OSPAR COMMISSION

Riverine Inputs and Direct Discharges to Convention Waters

OSPAR Contracting Parties' RID 2008 Data Report

Monitoring and Assessment Series

2010

OSPAR Convention

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.

Convention OSPAR

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.

Acknowledgement

This report has been prepared by Eva Skarbøvik and Lars Gjemlestad (Bioforsk), with contributions from Per Stålnacke (Bioforsk), Lars Sonesten (Swedish University of Agricultural Sciences), Lars Svendsen and Søren Erik Larsen (National Environmental Research Institute, Aarhus).

Bioforsk

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Contents

Glossary

Catchment	The whole of an area having one common outlet for its drainage water. A catchment area could be subdivided into a monitored and unmonitored area, depending on where the monitoring point is located.
Cd	Cadmium
Cu	Copper
Direct discharges	A 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 inputs is made.
Heavy metals	Refers to the five metals whose direct discharges and riverine inputs were studied in this assessment namely: cadmium, copper, lead, mercury and zinc
Hg	Mercury
LOD	Limit of Detection is, 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”.
LOQ	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.
Main river	A river to be monitored at least once a month (12 datasets) every year in accordance with the objectives of the Comprehensive Study. Main rivers should be major load bearing rivers.
Monitored area	The catchment upstream of the river monitoring point.
Nutrients	Refers to the nutrients whose direct discharges and riverine inputs were examined in this assessment, namely total Nitrogen and total Phosphorus
Pb	Lead
RID	Comprehensive Study of Riverine Inputs and Direct Discharges (reference number: 1998-5), as amended by ASMO 2005 (Annex 5 to the ASMO 2005 Summary Record, ASMO 05/13/1).
Riverine inputs	A mass of a determinand carried to the Maritime Area by a watercourse (natural river or man-made watercourse) per unit of time
SPM	Suspended Particulate Matter
Total inputs	Sum of direct discharges and riverine inputs.
Total-N	Total Nitrogen
Total-P	Total Phosphorus
Tributary river	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.
Unmonitored area	Defined as any sub-catchment(s) located downstream 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).
Zn	Zinc

Executive Summary

This report presents the results of monitoring undertaken by OSPAR Contracting Parties within the framework of the Comprehensive Study of Riverine Inputs and Direct Discharges (RID) during 2008. Under the RID, OSPAR Contracting Parties are committed to monitoring, on a mandatory basis, the riverine inputs and direct discharges into the sea of certain heavy metals and nutrients, and, on a voluntary basis, of some organic contaminants. The report gives information on the observed riverine inputs and direct discharges of selected contaminants to the OSPAR maritime area and its regions during 2008 and gives national trend examples.

Récapitulatif

Le présent rapport présente les résultats de la surveillance réalisée par les Parties contractantes OSPAR dans le cadre de l'Etude exhaustive des apports fluviaux et des rejets directs (RID) en 2008. Les Parties contractantes s'engagent, dans le cadre du RID, à surveiller, à titre obligatoire, les apports fluviaux et les rejets directs dans la mer de certains métaux lourds et de nutriments et, à titre facultatif, de certains contaminants organiques. Le rapport comporte des informations sur les apports fluviaux et les rejets directs observés de contaminants sélectionnés dans la zone maritime OSPAR et ses régions en 2008 ainsi que des exemples de tendances nationales.

1 Introduction

The 2008 data RID-Centre report gives the overview tables of the national RID reporting in 2008 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 and V: Wider Atlantic.

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 riverine inputs and direct discharges 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. Further details regarding the RID Principles are given in Annex 1.

For the last three years (i.e. covering data from 2005, 2006 and 2007), comprehensive reports were developed based on the reported RID data. These reports presented the challenges of the RID programme, including uncertainties, knowledge gaps, lack of documentation on harmonised practises, approaches and methodologies amongst Contracting Parties (Skarbøvik and Borgvang 2007; Borgvang *et al*. 2008; Borgvang *et al*. 2010). In 2009, a RID Database in Access format was prepared; hence most of the work related to Bioforsk's responsibilities this year has focussed on the installation and functioning of this database. Thus, for the year 2008, only the data of the countries are presented, and no further evaluations of the results have been done. This decision was further supported by the fact that a comprehensive assessment on the RID Programme data from 1990 – 2006 was developed during 2009. Examples of national trend assessments are presented in section 3.

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1 At its Tenth Meeting (Lisbon, 1988) the Paris Commission[1] (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 Country submission of RID data for 2008

Table 1 provides an overview of the status of submitted information by Contracting Parties on which this report is based. In 2008, the submission of data and written reports did, in general, follow the agreed deadlines. All Contracting Parties, except Denmark, had a deadline of 1st November, whereas Denmark's deadline was 1st December. All countries were asked to follow the new data format generated by the database, and several of the countries consequently delivered on the new format. Where data were delivered on other formats, Bioforsk transferred the data into the format of the database. Next, Bioforsk produced the overview tables 1a-4a. These tables were supposed to be derived from the database, but unforeseen problems made it necessary to prepare the tables manually. Next, each country received the overview tables together with the Contracting Party's own dataset and was given a new deadline to verify these datasets. Incoming corrections were followed up by Bioforsk and new overview tables were produced (cf. Tables 1a–4b in Annex 2). By 1st February 2010, all Contracting Parties except two had verified their data tables and the overview tables.

Table 1: Overview of submitted information from Contracting Parties

Country	RID 2008 Report submitted	RID 2008 Data submitted	RID 2008 Data verified
Belgium	Yes	Yes	Yes
Denmark	Yes	Yes	Yes
France	Yes	Yes	Yes
Germany	Yes	Yes	Yes
Iceland	Yes	Yes	Yes
Ireland	Yes	Yes	Yes
Netherlands	Yes	Yes	Yes
Norway	Yes	Yes	Yes
Portugal[2]	Yes	Yes	No
Spain	Yes	Yes	Yes
Sweden	Yes	Yes	Yes
United Kingdom	Yes	Yes	Yes

Thus, RID 2008 data reports have been submitted by all Contracting Parties which is a significant improvement from former years.

Table 2: Overview of information for 2008 reported by Contracting Parties within the agreed deadline on inputs to the OSPAR Maritime Area (green = data reported; NI = no information, NA = not applicable)

Country	Sewage effluents	Industrial effluents	Main rivers	Tributary rivers
Belgium	NA	NA		
Denmark				
France	NI	NI		
Germany				
Iceland	NI	NI		
Ireland				
Netherlands				
Norway				
Portugal	NI	NI		NI
Spain				
Sweden				
UK				

3 Trends in inputs in some selected Contracting Parties

During the INPUT meeting in London in February 2010, the Contracting Parties expressed a wish that future RID data reports should present time trends per country, to allow continuous checking of progress in reducing inputs of pollutants. In the present report, some national examples of such trend analyses are included for Norway, Sweden and Denmark. It must be noted that the countries often use different methods for calculating trends, and for each example a description of the methodology is therefore given. The authors are also given for each of these analyses.

Whenever possible, focus has been given on the same parameters selected for the 2009 RID Assessment (http://www.ospar.org/v_publications/download.asp?v1=p00448), i.e. cadmium, lead, mercury, nitrogen and phosphorus, for the period of 1990s to 2008.

3.1 Long-term trends in Norwegian rivers

Prepared by: Per Stålnacke, Department of Water Quality and Hydrology; Bioforsk (The Norwegian Institute for Agricultural and Environmental Research)

In Norway, trend analyses have been carried out for the rivers that are monitored monthly, and not for rivers monitored less frequently, nor for direct discharges. Thus, the discussion below is based on nine rivers draining into four sea areas, as shown in Table 3. In 2009 a major revision of the Norwegian RID data from 1990-2009 was performed (Stålnacke *et al*. 2009), and the below trend analyses are therefore based on this new dataset.

Table 3: Overview of the nine Norwegian rivers for which trend analyses have been done

Discharge area	Name of river	Catchment area (km^2)	Long term average flow (1000 m^3/day) *
I. Skagerrak	Glomma	41918	61347
	Drammenselva	17034	26752
	Numedalslågen	5577	10173
	Skienselva	10772	23540
	Otra	3738	12863
II. North Sea	Orreelva	105	430
III. Norwegian Sea	Orkla	3053	3873
	Vefsna	4122	14255
IV. Barents Sea	Alta	7373	7573

Methodology

The partial Mann-Kendall test (Libiseller and Grimvall, 2002) has been used to test for long-term changes in flow-normalised loads. The method has its methodological basis in the seasonal Mann-Kendall-test (Hirsch and Slack, 1984) with the difference that water discharge is included as explanatory variable. A correction for serial correlation up to a user-defined time span (here two years) were also included (Wahlin & Grimvall, 2009).

The method tests for monotonic trends[2] (including linear trends), and each month was tested separately for trends before it is summed up to an overall test statistic. The trends were regarded statistically significant at the 5% level (double-sided test). In addition to the formal statistical test, a visual inspection of all the time series was performed.

Moreover, the trend assessment was performed by comparing the estimated load with the flow-normalised loads, based on a method by Stålnacke & Grimvall (2001) and further developed and improved by Hussian *et al*. (2004). A trend line given as a smoother was also estimated according to the newly developed method of Grimvall *et al*. (2008). More specifically, this smoother was obtained by statistical cross-validation that minimises the residuals in the statistical modelling. However, this 'smoother' should be interpreted with caution and is only included to give a visual picture of the most likely long-term trend given the flow-normalised loads.

As all annual loads were recalculated during the revision of the Norwegian RID data (Stålnacke *et al* 2009), two important changes should be noticed as compared to former years:

- Total phosphorus and mercury loads in the period 1999-2003 have been based on estimated annual concentrations, as the actual measured concentrations deviated significantly from the years before and after; the new loads have been calculated by a trend-line interpolation;
- A new method for estimating annual river loads has been used (cf. Stålnacke *et al*. 2009; Skarbøvik *et al*. 2009).

It should also be noted that flow normalisation and other statistical trend analyses were not conducted for metals (except for copper and zinc) given the problem with changed level of detection (LOD) over time and/or a large number of samples reported at the LOD.

Trends in water discharge

The riverine loads of nutrients and particles have considerable inter-annual variability. This is mainly due to variations in runoff from year to year.

The most interesting observations made in the water discharge series were:

- The water discharge can differ with a factor of two between years. This has been observed in all main rivers expect River Vefsna.
- In the five Skagerrak rivers, the water discharge was particularly high in the year 2000 due to heavy and long-lasting rainfall in autumn 2000.
- For the two rivers in northern Norway, Rivers Vefsna and Altaelva, the highest annual water discharges were registered in 2005.
- The year 1996 was characterised by low water discharges in all Skagerrak rivers.
- The year 2008 had high discharges in all Skagerrak rivers; in fact this was the year with the second highest discharges in Rivers Glomma, Drammenselva and Skienselva in the entire period 1990-2008.
- A serial correlation between years can be noted in all Skagerrak rivers, particularly accentuated in Rivers Drammenselva, Numedalslågen and Skienselva.
- No obvious upward or downward trends in annual water discharge could be detected in the visual inspection of the data.

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[2] Monotonic is here defined as a consistent increase or decrease over time. Monotonic trends may be linear (the same slope over time) or non-linear.

Trends in total nitrogen

For all the five Skagerrak rivers the observed total nitrogen loads were particularly high in 2000. However, a substantial fraction of the inter-annual variation in nitrogen loads was removed when load data were flow normalised, especially in years with very high or low flows.

Flow-normalised nitrogen loads were relatively low in 2001 in all five Skagerrak rivers. This might be an effect of intensive leaching of nutrients and increased soil erosion during the precipitation-rich autumn of 2000, and thus, less available material for river transport in 2001.

A slight tendency of an upward trend in River Drammenselva was mainly due to low concentrations and loads during the period 1990-1993.

After flow-normalisation, a clear downward trend can be seen in River Skienselva and also in River Vefsna a rather abrupt change in loads before and after 1999 can be noted (Figure 2). For River Vefsna, the same pattern was also noted for lead and copper (Figure 2) and to some extent also ammonium, in addition to relative high concentration levels compared to the other rivers in the regions. This might indicate industrial discharges or sewage treatment effluents. One argument that supports this was the fact that high concentrations before 1999 were observed almost solely at low water discharge when dilution is at a minimum. However, no examples of industrial or sewage treatment plants with reduced effluents or units that have ceased to exist have been found. Similarly, the downward trend in River Skienselva may be caused by a number of different changes and measures in the river basin, but no concrete explanation has yet been found.

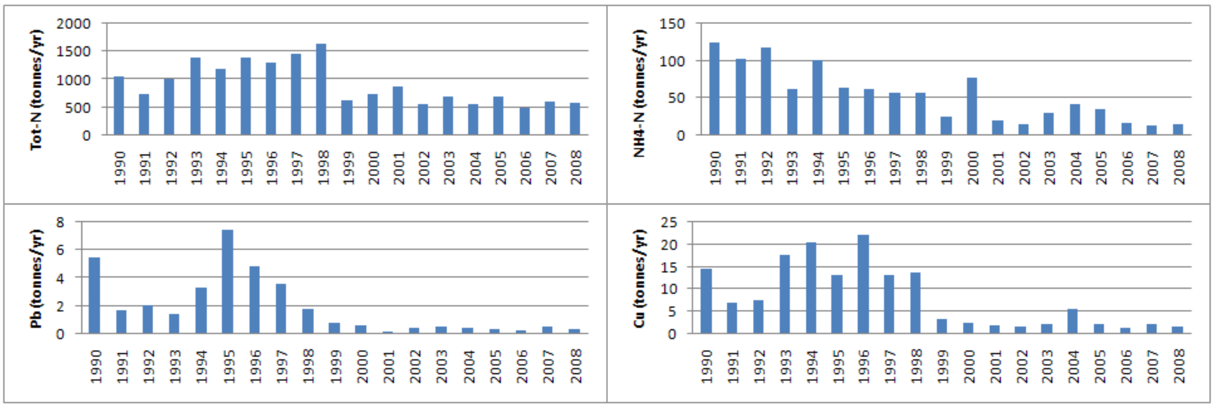

Figure 2: Annual riverine loads in River Vefsna of total nitrogen, ammonium, lead and copper in 1990-2008. Loads shown are the upper estimates.

In River Orreelva, elevated loads for total nitrogen in the period 2004-2007, with the highest load ever observed in 2007 (Figure 3), have resulted in a trend smoother line pointing upwards although the loads in 2008 were back at average levels. The high loads in recent years were examined in more detail in Skarbøvik *et al*. (2007; 2008).

A visible downward trend in River Otra for nitrate loads was noted. The reason for this is not known.

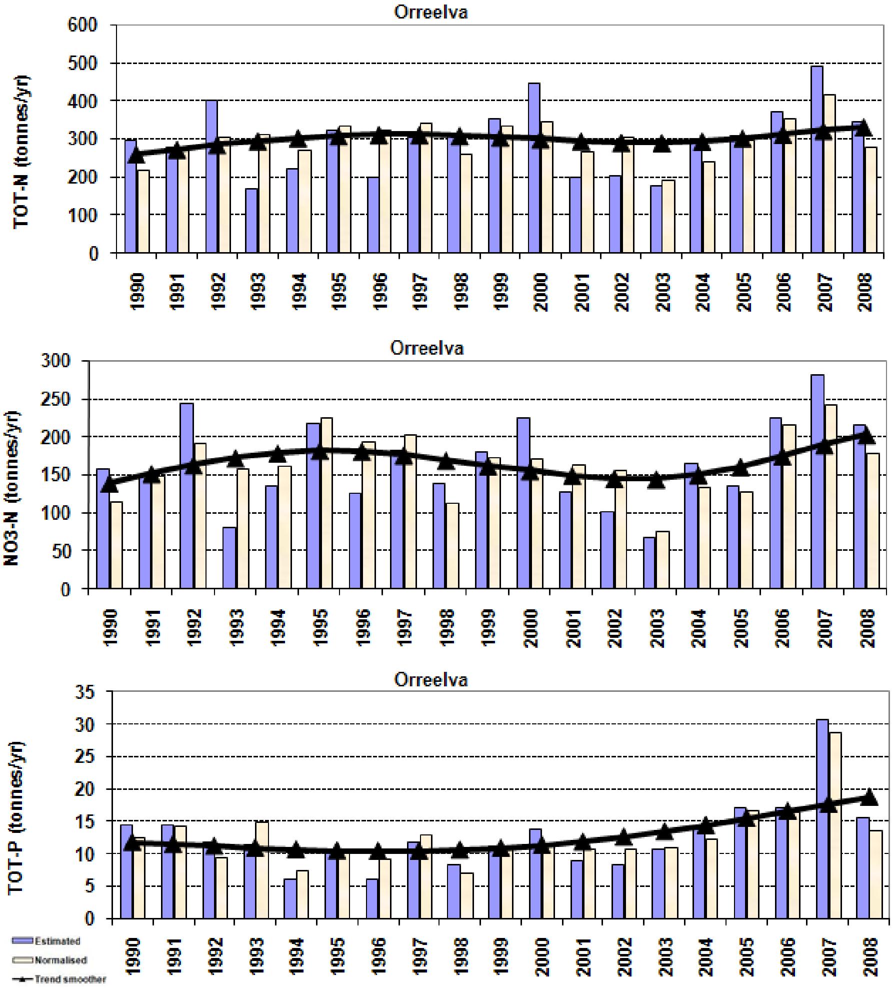

Figure 3: Annual riverine loads in River Orreelva of total nitrogen, nitrate nitrogen and total phosphorus, 1990-2008.

Trends in total phosphorus

The total phosphorus loads generally show a large inter-annual variability which in a majority of the nine rivers varied by a factor of three or more (*e.g.* Rivers Numedalslågen, Skienselva, Otra, Vefsna and Altaelva). Apart from some periods with increased water flow, the high observed and flow-normalised loads cannot be explained. Given this and especially high inter-annual variability, it is difficult to detect long-term trends. The only exception is in River Vefsna, where the phosphorus loads have declined, primarily during the years 2004-2007. This coincides with low loads of orthophosphate and SPM the same years (Figure 4).

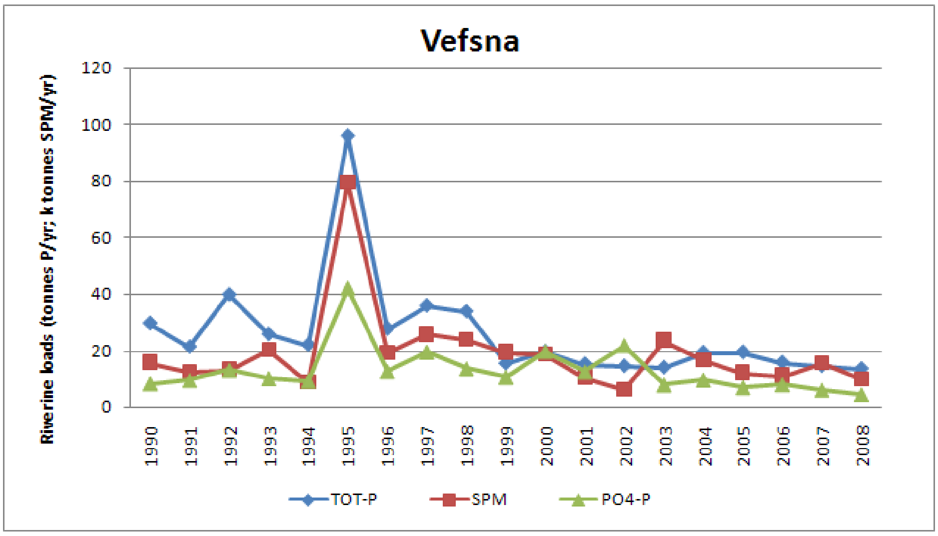

Figure 4: Observed riverine loads of total phosphorus (tot-P), orthophosphate (PO_4-P) and suspended particulate matter (SPM) in Vefsna 1990-2008. Total phosphorus loads in 1999-2003 are calculated and not monitored (cf. Stålnacke et al. 2009).

The tendency of upward trends in River Orreelva was already discussed in the previous section as the same phenomena were also noted for nitrogen. The high loads in 2007 in Rivers Drammenselva and Numedalslågen coincide with high SPM loads and are a result of increased sampling frequency during floods. The highest load of total phosphorus during the monitoring period in River Glomma in 2008 corresponds with high SPM and orthophosphate loads, and the second highest water runoff registered since 1990. Skienselva also had high loads of phosphorus and high runoff in 2008 but this is not seen in the SPM and orthophosphate loads. The reasons for the high total-P loads in 2008 are due to high concentrations in the sampling conducted in September, October and December (3-4 times higher concentrations compared to average values).

Orthophosphate concentrations are in most samples at very low levels (1-2 µg/l) or at LOD, which in turn have changed during the course of the monitoring period. This implies that interpretation of orthophosphate trends should be made with great caution.

Trends in Copper (Cu)

Copper was together with zinc the only metal with few values below LOD and few changes in LOD over the monitoring period 1990-2008. Long-term trends have, in general, been difficult to identify in a majority of the rivers. However, a sharp break in the trend in the River Vefsna is interesting. Here, the annual loads of copper during the years 1990-1998 amounted to around 12-17 tonnes, while in the following period (1999-2008) it dropped to 2-5 tonnes. The same pattern is also noted in River Vefsna for lead, nitrogen and phosphorus. The reason for this is not known; the sampling site in Vefsna is located *upstream* of the major settlement (Mosjøen) and any large industries in the catchment area, and no trend of declined water discharge can be observed.

A decline in loads in Rivers Altaelva (Figure 5), Skienselva and Orkla can also be noted. In River Altaelva, the loads have declined from 4-7 tonnes in the early to mid-1990s to 1-3 tonnes in the 2000s.

A relatively steep increase since 2004 can be noted in River Otra.

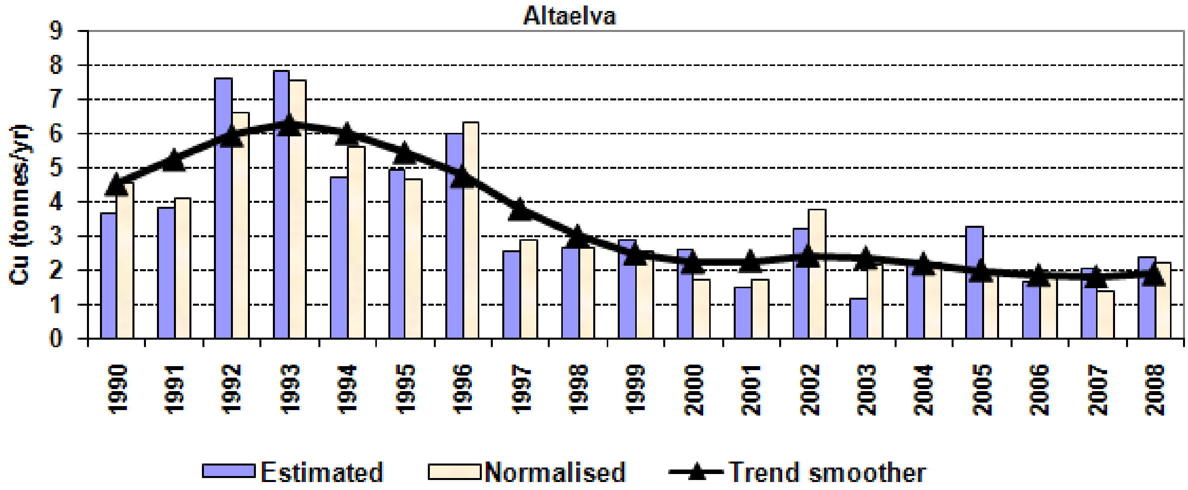

Figure 5: Annual riverine loads of copper in River Altaelva, 1990-2008

Trends in Zinc (Zn)

The zinc loads show a relatively low inter-annual variability as compared to many of the other metals. A visible downward trend could be detected in Orkla (Figure 36), as well as in Vefsna. But also Rivers Glomma, Numedalslågen and Skienselva show tendencies of decreased loads. High loads in single years were almost solely explained by high single concentration values (*e.g.* 1993 in River Numedalslågen, 1990 in River Skienselva, 2005 in River Orreelva and in River Altaelva in 2008).

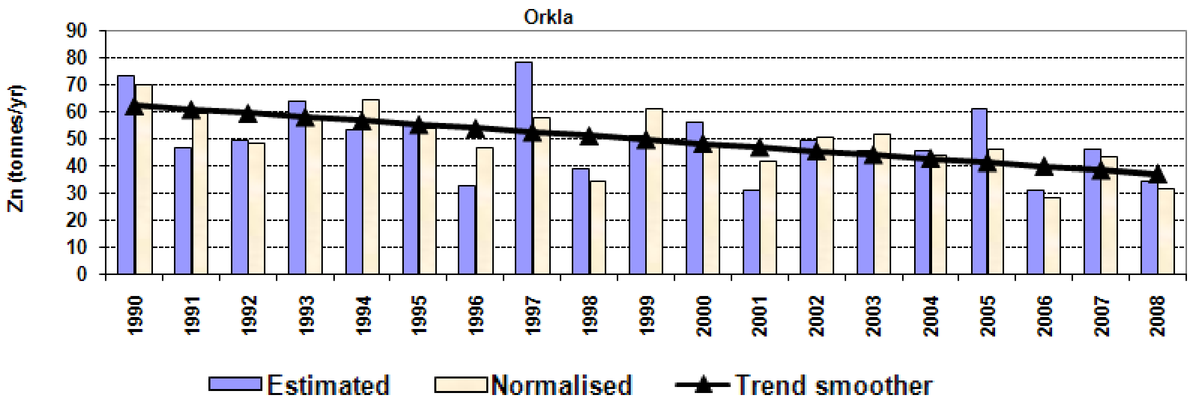

Figure 6: Annual riverine loads of zinc in River Orkla, 1990-2008.

Trends in Lead (Pb), Cadmium (Cd) and Mercury (Hg)

For lead, the inter-annual variability and trends in inputs are mainly due to changes in LOD. Thus, no reliable trend assessment of the annual inputs of lead can be carried out.

For cadmium, more than 25% of the total number of observations in the ten rivers was below LOD. In addition, the LODs have changed substantially during the course of the monitoring period; *e.g.* from 100 ng/l in 1990 to 10 ng/l in 1991 and down to 5 ng/l in 2004-2008. For this reason, no meaningful trend assessment of the annual loads is possible.

For mercury, 50% of the total number of observations in the ten rivers was below LOD. The LODs have not changed to any particular degree during the course of the monitoring period. In most rivers, the concentrations were just above LOD, thus no meaningful trend assessment of the annual loads was possible.

Overview of trends in Norwegian riverine loads

The main conclusions of the trend analysis on loads include:

- There is a substantial inter-annual variability in loads primarily connected to a corresponding variability in water discharge.
- Peaks in annual loads are primarily due to single peak concentrations which in most cases are due to flooding peaks.
- No obvious upward or downward trends in annual water discharge can be detected.
- For nutrients only very few trends can be detected, as follows:
    - In Rivers Skienselva and Vefsna, a downward trend in nitrogen;
    - In River Orreelva, particularly high loads of both nitrogen, phosphorus and to some extent suspended particles were observed in the period 2004-2007;
    - In River Vefsna, the phosphorus loads have declined somewhat during the 2000s compared to the ‘high-load period 1992-1998.
- For suspended particulate matter (SPM), no long-term trends can be observed due to very high inter-annual variability. This is most likely due to too low sampling frequency related to the fact that SPM concentrations normally show high peaks during high water discharge.
- For copper there was a downward trend in Rivers Vefsna, Orkla and Skienselva and Altaelva.
- For zinc, visible downward trends could be detected in Rivers Orkla and Vefsna and tendencies of decreased loads in Rivers Glomma, Numedalslågen and Skienselva.

3.2 Swedish trends 1990-2008 – An example from River Göta älv

Prepared by: Lars Sonesten; Department of Aquatic Sciences and Assessment; Swedish University of Agricultural Sciences

Methodology

The flow-normalised transports of the substances in question are estimated in two different ways for River Göta älv. One of these methods is a simple calculation using the flow-normalised concentrations and the average water flow 1990-2008 (called Normtransport in this document). In the other method the normalised transports are obtained using the Multitrend software (http://www.ida.liu.se/divisions/stat/research/engo/reports.html).

The flow-normalised concentrations in the first estimation method are obtained by dividing the total annual transport by the total annual water flow. Hence, the flow-normalised transports are obtained by multiplying the flow-normalised concentrations by the average water flow 1990-2008.

The two methods give almost identical normalised nutrient transports, whereas the metal transports are more deviating especially for the very dry year 1996. For comparison are also the "measured" transports given in the data tables.

Statistical significance of the estimated flow-normalised transports is tested by the Mann-Kendall test (Multitest, to be found at the same homepage as Multitrend).

Data for all elements except mercury are available for the whole time period, while mercury was not included in the monitoring programme until 1995. All "measured" transport data are available via the homepage of the Department of Aquatic Sciences and Assessment at the Swedish University of Agricultural Sciences (http://www.ma.slu.se). The Department is assigned by the Swedish EPA to run the national monitoring of rivers and to act as data hosts for the produced data.

Transport in River Göta älv 1990-2008 of Total phosphorus (Tot-P)

Table 4: Flow-normalised and "measured" transport (metric tonnes/year) of total phosphorus in River Göta älv 1990-2008.

Year	Flow normalised transport		Measured transport
	Multitrend	Normtransport	
1990	350	355	320
1991	417	449	346
1992	299	297	248
1993	338	342	303
1994	320	319	326
1995	340	337	390
1996	326	340	184
1997	309	309	266
1998	426	426	422
1999	304	305	443
2000	297	300	402
2001	324	319	529
2002	248	243	229
2003	286	273	184
2004	352	362	285
2005	400	419	342
2006	485	487	482
2007	266	273	311
2008	321	319	397

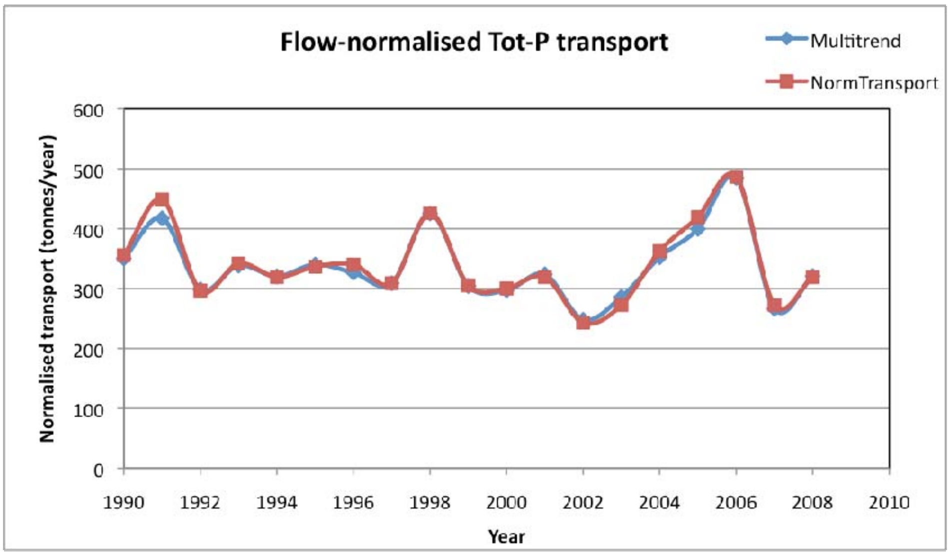

Figure 7: Flow-normalised transport of total phosphorus in River Göta älv 1990-2008

Transport in River Göta älv 1990-2008 of Total nitrogen (Tot-N)

Table 5: Flow-normalised and "measured" transport (metric tonnes/year) of total nitrogen in River Göta älv 1990-2008

Year	Flow normalised transport		Measured transport
	Multitrend	Normtransport	
1990	14955	15065	13592
1991	15515	15945	12308
1992	14716	14841	12431
1993	15570	15755	13976
1994	15180	15169	15431
1995	14804	14703	17053
1996	14594	15082	8185
1997	14205	14237	12278
1998	15187	15186	15028
1999	15196	14841	21441
2000	14783	14599	19491
2001	14209	14133	23451
2002	13857	13840	13006
2003	14905	15341	10314
2004	15057	15341	12029
2005	13232	13046	10639
2006	15358	15376	15225
2007	13647	13702	15665
2008	13195	13357	16622

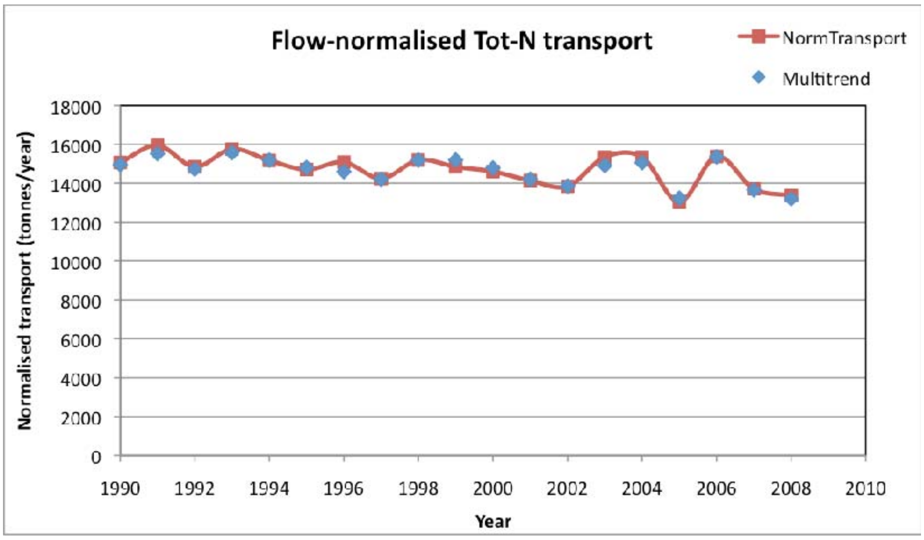

Figure 8: Flow-normalised transport of total nitrogen in River Göta älv 1990-2008

Transport in River Göta älv 1990-2008 of Cadmium (Cd)

Table 6: Flow-normalised and "measured" transport (metric tonnes/year) of cadmium in River Göta älv 1990-2008.

Year	Flow normalised transport		Measured transport
	Multitrend	Normtransport	
1990	0.170	0.176	0.159
1991	0.150	0.160	0.124
1992	0.137	0.141	0.118
1993	0.097	0.094	0.083
1994	0.076	0.077	0.078
1995	0.103	0.105	0.122
1996	0.145	0.169	0.092
1997	0.137	0.141	0.121
1998	0.135	0.135	0.134
1999	0.113	0.114	0.165
2000	0.135	0.130	0.174
2001	0.167	0.147	0.243
2002	0.136	0.137	0.129
2003	0.116	0.117	0.079
2004	0.138	0.144	0.113
2005	0.137	0.142	0.116
2006	0.173	0.173	0.172
2007	0.149	0.145	0.166
2008	0.229	0.207	0.257

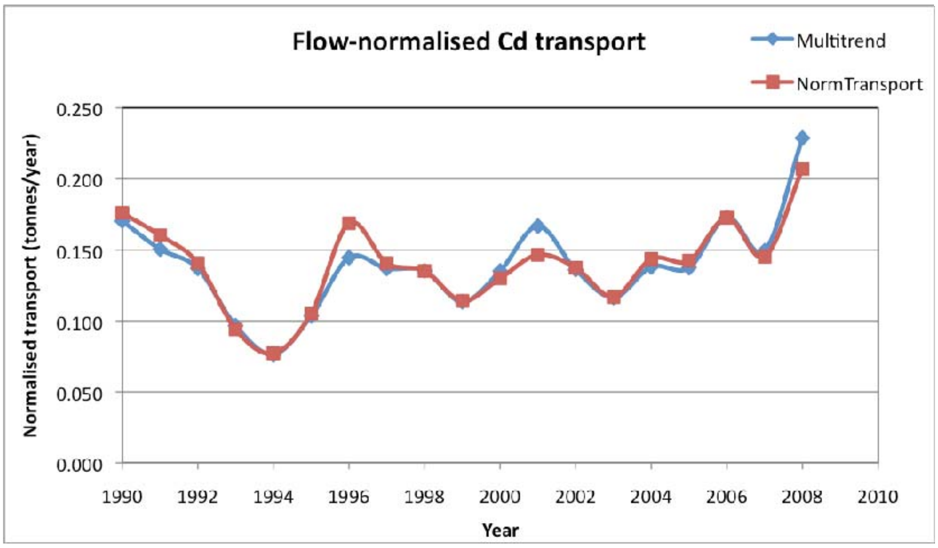

Figure 9: Flow-normalised transport of cadmium in River Göta älv 1990-2008

Transport in River Göta älv 1990-2008 of Lead (Pb)

Table 7: Flow-normalised and "measured" transport (metric tonnes/year) of lead in River Göta älv 1990-2008

Year	Flow normalised transport		Measured transport
	Multitrend	Normtransport	
1990	4.01	3.92	3.53
1991	3.62	3.23	2.49
1992	2.37	1.88	1.57
1993	1.98	1.60	1.42
1994	3.84	3.87	3.93
1995	5.50	5.42	6.29
1996	7.05	8.85	4.80
1997	5.57	5.68	4.89
1998	6.53	6.54	6.47
1999	5.63	5.42	7.83
2000	5.39	5.28	7.05
2001	5.85	5.49	9.10
2002	4.38	4.35	4.08
2003	4.35	4.06	2.73
2004	6.16	6.49	5.09
2005	6.62	6.99	5.71
2006	8.44	8.47	8.39
2007	5.15	5.13	5.86
2008	7.49	6.99	8.70

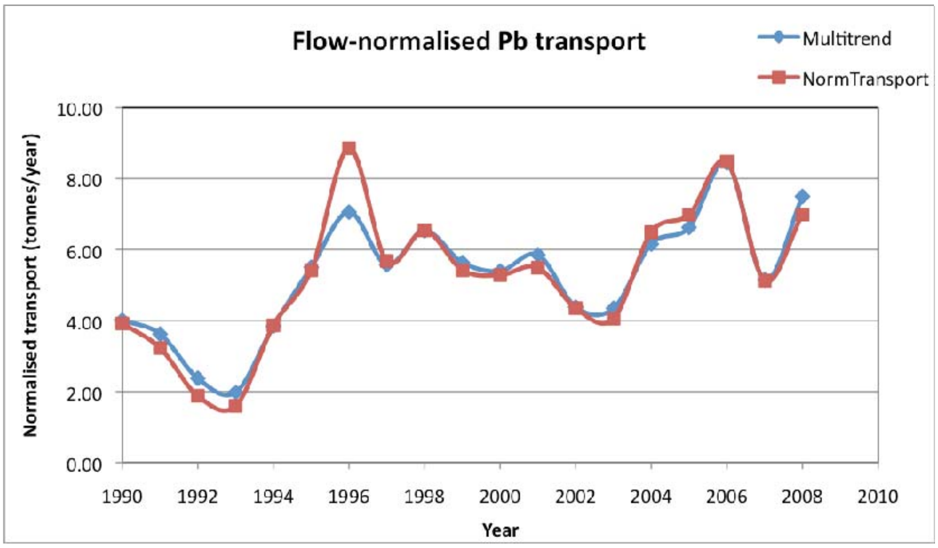

Figure 10: Flow-normalised transport of lead in River Göta älv 1990-2008

Transport in River Göta älv 1990-2008 of Mercury (Hg)

Table 8: Flow-normalised and "measured" transport (metric tonnes/year) of mercury in River Göta älv 1995-2008.

Year	Flow normalised transport Multitrend	Flow normalised transport Normtransport	Measured transport
1990			
1991			
1992			
1993			
1994			
1995	0.0679	0.0642	0.074
1996	0.0675	0.0739	0.040
1997	0.0538	0.0509	0.044
1998	0.0454	0.0430	0.043
1999	0.0197	0.0290	0.042
2000	0.0357	0.0388	0.052
2001	0.0533	0.0526	0.087
2002	0.0272	0.0230	0.022
2003	0.0346	0.0212	0.014
2004	0.0362	0.0281	0.022
2005	0.0351	0.0276	0.023
2006	0.0414	0.0390	0.039
2007	0.0256	0.0273	0.031
2008	0.0265	0.0304	0.038

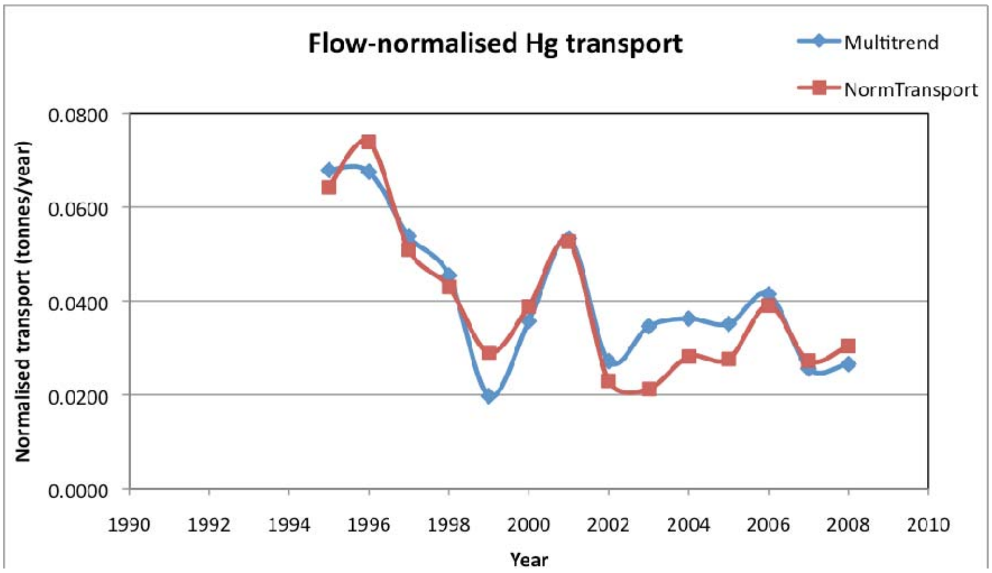

Figure 11: Flow-normalised transport of mercury in River Göta älv 1995-2008

Statistical analysis of the Swedish trends

Three out of the five estimated flow-normalised transports show statistically significant trends in River Göta älv. Lead is increasing by approximately 0.2 tonnes per year under the investigated time period 1990-2008. This increase is probably connected to an increased transport of particles during this time period.

Two trends are significantly decreasing during the investigated time period. The total nitrogen transport decreases by approximately 75-95 tonnes per year, whereas mercury decreases by about 2.4 kg per year.

Table 9: Statistical test of trends in flow-normalised transport in River Göta älv 1990-2008

Variable	MK statistic	p-value (two-sided)	Significance code	Slope (change/yr)	Median
Output from Multitest on Normtransport					
Tot_N	-59	0.0388	-	-94.89	14841
Tot-P	-23	0.4194		-2.18	319
Cd	36	0.2076		0.0015	0.141
Pb	67	0.0189	+	0.214	5.420
Hg	-43	0.0182	-	-0.0024	0.035
Output from Multitest on Multitrend					
Tot_N	-61	0.0328	-	-76.9	14804
Tot-P	-23	0.421		-2.20	324
Cd	41	0.1503		0.0016	0.137
Pb	77	0.0071	++	0.19	5.5
Hg	-45	0.0138	-	-0.0024	0.036

3.3 Flow normalisation and trend analysis on total Danish inputs

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In this sub-chapter, an analysis is presented of trends in total Danish inputs to the three OSPAR Sea areas Skagerrak, Kattegat and the North Sea. The trend analysis is based on the reported annual RID data from Denmark on total nitrogen, total phosphorus and water flow by rivers and direct point source discharges for the period 1990-2008. The total riverine inputs cover 100 % of the Danish part of the catchment areas to the three sea regions that constitute:

- The Skagerrak: 1097 km^2
- The Kattegat: 15828 km^2
- The North Sea: 10809 km^2

Trend analyses of time series of nutrient loads can be undertaken using Kendall's trend test and Kendall's seasonal trend. These tests are robust non-parametric statistical tests for monotone trends. They are robust towards non-normality (i.e. non-Gaussian data). The test was introduced in Hirsch *et al*. (1982) and Hirsch and Slack (1984) and has become a very popular and effective method for trend analysis of water quality data. The statistical trend method can analyse both seasonal (*e.g.* monthly) and annual data and provide a trend statistic together with the statistical significance (a *P*-value) and an estimate of the annual increase or decrease in nutrient loads. Slopes (size of the trend) are estimated by the Sen-Theil estimator (Hirsch *et al.*, 1982).

Before performing the trend test total riverine inputs of total nitrogen and total phosphorus, respectively are flow-normalised. Flow normalisation of riverine inputs is carried out to smooth out variations in hydrology (precipitation which have a major impact on riverine flow) which allow for a more correct evaluation of progress in input reduction although other climatic and factors also could be included in the normalisation, but this will make the normalization procedure much more complicated. The riverine water flow is in most cases the main cause for variations in riverine inputs of nitrogen and phosphorus, which then means that inputs cannot be compared without evening out differences in water flow between years. The discharges (effluents) from point sources to the marine areas are not flow normalised as these are not influenced by changing riverine water flow.

The flow normalisation procedure of total riverine total nitrogen and total phosphorus inputs is: the total riverine total nitrogen and total phosphorus respectively has been log normalized by doing a regression between the log value of input and discharge, giving slope (b) and intercept (a), for observed data in the time period 1990 to 2008. The log average water flow for 1990 to 2008 ($q_{average}$) is thereafter put into the regression equation and is divided with the same regression equation, but using the log flow observed for a particular year (q_{year}), thus giving a ratio, see the equation below.

$$L_{normalized\_year} = L_{year} \cdot \frac{a + b \cdot q_{average}}{a + b \cdot q_{year}}$$

where L –total riverine input of total nitrogen or total phosphorus, a – intercept, b – slope, q – flow. Used period for $q_{average}$ is 1990 – 2008.

The ratio was multiplied with the observed total riverine input (total nitrogen or total phosphorus) for a particular year (L_{year}) and afterwards directs discharges from point sources are added. This procedure follows the recommendations outlined by Silgram and Schoumans (2004).

The trend test is applied on the annual flow-normalised total riverine inputs of total nitrogen and total phosphorus. A trend is only significant decreasing (negative estimated slope) or increasing (positive estimated slope) when the P-value is equal or less than 0.05 (*i.e.* the probability that the trend by change is significant decreasing or increasing is equal or less than 5 %).

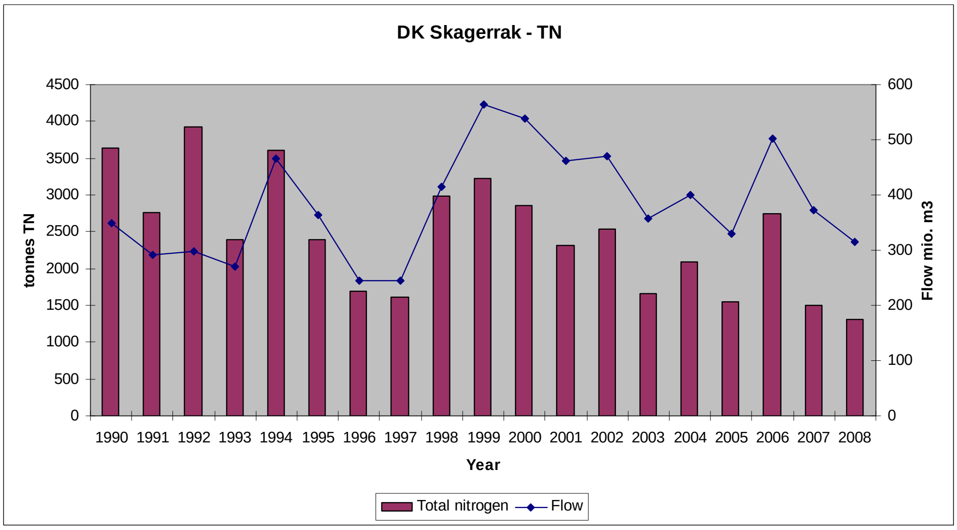
In Table 10, the significant trends are marked with bold. The total nitrogen and total phosphorus inputs (total riverine plus direct point source discharges) to The Skagerrak, The Kattegat and The North Sea are significant decreasing from 1990 to 2008 with the exception of total phosphorus to the North Sea. In Table 10 the annual decrease in total nitrogen and phosphorus riverine inputs + direct discharges calculated as a linear trend is also given. The former reported total riverine total inputs of nitrogen and phosphorus (+ direct point source discharges) and water flow are shown in Figures 12 and 13. In Figures 14 and 15 the flow normalised total riverine inputs and total nitrogen and total phosphorus (and then not flow normalised direct point source discharges have been added) are shown respectively together with the calculated linear trend line.

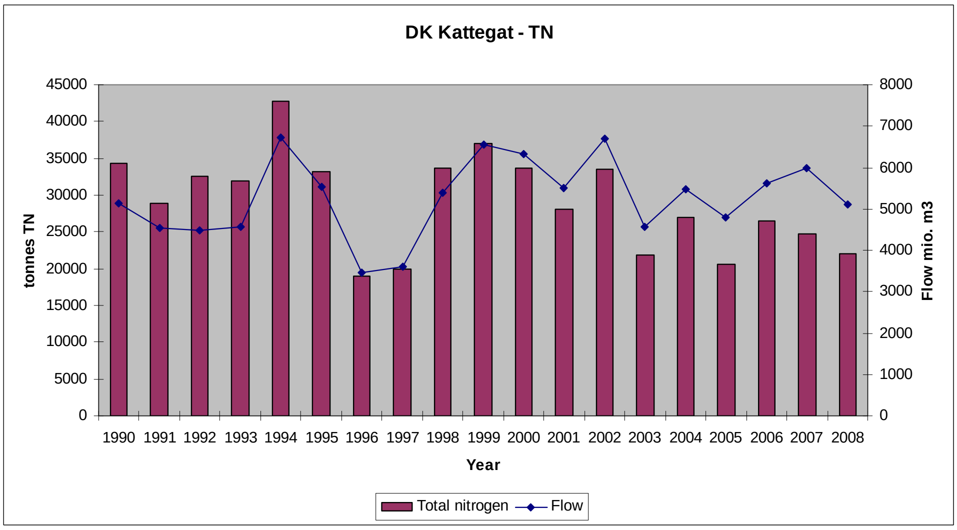
The reduction in total riverine inputs plus direct point source discharges of total nitrogen and total phosphorus from the Danish OSPAR catchment since the 1980s have already been explained in the annual RID reports. For total phosphorus it is mainly explained by a marked reduction in discharges from point sources (approx. 90 %) since the mid-1980s. Discharges from point sources are also markedly reduced for total nitrogen (approx. 70 % since the mid-1980s) but the main explanation for the reduction in total riverine nitrogen inputs is reduced nitrogen losses from agricultural land amounting to approximately 40 % since 1990. The reduction is a result of several implemented measures taken against point sources, agriculture and scattered dwellings since the late 1980s.

Table 10. Result of trend analysis for annual Danish total riverine input of total nitrogen and total phosphorus + direct point discharges during 1990-2008 to The Skagerrak, The Kattegat and the North Sea, respectively. P value expresses the statistical significance where P < 0,05 marked with bold corresponds to high statistical significance. S is the annual slope (in tonnes) – negative slope indicates decrease in inputs.

	Nitrogen		Phosphorus	
	P	S tonnes/year	P	S tonnes/year
The Skagerrak	**0.001**	-95	**0.0002**	-7.4
The Kattegat	**0.036**	-582	**0.021**	-18
The North Sea	**0.050**	-283	0.11	-11

The water flow has also been tested for trend. There is no trend in the water flow to the Skagerrak, the Kattegat or the North Sea during 1990-2008.





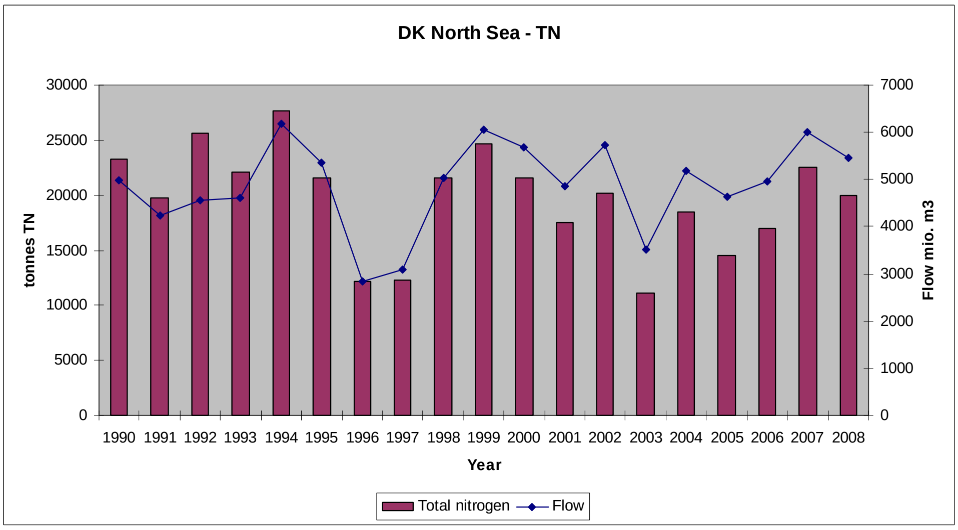


Figure 12: Reported annual total riverine inputs + direct point source discharges of total nitrogen and water flow during 1990-2008 to the Skagerrak, the Kattegat and the North Sea from Denmark

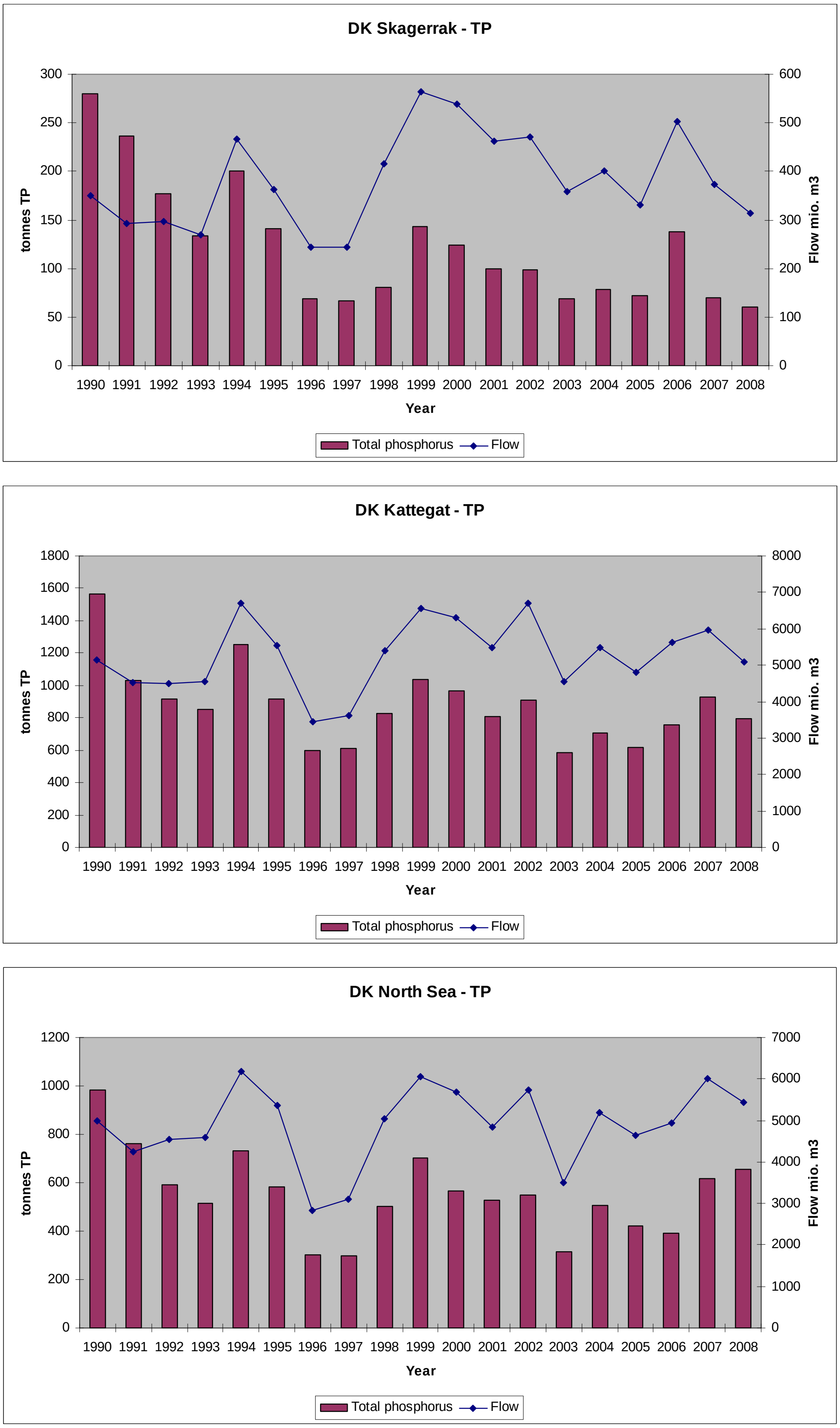


Figure 13: Reported annual total riverine inputs + direct point source discharges of total phosphorus and water flow during 1990-2008 to the Skagerrak, the Kattegat and the North Sea from Denmark

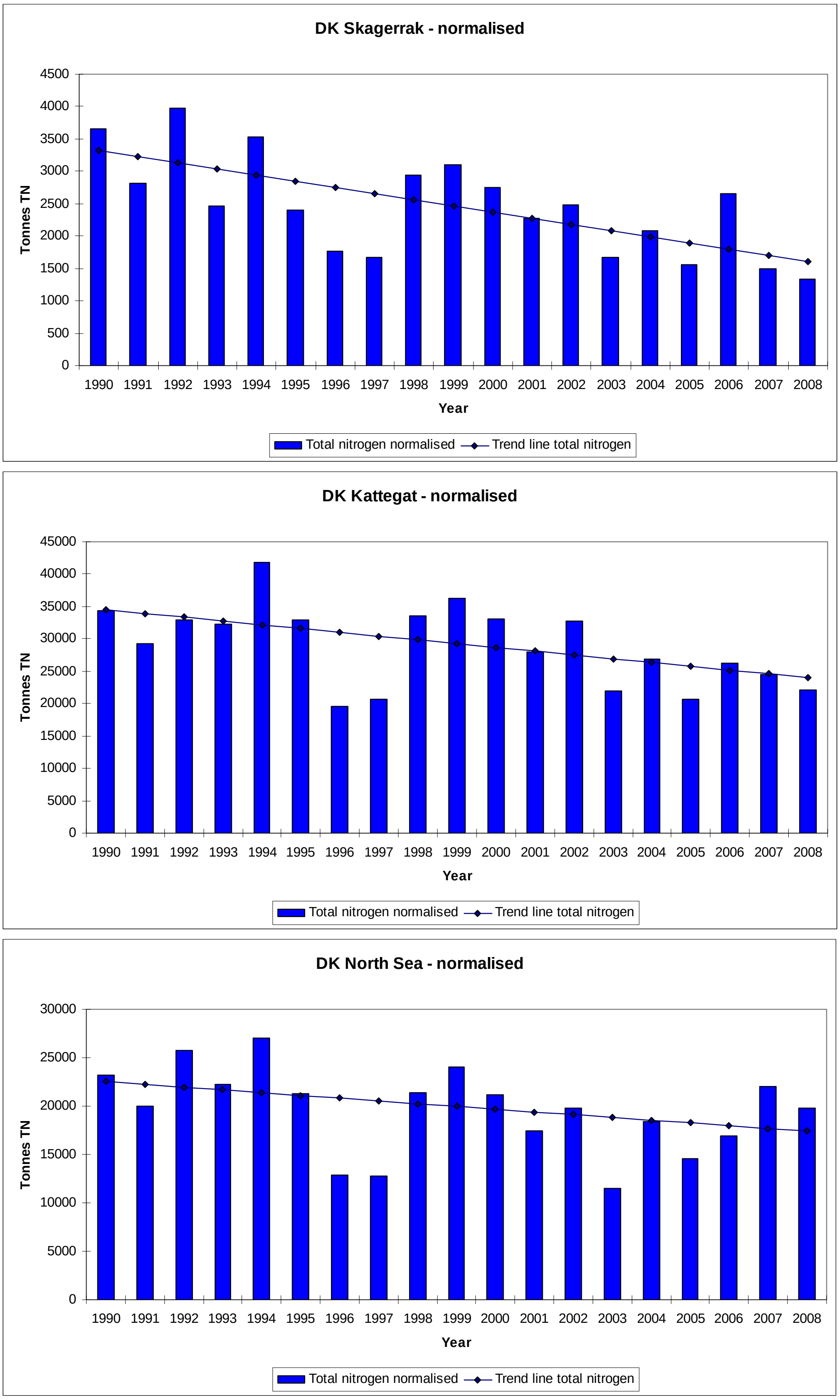
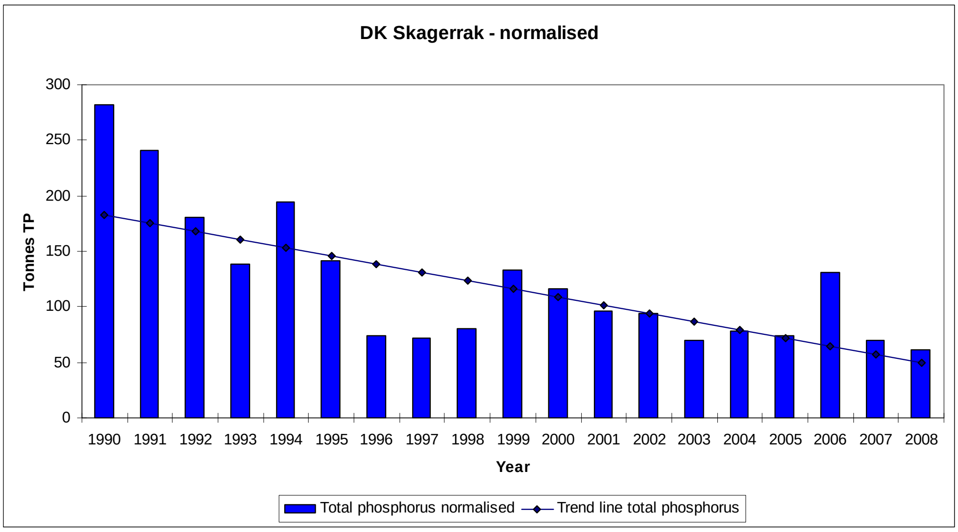
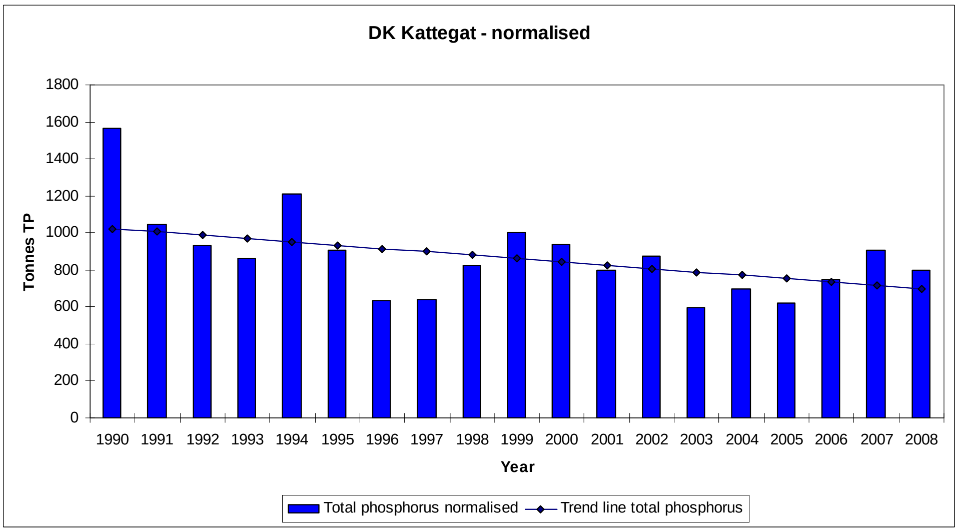


Figure 14: Danish RID figures of annual flow normalised total riverine inputs of total nitrogen (and after normalisation total direct point source discharges are added) during 1990-2008 to the Skagerrak, The Kattegat and the North Sea. The linear trend line is inserted. See text for further explanation.





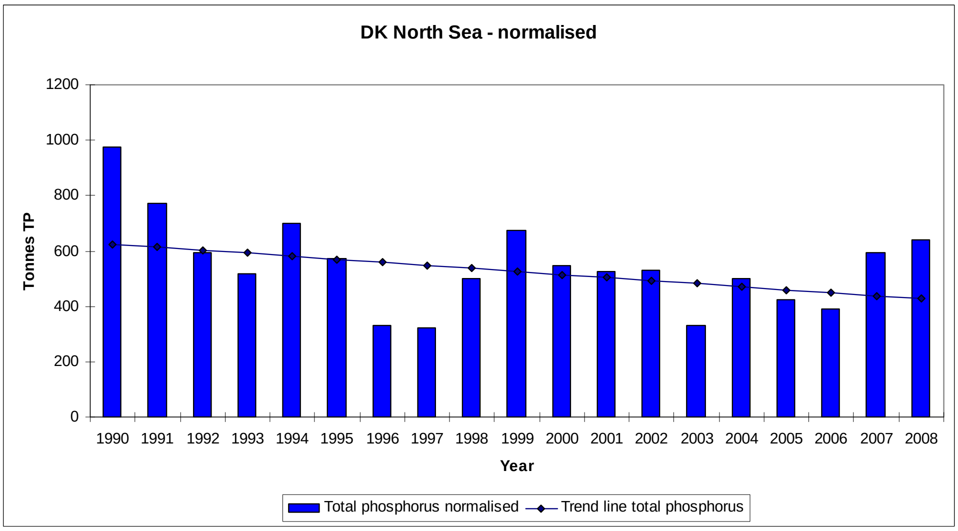


Figure 15: Danish RID figures of annual flow normalised total riverine inputs of total phosphorus (and after normalisation total direct point source discharges are added) during 1990-2008 to the Skagerrak, the Kattegat and the North Sea, respectively. The linear trend line is inserted. See text for further explanation.

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Annex 1 Details about the RID Principles

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

2. 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)

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

a. Hydrocarbons, in particular PAHs[3] and mineral oil[4] (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)[5]."

4. Contracting Parties are requested to report the relevant data annually (by 1 November) and to provide, for a selection of their main rivers, information on the annual mean/median concentration of selected pollutant.

5. 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 %.

6. 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.

7. 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 currently being prepared for 2009.

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

4 Provided that a suitable method is available.

5 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 by OSPAR 2000. The work formerly undertaken by DIFF has been carried out by SPDS until 2004/2005 and, since then, by HSC.)

Annex 2 Annual Overview Tables

Table 1a: Information Received on Inputs to the Maritime Area of the OSPAR Convention in 2008

Table 1a	Direct Discharges			Riverine Inputs	
Country	Sewage Effluents	Industrial Effluents	Coastal Areas (1)	Main Rivers	Tributary Rivers (2)
Belgium					
_North Sea (BE)	NA	NA	(6)	+	+
Denmark					
_Skagerrak (DK)	+	+		+	+ (5)
_Kattegat (DK)	+	+		+	+ (5)
_North Sea (DK)	+	+		+	+ (5)
France					
_Channel	NI	NI		+	+
_Atlantic	NI	NI		+	+
Germany					
_North Sea (GER)	+	+		+	+ (3)
Iceland					
_Atlantic	NI	NI		+	+ (5)
Ireland					
_Irish Sea	+	+		+	+
_Celtic Sea	+	+		+	+
_Atlantic	+	+		+	+
Netherlands					
_North Sea (NL)	+	+		+	+ (3)
Norway					
_Norwegian Sea (NO)	+	+		+	+
_Barents Sea (NO)	+	+		+	+
_Skagerrak (NO)	+	+		+	+
_North Sea (NO)	+	+		+	+
Portugal					
_Bay of Biscay and Iberian Coast (PO)	NI	NI		+ (4)	NI
Spain					
_Atlantic (ESP)	+	+		+	+
Sweden					
_Kattegat (SWE)	+	+		+	+
_Skagerrak (SWE)	+	+		+	+
UK					
_North Sea (North)	+	+		+	+ (5)
_North Sea (South)	+	+		+	+ (5)
_Channel	+	+		+	+ (5)
_Irish Sea	+	+		+	+ (5)
_Celtic Sea	+	+		+	+ (5)
_Atlantic	+	+		+	+ (5)

+ = Information avaliable
NI = No information
NA = Not applicable

1) Coastal areas:
- "downstream areas" of main and tributary rivers and rivers not monitored;
- areas discharging to the maritime area which, however, are located outside the catchment area of a river.

2) Tributary Rivers:
- any tributary river flowing into (the estuary of) a main river, downstream from the sampling point;
- any minor river or a river that is sampled more seldom than monthly.

3) Included in data on main riverine inputs.
4) River Tejo only.
5) All rivers are reported as main rivers.
6) Included in other datasets

Table 1b: Determinands reported by Contracting Parties in 2008

Table 1b	Determinands													
Country	Cd	Hg	Cu	Pb	Zn	g-HCH	PCBs (1)	NH4-N	NO3-N	PO4-P	N-Total	P-Total	SPM (2)	others
Belgium														
_ direct inputs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
_ riverine inputs	R	R	R	R	R	R	R	R	R	R	R	R	R	
Denmark														
_direct inputs	NI	NI	NI	NI	NI	NI	NI	+	+	+	+	+	NI	
_ riverine inputs	NI	NI	NI	NI	NI	NI	NI	+	+	+	+	+	+	
France														
_direct inputs	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
_ riverine inputs	R (4)	R (4)	R (4)	R (4)	R (4)	R (4)	NI	R (3)	R (3)	R (3)	R (3)	R (3)	R (3)	
Germany														
_direct inputs	R	R	R	R	R	R	R	R	R	R	R	R	R	
_ riverine inputs	R (4)	R (4)	R (3)	R (3)	R (3)	R (3)	R (4)	R (3)	R (3)	R (*)	R (3)	R (3)	R (4)	
Iceland														
_direct inputs	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
_ riverine inputs	+ (4)	+ (4)	+ (4)	+ (4)	NI	NI	NI	NI	+	+	+	+	NI	
Ireland														
_direct inputs	+	+	+	+	+	NI	NI	NI	NI	NI	+	+	+	
_ riverine inputs	R (4)	NI	R (4)	R (4)	R (3)	NI	NI	R (3)	R (3)	R (3)	R (3)	R (3)	R (4)	
Netherlands														
_direct inputs	+	+	+	+	+	NI	NI	NI	NI	NI	+	+	NI	
_ riverine inputs	R (*)	R (*)	R (*)	R (*)	R (*)	R (*)	R (*)	R (*)	R (*)	R (*)	R (*)	R (*)	R (*)	
Norway														
_direct inputs	+	+	+	+	+	+	+	+	+	+	+	+	+	As; Total Cr, Ni, TOC
_ riverine inputs	R (3)	R (4)	R (3)	R (3)	R (3)	R (4)	R (4)	R (3)	R (3)	R (4)	R (3)	R (3)	R (3)	As; Total Cr, Ni, TOC
Portugal														
_direct inputs	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
_ riverine inputs (5)	+	+	+	+	+	NI	NI	+	+	+	+	+	+	
Spain														
_direct inputs	R	R	R	R	R	R	R	R	R	R	R	R	R	
_ riverine inputs	R (4)	R (4)	R (4)	R (4)	R (4)	R (4)	R (4)	R (4)	R (3)	R (4)	R (4)	R (4)	R (4)	
Sweden														
_direct inputs	+	+	+	+	+	NI	NI	+	NI	NI	+	+	NI	
_ riverine inputs	+	+	+	+	+	NI	NI	+	+	+	+	+	NI	
UK														
_direct inputs	R	R	R	R	R	R	R	R	R	R	R	R	R	
_ riverine inputs	R	R	R (A)	R	R (A)	R	R	R	R	R	R (A)	R (A)	R	

+ : Data provided
NI: No information
NA: Not applicable
R: Estimate given as a range (lower/upper)
1) IUPAC Nos 28, 52, 101, 118, 153, 138, 180
2) Suspended particulate matter
3) 70 % of measurements above detection limit
4) Less than 70 % of measurements above detection limit
(*) Uncertain of whether or not 70 % are below or above detection limits
5) River Tejo only
(A) includes data from aquaculture; these are not given as a range

Table 2: Direct Discharges to the Maritime Area of the OSPAR Convention in 2008 by Country

Table 2

Country	Region		Cd [t/a]	Hg [t/a]	Cu [t/a]	Pb [t/a]	Zn [t/a]	g-HCH [kg/a]	PCBs (1) [kg/a]	NH4-N [kt/a]	NO3-N [kt/a]	PO4-P [kt/a]	N-Total [kt/a]	P-Total [kt/a]	SPM (2) [kt/a]
Belgium	North Sea (BE)	lower	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		upper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Denmark (3)	Kattegat (DK)	lower	NI	NI	NI	NI	NI	NI	NI	0.048	0.431	0.035	0.479	0.054	NI
		upper	NI	NI	NI	NI	NI	NI	NI						NI
	North Sea (DK)	lower	NI	NI	NI	NI	NI	NI	NI	0.023	0.116	0.009	0.141	0.015	NI
		upper	NI	NI	NI	NI	NI	NI	NI						NI
	Skagerrak (DK)	lower	NI	NI	NI	NI	NI	NI	NI	0.002	0.019	0.001	0.021	0.002	NI
		upper	NI	NI	NI	NI	NI	NI	NI						NI
France	Atlantic	lower	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
		upper	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	Channel	lower	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
		upper	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Germany	North Sea (GER)	lower	0.013	0.022	2.13	0.84	10.38	0.02	0.04	1.67	1.70	0.08	3.54	0.38	1.95
		upper	0.050	0.057	2.72	1.47	15.51	0.28	2.82	1.67	1.70	0.08	3.54	0.38	1.95
Iceland	Atlantic	lower	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
		upper	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Ireland	Atlantic	lower	0.007	NI	0.83	0.39	7.7	NI	NI	NI	NI	NI	0.70	0.21	4.32
		upper													
	Celtic Sea	lower	0.023	NI	3.20	4.40	21.5	NI	NI	NI	NI	NI	2.67	0.65	18.59
		upper													
	Irish Sea	lower	0.060	NI	7.50	3.30	63.0	NI	NI	NI	NI	NI	6.83	1.58	38.13
		upper													
Netherlands	North Sea (NL)	lower													
		upper	0.266	0.019	2.59	2.12	10.8	NI	NI	NI	NI	NI	1.56	0.31	NI
Norway (3)	Barents Sea (NO)	lower													
		upper	NI	0.001	32.76	NI	NI	NI	NI	1.69	0.22	0.29	2.13	0.42	0.01
	North Sea (NO)	lower													
		upper	0.057	0.017	267.66	1.18	15.7	NI	NI	14.84	1.84	2.41	18.79	3.55	14.88
	Norwegian Sea (NO)	lower													
		upper	0.048	0.002	429.05	1.59	1.8	NI	NI	22.91	2.92	3.86	28.92	5.67	18.47
	Skagerrak (NO)	lower													
		upper	0.068	0.014	12.36	0.69	16.8	NI	0.01	4.30	0.29	0.11	5.74	0.19	6.05
Portugal	Bay of Biscay and Iberian Coast (PO)	lower	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
		upper	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Spain (3)	Atlantic (ESP)	lower	1.26	0.095	17.00	3.66	66.4	0.64	0.00	7.54	1.77	0.65	13.19	1.10	114.63
		upper	5.86	9.409	21.49	25.90	74.2	1.60	9.30	8.57	1.79	0.90	13.77	1.29	128.25
Sweden	Kattegat (SWE)	lower	0.026	0.008	2.20	0.15	5.3	NI	NI	1.54	NI	NI	2.23	0.08	NI
		upper	0.026	0.008	2.20	0.15	5.3	NI	NI	1.54	NI	NI	2.23	0.08	NI
	Skagerrak (SWE)	lower	0.002	0.001	0.30	0.41	0.6	NI	NI	0.20	NI	NI	0.36	0.01	NI
		upper	0.002	0.001	0.30	0.41	0.6	NI	NI	0.20	NI	NI	0.36	0.01	NI
UK (3)	Atlantic	lower	0.294	0.031	76.87	1.99	35.5	2.89	0.00	4.67	2.55	0.94	15.62	2.38	25.54
		upper	0.350	0.035	76.93	2.06	36.0	2.90	0.00	4.67	2.59	0.94	15.62	2.40	25.69
	Celtic Sea	lower	0.026	0.002	1.40	1.02	27.7	0.13	0.00	3.72	1.26	0.44	1.73	0.44	4.34
		upper	0.044	0.004	1.40	1.03	27.7	1.70	7.91	3.78	1.28	0.46	1.73	0.46	4.38
	Channel	lower	0.010	0.003	4.33	0.84	15.3	0.65	NI	5.41	2.72	0.95	9.12	0.95	13.42
		upper	0.043	0.006	4.33	0.86	15.3	5.28	NI	5.47	2.79	0.99	9.14	0.99	13.47
	Irish Sea	lower	0.593	0.085	2.41	2.63	18.4	0.05	0.02	3.42	1.68	0.59	6.55	0.63	7.44
		upper	0.912	0.082	3.46	2.93	20.7	1.83	0.24	3.44	1.70	0.63	6.57	0.70	7.58
	North Sea (North)	lower	0.038	0.012	34.48	2.67	47.7	1.80	5.78	9.88	2.98	1.65	19.77	2.81	26.86
		upper	0.085	0.014	34.62	2.68	47.8	4.86	9.96	9.88	2.99	1.65	19.78	2.81	26.89
	North Sea (South)	lower	0.089	0.082	16.76	6.58	73.2	4.31	0.77	4.81	8.90	2.95	16.03	2.95	167.38
		upper	0.278	0.089	16.84	6.68	74.3	17.83	36.71	4.85	8.90	2.96	16.05	2.96	167.56

NI: No information
NA: Not applicable
1) IUPAC Nos 28, 52, 101, 118, 153, 138, 180
2) Suspended particulate matter
3) Includes data on fish farming effluentes

Table 3: Riverine Inputs to the Maritime Area of the OSPAR Convention in 2008 by Country

Table 3			Cd	Hg	Cu	Pb	Zn	g-HCH	PCBs	NH4-N	NO3-N	PO4-P	N-Total	P-Total	SPM
Country	Region		[t/a]	[t/a]	[t/a]	[t/a]	[t/a]	[kg/a]	[kg/a]	[kt/a]	[kt/a]	[kt/a]	[kt/a]	[kt/a]	[kt/a]
Belgium	North Sea (BE)	lower	3.14	0.35	33.23	73.98	351.2	2.49	0.00	2.75	31.49	1.37	37.73	3.12	534.8
		upper	4.08	0.43	52.46	91.77	424.8	18.31	94.63	3.38	36.11	1.55	46.18	3.77	657.0
Denmark (4)	Kattegat (DK)	lower	NI	NI	NI	NI	NI	NI	NI	0.48	17.61	0.27	21.59	0.74	19.7
		upper	NI	NI	NI	NI	NI	NI	NI						
	North Sea (DK)	lower	NI	NI	NI	NI	NI	NI	NI	0.52	16.08	0.12	19.86	0.64	30.9
		upper	NI	NI	NI	NI	NI	NI	NI						
	Skagerrak (DK)	lower	NI	NI	NI	NI	NI	NI	NI	0.05	1.02	0.02	1.29	0.06	7.6
		upper	NI	NI	NI	NI	NI	NI	NI						
France	Atlantic	lower	0.24	0.24	2.05	1.82	18.7	0.00	0.00	4.87	327.83	3.16	303.98	8.39	2213.9
		upper	0.37	0.37	2.05	1.82	18.7	200.84	0.00	5.92	327.83	3.53	422.63	8.44	2215.7
	Channel	lower	0.36	0.36	43.70	5.48	226.9	0.74	0.00	4.45	193.56	2.61	202.49	3.80	565.7
		upper	23.71	12.15	45.78	14.00	228.5	484.07	0.00	171.91	193.56	2.68	229.19	3.99	565.7
Germany	North Sea (GER)	lower	3.18	1.24	183.21	98.20	841.3	23.80	3.68	5.48	124.97	1.80	151.30	5.94	892.0
		upper	3.60	1.25	183.21	102.21	850.6	24.00	27.02	5.58	124.97	1.83	151.30	5.94	1121.9
Iceland	Atlantic	lower					NI	NI	NI	NI					NI
		upper	0.02	0.02	6.19	0.21	NI	NI	NI	NI	0.28	0.24	1.83	0.40	NI
Ireland	Atlantic	lower	0.00	NI	20.24	0.42	114.9	NI	NI	0.22	22.49	0.83	31.30	1.10	84.1
		upper	2.37	NI	37.10	24.01	126.3	NI	NI	0.79	18.80	0.84	31.30	1.10	219.6
	Celtic Sea	lower	0.00	NI	42.67	5.49	246.8	NI	NI	1.09	59.89	1.21	80.79	2.87	441.6
		upper	3.24	NI	64.76	36.16	251.1	NI	NI	1.14	59.91	1.21	80.80	2.87	525.1
	Irish Sea	lower	0.24	NI	23.39	9.63	144.4	NI	NI	0.29	22.49	0.21	28.66	0.41	85.1
		upper	1.01	NI	27.88	16.26	144.9	NI	NI	0.31	22.49	0.21	28.66	0.41	99.6
Netherlands	North Sea (NL)	lower	6.09	0.87	231.16	114.33	1156.8	35.60	55.20	5.85	184.81	4.90	233.15	11.19	1247.1
		upper	6.92	0.87	231.91	114.36	1158.4	36.00	55.40	5.96	184.81	4.90	233.15	11.35	1248.6
Norway	Barents Sea (NO)	lower	0.16	0.00	22.26	1.34	47.2	0.00	0.00	0.12	0.47	0.03	2.77	0.09	40.3
		upper	0.20	0.02	22.27	1.35	47.2	0.91	7.40	0.12	0.47	0.04	2.77	0.10	40.4
	North Sea (NO)	lower	0.53	0.05	28.60	10.48	112.7	0.00	0.00	0.50	8.27	0.13	14.18	0.33	98.5
		upper	0.55	0.08	28.63	10.48	112.7	2.30	20.13	0.51	8.27	0.15	14.18	0.33	98.6
	Norwegian Sea (NO)	lower	0.36	0.03	64.06	5.48	148.5	0.00	0.00	0.36	3.89	0.14	9.37	0.31	253.2
		upper	0.49	0.08	64.07	5.50	148.5	2.44	20.70	0.37	3.89	0.16	9.38	0.31	253.4
	Skagerrak (NO)	lower	1.37	0.03	103.54	24.75	336.5	0.00	1.43	1.15	20.30	0.46	34.29	0.91	540.7
		upper	1.38	0.10	103.55	24.75	336.5	13.29	93.52	1.16	20.30	0.48	34.29	0.92	540.7

Table 3 cont: Riverine Inputs to the Maritime Area of the OSPAR Convention in 2008 by Country

Table 3 cont.			Cd	Hg	Cu	Pb	Zn	g-HCH	PCBs	NH4-N	NO3-N	PO4-P	N-Total	P-Total	SPM
Country	Region		[t/a]	[t/a]	[t/a]	[t/a]	[t/a]	[kg/a]	[kg/a]	[kt/a]	[kt/a]	[kt/a]	[kt/a]	[kt/a]	[kt/a]
Portugal	Bay of Biscay and Iberian Coast (PO)	lower	0.28	0.39	5.83	3.38	46.2	NI	NI	0.38	3.16	0.56	4.80	0.80	36.0
		upper	0.28	0.39	5.83	3.38	46.2	NI	NI	0.38	3.16	0.56	4.80	0.80	36.0
Spain (3)	Atlantic (ESP)	lower	0.05	0.03	13.39	5.01	282.4	0.00	0.00	3.49	18.20	0.64	37.34	1.58	334.0
		upper	8.64	1.15	53.06	59.16	391.5	44.73	41.19	5.23	42.25	1.11	45.24	1.82	530.3
Sweden	Kattegat (SWE)	lower	0.57	0.09	46.30	16.33	179.8	NI	NI	0.99	20.05	0.30	35.40	0.79	NI
		upper	0.57	0.09	46.30	16.33	179.8	NI	NI	0.99	20.05	0.30	35.40	0.79	NI
	Skagerrak (SWE)	lower	0.08	0.02	5.50	2.08	21.2	NI	NI	0.12	1.42	0.07	3.50	0.15	NI
		upper	0.08	0.02	5.50	2.08	21.2	NI	NI	0.12	1.42	0.07	3.50	0.15	NI
UK	Atlantic	lower	0.01	0.05	35.74	15.08	107.2	4.90	0.20	0.83	10.61	1.16	15.10	1.64	158.1
		upper	1.91	0.38	37.90	15.70	119.4	18.42	7.10	1.12	10.67	1.20	15.31	1.67	165.2
	Celtic Sea	lower	1.23	0.16	82.06	68.31	368.2	0.16	0.00	1.03	52.44	1.86	56.54	1.86	1234.0
		upper	2.57	0.30	83.28	84.31	378.0	60.09	49.42	1.25	52.44	1.95	56.61	1.95	1237.9
	Channel	lower	0.35	0.07	43.46	11.69	142.6	0.12	0.00	0.36	27.49	0.91	28.85	0.91	143.2
		upper	0.68	0.13	43.66	17.66	145.5	24.79	45.92	0.44	27.49	0.92	28.85	0.92	145.7
	Irish Sea	lower	0.90	0.24	86.21	45.54	351.8	1.87	0.00	3.00	34.95	2.05	38.68	2.17	303.2
		upper	1.95	0.39	87.14	55.72	359.5	53.35	71.69	3.37	35.07	2.12	38.68	2.23	314.6
	North Sea (North)	lower	0.76	0.10	60.31	48.65	293.4	3.84	5.38	0.80	37.63	0.73	50.39	1.21	296.6
		upper	1.29	0.20	63.03	49.27	303.4	26.47	50.72	0.97	37.67	0.88	50.43	1.34	303.8
	North Sea (South)	lower	2.18	0.15	109.36	88.52	465.5	0.13	0.00	3.27	153.03	5.83	153.65	5.83	617.5
		upper	2.54	0.28	109.36	94.26	466.2	85.02	110.53	3.32	153.03	5.84	153.66	5.84	619.6

NI: No information
1) IUPAC Nos 28, 52, 101, 118, 153, 138, 180
2) Suspended particulate matter
3) Also include inputs from Tinto (metals). These have not been taken into account in the reported totals due to high natural background concentration values.
4) For all parameters except SPM sums to North Sea, Skagerrak and Kattegat are the monitored loads in rivers + estimated loads
from “unmonitored parts” which also includes minor streams not reported separately to OSPAR

Table 4a: Sum of Direct (Table 2) and Riverine (Table 3) Inputs to the Maritime area of the OSPAR Convention in 2008 by Country

Table 4a			Cd	Hg	Cu	Pb	Zn	g-HCH	PCBs (1)	NH4-N	NO3-N	PO4-P	N-Total	P-Total	SPM (2)
Country	Region		[t/a]	[t/a]	[t/a]	[t/a]	[t/a]	[kg/a]	[kg/a]	[kt/a]	[kt/a]	[kt/a]	[kt/a]	[kt/a]	[kt/a]
Belgium	North Sea (BE)	lower	3.14	0.35	33.23	73.98	351.2	2.49	0.00	2.75	31.49	1.37	37.73	3.12	534.8
		upper	4.08	0.43	52.46	91.77	424.8	18.31	94.63	3.38	36.11	1.55	46.18	3.77	657.0
Denmark (3)	Kattegat (DK)	lower	NI	NI	NI	NI	NI	NI	NI	0.52	18.04	0.30	22.07	0.80	19.7
		upper													
	North Sea (DK)	lower	NI	NI	NI	NI	NI	NI	NI	0.54	16.19	0.13	20.00	0.66	30.9
		upper													
	Skagerrak (DK)	lower	NI	NI	NI	NI	NI	NI	NI	0.06	1.04	0.02	1.31	0.06	7.6
		upper													
France	Atlantic	lower	0.24	0.24	2.05	1.82	18.7	0.00	0.00	4.87	327.83	3.16	303.98	8.39	2213.9
		upper	0.37	0.37	2.05	1.82	18.7	200.84	0.00	5.92	327.83	3.53	422.63	8.44	2215.7
	Channel	lower	0.36	0.36	43.70	5.48	226.9	0.74	0.00	4.45	193.56	2.61	202.49	3.80	565.7
		upper	23.71	12.15	45.78	14.00	228.5	484.07	0.00	171.91	193.56	2.68	229.19	3.99	565.7
Germany	North Sea (GER)	lower	3.20	1.26	185.35	99.04	851.7	23.82	3.72	7.15	126.67	1.88	154.84	6.32	893.9
		upper	3.65	1.30	185.93	103.68	866.1	24.29	29.84	7.25	126.67	1.91	154.84	6.32	1123.9
Iceland	Atlantic	lower													
		upper	0.023	0.023	6.19	0.206	NI	NI	NI	NI	0.28	0.24	1.83	0.40	NI
Ireland	Atlantic	lower	0.01	NI	21.07	0.81	122.6	NI	NI	0.22	22.49	0.83	32.00	1.31	88.4
		upper	2.37	NI	37.10	24.01	126.3	NI	NI	0.79	18.80	0.84	31.30	1.10	219.6
	Celtic sea	lower	0.02	NI	45.87	9.89	268.3	NI	NI	1.09	59.89	1.21	83.46	3.53	460.2
		upper	3.24	NI	64.76	36.16	251.1	NI	NI	1.14	59.91	1.21	80.80	2.87	525.1
	Irish sea	lower	0.30	NI	30.89	12.93	207.4	NI	NI	0.29	22.49	0.21	35.49	1.99	123.2
		upper	1.01	NI	27.88	16.26	144.9	NI	NI	0.31	22.49	0.21	28.66	0.41	99.6
Netherlands	North Sea (NL)	lower	6.09	0.87	231.16	114.33	1156.8	35.60	55.20	5.85	184.81	4.90	233.15	11.19	1247.1
		upper	7.19	0.88	234.50	116.48	1169.2	36.00	55.40	5.96	184.81	4.90	234.70	11.66	1248.6

Table 4a cont. Sum of Direct (Table 2) and Riverine (Table 3) Inputs to the Maritime area of the OSPAR Convention in 2008 by Country

Table 4a cont			Cd	Hg	Cu	Pb	Zn	g-HCH	PCBs (1)	NH4-N	NO3-N	PO4-P	N-Total	P-Total	SPM (2)
Country	Region		[t/a]	[t/a]	[t/a]	[t/a]	[t/a]	[kg/a]	[kg/a]	[kt/a]	[kt/a]	[kt/a]	[kt/a]	[kt/a]	[kt/a]
Norway	Barents Sea (NO)	lower	0.16	0.00	22.26	1.34	47.2	0.00	0.00	0.12	0.47	0.03	2.77	0.09	40.3
		upper	0.20	0.02	55.02	1.35	47.2	0.91	7.40	1.81	0.69	0.32	4.90	0.51	40.4
	North Sea (NO)	lower	0.53	0.05	28.60	10.48	112.7	0.00	0.00	0.50	8.27	0.13	14.18	0.33	98.5
		upper	0.61	0.10	296.29	11.66	128.3	2.30	20.13	15.35	10.11	2.56	32.96	3.88	113.5
	Norwegian Sea (NO)	lower	0.36	0.03	64.06	5.48	148.5	0.00	0.00	0.36	3.89	0.14	9.37	0.31	253.2
		upper	0.54	0.08	493.11	7.08	150.3	2.44	20.70	23.29	6.81	4.02	38.29	5.99	271.9
	Skagerrak (NO)	lower	1.37	0.03	103.54	24.75	336.5	0.00	1.43	1.15	20.30	0.46	34.29	0.91	540.7
		upper	1.45	0.11	115.91	25.44	353.3	13.29	93.53	5.46	20.59	0.59	40.02	1.11	546.8
Portugal	Bay of Biscay and Iberian Coast (PO)	lower	0.28	0.39	5.83	3.38	46.2	NI	NI	0.38	3.16	0.56	4.80	0.80	36.0
		upper	0.28	0.39	5.83	3.38	46.2	NI	NI	0.38	3.16	0.56	4.80	0.80	36.0
Spain	Atlantic (ESP)	lower	1.31	0.13	30.38	8.67	348.8	0.64	0.00	11.03	19.96	1.29	50.52	2.68	448.6
		upper	14.50	10.56	74.55	85.06	465.7	46.32	50.49	13.80	44.03	2.01	59.01	3.11	658.5
Sweden	Kattegat (SWE)	lower	0.60	0.10	48.50	16.48	185.1	NI	NI	2.52	20.05	0.30	37.63	0.87	NI
		upper	0.60	0.10	48.50	16.48	185.1	NI	NI	2.52	20.05	0.30	37.63	0.87	NI
	Skagerrak (SWE)	lower	0.09	0.02	5.80	2.49	21.8	NI	NI	0.32	1.42	0.07	3.86	0.16	NI
		upper	0.09	0.02	5.80	2.49	21.8	NI	NI	0.32	1.42	0.07	3.86	0.16	NI
UK	Atlantic	lower	0.30	0.09	112.61	17.07	142.7	7.79	0.20	5.50	13.16	2.10	30.71	4.02	183.7
		upper	2.26	0.42	114.83	17.76	155.4	21.32	7.10	5.80	13.26	2.14	30.93	4.07	190.9
	Celtic Sea	lower	1.26	0.16	83.46	69.33	395.9	0.29	0.00	4.75	53.70	2.30	58.27	2.30	1238.4
		upper	2.61	0.30	84.68	85.34	405.8	61.79	57.33	5.03	53.72	2.41	58.35	2.41	1242.3
	Channel	lower	0.36	0.07	47.80	12.53	157.9	0.77	0.00	5.76	30.22	1.86	37.96	1.86	156.7
		upper	0.72	0.14	47.99	18.52	160.8	30.07	45.92	5.90	30.28	1.91	37.99	1.91	159.2
	Irish Sea	lower	1.49	0.33	88.62	48.17	370.2	1.92	0.02	6.42	36.63	2.64	45.23	2.79	310.7
		upper	2.86	0.47	90.60	58.65	380.3	55.18	71.92	6.815	36.76	2.75	45.25	2.93	322.1
	North Sea (North)	lower	0.79	0.11	94.79	51.32	341.1	5.65	11.15	10.68	40.61	2.38	70.17	4.02	323.5
		upper	1.37	0.22	97.65	51.95	351.2	31.33	60.68	10.85	40.66	2.53	70.20	4.14	330.7
	North Sea (South)	lower	2.27	0.23	126.12	95.10	538.7	4.43	0.77	8.08	161.93	8.78	169.68	8.78	784.9
		upper	2.81	0.37	126.21	100.94	540.5	102.85	147.24	8.17	161.94	8.80	169.71	8.80	787.1

NI: No information

1) IUPAC Nos 28, 52, 101, 118, 153, 138, 180

2) Suspended particulate matter

3) SPM in Denmark only estimated in monitored rivers

Table 4b: Sum of Direct and Riverine Inputs to the Maritime area of the OSPAR Convention in 2008 by Sea Area

Region **Sea Area**		Cd [t/a]	Hg [t/a]	Cu [t/a]	Pb [t/a]	Zn [t/a]	g-HCH [kg/a]	PCBs (1) [kg/a]	NH4-N [kt/a]	NO3-N [kt/a]	PO4-P [kt/a]	N-Total [kt/a]	P-Total [kt/a]	SPM (2) [kt/a]
Arctic Ocean (Barents sea)	lower	0.18	0.03	61.21	1.55	47.21	0	0	1.81	0.97	0.55	6.73	0.91	40.3
	upper	0.22	0.04	61.21	1.56	47.23	0.91	7.40	1.81	0.97	0.56	6.73	0.92	40.4
Atlantic Ocean	lower	0.30	0.09	112.61	17.07	142.72	7.79	0.20	5.50	13.16	2.10	30.71	4.02	183.7
	upper	2.26	0.42	114.83	17.76	155.41	21.32	7.10	5.80	13.26	2.14	30.93	4.07	190.9
Bay of Biscay and	lower	1.83	0.76	38.27	13.87	413.72	0.64	0	16.28	350.95	5.02	359.31	11.87	2698.5
Iberian Coast	upper	15.16	11.32	82.43	90.26	530.66	247.16	50.49	20.11	375.03	6.10	486.44	12.35	2910.2
Celtic Sea	lower	1.29	0.16	150.40	80.04	786.82	0.29	0	6.06	136.09	4.35	173.73	7.14	1787.0
	upper	8.25	0.30	190.57	150.29	812.33	61.79	57.33	6.96	132.43	4.47	173.81	7.25	2009.9
Channel	lower	0.73	0.44	91.50	18.00	384.75	1.51	0.00	10.22	223.77	4.46	240.45	5.66	722.3
	upper	24.43	12.29	93.77	32.52	389.33	514.14	45.92	177.81	223.84	4.59	267.18	5.90	724.9
Irish Sea	lower	1.79	0.33	119.51	61.10	577.57	1.92	0.02	6.71	59.13	2.84	80.72	4.78	433.9
	upper	3.93	0.47	125.98	78.21	588.12	55.18	71.92	7.12	59.26	2.95	80.74	4.91	459.8
Kattegat	lower	0.60	0.10	48.50	16.48	185.06	NI	NI	3.05	38.09	0.60	59.70	1.66	19.7
	upper	0.60	0.10	48.50	16.48	185.06	NI	NI	3.05	38.09	0.60	59.70	1.66	19.7
North Sea (main body)	lower	16.34	2.90	969.50	447.55	3377.60	71.99	70.85	50.39	571.81	21.99	720.09	38.28	3928.5
	upper	19.72	3.30	993.03	476.48	3480.09	215.07	407.91	51.49	576.49	22.39	728.60	39.24	4291.7
Norwegian Sea	lower	0.41	0.04	493.10	7.06	149.29	0	0	23.28	6.81	4.00	38.29	5.99	271.7
	upper	0.54	0.08	493.11	7.08	150.31	2.44	20.70	23.29	6.81	4.02	38.29	5.99	271.9
Skagerrak	lower	1.52	0.06	121.70	27.92	374.10	0.00	1.44	5.84	23.05	0.66	45.19	1.33	554.3
	upper	1.54	0.13	121.70	27.92	375.10	13.29	93.53	5.84	23.05	0.68	45.19	1.33	554.3

NI: No information

1) IUPAC Nos 28, 52, 101, 118, 153, 138, 180

2) Suspended particulate matter

Statistical information on river catchment areas

Statistical Information on River Catchment Areas

River	Catchment area	Countries	Share in catchment area		Population (1990)		LTA*	LTA-period
	[km2]		[km2]	[%]	[10E6]	[%]	[1000 m3/d]	[a]
Statistical Information provided by Belgium:								
Coastal Area	**2675**				**~0.497**		**2367**	NI
Western	1689	*Belgium*	>1082	NI	>0,305	NI	708	
		France	NI	NI	NI	NI		
Middle	499	*Belgium*			0.014		501	
Eastern	487	*Belgium*			0.177		1158	
Scheldt basin								
Scheldt	**22004**				**~10**		**11139**	1949-2008
		Belgium (1)	13324	*61*	6.9			
		France	6680	*30*	~2,7			
		Netherlands (1)	2000	*9*	0.4			
		(1) Ghent-Terneuzen canal comprised						
Ghent-Terneuzen canal	**NI**						**1 885**	1991-2008
		Belgium	NI		NI			
		Netherlands	NI		NI			
Statistical Information provided by Denmark:								
Vid å	248.3	*DK*	*248*	*81*			300.5	78-07
Brøns å	94.1	*DK*	*94*	*100*		*100*	107.0	74-07
Ribe å	675	*DK*	*675*	*100*		*100*	756.6	33-07
Kongeaen	426.6	*DK*	*427*	*100*		*100*	627.0	90-07
Sneum å	223	*DK*	*223*	*100*		*100*	283.1	66-07
Varde å	815	*DK*	*815*	*100*		*100*	1048.8	69-07
Skjern å	1558.4	*DK*	*1558*	*100*		*100*	2108.2	74-07
Stor å	1096.7	*DK*	*1097*	*100*		*100*	1427.3	71-07
Brede å	290	*DK*	*290*	*100*		*100*	311.0	22-07
Omme å	612	*DK*	*612*	*100*		*100*	743.1	83-07
Grøn å	563	*DK*	*563*	*100*		*100*	606.2	59-07
Total	**10809**	**=Total of Danish rivers discharging to the North Sea**					**8230**	**71-90**
Liver å	249.8	*DK*	*250*	*100*		*100*	226.4	89-07
Uggerby å	347.5	*DK*	*348*	*100*		*100*	351.3	89-07
	1097	**=Total of Danish rivers discharging to the Skagerrak**					**863**	**71-90**
Karup å	626.8	*DK*	*527*	*100*		*100*	635.2	86-07
Jordbro å	110.9	*DK*	*111*	*100*		*100*	110.7	80-07
Skals å	556.4	*DK*	*556*	*100*		*100*	389.7	73-07
Simmersted å	214.9	*DK*	*215*	*100*		*100*	207.6	92-07
Elling å	132.2	*DK*	*132*	*100*		*100*	123.2	89-07
Voer å	238.7	*DK*	*239*	*100*		*100*	247.6	89-07
Ger å	153.8	*DK*	*154*	*100*		*100*	149.6	85-07
Lindeborg å	317.8	*DK*	*318*	*100*		*100*	310.3	83-07
Haslevgard å	75	*DK*	*75*	*100*		*100*	62.3	89-07
Kastbjerg å	96.3	*DK*	*96*	*100*		*100*	70.1	76-07
Guden å	2602.9	*DK*	*2 603*	*100*		*100*	2837.8	78-07
Ry å	285	*DK*	*285*	*100*		*100*	264.7	72-07
	15828	**=Total of Danish rivers discharging to the Kattegat**					**5284**	**71-90**

River	Catchment area	Countries	Share in catchment area		Population (1990)		LTA*	LTA-period
	[km2]		[km2]	[%]	[10E6]	[%]	[1000 m3/d]	[a]
Statistical Information provided by France:								
Coastal area	2308	*France*		*100*	0.61	*100*	2764	1989 - 2006
Canche	3895	*France*		*100*	0.38	*100*	4579	1961 - 2006
Somme	5916	*France*		*100*	0.59	*100*	3197	1963 - 2006
Béthune et Bresle	2153	*France*		*100*	0.16	*100*	2074	1998 - 2006
Saane	1718	*France*		*100*	0.16	*100*	2938	1996 - 2006
Seine	64953	*France*		*100*	13.94	*100*	44842	1974 - 2006
Andelle	789	*France*		*100*	0.05	*100*	691	1972 - 2006
Eure	6023	*France*		*100*	0.60	*100*	2246	1971 - 2006
Coastal area	2439	*France*		*100*	0.93	*100*	1599	1989 - 2006
Risle	2545	*France*		*100*	0.16	*100*	1642	1976 - 2006
Dives	1815	*France*		*100*	0.11	*100*	1296	1968 - 2006
Douve	1474	*France*		*100*	0.08	*100*	625	1989 - 2006
Orne	2976	*France*		*100*	0.40	*100*	2506	1984 - 2006
Seulles	547	*France*		*100*	0.06	*100*	346	1970 - 2006
Touques	1311	*France*		*100*	0.10	*100*	1037	1981 - 2006
Vire	2077	*France*		*100*	0.15	*100*	2246	1993 - 2006
Coastal area	1302	*France*		*100*	0.16	*100*	1174	1989 - 2006
Sélune et Sée	1623	*France*		*100*	0.09	*100*	1987	1994 - 2006
Sienne	1135	*France*		*100*	0.09	*100*	1328	1989 - 2006
Aulne	4312	*France*		*100*	0.52	*100*	6653	1969 - 2006
Rance et Couesnon	2848	*France*		*100*	0.27	*100*	2160	1983 - 2006
Coastal area	4961	*France*		*100*	0.49	*100*	3654	1989 - 2006
	119122	=Total of rivers discharging in ZONE II			20.10		91 582	
Blavet et Scorff	4649	*France*		*100*	0.50	*100*	5702	1982 - 2006
Coastal area	2868	*France*		*100*	0.32	*100*	4558	1989 - 2006
Vilaine	10144	*France*		*100*	0.90	*100*	5443	2001 - 2006
Coastal area	3636	*France*		*100*	0.82	*100*	2847	1989 - 2006
Loire	110178	*France*		*100*	6.67	*100*	73526	1868 - 2006
Sèvre Nantaise	4664	*France*		*100*	0.52	*100*	4234	1993 - 2006
Lay	4522	*France*		*100*	0.39	*100*	3456	1971 - 2006
Sèvre Niortaise	4363	*France*		*100*	0.42	*100*	4752	1992 - 2006
Coastal area	291	*France*		*100*	0.02	*100*	239	1989 - 2006
Boutonne	2141	*France*		*100*	0.14	*100*	1754	1989 - 2006
Charente	7526	*France*		*100*	0.43	*100*	5357	1979 - 2006
Coastal area	1172	*France*		*100*	0.09	*100*	446	1989 - 2006
Seudre	988	*France*		*100*	0.06	*100*	432	1971 - 2006
Eyre	2036	*France*		*100*	0.03	*100*	1814	1967 - 2006
Coastal area	2810	*France*		*100*	0.10	*100*	2264	1989 - 2006
Dordogne	14605	*France*		*100*	0.55	*100*	21859	1997 - 2006
Isle	8472	*France*		*100*	0.40	*100*	6912	1971 - 2006
Coastal area	870	*France*		*100*	0.09	*100*	647	1989 - 2006
Dropt	2672	*France*		*100*	0.21	*100*	1989	1989 - 2006
Garonne	38227	*France*		*100*	2.24	*100*	40003	1966 - 2006
Lot	11541	*France*		*100*	0.35	*100*	12614	2000 - 2006
Coastal area	3875	*France*		*100*	0.75	*100*	10983	1989 - 2006
Coastal area	3105	*France*		*100*	0.15	*100*	2501	1989 - 2006
Adour	7977	*France*		*100*	0.37	*100*	7690	1920 - 2006
Bidouze	1041	*France*		*100*	0.04	*100*	938	1989 - 2006
Gaves réunis	5504	*France*		*100*	0.32	*100*	17453	1925 - 2006
Luy	1367	*France*		*100*	0.10	*100*	1814	1966 - 2006
Nive	1153	*France*		*100*	0.12	*100*	3197	1968 - 2006
Coastal area	644	*France*		*100*	0.10	*100*	1825	1989 - 2006
	263040	=total of rivers discharging in ZONE IV			17.19		247 250	
Statistical Information provided by Germany:								
Ems	15552						7690	1941-2006
		Germany	13152	85.00	3.75	85		
		Netherlands	2400	15.00	0.6	15		
Weser	46306	*Germany*	-	-	9.0	-	31541	1941-2003
Elbe	148268		148268	100	25.11	-	74500	1926-2003
		Germany	*96932*	*65.38*	*19.09*	*76.03*		
		Czech Republic	*50176*	*33.84*	*5.97*	*23.78*		
		Austria	*920*	*0.62*	*0.05*	*0.20*		
		Poland	*240*	*0.16*	*NI*	*NI*		
Eider	2065	*Germany*	-	-	0.159	-	2391	1974-2006

River	Catchment area [km2]	Countries	Share in catchment area [km2]	Share in catchment area [%]	Population (1990) [10E6]	Population (1990) [%]	LTA* [1000 m3/d]	LTA-period [a]
Statistical Information provided by Ireland:								
Boyne	2695	Ireland	-	-	NI	-	3280	1940-2006
Liffey	1256	Ireland	-	-	NI	-	1459	1900-2006
								1956-2006
Avoca	652	Ireland	-	0	NI	-	1562.112	1986-2006
Slaney	1762	Ireland	-	-	NI	-	3208.032	1990-2006
	6365	**=Total of main Irish rivers discharging to the Irish Sea**						
Barrow	3067	Ireland	-	-	NI	-	3784.32	1996-2006
Nore	2530	Ireland	-	-	NI	-	3602.016	1972-2006
Suir	3610	Ireland	-	-	NI	-	5889.024	1972-2006
								1953-2006
Blackwater	3324	Ireland	-	-	NI	-	7521.984	1955-2006
Lee	1253	Ireland	-	-	NI	-	3435.264	1957-2006
Bandon	608	Ireland	-	-	NI	-	1858	1975-2006
Deel	486	Ireland	-	-	NI	-	624.672	1982-2006
Maigue	1052	Ireland	-	-	NI	-	1513.728	1990-2006
Shannon Old Chan.	11700	Ireland	-	-	NI	-	4499.712	1990-2006
Shannon Tailrace		Ireland					13307.33	1947-2006
Fergus	1042	Ireland	-	-	NI	-	1 598	1956-2006
	28672	=Total of main Irish rivers discharging to the Celtic Sea						
Corrib	3138	Ireland	-	-	NI	-	9011.52	1973-06 excl. 86-90, 92-93
Moy	2086	Ireland	-	-	NI	-	5405.184	1974-2006
Erne	4372	**Ireland/UK**	2572/1800	60/40	NI	-	7 333	1951-2006
	9596	**=Total of main Irish rivers dischrging to the Atlantic**						
Statistical Information provided by The Netherlands (with assistance from Germany and Belgium)								
Rhine	185000				2) 55.6		4) 198720	1901-1995
		Switzerland	1) 28000	15	3.0	6		
		France	24000	13	3.7	7		
		Luxembourg	2500	1	0.3	1		
		Germany	105900	57	32.5	65		
		Netherlands	21000	11	10.9	21		
		Belgium	700	0				
		Austria	2500	1				
		Liechtenstein	300	0				
		Italy	100	0				
Meuse	33500				3) 7.15		5) 28080	1911-1995
		France	8500	25	0.50			
		Luxembourg	100	0	0.05			
		Belgium	13150	39	2.00			
		Germany	4300	13	1.00			
		Netherlands	7400	22	3.60			
Scheldt	22004				~10		9331	1949-1995
		France	6680	30.00	~2.7	~27		
		Belgium	13324	61.00	6.9	69		
		Netherlands	2000	9.00	0.4	4		
Ems	15552						7690	1941-2006
		Germany	13152	85.00	3.75	85		
		Netherlands	2400	15.00	0.6	15		

1) Catchment areas rounded off to the nearest hundred km2
2) Population Rhine catchment per country requires further analysis
3) Population Meuse catchment: rough estimates
4) Estimated discharge at outlet: 2.300 m3/s * 24 h/d * 3600 s/h
5) Estimated discharge at outlet: 325 m3/s * 24 h/d * 3600 s/h

River	Catchment area [km2]	Countries	Share in catchment area [km2]	Share in catchment area [%]	Population (1990) [10E6]	Population (1990) [%]	LTA* [1000 m3/d]	LTA-period [a]
Statistical Information provided by Norway:								
Glomma (1)	41918	Norway		100.00	0.62	100	61350	1961-1990
Drammenselva (2)	17034	Norway		100.00	0.2	100	28850	1961-1990
Numedalslågen (3)	5577	Norway		100.00	0.04	100	10200	1961-1990
Skienselva (4)	10772	Norway		100.00	0.11	100	23535	1961-1990
Otra (5)	3738	Norway		100.00	0.03	100	12870	1961-1990
	79039	**=Total of Norwegian rivers discharging to the Skagerrak**						
Orreelva (6)	105	Norway		100.00	0.01	100	335	1961-1990
Suldalslågen (7)	1457	Norway		100.00	0.003	100	7420	1961-1990
	1562	**=Total of Norwegian rivers discharging to the North Sea**						
Orkla (8)	3053	Norway		100.00	0.02	100	5710	1961-1990
Vefsna (9)	4122	Norway		100.00	0.01	100	15655	1961-1990
	7175	**=Total of Norwegian rivers discharging to the Norwegian Sea**						
Altaelva (10)	7373	Norway		100.00	0.005	100	7495	1961-1990
	95149	**Total catchment for main rivers discharging to all four regions**						
	126706	**Total catchment for tributary rivers discharging to all four regions**						
	221855	**Total catchment for monitored rivers**						
Statistical Information provided by Portugal:								
Tejo	80149	Portugal	24380	30.8	2.89	32.0	15900	50
		Spain	55769	69.2	6.14	68.0	34800	50
Douro	97600	Portugal	18600	19.1	1.76	43.5	22500	50
		Spain	79000	80.9	2.28	56.5	40900	50
Miño/Minho	17000	Portugal	900	5.3	0.07	7.9	6000	15
		Spain	16100	94.7	0.86	92.1	29000	15

River	Catchment area	Countries	Share in catchment area		Population (1990)		LTA*	LTA-period
	[km2]		[km2]	[%]	[10E6]	[%]	[1000 m3/d]	[a]
Statistical Information provided by Spain:								
Oyarzun	74	Spain	74	100	0.055	100	166	
Urumea	266	Spain	266	100	0.176	100	633	
Oria	860	Spain	860	100	0.020	100	740	
Cadagua		Spain						
Asua		Spain						
Galindo		Spain						
Ibaizabal		Spain						
Urola	342	Spain	342	100	0.082	100	447	
Deva	531	Spain	531	100	0.146	100	694	
Artibay	106	Spain	106	100	0.016	100	NI	
Lea	81	Spain	81	100	0.010	100	NI	
Oca	132	Spain	132	100	0.022	100	NI	
Butron	175	Spain	175	100	0.024	100	NI	
Barbadun	135	Spain	135	100	0.020	100	NI	
Nervión	1764	Spain	1764	100	0.997	100	1 105	
Pas	620	Spain	606	97				
Eo	818	Spain	715	87				
Saja	955	Spain	955	100	0.104	100	1 166	
Nalón	4866	Spain	4866	100	0.539	100	6 977	
Miera	291	Spain	291	100	0.016	100	352	
Sella	1246	Spain	1246	100	0.035	100	832	
Masma	291	Spain	291	100	0.014	100	404	1970-2005
Oro	189	Spain	189	100	0.007	100	389	1970-2005
Landro	270	Spain	270	100	0.017	100	629	1975-2005
Sor	202	Spain	202	100	0.007	100	528	1996-2005
Mera	127	Spain	127	100	0.007	100	435	1970-2005
Forcadas	68	Spain	68	100	0.000	100	183	1970-2005
Grande de Jubia	182	Spain	182	100	0.004	100	318	1970-2005
Belelle	60	Spain	60	100	0.003	100	1 484	1970-2005
Eume	470	Spain	470	100	0.013	100	1 696	1970-2005
Mandeo	457	Spain	457	100	0.039	100	771	1970-2005
Mero	345	Spain	345	100	0.042	100	456	1984-2005
Allones	516	Spain	516	100	0.049	100	988	1970-2005
Grande	283	Spain	283	100	0.002	100	647	1970-2005
Castro	140	Spain	140	100	0.004	100	167	1970-2005
Jallas	504	Spain	504	100	0.022	100	739	1970-2005
Tambre	1530	Spain	1530	100	0.059	100	3828	1994-2005
Furelos		Spain						
Deza		Spain						
Traba	122	Spain	122	100	0.004	100	316	1970-2005
Ulla	2803	Spain	2803	100	0.104	100	1337	1971-2005
	156	Spain	156	100				
Umia	440	Spain	440	100	0.052	100	846	1970-2005
Lerez	450	Spain	450	100	0.085	100	1249	1970-1999
Verdugo	334	Spain	334	100	0.021	100	484	1970-2005
Miño	17247	Spain	16347	94.8	0.881		25716	1975-95
		Portugal	900	5.2				
Duero	97670	Spain	78960	80.8	3.093			
		Portugal	18710	19.2				
Tajo	80190	Spain	55810	69.6	6.459			
		Portugal	24380	30.4				
Guadiana	67122	Spain	55597	82.8	1.800		8556	1.912 - 1.995
		Portugal	11525	17.2				
Piedras	550	Spain	550	100	0.034	100	61	
Odiel	2417	Spain	2417	100	0.211	100	1 200	1967-1995
Guadaira		Spain						
Tinto	1727	Spain	1727	100	0.090	100	178	1966-1995
Guadalquivir	63241	Spain	63241	100	4.966	100	3423	1942-88
Guadiamar								
Guadalete	3360	Spain	3360	100	0.555	100	413	
TOTAL	**356726**	**Spain**	**301093**	**84.4**	**20.907**	**NI**	**70553**	
		Portugal	**55515**	**15.6**	**NI**			
		TOTAL	**356608**	**100**				

River	Catchment area	Countries	Share in catchment area		Population (1990)		LTA*	LTA-period
	[km2]		[km2]	[%]	[10E6]	[%]	[1000 m3/d]	[a]
Statistical Information provided by Sweden:					2005			
Vege å (95)	498	Sweden	498	100	0.0430	100	440	1961-1990
Rönne å (96)	1890	Sweden	1890	100	0.0903	100	2030	1961-1990
Stensån (97)	284	Sweden	284	100	0.0065	100	350	1961-1990
Lagan (98)	6444	Sweden	6444	100	0.1181	100	7410	1961-1990
Genevadsån (99)	225	Sweden	225	100	0.0046	100	350	1961-1990
Fylleån (100)	359	Sweden	359	100	0.0092	100	650	1961-1990
Nissan (101)	2682	Sweden	2682	100	0.0834	100	3690	1961-1990
Suseån (102)	441	Sweden	441	100	0.0074	100	640	1961-1990
Ätran (103)	3343	Sweden	3343	100	0.0657	100	5070	1961-1990
Himleån (104)	214	Sweden	214	100	0.0127	100	330	1961-1990
Viskan (105)	2201	Sweden	2201	100	0.1236	100	2760	1961-1990
Rolfsån (106)	723	Sweden	723	100	0.0281	100	1030	1961-1990
Kungsbackaån (107)	310	Sweden	310	100	0.0404	100	410	1961-1990
Göta älv (108)	50230	Sweden	42780.00	85.20	0.8776	ni	50530	1961-1990
		Norway	7450.00	14.80	ni	ni		
	69844	**=Total of Swedish rivers discharging to the Kattegat**						
Bäveån (109)	302	Sweden	302	100	0.0226	100	350	1961-1990
Örekilsälven (110)	1327	Sweden	1327	100	0.0138	100	2050	1961-1990
Strömsån (111)	253	Sweden	253	100	0.0056	100	390	1961-1990
Enningsdalsälven (112)	704	Sweden	704	100	0.0029	100	1360	1961-1990
	2586	**=Total of Swedish rivers discharging to the Skagerrak**						
Statistical Information provided by the United Kingdom:								
Ness (SC2b)	NI	-	-	-	NI	-	7 600	NI
Conon (SC2b)	NI	-	-	-	NI	-	NI	NI
Baeuly (SC2b)	NI	-	-	-	NI	-	NI	NI
Findhorn (SC2b)	NI	-	-	-	NI	-	NI	NI
Shin (SC2b)	NI	-	-	-	NI	-	NI	NI
Helmsdale (SC2b)	NI	-	-	-	NI	-	NI	NI
Naver (SC2b)	NI	-	-	-	NI	-	NI	NI
Thurso (SC2b)	NI	-	-	-	NI	-	NI	NI
Brora (SC2b)	NI	-	-	-	NI	-	NI	NI
Oykel (SC2b)	NI	-	-	-	NI	-	NI	NI
Nairn (SC2b)	NI	-	-	-	NI	-	NI	NI
Carron (Sutherland) (SC2	NI	-	-	-	NI	-	NI	NI
Wick (SC2b)	NI	-	-	-	NI	-	NI	NI
Halladale (SC2b)	NI	-	-	-	NI	-	NI	NI
Hope (SC2b)	NI	-	-	-	NI	-	NI	NI
Alness (SC2b)	NI	-	-	-	NI	-	NI	NI
Cassley (SC2b)	NI	-	-	-	NI	-	NI	NI
Fleet (SC2b)	NI	-	-	-	NI	-	NI	NI
Berriedale Water (Sc2b)	NI	-	-	-	NI	-	NI	NI
Borgie (SC2b)	NI	-	-	-	NI	-	NI	NI
Forss Water (SC2b)	NI	-	-	-	NI	-	NI	NI
Loch of Stenness (SC2b)	NI	-	-	-	NI	-	NI	NI
Glass (SC2b)	NI	-	-	-	NI	-	NI	NI
Strathy (Sc2b)	NI	-	-	-	NI	-	NI	NI
Mickle Burn (SC2b)	NI	-	-	-	NI	-	NI	NI
Dunbeath Water (SC2b)	NI	-	-	-	NI	-	NI	NI
Spey (SC3)	NI	-	-	-	NI	-	5 600	NI

UK Cont.

River	Catchment area	Countries	Share in catchment area		Population (1990)		LTA*	LTA-period
	[km2]		[km2]	[%]	[10E6]	[%]	[1000 m3/d]	[a]
Dee (Grampian) (SC3)	NI	-	-	-	NI	-	NI	NI
Don (SC3)	NI	-	-	-	NI	-	NI	NI
Deveron (SC3)	NI	-	-	-	NI	-	NI	NI
Ythan (SC3)	NI	-	-	-	NI	-	NI	NI
Ugie (SC3)	NI	-	-	-	NI	-	NI	NI
Bervie Water (SC3)	NI	-	-	-	NI	-	NI	NI
Lossie (SC3)	NI	-	-	-	NI	-	NI	NI
Tay (SC4)	NI	-	-	-	NI	-	14 000	NI
Earn (SC4)	NI	-	-	-	NI	-	NI	NI
North Esk (Tayside) (SC4	NI	-	-	-	NI	-	NI	NI
South Esk (Tayside) (SC4	NI	-	-	-	NI	-	NI	NI
Eden SC4)	NI	-	-	-	NI	-	NI	NI
Lunan Water (SC4)	NI	-	-	-	NI	-	NI	NI
Dighty Water (SC4)	NI	-	-	-	NI	-	NI	NI
Tweed (SC5)	NI	-	-	-	NI	-	NI	NI
Forth (SC5)	NI	-	-	-	NI	-	4 300	NI
Whiteadder Water (SC5)	NI	-	-	-	NI	-	NI	NI
Leven (Fife) (SC5)	NI	-	-	-	NI	-	NI	NI
Almond (SC5)	NI	-	-	-	NI	-	NI	NI
Esk (Lothian) (SC5)	NI	-	-	-	NI	-	NI	NI
Tyne (SC5)	NI	-	-	-	NI	-	3 900	NI
Allan Water (SC5)	NI	-	-	-	NI	-	NI	NI
Devon (SC5)	NI	-	-	-	NI	-	NI	NI
Carron (Falkirk) (SC5)	NI	-	-	-	NI	-	NI	NI
Avon (SC5)	NI	-	-	-	NI	-	NI	NI
Eye Water (SC5)	NI	-	-	-	NI	-	NI	NI
Water of Leith (SC5)	NI	-	-	-	NI	-	NI	NI
Tweed (E1)	NI	-	-	-	NI	-	NI	NI
Coquet (E1)	NI	-	-	-	NI	-	NI	NI
Wansbeck (E1)	NI	-	-	-	NI	-	NI	NI
Blyth (E1)	NI	-	-	-	NI	-	NI	NI
Tyne (E2)	NI	-	-	-	NI	-	NI	NI
Derwent (E2)	NI	-	-	-	NI	-	NI	NI
Team (E2)	NI	-	-	-	NI	-	NI	NI
Wear (E3)	NI	-	-	-	NI	-	NI	NI
Skerne (E5)	NI	-	-	-	NI	-	NI	NI
Tees (E5)	NI	-	-	-	NI	-	NI	NI
Tot.N.Sea (N) catch.	50000						89300	1960 to 1990
Aire (E8)	NI	-	-	-	NI	-	NI	NI
Derwent (E8)	NI	-	-	-	NI	-	NI	NI
Don (E8)	NI	-	-	-	NI	-	NI	NI
Ouse (E8)	NI	-	-	-	NI	-	NI	NI
Wharfe (E8)	NI	-	-	-	NI	-	NI	NI
Ancholme (E8)	NI	-	-	-	NI	-	NI	NI
Trent (E8)	NI	-	-	-	NI	-	7800	NI
Idle (E8)	NI	-	-	-	NI	-	NI	NI
Welland (E9)	NI	-	-	-	NI	-	NI	NI
Nene (E9)	NI	-	-	-	NI	-	NI	NI
Ouse (E9)	NI	-	-	-	NI	-	NI	NI
Witham (E9)	NI	-	-	-	NI	-	NI	NI
Glan (E9)	NI	-	-	-	NI	-	NI	NI
Hundred Foot River (E9)	NI	-	-	-	NI	-	NI	NI
Ten Mile River (E9)	NI	-	-	-	NI	-	NI	NI
Bure (E10)	NI	-	-	-	NI	-	NI	NI
Wensum (E10)	NI	-	-	-	NI	-	NI	NI
Stour (E10)	NI	-	-	-	NI	-	NI	NI
Gipping (E10)	NI	-	-	-	NI	-	NI	NI
Waveney (E10)	NI	-	-	-	NI	-	NI	NI
Yare (E10)	NI	-	-	-	NI	-	NI	NI
Colne (E11)	NI	-	-	-	NI	-	NI	NI
Chalmer (E11)	NI	-	-	-	NI	-	NI	NI
Blackwater (E11)	NI	-	-	-	NI	-	NI	NI
Thames (E12)	NI	-	-	-	NI	-	6700	NI

UK Cont.

Beam (E12)	NI	-	-	-	NI	-	NI	NI
Beverley Brook (E12)	NI	-	-	-	NI	-	NI	NI
Brent (E12)	NI	-	-	-	NI	-	NI	NI
Crane (E12)	NI	-	-	-	NI	-	NI	NI
Ingrebourne (E12)	NI	-	-	-	NI	-	NI	NI
Lee (E12)	NI	-	-	-	NI	-	NI	NI
Ravensbourne (E12)	NI	-	-	-	NI	-	NI	NI
Roding (E12)	NI	-	-	-	NI	-	NI	NI
Wandle (E12)	NI	-	-	-	NI	-	NI	NI
Tot.N.Sea (S) catch.	62000						32300	1960 to 1990
Medway (E13)	NI	-	-	-	NI	-	NI	NI
Stour (E13)	NI	-	-	-	NI	-	1130	NI
Rother (E13)	NI	-	-	-	NI	-	NI	NI
Adur (E14)	NI	-	-	-	NI	-	NI	NI
Ouse (E14)	NI	-	-	-	NI	-	NI	NI
Cuckmere (E14)	NI	-	-	-	NI	-	NI	NI
Arun (E14)	NI	-	-	-	NI	-	NI	NI
Itchen (E15)	NI	-	-	-	NI	-	NI	NI
Test (E15)	NI	-	-	-	NI	-	NI	NI
Blackwater (E15)	NI	-	-	-	NI	-	NI	NI
Frome (E16)	NI	-	-	-	NI	-	NI	NI
Stour (E16)	NI	-	-	-	NI	-	NI	NI
Avon (E16)	NI	-	-	-	NI	-	1330	NI
Axe (E17)	NI	-	-	-	NI	-	NI	NI
Dart (E17)	NI	-	-	-	NI	-	NI	NI
Exe (E17)	NI	-	-	-	NI	-	1360	NI
Gara (E17)	NI	-	-	-	NI	-	NI	NI
Otter (E17)	NI	-	-	-	NI	-	NI	NI
Teign (E17)	NI	-	-	-	NI	-	NI	NI
Cober (E18)	NI	-	-	-	NI	-	NI	NI
Erme (E18)	NI	-	-	-	NI	-	NI	NI
Fal (E18)	NI	-	-	-	NI	-	NI	NI
Fowey (E18)	NI	-	-	-	NI	-	NI	NI
Gara (E18)	NI	-	-	-	NI	-	NI	NI
Lynher (E18)	NI	-	-	-	NI	-	NI	NI
Par (E18)	NI	-	-	-	NI	-	NI	NI
Plym (E18)	NI	-	-	-	NI	-	NI	NI
Porthleven (E18)	NI	-	-	-	NI	-	NI	NI
St Austel (E18)	NI	-	-	-	NI	-	NI	NI
Tavy (E18)	NI	-	-	-	NI	-	NI	NI
Tamar (E18)	NI	-	-	-	NI	-	1940	NI
Tot.Channel catch.	22000						16500	1960-1990
Camel (E19)	NI	-	-	-	NI	-	NI	NI
Hayle (E19)	NI	-	-	-	NI	-	NI	NI
Menalhyl (E19)	NI	-	-	-	NI	-	NI	NI
Red River (E19)	NI	-	-	-	NI	-	NI	NI
Taw (Yeo) (E19)	NI	-	-	-	NI	-	NI	NI
Taw (2) (E20)	NI	-	-	-	NI	-	NI	NI
Torridge (E20)	NI	-	-	-	NI	-	NI	NI
Parrett (E21)	NI	-	-	-	NI	-	NI	NI
Tone (E21)	NI	-	-	-	NI	-	NI	NI
Bristol Avon (E22)	NI	-	-	-	NI	-	NI	NI
Severn (2) (E22)	NI	-	-	-	NI	-	9100	NI
Wye (E23)	NI	-	-	-	NI	-	6200	NI
Usk (E23)	NI	-	-	-	NI	-	NI	NI
Rhymney (E23)	NI	-	-	-	NI	-	NI	NI
Ely (E23)	NI	-	-	-	NI	-	NI	NI
Afon Lwyd (E23)	NI	-	-	-	NI	-	NI	NI
Ebbw Fawr (E23)	NI	-	-	-	NI	-	NI	NI
Taff (E23)	NI	-	-	-	NI	-	NI	NI
Cadoxton (E24)	NI	-	-	-	NI	-	NI	NI
Neath (E24)	NI	-	-	-	NI	-	NI	NI
Ogmore (E24)	NI	-	-	-	NI	-	NI	NI
Thaw (E24)	NI	-	-	-	NI	-	NI	NI
Tawe (E24)	NI	-	-	-	NI	-	NI	NI
Ewenny (E24)	NI	-	-	-	NI	-	NI	NI
Nant Y Fendrod (E24)	NI	-	-	-	NI	-	NI	NI
Thaw Kenson (E24)	NI	-	-	-	NI	-	NI	NI
Dafen (E25)	NI	-	-	-	NI	-	NI	NI

UK Cont.

W Cleddau (E25)	NI	-	-	-	NI	-	NI	NI
Tywi (E25)	NI	-	-	-	NI	-	3700	NI
Taf (E25)	NI	-	-	-	NI	-	NI	NI
Loughor (E25)	NI	-	-	-	NI	-	NI	NI
Tot.Celtic S. catch.	32000						36400	1960-1990
Teifi (E26)	NI	-	-	-	NI	-	NI	NI
Ystwyth (E26)	NI	-	-	-	NI	-	NI	NI
Rheidol (E26)	NI	-	-	-	NI	-	NI	NI
Mawddach (E26)	NI	-	-	-	NI	-	NI	NI
Dyfi (E26)	NI	-	-	-	NI	-	NI	NI
Glaslyn (E26)	NI	-	-	-	NI	-	NI	NI
Afon Goch (2) (E27)	NI	-	-	-	NI	-	NI	NI
Clwyd (E27)	NI	-	-	-	NI	-	NI	NI
Cefni (E27)	NI	-	-	-	NI	-	NI	NI
Conwy (E27)	NI	-	-	-	NI	-	NI	NI
Dee (E27)	NI	-	-	-	NI	-	3020	NI
Nant Glywdyr (E27)	NI	-	-	-	NI	-	NI	NI
Alt (E28)	NI	-	-	-	NI	-	NI	NI
Mersey (E28)	NI	-	-	-	NI	-	3540	NI
Weaver (E28)	NI	-	-	-	NI	-	NI	NI
Darwen (E29)	NI	-	-	-	NI	-	NI	NI
Douglas (E29)	NI	-	-	-	NI	-	NI	NI
Ribble (E29)	NI	-	-	-	NI	-	NI	NI
Kent (E29)	NI	-	-	-	NI	-	NI	NI
Lune (E29)	NI	-	-	-	NI	-	3020	NI
Wyre (E29)	NI	-	-	-	NI	-	NI	NI
Leven (E29)	NI	-	-	-	NI	-	NI	NI
Derwent (E30)	NI	-	-	-	NI	-	NI	NI
Eden (E30)	NI	-	-	-	NI	-	4320	NI
Nith (SC1)	NI	-	-	-	NI	-	NI	NI
Annan (SC1)	NI	-	-	-	NI	-	NI	NI
Dee (Solway) (SC1)	NI	-	-	-	NI	-	NI	NI
Esk (Solway) (SC1)	NI	-	-	-	NI	-	NI	NI
Cree (SC1)	NI	-	-	-	NI	-	NI	NI
Bladnoch (SC1)	NI	-	-	-	NI	-	NI	NI
Water of Luce (SC1)	NI	-	-	-	NI	-	NI	NI
Urr Water (SC1)	NI	-	-	-	NI	-	NI	NI
Lochar Water (SC1)	NI	-	-	-	NI	-	NI	NI
Newry (NI2)	NI				NI	-	NI	NI
Quoile (NI2)	NI				NI	-	NI	NI
Lagan (NI2)	NI				NI	-	NI	NI
Tot.Irish Sea catch.	35000						48400	1960-1990
Clyde (SC2)	NI	-	-	-	NI	-	4 000	NI
Awe (SC2)	NI	-	-	-	NI	-	NI	NI
Leven (Loch Lomond (SC	NI	-	-	-	NI	-	NI	NI
Ayr (SC2)	NI	-	-	-	NI	-	NI	NI
Irvine (SC2)	NI	-	-	-	NI	-	NI	NI
Kelvin (SC2)	NI	-	-	-	NI	-	NI	NI
Stinchar (SC2)	NI	-	-	-	NI	-	NI	NI
Doon (SC2)	NI	-	-	-	NI	-	NI	NI
Water of Girvan (SC2)	NI	-	-	-	NI	-	NI	NI
White Cart Water (SC2)	NI	-	-	-	NI	-	NI	NI
Garnock (SC2)	NI	-	-	-	NI	-	NI	NI

UK cont.

Etive (SC2)	NI	-	-	-	NI	-	NI	NI
Eachaig (SC2)	NI	-	-	-	NI	-	NI	NI
Black Cart Water (SC2)	NI	-	-	-	NI	-	NI	NI
Gryfe (SC2)	NI	-	-	-	NI	-	NI	NI
Add (SC2)	NI	-	-	-	NI	-	NI	NI
Lochy (SC2a)	NI	-	-	-	NI	-	5 400	NI
Ewe (SC2a)	NI	-	-	-	NI	-	NI	NI
Shiel (SC2a)	NI	-	-	-	NI	-	NI	NI
Leven (Lochaber) (SC2a)	NI	-	-	-	NI	-	NI	NI
Morar (SC2a)	NI	-	-	-	NI	-	NI	NI
Inver (SC2a)	NI	-	-	-	NI	-	NI	NI
Carron (Wester Ross (SC	NI	-	-	-	NI	-	NI	NI
Gruinard (SC2a)	NI	-	-	-	NI	-	NI	NI
Broom (SC2a)	NI	-	-	-	NI	-	NI	NI
Kirkaig (SC2a)	NI	-	-	-	NI	-	NI	NI
Ling (SC2a)	NI	-	-	-	NI	-	NI	NI
Laxford (SC2a)	NI	-	-	-	NI	-	NI	NI
Abhainn Ghriomarstaidh	NI	-	-	-	NI	-	NI	NI
Aline (SC2a)	NI	-	-	-	NI	-	NI	NI
Loch Linnhe (SC2a)	NI	-	-	-	NI	-	NI	NI
Bush (NI1)	NI				NI		NI	NI
Bann (NI1)	NI				NI		7900	NI
Roe (NI1)	NI				NI		NI	NI
Faughan (NI1)	NI				NI		NI	NI
Burn Dennet NI1	NI				NI		NI	NI
Mourne (NI1)	NI				NI		NI	NI
Finn (NI1)	NI				NI		NI	NI
Tot.Atlantic catchm.	42000						49700	1960-1990

***) LTA = Long-term average**

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