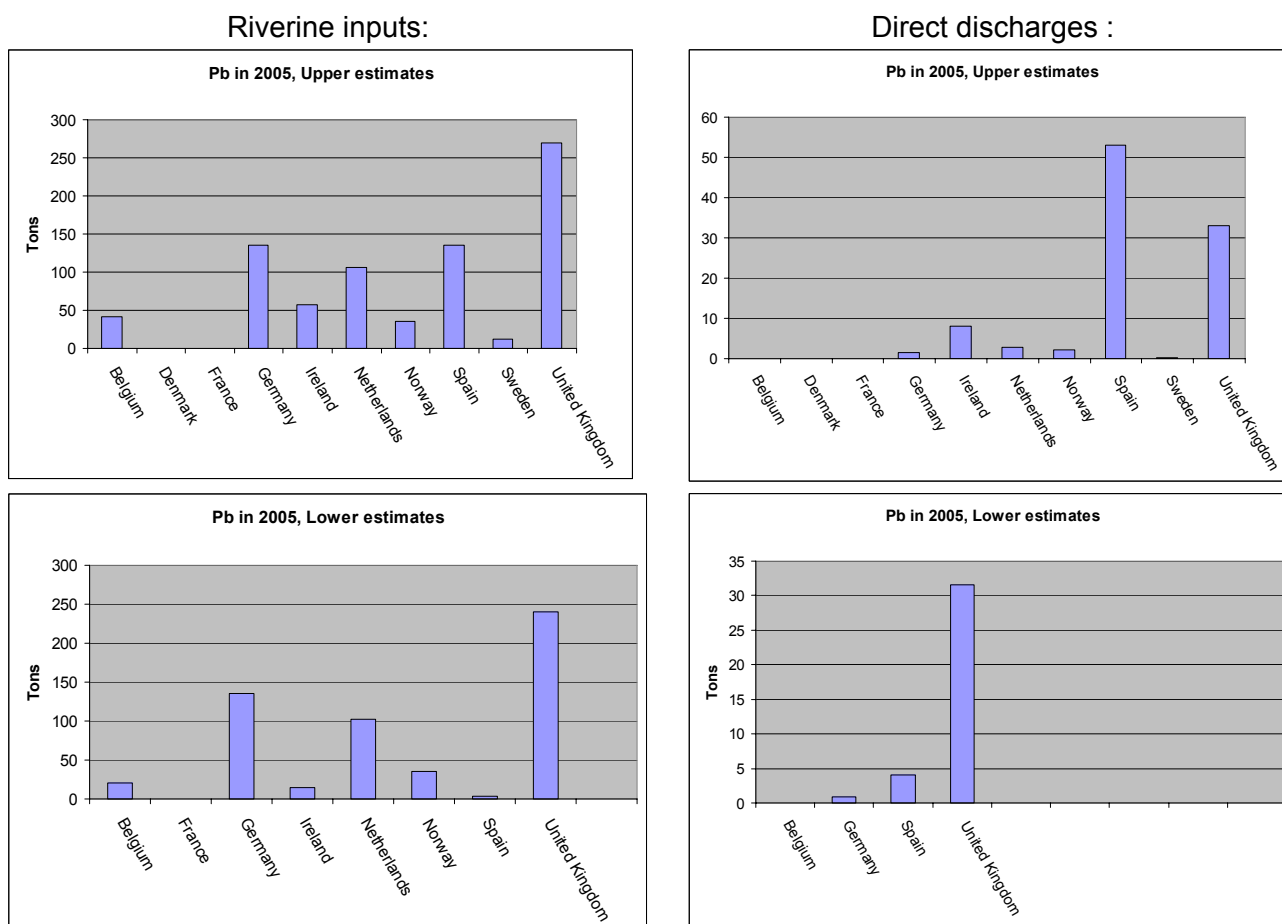


Figure 4.6. Illustration of riverine inputs (in tons) and direct discharges (in tons) of lead reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability. No data reported by Denmark, France and Portugal. Direct discharges not applicable for Belgium. Direct discharges reported by Sweden are too small to show in the chart.

4.4 Copper Inputs

81. The total inputs of copper into the OSPAR maritime area in 2005 reported by Contracting Parties range from 15 tons to more than 450 tons in Norway (Figure 4.7).

82. The difference between upper and lower estimates is less explicit that for other metals. Regardless of the estimation method used, Norway reported the largest inputs of copper. The relative contribution of inputs from Contracting Parties is lower when upper estimates are used because the LOQ based estimates reported by Spain are higher, representing 10% of total inputs, than the lower estimate (1%).

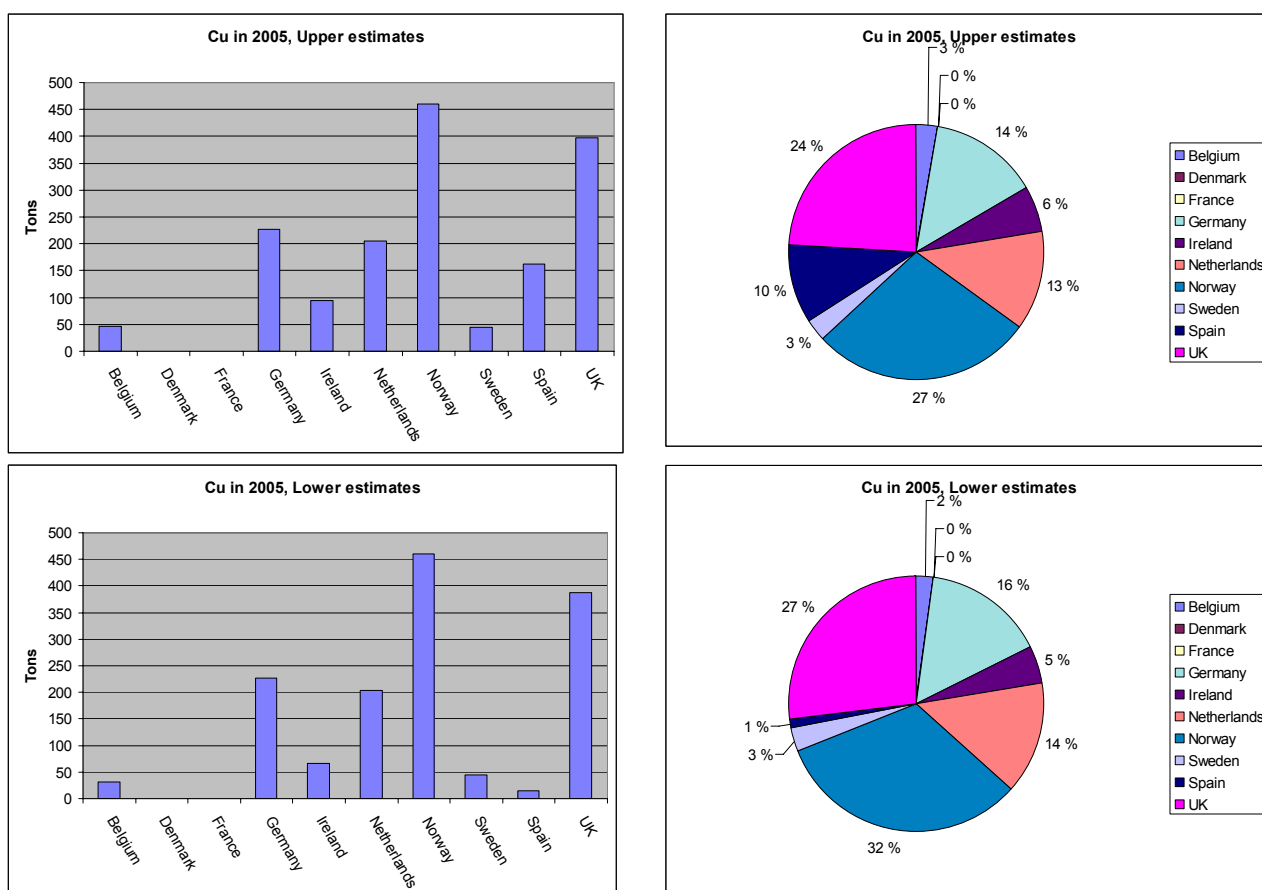


Figure 4.7. Illustration of copper inputs (in tons) reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability and relative contributions (%). No data reported by Denmark, France and Portugal.

83. Direct discharges form the smaller part of the total inputs (Figure 4.8).

84. Under both estimates used, the riverine inputs reported by the UK are highest, followed by Germany, Norway and the Netherlands.

85. For direct discharges, Norway reported highest inputs which are also higher than riverine inputs reported by Norway. This is due to the fact that Norway is reporting discharges of copper from the cleaning of fish cages in the fish farming industry. These cages are impregnated with a substance containing copper in order to prevent algae growth. The discharges reported by Norway are uncertain: they are only estimates and not monitored data and therefore only upper estimates for direct discharges are given.

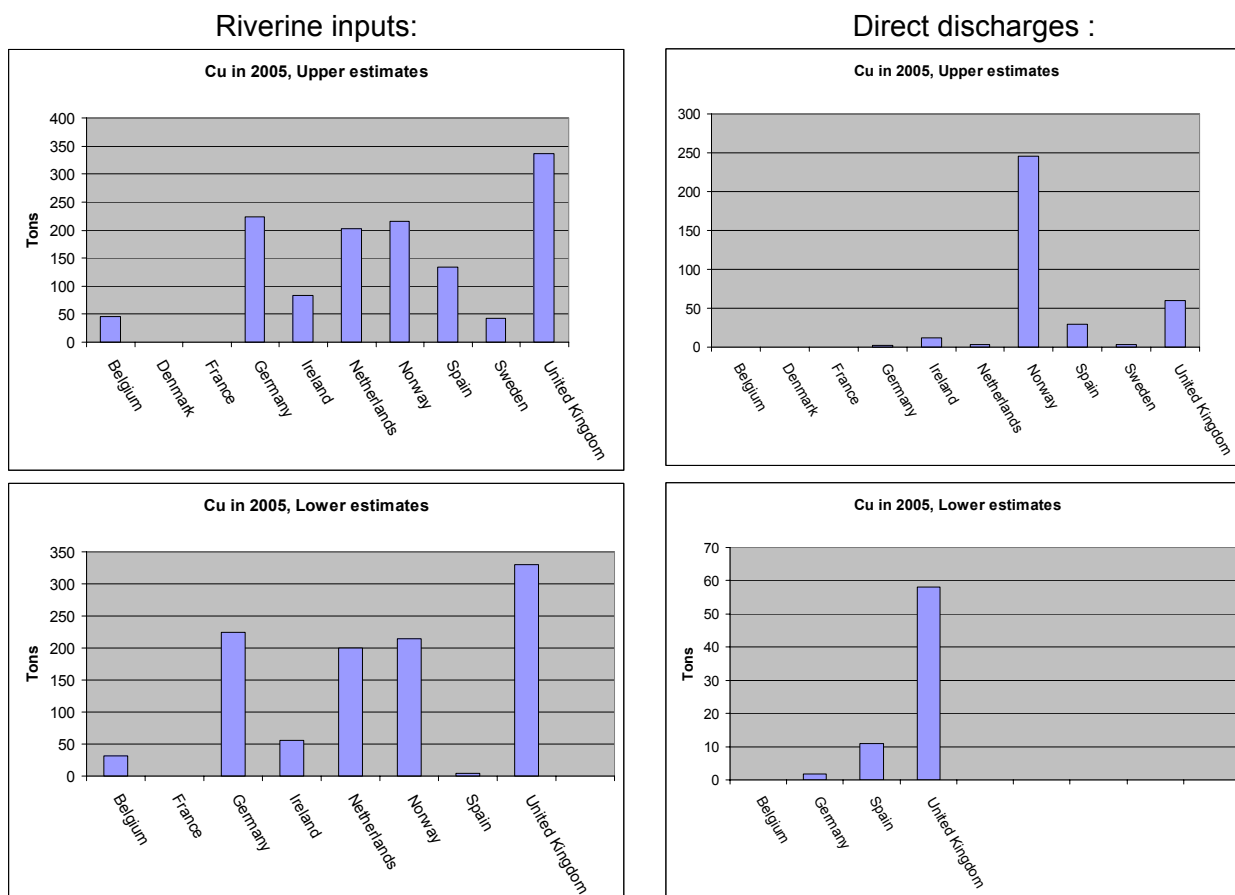


Figure 4.8. Illustration of riverine inputs (in tons) and direct discharges (in tons) of copper reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability. No data reported by Denmark, France and Portugal. Direct discharges not applicable for Belgium.

4.5 Zinc Inputs

86. The total inputs of zinc into Convention Waters in 2005 by Contracting Parties range from 160 in Sweden to 1639 tons in UK (Figure 4.9).

87. The upper and lower estimates reported by Contracting Parties are more consistent than for other metals. This may reflect the relative high concentrations of zinc. In this case, detection limits are a less distorting factor. Only the figures reported by Spain show an almost 50% discrepancy between the LOQ based upper estimate and the lower estimate.

88. Regardless of estimation method, the UK reported the highest inputs of zinc, followed by Germany the Netherlands and Norway with relative contributions to inputs at a magnitude of 29-32% (UK), 19-21% (Germany), 15-16% (Netherlands) and 12% (Norway).

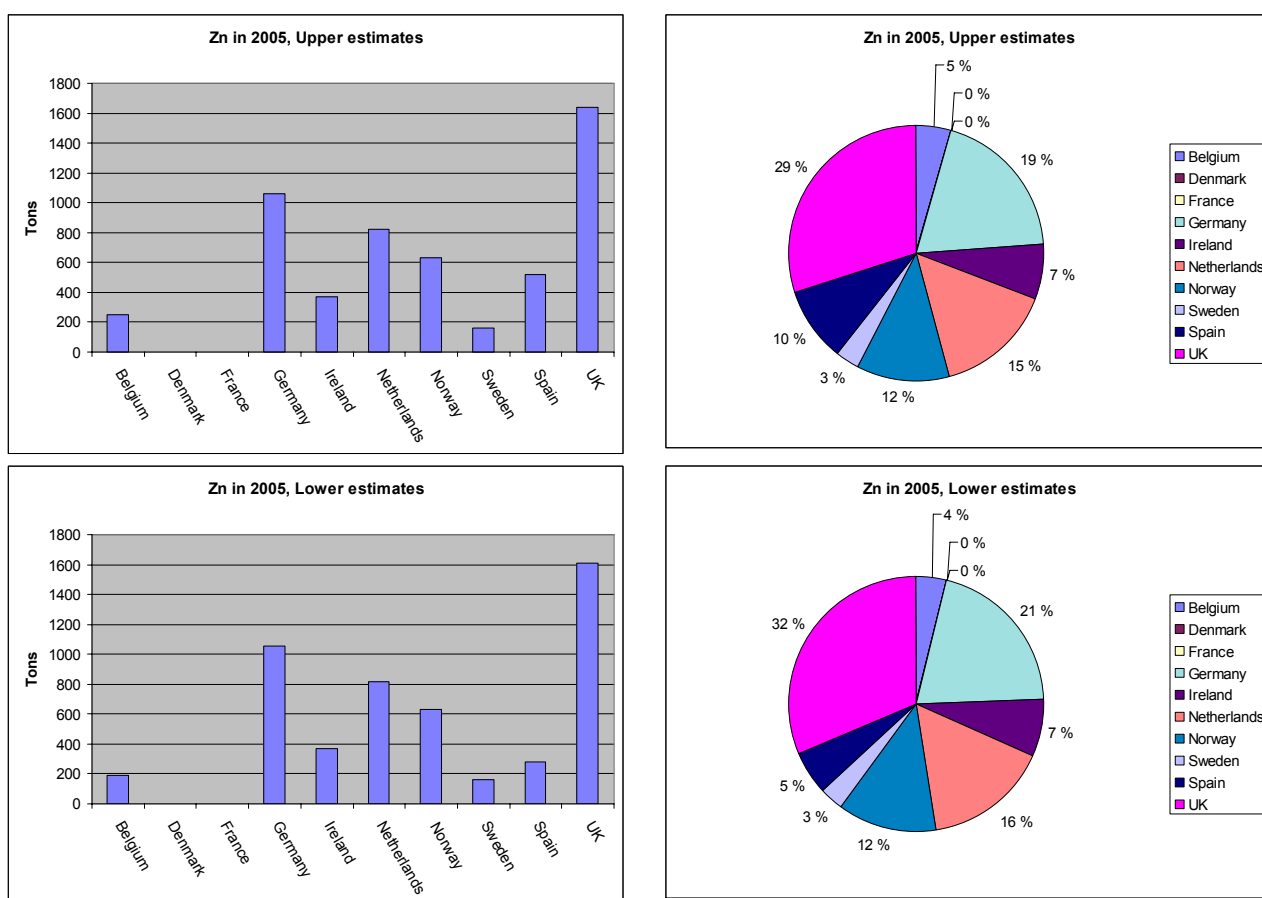


Figure 4.9 Illustration of zinc inputs (in tons) reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability and relative contributions (%). No data reported by Denmark, France and Portugal.

89. The riverine inputs are an order of magnitude higher than direct discharges (Figure 4.10).
90. Highest inputs were reported for both riverine and direct discharges by the UK. Germany and the Netherlands reported important contributions to riverine inputs. Spain and partly Ireland reported high contributions to direct discharges.
91. The discrepancy between upper and lower estimates in Spanish data is mainly reflected in riverine inputs.

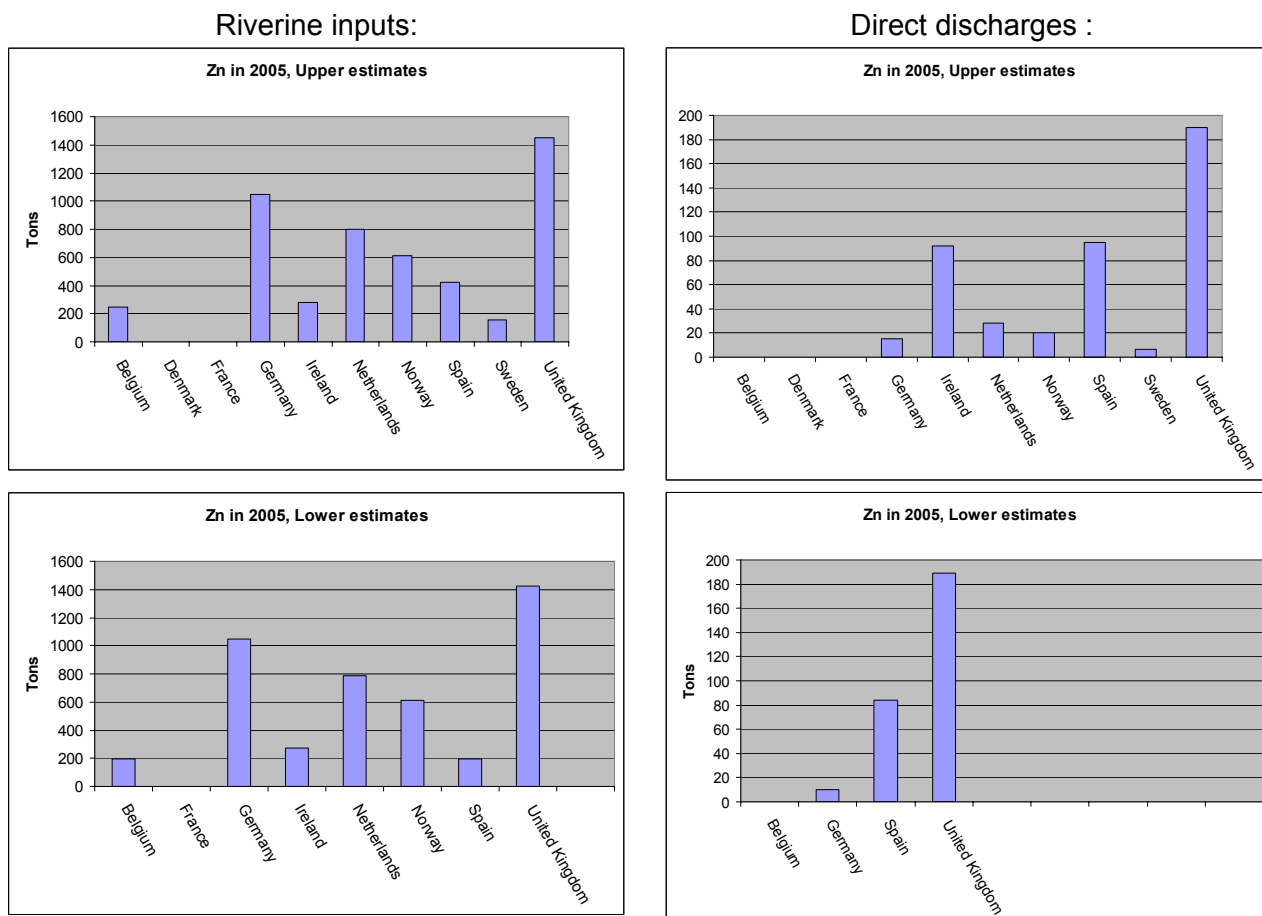


Figure 4.10: Illustration of riverine inputs (in tons) and direct discharges (in tons) of zinc reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability. No data reported by Denmark, France and Portugal. Direct discharges not applicable for Belgium.

4.6 Inputs of Total Nitrogen

92. The total inputs of nitrogen to the OSPAR maritime area in 2005 reported by Contracting Parties range from 29 tons (Sweden) to almost 300 tons (UK) (cf. Figure 4.11).

93. In general, the reported total nitrogen inputs show less difference between the upper and lower estimates than the inputs reported for metals. For both estimate methods, the inputs reported by the UK, the Netherlands and Germany were highest representing a relative contribution at a magnitude of 26-28%, 22% and 17-18% respectively.

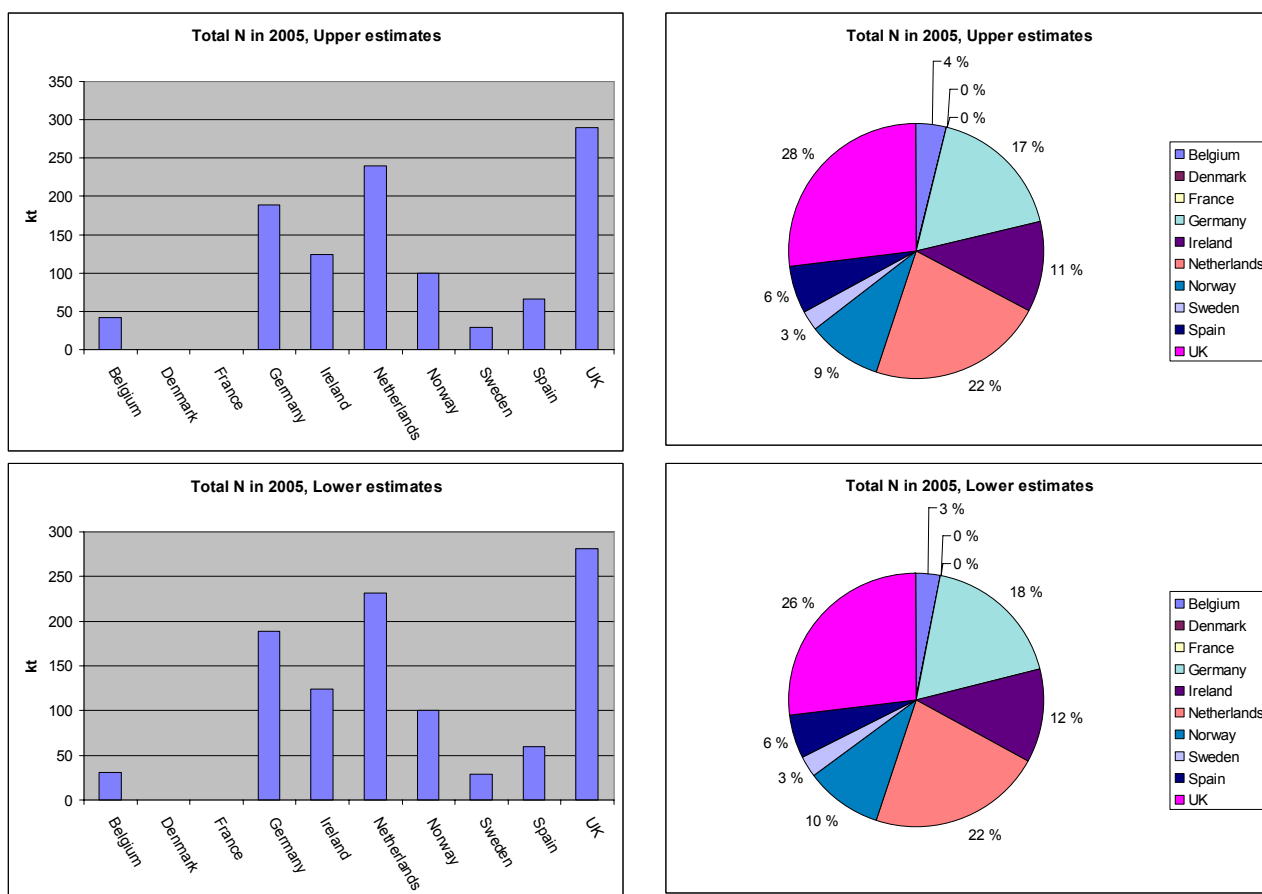


Figure 4.11. Illustration of total nitrogen inputs (in tons) reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability and relative contributions (%). No data reported by France and Portugal.

94. Riverine inputs form the larger part of inputs of total nitrogen (Figure 4.12).
95. The highest contributions to riverine inputs of total nitrogen were reported by the Netherlands, with the UK and Germany at close range.
96. For direct discharges, the UK and Norway reported the highest inputs. Norwegian direct discharges are strongly connected to fish farming.

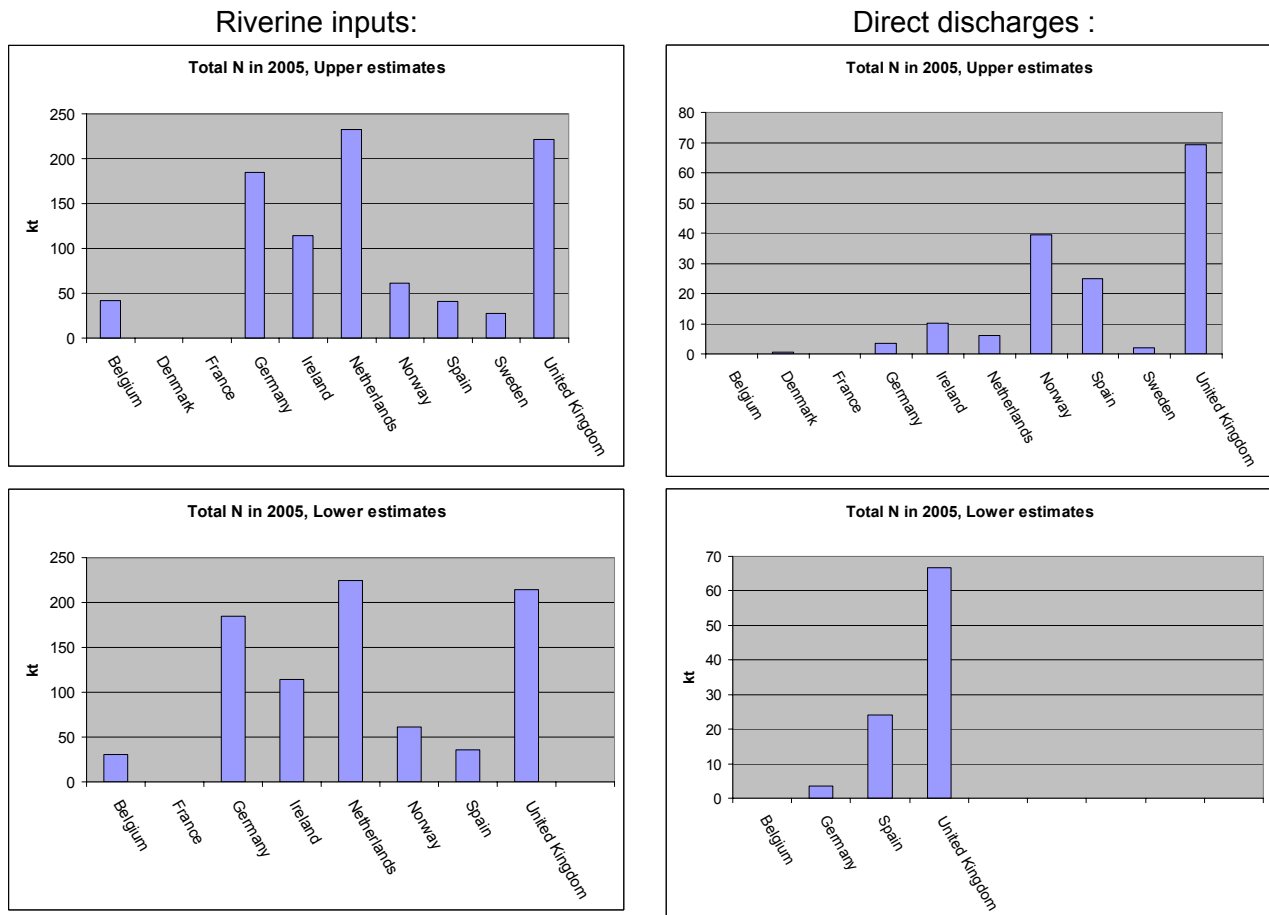


Figure 4.12. Illustration of riverine inputs (in tons) and direct discharges (in tons) of total nitrogen reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability. No data reported by France and Portugal. Direct discharges not applicable for Belgium. Riverine inputs reported by Denmark are too small to show in the chart.

4.7 Inputs of Total Phosphorus

97. The total inputs of phosphorus to the OSPAR maritime area in 2005 reported by Contracting Parties range from less than 1 to 24 tons (Figure 4.13).

98. As for total nitrogen, the differences between the upper and lower estimates are less explicit than for metals, possibly because of lower detection limits and higher concentrations.

99. United Kingdom reported the highest inputs (36%) of phosphorus followed by the Netherlands (14-15%) and Germany (13%).

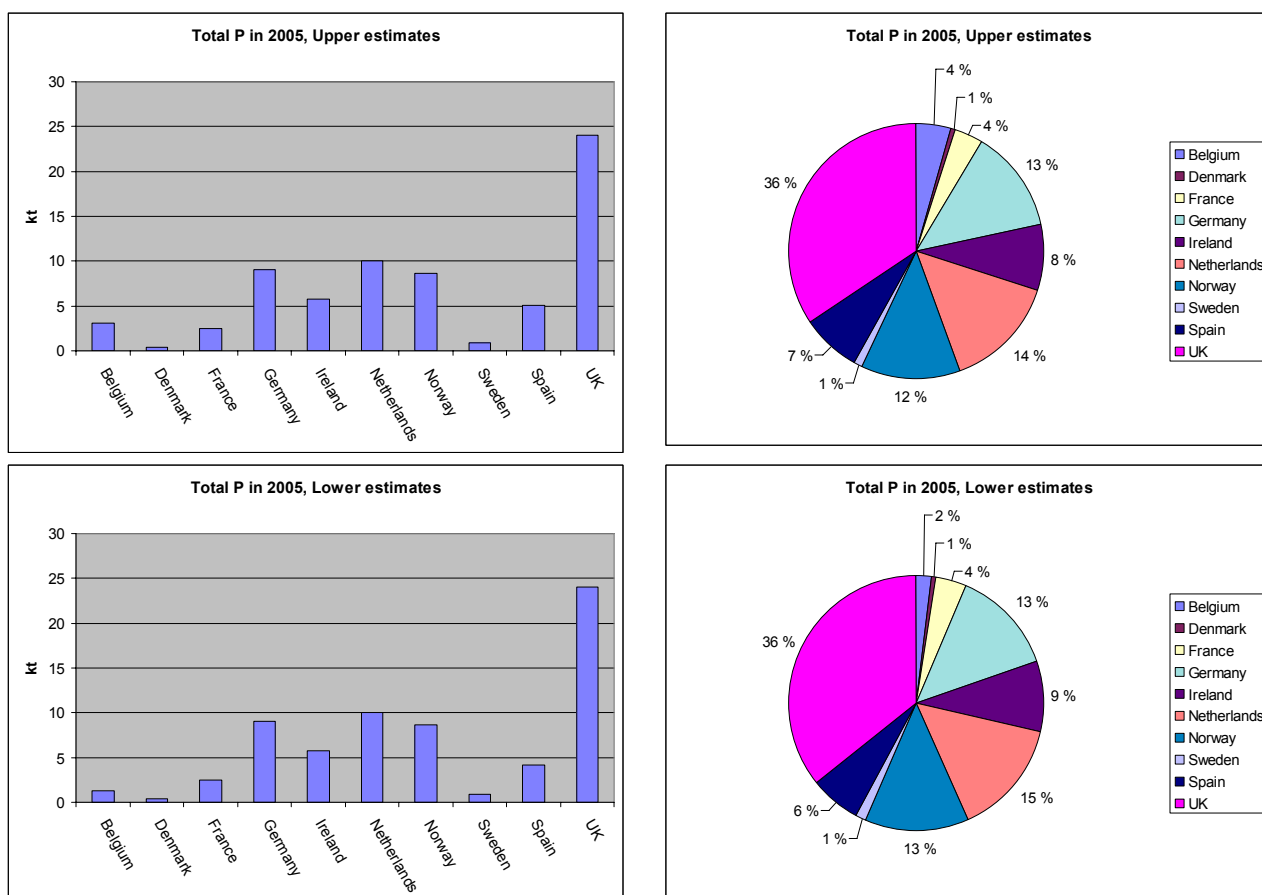


Figure 4.13. Illustration of total phosphorus inputs (in tons) reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability and relative contributions (%). No data reported by Portugal.

100. The total riverine inputs are higher than direct discharges. Single discharges reported are at the same magnitude as single riverine contributions (Figure 4.14).

101. The United Kingdom reported the highest inputs of phosphorus for both riverine inputs and direct discharges.

102. Like for nitrogen, the Netherlands and Germany also reported high riverine loads of total phosphorus. Norway reported high direct discharges due to fish farming.

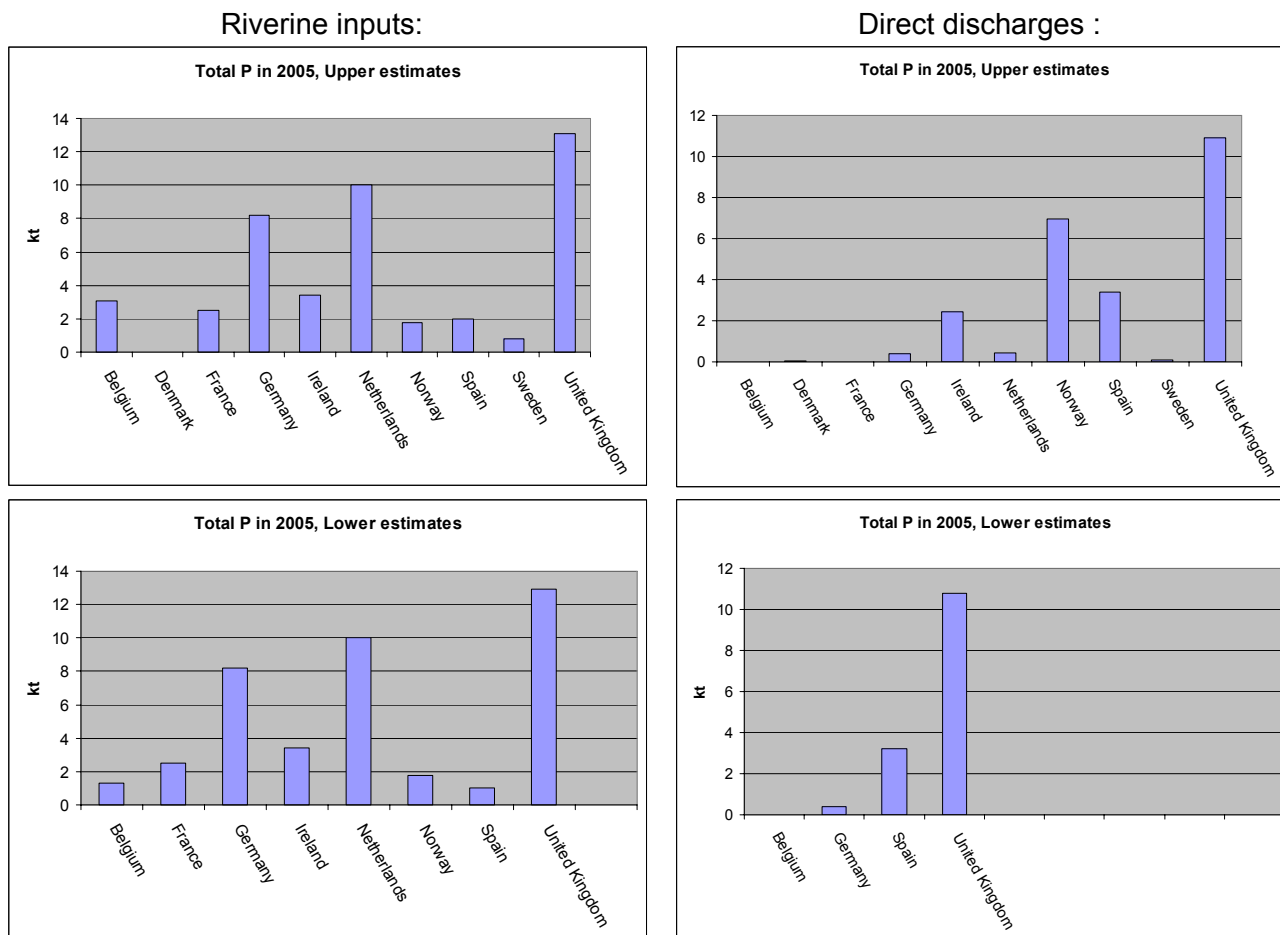


Figure 4.14. Illustration of riverine inputs (in tons) and direct discharges (in tons) of total phosphorus reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability. No data reported by Portugal. No direct discharges reported by France. Direct discharges not applicable for Belgium. Data reported by Denmark are too small to show in the chart.

4.8 Inputs of Suspended Particulate Matter (SPM)

103. Suspended particulate matter (SPM) is the determinand for which most Contracting Parties reported similar values for the upper and lower estimates (c.f. Figure 4.15). The consistency between upper and lower limits for this substance does not necessarily reflect that the estimates are correct. It only reflects the results of the laboratory analyses but not the reliability of the monitoring methodology.

104. Highest inputs were reported from the UK (26-27%), Germany (20%), Norway (15-16%) and the Netherlands (14%).

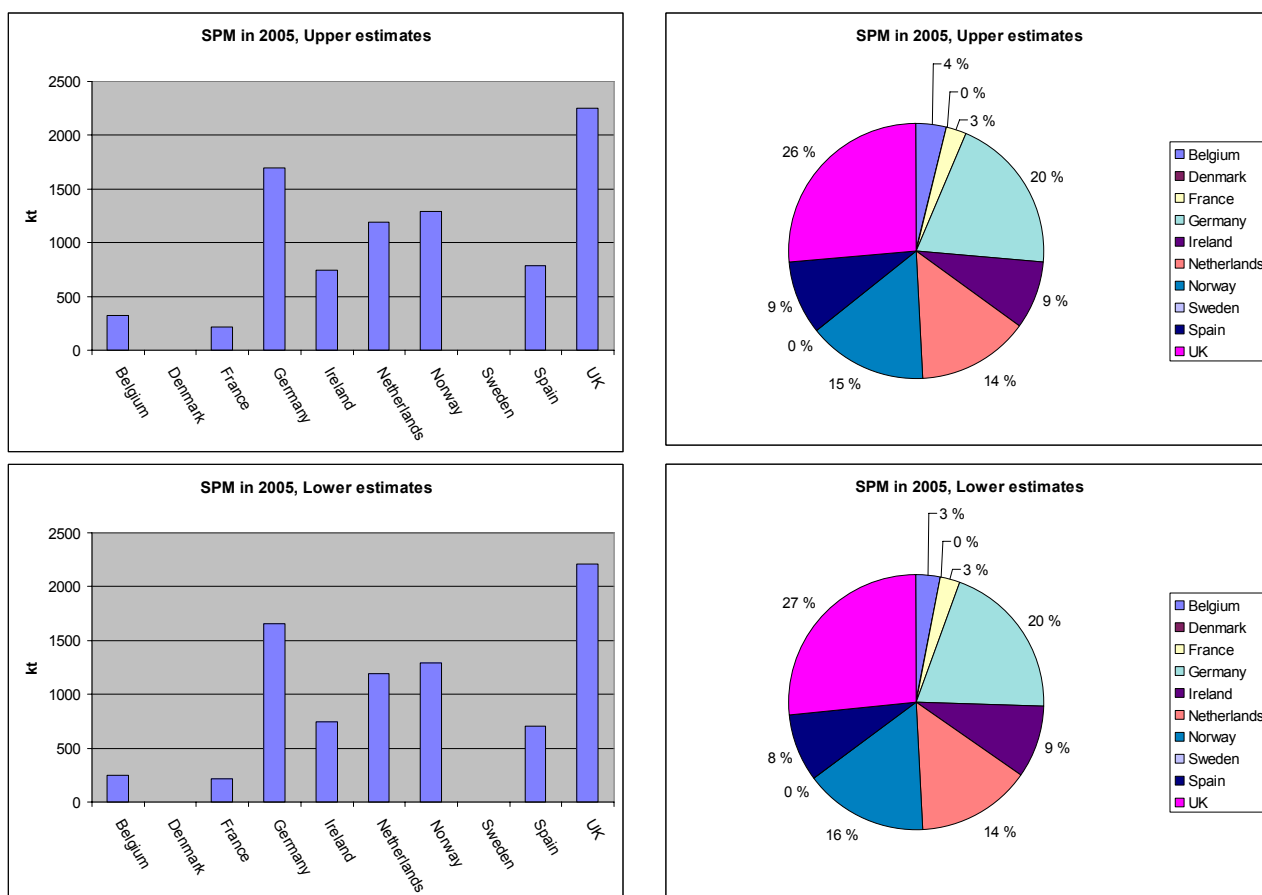


Figure 4.15. Illustration of total inputs of suspended particulate matter (in tons) reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability and relative contributions (%). No data reported by Denmark, Portugal and Sweden.

105. Riverine inputs of SPM are significantly higher than direct discharges (Figure 4.16).

106. Germany, United Kingdom, the Netherlands, Norway and Ireland reported relatively high loads of suspended particulate matter in rivers. For direct discharges, the main contributions were reported by the UK, Norway and Spain.

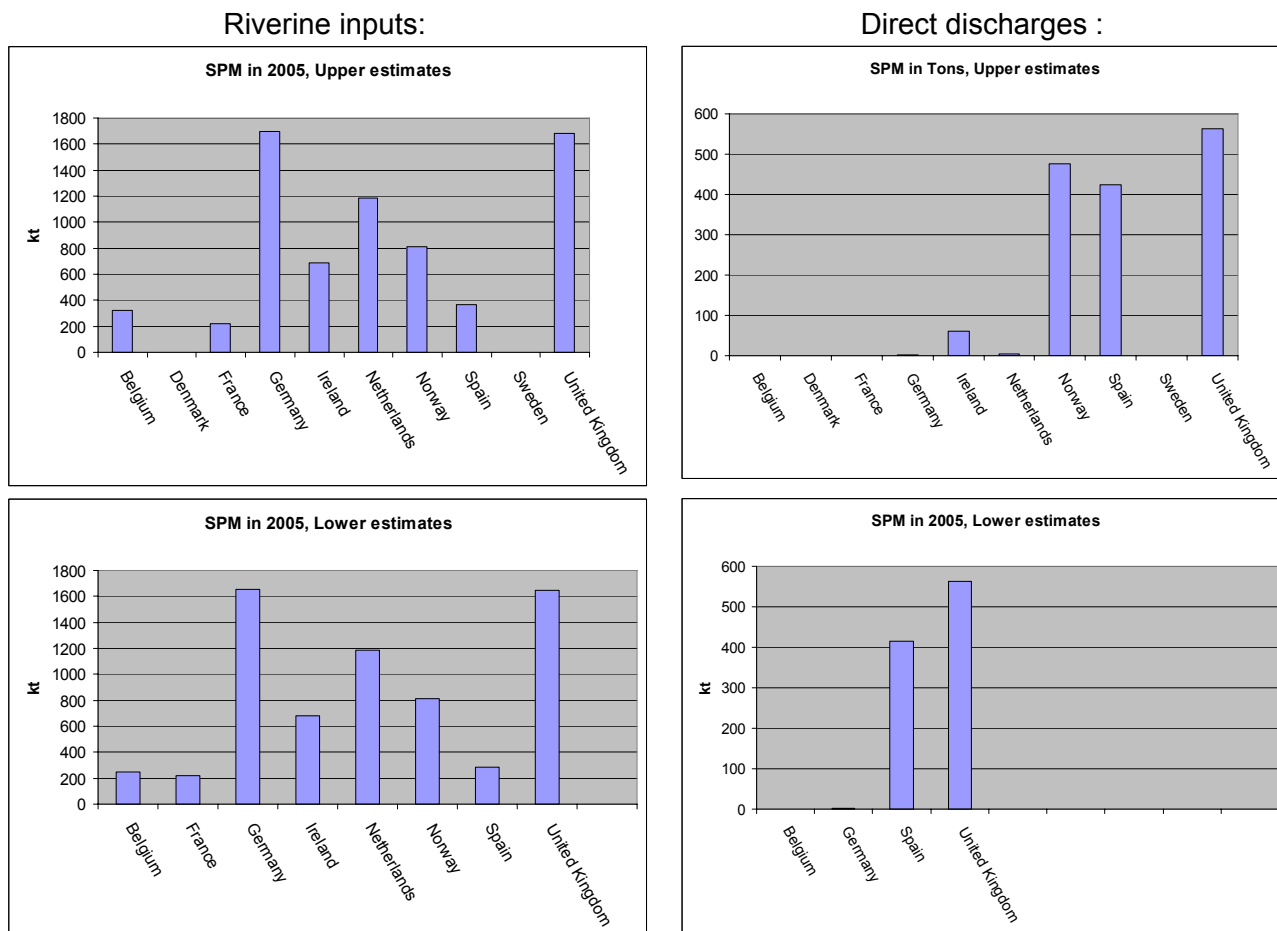


Figure 4.16. Illustration of riverine inputs (in tons) and direct discharges (in tons) of total suspended particulate matter reported by Contracting Parties in 2005 as upper and lower estimates and their implications on data comparability. No data reported by Denmark, Portugal and Sweden. No direct discharges reported by France. Direct discharges not applicable for Belgium.

5. General conclusions and recommendations

107. The "visualising" of the reported RID 2005 data in figures and charts presented in Chapter 4 revealed important features of the 2005 data and their reliability. In particular, the differences between upper and lower estimates reported for some substances were rather striking, as were some of the differences between riverine and direct discharges both for different countries and substances. A closer look at the detection limits (section 3.3), showed that these vary significantly, not just between the countries but also within the same country, depending on the laboratory used. It may therefore be concluded that:

- the higher estimates may give too high input values when the detection limits are high; and
- with similarly high detection limits, the lower estimates may give too low input values, and often equal zero if all samples analysed are below the detection limit.

108. In short, neither the higher nor the lower estimates can be trusted when the detection limits are too high.

109. The question on whether to use LOD (limit of detection) or LOQ (limit of quantification) is therefore a valid one. Since the different Contracting Parties have such differences in detection limits, and since different laboratories use different practices relating to LODs and LOQs, it is difficult to give advice on the correct choice. It can only be concluded that it is of vital importance that Contracting Parties report which detection method is used in which laboratory.

110. The fact that many Contracting Parties use different laboratories, or that laboratories change over time, is a challenge. It means that the detection limits (and analytical methods) also change. It is therefore important that Contracting Parties have a good overview of which samples are analysed in which laboratory, and with which detection limits. Changes in laboratories and detection limits over time should be duly registered – preferably in a common database, since this will influence the trends significantly; perhaps more than factual variations. This is also very important for the forthcoming 2009 RID assessment.

111. This report also revealed that several concepts within the RID programme are differently understood by Contracting Parties. It is recommended that the proposed definitions in Annex 2 on concepts such as "tributary rivers" and "unmonitored areas" are further developed and agreed upon by Contracting Parties. Such definitions could become part of a RID quality assessment document. A first rough outline of quality assurance aspects is given in Annex 4. It is suggested that Contracting Parties could further develop this into a common RID QA Document. One of the factors that may need clarification in such a quality assessment document is the sampling procedures, as many countries use different institutions for the sampling. Another such factor is the load calculation practices, which seem to vary between Contracting Parties, partly according to available hydrological data.

112. One factor that was only lightly treated in this report is that Contracting Parties report very different sampling frequencies, although monthly sampling seems to be the most usual. There is a risk of underestimating particulate and particle associated loads with regular monthly sampling, especially if event sampling is not carried out. It should be of concern that few of the Contracting Parties reported that they did extra sampling during floods. For this reason it is not improbable that the annual inputs reported by Contracting Parties are underestimated for SPM and substances that are mainly transported in the sediment phase.

113. It should also be noted that there are large variations in the way that direct discharges are included in the Contracting Parties' annual RID data reports. Some Contracting Parties report on sewage treatment plants, industries and fish farming, others do not report any direct discharges at all. In many Contracting Parties, large cities are located along the shores of the marine coastline. It is, perhaps, interesting to notice how relatively less important the direct discharges are compared to the riverine inputs (cf. Chapter 4). This may be reasonable for areas where large cities are located upstream and along major rivers, especially in central Europe, but it might nevertheless be a valid question to ask if the inputs of coastal urban areas are sufficiently accounted for.

114. It is hoped that one important outcome from this report may be related to how confident we can be that the figures to be created in the forthcoming 2009 RID Assessment, i.e. the follow up of the 1990-2002 RID Assessment, are reasonably reliable, accurate and comparable between Contracting Parties. It is also hoped that some of the conclusions of the present report can help in the preparation of this 2009 RID Assessment. It must be noted that since the practices of the different Contracting Parties vary as much as is demonstrated in this assessment, it might be very difficult to produce meaningful comparative trend analyses between countries.