EEA/ADS/06/001 – Water

European Environment Agency
European Topic Centre on Water

Comparison of NiD/WFD/SoE Nitrate Reporting

EEA – ETC/Water Technical report

Version: 1.3
Date: 16.11.2010
EEA activity: 1.4.1
ETC/Water Task: 1.4.1.1, activity 3

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Version History

Version	Date	Author	Status and description	Distribution
1.0	17.09.2010	HPR,SSE	First draft for EEA and DG ENV	CIRCA, COM, BNJ, RCO
1.1	22.09.10	HPR	2nd draft for EEA and DG ENV (adaptation of comments)	CIRCA, COM, BNJ, RCO
1.2	15.11.10	HPR	3rd draft for EEA and DG ENV (adaptation of comments), editing, English check	CIRCA, COM, BNJ, RCO
1.3	16.11.10	AKU	Updated 3rd draft following EEA comments	CIRCA

Contents

Abbreviations used

NiD	Nitrates Directive
SoE	State of Environment (Eionet)
WFD	Water Framework Directive
CDR	Central Data Repository
ETC/Water	European Topic Centre on Water
TCM	Transitional Coastal and Marine Waters
GIS	Geographical Information System
GWBs	Groundwater bodies
RBD	River Basin District

1. Introduction

- If Member States would like to "report once - use many times", then streamlining of environmental data reporting is needed. Nitrate concentrations in water are being reported under three reporting obligations: the Nitrate Directive (NiD) reporting, State of Environment (SoE) reporting and Water Framework Directive (WFD) reporting. In order to develop a proposal for streamlining of these three reporting obligations (or at least identify potential synergies), the similarities and differences of the three reporting obligations have been compared by ETC Water during the last 3 years. This report summarises the results and main findings and provides recommendations for potential streamlining. It provides a background for further discussions.

- Two main outputs were prepared in 2008 and 2009 by ETC/Water: a) A comparison of the Nitrate Directive, State of Environment and Water Framework Directive reporting with respect to nitrate water quality. b) A comparison of monitoring sites across the three reporting streams.

- The main conclusions were: 1.) Reporting requirements differ in data aggregation and 2.) Monitoring networks for SoE, NiD and WFD vary significantly in their degree of overlap (from 10 to 100 %). Precise quantification of the overlap was not possible in many countries due to site ID issues.

- The results were presented to countries at the Eionet workshop in the autumn of 2009. A DG Environment consultant report with a similar focus was produced at the same time.

- This 3rd 2010 ETC/Water report summarises the 2008 and 2009 outputs in chapter 2 and adds in chapter 3 a comparison of monitoring sites that includes newly reported WFD and SoE monitoring sites. In chapter 4, the WFD chemical status of groundwater (and surface water) based on nitrates is compared with NO3 thresholds based on NiD and SoE data within pilot River Basin Districts. Chapter 5 draws conclusions and streamlining possibilities are outlined in chapter 6.

2. Comparison of monitoring sites of Nitrates Directive, State of Environment and Water Framework Directive datasets

ETC Water has prepared in 2008/2009 a detailed comparison of monitoring sites reported under the Nitrates Directive, SoE – Eionet and Water Framework Directive. The comparison provides a first step towards a potential future streamlining of reporting with respect to nitrate data.

The entire work focused on a comparison of monitoring stations of rivers, lakes, groundwater and TCM waters for existing (NiD and Eionet-SoE) or expected (WFD, Art. 8) data for **Nitrates** (or $N\text{-}NO_3$).

There were three different sources of nitrate data:

1. Eionet (SoE) monitoring data
2. Nitrates Directive reporting and
3. Water Framework Directive (Article 8) reporting.

While Eionet and Nitrate Directive data are reported after measurement (station information with nutrient concentrations), WFD Article 8 reporting was focused on planned monitoring (station information without nutrient concentration data and before measurement).

Available datasets:

- Water Framework Directive Art. 8 data was obtained from the database http://eea.eionet.europa.eu/Members/irc/eionet-circle/eionet-telematics/library?l=/art8products/20090219&vm=detailed&sb=Title .
- Eionet (SoE) data for rivers, lakes and TCM was used from Waterbase (version 9 for rivers and lakes, version 6 for TCM) and groundwater from working database (status April 2009).

Links: GW http://eea.eionet.europa.eu/Members/irc/eionet-circle/etcwater/library?l=/subvention_2009/activities_2009/151_wise_centre/1512_directives/1512_directives/directive_integration

SW Waterbase_lakes_v9_mdb_selection.zip, Waterbase_rivers_v9__mdb_selection.zip

TCM http://eea.eionet.europa.eu/Members/irc/eionet-circle/etcwater/library?l=/subvention_2009/activities_2009/151_wise_centre/1512_directives/1512_directives/directive_integration /

- Nitrate Directive data was used from file: NiD_WQ_tabelsEU27_8juli.xls provided by DG ENV.

For the comparison it was possible to use all monitoring stations from Eionet and all or selected data from WFD and NiD. We used all data without preliminary selection. Nitrate Directive data is from the reporting period 2004 – 2007 and Eionet SoE data from the same period was used. Data regarding WFD monitoring programmes is officially from the end of 2006, but some of them were subsequently updated.

2.1. General method for comparison of stations

The comparison was performed for each country separately. A comparable time period was used for NiD data and SoE data (2004 – 2007).

The comparison of Nitrate Directive dataset with Eionet SoE and Water Framework Directive datasets was performed in the following steps:

1. Selection of stations with nitrate data from all datasets

2. GIS analysis of distance between NiDxSoE and NiDxWFD station positions
3. Database comparison of identifiers (ID) between NiDxSoE and NiDxWFD
4. Synthesis - comparison of GIS position and database (ID) results

Finally, an overview of content analysis of NiD, SoE and WFD nitrate data was prepared. It was focused on different type of data aggregation.

2.1.1. Spatial comparison of monitoring stations

GIS analysis was undertaken to enable a spatial comparison of monitoring stations. The aim was to identify 'identical' monitoring stations according to their geographical position. Station locations were compared between NiD and SoE databases and between NiD and WFD databases. Groundwater and different categories of surface water monitoring stations were analysed separately. The surface water databases were divided into river, lake and transitional, coastal and marine categories. Analyses were undertaken for each country separately.

The selected databases were used as a basis for creating GIS 'point' layers for station locations for each of the three databases (SoE, NiD and WFD) using the attributes "longitude" and "latitude". Once completed, these were 'joined' with data available on nitrate concentration, resulting in stations with no information on nitrate concentration being discarded from further analysis.

The data of SoE - TCM was held in two databases, EIONET and MEDPOL (ICES). Both databases were used for the GIS analyses.

For each GIS layer the tool "Buffer" was used which selects a zone around a map feature (in our case the point – monitoring station) based on distance. The radius of the Buffer was defined as 500 m from each monitoring station.

2.1.2. Attribute comparison of monitoring stations

Attribute analysis proceeded parallel to the spatial analysis. Each state and each water category (ground water, surface water rivers, surface water lakes and surface water – transitional, coastal, marine) was treated separately.

To get comparable results, relevant sites from all datasets had to be chosen. For SoE and NiD this meant that only stations with information on nitrate concentration were chosen. In the case of WFD, aggregated quality elements were used. The structure of WFD Art. 8 data allows relating of quality elements both to monitoring station and monitoring programme. Information relative to station was preferred. The WFD dataset also includes information flagging whether a site is also used for NiD reporting. Stations with this flag were added to the list of selected stations.

The following process was applied for selecting stations of interest:

<u>Selection of surface water monitoring sites from WFD dataset:</u>

1. Stations which were assigned by Member States as measuring Quality Elements QE3-1-6 or QE3-1 or QE3

2. For Member States which did not deliver information about QE in each station, programmes with the above mentioned QEs were selected and after that stations with these programmes were selected (DK,IT,IE,LV,PL)

3. columns 'inter_networks' and 'other_networks' were analyzed, but no station with NiD reporting, which was not selected before, was found

Selection of groundwater monitoring sites from WFD dataset:

1. Programmes with Quality Elements GE2 or GE2-4 were selected.

2. Stations with these programmes were selected

3. columns 'inter_networks' and 'other_networks' were analyzed, stations with NiD reporting, which was not selected before, were added to the list

After selection, monitoring stations with a matching identifier in SoE and NiD or in NiD and WFD datasets were searched for. Each of these three datasets gives more opportunities to identify a station. Initially the WFD codes, water base codes and national codes were compared manually. Then systematic error removal was done – mostly by using substrings of identifiers („20.11.01.01" = „DK20.11.01.01" etc.). At the end the combination of best results was used for ID comparison.

2.1.3. Synthesis of results and outputs

Results of the database analysis were compared with the results of the GIS analysis and divided according to their reliability. Monitoring stations with the same ID and positive GIS result are in the first category – '**best match**'. Monitoring stations with identical ID but with different localisation (or missing coordinates) are in the second category – '**moderate match**'. Sites with different ID and positive GIS results are in the third category – '**possible match**'. Results of the comparison between NiD and SoE datasets are displayed in detailed tables 1 – 4 for rivers, lakes, groundwater and transitional/coastal and marine waters.

The second and third columns of the detailed tables 1 - 4 show the number of preselected stations (stations with information on nitrate concentration) in each dataset, the fourth column contains the ratio of preselected (but not matching) NiD and SoE sites. The next four columns ('database analysis results') give results of the database comparison (common identifier or a relevant part of it) – according WFD code, SoE (Waterbase) code or national codes and, the final result as a combination of them. The next two columns ('GIS analysis results') show the results of the GIS analysis – number of sites with positive results (closer than 500 m). The last two columns ('GIS and DB comparison') illustrate the 'best results' for both datasets – number of station from Nitrate Directive in this category and the proportion of positive results on the NiD dataset.

The similar results for the comparison between NiD and WFD are presented in the tables 5 - 8.

Detailed maps with monitoring stations were produced separately for each country together with accompanying notes. Individual files per country are publically available at:

http://eea.eionet.europa.eu/Public/irc/eionet-circle/water/library?l=/copenhagen_freshwater_3/comparison_directive&vm=detailed&sb=Title

Legend to the tables 1 - 8:

4,2	< 25 % of matching stations
35,7	≥ 25 % and < 50 % of matching stations
61,1	≥ 50 % and < 75 % of matching stations
81,9	≥ 75 % of matching stations

	around the same number of sites
	significantly less WFD sites
	significantly less NiD sites

Tab.1: Detailed table of comparison NiD x SoE– Surface Water Rivers

Country	Number of sites			Database analysis results				GIS analysis results		GIS and DB comparison	
	NiD	SoE	Ratio NiDxSoE	WFD code	Waterbase code	national code	result	NiD_SoE	SoE_NiD	NiDxSoE - number of common sites	NiD - % of common sites
AT	271	290	0,93	72	0	0	249	228	225	225	83
BE	1142	63	18,13	0	0	0	4	28	26	4	0
BG	102	111	0,92	0	0	0	0	14	13	0	0
CY	10	23	0,43	1	0	0	4	4	4	4	40
CZ	940	73	12,88	44	0	64	64	53	2	50	5
DE	151	151	1,00	79	0	151	151	151	151	151	100
DK	127	42	3,02	0	0	28	28	27	27	27	21
EE	10	60	0,17	6	4	9	9	10	10	9	90
ES	2070	939	2,20	0	0	0	627	3	3	1	0
FI	84	227	0,37	19	23	0	30	30	30	30	36
FR	1744	1621	1,08	0	0	689	689	657	661	588	34
GR	81	14	5,79	0	0	0	0	77	87	0	0
HU	419	154	2,72	0	0	55	55	98	94	30	7
IE	148	153	0,97	0	0	124	124	148	150	124	84
IT	1855	1380	1,34	0	0	0	0	945	734	0	0
LT	53	99	0,54	51	0	53	53	53	55	53	100
LU	16	4	4,00	0	0	3	3	2	2	2	13
LV	170	117	1,45	0	0	58	58	78	86	58	34
MT	3	0									
NL	193	11	17,55	0	0	7	7	16	40	6	3
PL	3351	136	24,64	0	0	0	0	141	131	0	0
PT	71	56	1,27	0	0	13	13	14	14	13	18
RO	831	126	6,60	0	0	0	103	67	56	50	6
SE	193	126	1,53	0	0	0	0	114	118	0	0
SI	106	30	3,53	27	0	27	27	25	25	26	25
SK	224	90	2,49	39	0	89	89	93	91	86	38
UK	7915	204	38,80	0	0	0	169	216	174	140	2

Tab.2: Detailed table of comparison NiD x SoE– Surface Water Lakes

Country	Number of sites			Database analysis results				GIS analysis results		GIS and DB comparison	
	NiD	SoE	Ratio NiDxSoE	WFD code	Waterbase code	national code	result	NiD_SoE	SoE_NiD	NiDxSoE - number of common sites	NiD - % of common sites
AT	26	37	0,70	0	0	0	26	25	18	25	96
BE	12	5	2,40	0	0	0	0	0	0	0	0
BG	7	16	0,44	0	0	0	1	2	3	0	0
CY	0	9									
CZ	0	0									
DE	20	20	1,00	0	0	0	20	20	20	20	100
DK	93	20	4,65	0	0	0	0	0	0	0	0
EE	0	17									
ES	474	0									
FI	63	243	0,26	2	24	0	24	24	24	24	38
FR	2	0									
GR	26	0									
HU	116	23	5,04	0	0	0	6	14	12	0	0
IE	69	94	0,73	0	0	0	68	60	60	59	86
IT	256	298	0,86	0	0	0	0	87	78	0	0
LT	7	28	0,25	0	0	0	0	50	51	0	0
LU	0	0									
LV	155	41	3,78	0	0	0	21	29	33	19	12
MT	4	2	2,00	0	0	0	2	3	2	2	50
NL	309	6	51,50	0	0	0	5	2	0	0	0
PL	46	46	1,00	0	0	0	0	9	14	0	0
PT	56	30	1,87	21	0	0	21	22	22	21	38
RO	409	16	25,56	0	0	0	0	3	5	0	0
SE	1992	192	10,38	0	0	0	74	24	20	4	0
SI	11	11	1,00	5	0	0	5	6	6	2	18
SK	0	0									
GB	73	102	0,72	0	0	0	0	8	37	0	0

Tab.3: Detailed table of comparison NiD x SoE– Groundwater

Country	Number of sites			Database analysis results				GIS analysis results		GIS and DB comparison	
	NiD	SoE	Ratio NiDxSoE	WFD code	Waterbase code	national code	result	NiD_SoE	SoE_NiD	NiDxSoE - number of common sites	NiD - % of common sites
AT	368	567	0,65	4	2	5	5	5	5	5	1
BE	3020	165	18,30	108	108	0	108	120	111	108	4
BG	128	83	1,54	0	0	0	46	38	41	37	29
CY	222	222	1,00	0	122	0	141	0	0	0	0
CZ	408	463	0,88	406	0	406	406	406	441	406	100
DE	170	856	0,20	0	0	59	81	56	60	37	22
DK	1478	65	22,74	0	0	0	65				
EE	564	294	1,92	0	0	0	7	59	58	7	1
ES	4078	251	16,25	0	0	152	152	258	240	152	4
FI	54	0									
FR	2664	1694	1,57	0	0	580	581	90	87	83	3
GR	415	303	1,37	0	0	0	181				
HU	1868	0									
IE	210	210	1,00	0	0	0	189	200	200	189	90
IT	5397	2741	1,97	0	0	0	0	1387	1037	0	0
LT	53	114	0,46	0	0	0	85	46	72	42	79
LU	20	0									
LV	164	192	0,85	0	0	0	105	163	188	105	64
MT	14	0									
NL	1244	0									
PL	1266	43	29,44	0	0	0	0	44	37	0	0
PT	494	320	1,54	210	0	211	211	0	319	211	43
RO	1371	0									
SE	163	22	7,41	0	0	22	22	22	22	22	13
SI	112	72	1,56	51	0	27	27	53	57	27	24
SK	560	466	1,20	14	0	188	188	220	192	188	34
UK	3061	5	612,20	0	0	0	0				

Tab.4: Detailed table of comparison NiD x SoE– TCM

Country	Number of sites			Database analysis results			GIS analysis results		GIS and DB comparison	
	NiD	SoE	Ratio NiDxSoE	Waterbase code	national code	result	NiD_SoE	SoE_NiD	NiDxSoE - number of common sites	NiD - % of common sites
AT	NR	NR	NR						NR	NR
BE	25	11	2,27	0	0	0	1	1	0	0
BG	6	28	0,21	0	0	6	14	6	0	0
CY	18	93	0,19	0	0	16	18	35	16	17
CZ	NR	NR	NR						NR	NR
DE	13	0								
DK	136	0								
EE	0	31								
ES	539	0								
FI	46	0								
FR	23	47	0,49	0	0	0	7	0	0	0
GR	11	81	0,14	0	0	0	10	0	0	0
HU	NR	NR	NR						NR	NR
IE	126	0								
IT	461	238	1,94	0	0	0	38	32	0	0
LT	19	20	0,95	0	14	14	13	13	10	50
LU	NR	NR	NR						NR	NR
LV	31	24	1,29	0	0	17	7	7	7	29
MT	29	120	0,24	0	27	27	27	81	26	22
NL	41	0								
PL	65	25	2,60	0	0	0	22	21	0	0
PT	42	0								
RO	60	72	0,83	0	0	7	11	7	1	1
SE	229	24	9,54	0	0	0	6	6	0	0
SI	5	0								
SK	NR	NR	NR						NR	NR
UK	841	0								

Tab.5: Detailed table of comparison NiD x WFD– Surface Water Rivers

Country	Number of sites			Database analysis results			GIS analysis results		GIS and DB comparison	
	NiD	WFD	Ratio NiDxWFD	national code	WFD code	result	NiDxWFD	WFDxNiD	NiDxWFD - number of common sites	NiD - % of common sites
AT	271	171	1,58	76	76	76	70	68	65	24
BE	1142	485	2,35	224	224	224	231	234	223	20
BG	102	338	0,30	20	0	93	91	100	91	89
CY	10	31	0,32	0	1	2	2	2	2	20
CZ	940	869	1,08	0	235	235	327	356	225	24
DE	151	3433	0,04	1	106	106	99	112	82	54
DK	127	748	0,17	125	0	125	126	129	124	98
EE	10	226	0,04	0	10	10	10	10	10	100
ES	2070	2995	0,69	1493	1493	1493	1483	1496	1394	67
FI	84	87	0,97	0	19	19	18	18	18	21
FR	1744	26	67,08	0	0	0	0	0	0	0
GR	81	0								
HU	419	13	32,23	0	0	0	2	2	0	0
IE	148	2762	0,05	148	0	148	148	174	148	100
IT	1855	4804	0,39	0	0	0	1653	1678	0	0
LT	53	1132	0,05	49	49	49	49	52	49	92
LU	16	17	0,94	15	0	15	13	13	12	75
LV	170	222	0,77	0	4	98	153	158	167	98
MT	3	0								
NL	193	131	1,47	0	0	11	62	63	11	6
PL	3351	0								
PT	71	617	0,12	0	26	26	27	28	26	37
RO	831	851	0,98	716	0	716	741	727	704	85
SE	193	463	0,42	0	0	0	122	126	0	0
SI	106	135	0,79	108	108	108	108	105	108	100
SK	224	260	0,86	68	67	68	61	60	57	25
UK	7915	4513	1,75	0	0	0	0	3264	0	0

Tab.6: Detailed table of comparison NiD x WFD– Surface Water Lakes

	Number of sites			Database analysis results			GIS analysis results		GIS and DB comparison	
	NiD	WFD	Ratio NiDxWFD	national code	WFD code	result	NiDxWFD	WFDxNiD	NiDxWFD - number of common sites	NiD - % of common sites
AT	26	33	0,79	0	0	0	26	26	0	0
BE	12	16	0,75	0	0	0	0	0	0	0
BG	7	303	0,02	1	0	1	5	5	0	0
CY	0	9								
CZ	0	76								
DE	20	432	0,05	0	0	0	0	0	0	0
DK	93	265	0,35	0	0	0	62	62	0	0
EE	0	96		0	0	0	0	0	0	
ES	474	477	0,99	289	288	289	310	311	284	60
FI	63	103	0,61	0	2	2	2	2	2	3
FR	2	0								
GR	26	0								
HU	116	10	11,60	0	0	0	2	2	0	0
IE	69	198	0,35	58	0	58	57	57	57	83
IT	256	714	0,36	0	0	0	165	220	0	0
LT	7	324	0,02	7	7	7	42	42	3	43
LU	0	0								
LV	155	269	0,58	0	0	149	148	150	147	95
MT	4	0								
NL	309	191	1,62	0	0	6	52	49	6	2
PL	46	0								
PT	56	76	0,74	0	29	29	29	29	29	52
RO	409	443	0,92	289	0	289	42	39	38	9
SE	1992	911	2,19	0	0	0	65	68	0	0
SI	11	14	0,79	11	11	11	11	11	11	100
SK	0	31								
GB	73	209	0,35	0	0	0	2	2	0	0

Tab.7: Detailed table of comparison NiD x WFD– Groundwater

	Number of sites			Database analysis results			GIS analysis results		GIS and DB comparison	
	NiD	WFD	Ratio NiDxWFD	national code	WFD code	result	NiDxWFD	WFDxNiD	NiDxWFD - number of common sites	NiD - % of common sites
AT	368	2012	0,18	246	246	246	258	258	244	66
BE	3020	506	5,97	277	271	277	328	315	274	9
BG	128	201	0,64	27	0	64	66	65	47	37
CY	222	153	1,45	0	0	0	58	109	0	0
CZ	408	462	0,88	405	405	405	407	441	405	99
DE	170	12930	0,01	63	0	63	78	91	11	6
DK	1478	857	1,72	0	0	0	1453	844	0	0
EE	564	248	2,27	0	0	0	48	40	0	0
ES	4078	3266	1,25	1190	2513	2513	2740	2604	2314	57
FI	54	275	0,20	0	44	44	44	44	16	30
FR	2664	2274	1,17	564	0	564	421	403	271	10
GR	415	0								
HU	1868	1742	1,07	0	410	410	1795	1586	405	22
IE	210	300	0,70	0	0	197	210	216	196	93
IT	5397	5705	0,95	0	0	0	4730	3545	0	0
LT	53	237	0,22	0	0	113	45	87	42	79
LU	20	31	0,65	0	0	13	13	14	13	65
LV	164	70	2,34	0	0	112	152	68	109	66
MT	14	0								
NL	1244	1102	1,13	0	0	0	495	460	0	0
PL	1266	0								
PT	494	520	0,95	0	356	356	493	493	356	72
RO	1371	2500	0,55	583	0	583	1230	1272	520	38
SE	163	115	1,42	0	0	0	35	33	0	0
SI	112	104	1,08	101	101	101	104	104	101	90
SK	560	543	1,03	0	265	265	305	270	177	32
UK	3061	3762	0,81	0	0	2543	2423	2494	2049	67

Tab.8: Detailed table of comparison NiD x WFD– TCM

	Number of sites			Database analysis results			GIS analysis results		GIS and DB comparison	
	NiD	WFD	Ratio NiDxWFD	national code	WFD code	result	NiDxWFD	WFDxNiD	NiDxWFD - number of common sites	NiD - % of common sites
AT	NR	NR	NR						NR	NR
BE	25	17	1,47	0	0	4	4	4	3	12
BG	6	13	0,46	6	0	6	6	6	6	100
CY	18	8	2,25	0	1	1	0	0	0	0
CZ	NR	NR	NR						NR	NR
DE	13	82	0,16	0	0	0	0	0	0	0
DK	136	51	2,67	3	0	3	0	0	0	0
EE	0	55								
ES	539	1898	0,28	194	194	194	302	488	188	35
FI	46	67	0,69	0	9	9	8	8	8	17
FR	23	4	5,75	0	0	1	1	1	1	4
GR	0	0								
HU	NR	NR	NR						NR	NR
IE	126	105	1,20	0	0	0	4	4	0	0
IT	461	2793	0,17	0	0	226	430	488	215	47
LT	19	0								
LU	NR	NR	NR						NR	NR
LV	31	65	0,48	0	30	30	23	23	23	74
MT	29	0								
NL	41	16	2,56	0	0	12	7	7	7	17
PL	65	0								
PT	42	54	0,78	0	4	4	7	8	4	10
RO	60	57	1,05	30	0	30	53	47	23	38
SE	229	162	1,41	0	0	0	33	34	0	0
SI	5	5	1,00	5	4	5	5	5	5	100
SK	NR	NR	NR						NR	NR
UK	841	445	1,89	0	0	0	81	97	0	0

2.1.4. Conclusions on comparison of monitoring sites NiD, SoE and WFD datasets

The best matching of monitoring sites were generally obtained for rivers and groundwater, however only 5 countries have more than 75 % of best matching river sites for NiDxSoE (AT, DE, EE, IE and LT), only 3 countries exceed 75% for lakes (AT, DE and IE) and for groundwater (CZ, IE, LT). 7 countries exceed 75% for NiDxWFD rivers, 3 countries for lakes and 4 countries for groundwater. Reasons for the low number of best matching monitoring stations are various but include: different monitoring networks for NiD, SoE and WFD, differences in the codes reported, mistakes or missing coordinates and a low number of sites reported for SoE. Code problems could be an issue in terms of future streamlining of reporting.

2.2. Conclusions on temporal and spatial aggregation scale of reporting for NiD and Eionet-SoE; frequency and observation period

The analysis focused on different types of spatial and temporal aggregation of NO_3 concentration data for Nitrates Directive and SoE reporting and frequency of sampling as well as observation period of Nitrates Directive, SoE reporting and WFD monitoring programmes.

The possibilities of future streamlining are determined by the different types of aggregation – spatial (aggregation of monitoring sites at water body level or sub-sites at one monitoring site) and temporal (aggregation of NO_3 results per year or observation period). While sub-sites aggregation is not so important, the other types of aggregation limit the use of data and future streamlining.

Spatial aggregation is applied for groundwater monitoring stations in the SoE database. Eight countries provided only data aggregated per groundwater body. A possible solution is to request only for spatially disaggregated data.

Temporal aggregation is applied for all data under the Nitrate Directive reporting. The reporting period is every 4th year but the time period actually reported differs per country – data can be aggregated over 2, 3 or 4 years, which makes any analysis unfeasible. A possible solution is to adapt the Guidance for reporting request annually aggregated data.

Streamlining of data reporting would require changes of reporting requirements.

2.3. Conclusions on reported parameters for eutrophication (Nitrate Directive)

Nitrate Directive reporting includes nitrates and as well eutrophication parameters for all surface water. Countries can choose an eutrophication determinand or parameters from code lists with 12 items.

Table 9: List of eutrophication parameters:

BOD5	Five-day Biochemical Oxygen Demand
BOD7	Seven-day Biochemical Oxygen Demand
Chl-a	Chlorophyll a
DIN	Dissolved Inorganic Nitrogen
DIP	Dissolved Inorganic Phosphorus
DO	Dissolved Oxygen
NO2	Nitrite
NO3	Nitrate
N-tot	Total Nitrogen
P-PO4	Orthophosphate
P-tot	Total phosphorus
Secchi depth	Secchi Depth Transparency
TRIX	Trophical index for marine systems

Chlorophyll-a, Dissolved Oxygen, Total Nitrogen, Orthophosphate and Total Phosphorus are the most frequently reported eutrophication parameters for all surface waters. Secchi Depth Transparency is frequently used for lakes, Nitrite for transitional and coastal water.

3. New comparison of monitoring sites of Nitrate Directive and State of Environment reporting based on updated datasets

The entire work focused on the updating of the comparison of monitoring sites of rivers, lakes and groundwater for existing (NiD and SoE) or expected (WFD, Art. 8) data for **Nitrates** (or $N\text{-}NO_3$).

There are two different sources of nitrate data:

1. Eionet (SoE) monitoring data reporting and
2. Nitrate Directive reporting.

In comparison to the analysis described in chapter 2, updated data sets were used for this analysis undertaken in 2010, which were SoE water quality data from the 2009 reporting and an updated version of the Nitrates Directive reporting dataset.

Available datasets:

- Eionet (SoE) data will be used from 2009 reporting - Waterbase for rivers and lakes and working database for groundwater:
    - rivers: http://www.eea.europa.eu/data-and-maps/data/waterbase-rivers-6
    - lakes: http://www.eea.europa.eu/data-and-maps/data/waterbase-lakes-6
    - groundwater: working database only (Waterbase groundwater includes only aggregated data per groundwater body)
- NiD database – updated database from 2009, as provided by DG ENV

3.1. Method for comparison of sites

The methodology is generally the same as in 2009 (see chapter 2). The specific features are described below.

NiD – SoE sites comparison methodology:

In the first step, the number of sites in new (2009) and old (2004 – 2007) datasets in both reportings was compared in order to determine which of the new data are actually new enough to enter the analysis. For every country, each water category - groundwater, surface water - rivers, surface water - lakes was treated separately. (Transitional, coastal and marine monitoring sites were not taken into account because of the low number of identical sites last year and small changes this year.) Where the number of newly reported sites exceeded the number of old ones by 10 % or more, these data entered into further comparison.

For several countries the number of SoE monitoring sites was smaller than the previous comparison due to the fact that monitoring sites with no NO_3 information were excluded. The comparison was then done only if the new number of monitoring sites was greater than 10%.

In the second step, the actual comparison of sites was carried out: for codes (IDs) from monitoring sites and by location as GIS analysis. The results were then joined in one table. In case the ID comparison showed much better results than the localisation (GIS) analysis, then a manual check of the sites with identical IDs was done.

The sites where both results come out positive were considered identical.

3.2. Results

There were found significant changes to monitoring sites for both NiD and SoE datasets.

Tables 10 – 12 show simple comparisons of number of sites per country in the updated dataset (2009) and in the previous dataset (2004-2007). Changes in number of sites exceeding 10% are highlighted (More than 10% of additional sites in the new data set are highlighted in orange, fewer than 10% of sites in the new datasets are in blue).

Tables 13 – 15 show the comparison of common monitoring sites for the 2009 analysis and for the current 2010 analysis only for those countries where the difference in the new and old datasets is more than 10% of sites. The last column in summary tables 13 – 15 shows also the trend – improvement, stabilisation or deterioration of the matching for all types of monitoring sites. Where the results seemed to be deteriorating (worse match), a detailed manual check of the data was done to confirm them.

European scale maps on the comparison of monitoring sites of NiD/SoE for groundwater, rivers and lakes are shown in Figures 1 – 3. As the density of monitoring sites is very high, some sites displayed in the bottom layers of the maps are barely visible (especially those SoE groundwater and river monitoring sites which could not be linked to their equivalents in the NiD database. Detailed maps with NiD, SoE and identical sites for newly compared countries were also prepared and are available in the country files[1].

[1] http://eea.eionet.europa.eu/Public/irc/eionet-circle/wwdr/library?l=/nitrate_directive&vm=detailed&sb=Title

Table 10: Number of groundwater monitoring sites

country	NID - number of sites		
	2009 dataset	2010 dataset	change (2010 - 2009)/2009
AT	368	368	0%
BE	3020	3020	0%
BG	128	128	0%
CY	222	222	0%
CZ	408	408	0%
DE	170	170	0%
DK	1478	1479	0%
EE	564	620	10%
ES	4078	4078	0%
FI	54	54	0%
FR	2664	2666	0%
GR	415	418	1%
HU	1868	1868	0%
IE	210	210	0%
IT	5397	5867	9%
LT	53	53	0%
LU	20	20	0%
LV	164	176	7%
MT	14	14	0%
NL	1244	1244	0%
PL	1266	1266	0%
PT	494	630	28%
RO	1371	1373	0%
SE	163	163	0%
SI	112	112	0%
SK	560	1775	217%
UK	3061	3061	0%

country	SoE - number of sites		
	2004 - 2007 dataset	2004 - 2007 + 2009 dataset	change (2009 - 2004/2007)
AT	567	663	17%
BE	165	165	0%
BG	79	124	57%
CY	222	278	25%
CZ	463	499	8%
DE	856	903	5%
DK	65	765	1077%
EE	294	304	3%
ES	251	251	0%
FI	aggregated only		0%
FR	1694	1957	16%
GR	303	303	0%
HU	no data	aggregated only	0%
IE	210	216	3%
IT	2741	2741	0%
LT	114	115	1%
LU	aggregated only		0%
LV	192	202	5%
MT	aggregated only		0%
NL	aggregated only		0%
PL	43	140	226%
PT	320	331	3%
RO	aggregated only		0%
SE	22	24	9%
SI	72	73	1%
SK	466	472	1%
UK	5	291	5720%

	Newly reported number of sites higher by 10% than previous dataset
	Newly reported number of sites lower by 10% than previous dataset
	No significant difference (> 10%) between number of sites in previous and new datasets

Note: Some countries provide spatially aggregated data only under SoE GW reporting

Table 11: Number of river monitoring sites

country	NID - number of sites		
	2009 dataset	2010 dataset	change (2010 - 2009)/2009
AT	271	271	0%
BE	1142	1142	0%
BG	102	102	0%
CY	10	10	0%
CZ	949	949	0%
DE	151	151	0%
DK	127	127	0%
EE	10	57	470%
ES	2070	2070	0%
FI	84	84	0%
FR	1744	1744	0%
GR	81	81	0%
HU	419	419	0%
IE	148	148	0%
IT	1855	1856	0%
LT	53	53	0%
LU	16	16	0%
LV	170	170	0%
MT	3	3	0%
NL	193	193	0%
PL	3351	3351	0%
PT	71	71	0%
RO	831	831	0%
SE	193	193	0%
SI	106	106	0%
SK	224	224	0%
UK	7915	7915	0%

country	SoE - number of sites		
	2004 - 2007 dataset	2004 - 2007 + 2009 dataset	change (2009 - 2004/2007)
AT	290	290	0%
BE	63	66	5%
BG	111	111	0%
CY	23	22	-4%
CZ	73	73	0%
DE	151	263	74%
DK	42	0	-100%
EE	60	60	0%
ES	939	2015	115%
FI	227	131	-42%
FR	1621	1824	13%
GR	14	85	507%
HU	154	150	-3%
IE	153	111	-27%
IT	1380	1193	-14%
LT	99	98	-1%
LU	4	4	0%
LV	117	117	0%
MT	no data	no data	
NL	11	31	182%
PL	136	136	0%
PT	56	54	-4%
RO	126	126	0%
SE	126	2	-98%
SI	30	30	0%
SK	90	122	36%
UK	204	206	1%

Newly reported number of sites higher by 10% than previous dataset

Newly reported number of sites lower by 10% than previous dataset

No significant difference (> 10%) between number of sites in previous and new datasets

Table 12: Number of lake monitoring sites

country	NID - number of sites		
	2009 dataset	2010 dataset	change (2010 - 2009)/2009
AT	26	26	0%
BE	12	12	0%
BG	7	7	0%
CY	no data	no data	
CZ	no data	no data	
DE	20	20	0%
DK	93	93	0%
EE	no data	13	100%
ES	474	474	0%
FI	63	63	0%
FR	2	2	0%
GR	26	26	0%
HU	116	116	0%
IE	69	73	6%
IT	256	256	0%
LT	7	55	686%
LU	no data	no data	
LV	155	155	0%
MT	4	4	0%
NL	309	309	0%
PL	46	46	0%
PT	56	56	0%
RO	409	410	0%
SE	1992	1992	0%
SI	11	11	0%
SK	no data	no data	
UK	73	73	0%

country	SoE - number of sites		
	2004 - 2007 dataset	2004 - 2007 + 2009 dataset	change (2009 - 2004/2007)
AT	37	25	-32%
BE	5	5	0%
BG	16	15	-6%
CY	9	9	0%
CZ	no data	no data	
DE	20	39	95%
DK	20	20	0%
EE	17	17	0%
ES	0	278	100%
FI	243	166	-32%
FR	no data	25	100%
GR	no data	no data	
HU	23	18	-22%
IE	94		-100%
IT	298	291	-2%
LT	28	29	4%
LU	no data	no data	
LV	41	44	7%
MT	2	2	0%
NL	6	22	267%
PL	46	47	2%
PT	30	30	0%
RO	16	16	0%
SE	192		-100%
SI	11	12	9%
SK	no data	20	100%
UK	102	150	47%

Newly reported number of sites higher by 10% than previous dataset

Newly reported number of sites lower by 10% than previous dataset

No significant difference (> 10%) between number of sites in previous and new datasets

Table 13: Comparison of common NiD/SoE groundwater monitoring sites

country	Number of common sites 2009 analysis			Number of common sites 2010 analysis			change of 2010 to 2009 analysis
	ID comparison	**GIS comparison**	**ID and GIS comparison**	**ID comparison**	**GIS comparison**	**ID and GIS comparison**	
AT	5	5	5	45	45	45	↑
BE	108	120	108				
BG	46	38	37	34	19	19	↓
CY	141	0	0	122	173	121	↑
CZ	406	406	406				
DE	81	101	81				
DK	65	0	0	65	4	0	→
EE	7	59	7	18	111	13	↑
ES	152	258	151	152	259	152	
FI	NA	NA	NA				
FR	581	90	83	648	330	198	↑
GR	181						
HU	NA	NA	NA				
IE	189	200	189				
IT	0	1387	0				
LT	45	46	43				
LU	NA	NA	NA				
LV	105	163	104				
MT	NA	NA	NA				
NL	NA	NA	NA				
PL	0	44	0	0	154	0	→
PT	211	0	0	326	328	322	
RO	NA	NA	NA				
SE	22	22	22				
SI	27	53	27				
SK	188	220	133	258	322	212	↑
UK	0	0	0	0	185	0	→

2010 compared countries

↑	improvement
→	stabilisation
↓	deterioration

Results of the comparison of common groundwater monitoring sites:

Most of the newly compared countries have an improvement in the number of identical monitoring sites with both positive results (Austria, Cyprus, Estonia, France and Slovakia). Results are the same for Denmark (problems with coordinates), Poland (probably different IDs) and the UK (probably different IDs).

Because Bulgarian coordinates of NiD monitoring sites were damaged during the process number of matching sites decreased.

Table 14: Comparison of common NiD/SoE river monitoring sites

country	Number of common sites 2009 analysis			Number of common sites 2010 analysis			change of 2010 to 2009 analysis
	ID comparison	**GIS comparison**	**ID and GIS comparison**	**ID comparison**	**GIS comparison**	**ID and GIS comparison**	
AT	249	228	225				
BE	4	31	4				
BG	0	14	0				
CY	4	4	4				
CZ	64	53	50				
DE	151	151	151	151	117	116	↓
DK	28	27	27				
EE	9	10	9	56	56	56	↑
ES	627	3	1	641	981	455	↑
FI	30	30	30				
FR	689	657	587	749	646	603	↑
GR	0	77	0	0	72		
HU	55	98	30				
IE	124	148	123				
IT	0	945	0				
LT	53	53	53				
LU	3	2	2				
LV	58	78	0				
MT	NA	NA	NA				
NL	7	16	6	10	21	10	↑
PL	0	141	0				
PT	13	14	13				
RO	103	67	50				↑
SE	0	114	0				
SI	27	25	26				
SK	89	93	86	95	92	87	→
UK	169	216	140				

2010 compared countries

↑	improvement
→	stabilisation
↓	deterioration

Results of the comparison of common river monitoring sites:

Most of the new compared countries have an improvement in the number of identical monitoring sites with both positive results (Estonia, Spain, France and The Netherlands). Results are the same for Slovakia.

Table 15: Comparison of common NiD/SoE lake monitoring sites

country	Number of common sites 2009 analysis			Number of common sites 2010 analysis			change of 2010 to 2009 analysis
	ID comparison	**GIS comparison**	**ID and GIS comparison**	**ID comparison**	**GIS comparison**	**ID and GIS comparison**	
AT	26	25	25				
BE	0	0	0				
BG	1	2	1				
CY	NA	NA	NA				
CZ	NA	NA	NA				
DE	20	20	20	20	20	18	→
DK	0	0	0				
EE	NA	NA	NA	13	12	12	↑
ES	NA	NA	NA	145	145	127	
FI	24	24	24				
FR	NA	NA	NA	0	0	0	→
GR	NA	NA	NA				
HU	6	14	2				
IE	68	60	59				
IT	0	87	0				
LT	0	50	0	0	28	0	→
LU	NA	NA	NA				
LV	21	29	19				
MT	2	3	2				
NL	5	2	0	10	16	10	↑
PL	0	9	0				
PT	21	22	21				
RO	0	9	0				
SE	74	24	4				
SI	5	6	2				
SK	NA	NA	NA	NA	NA	NA	→
UK	0	8	0	0	9	0	→

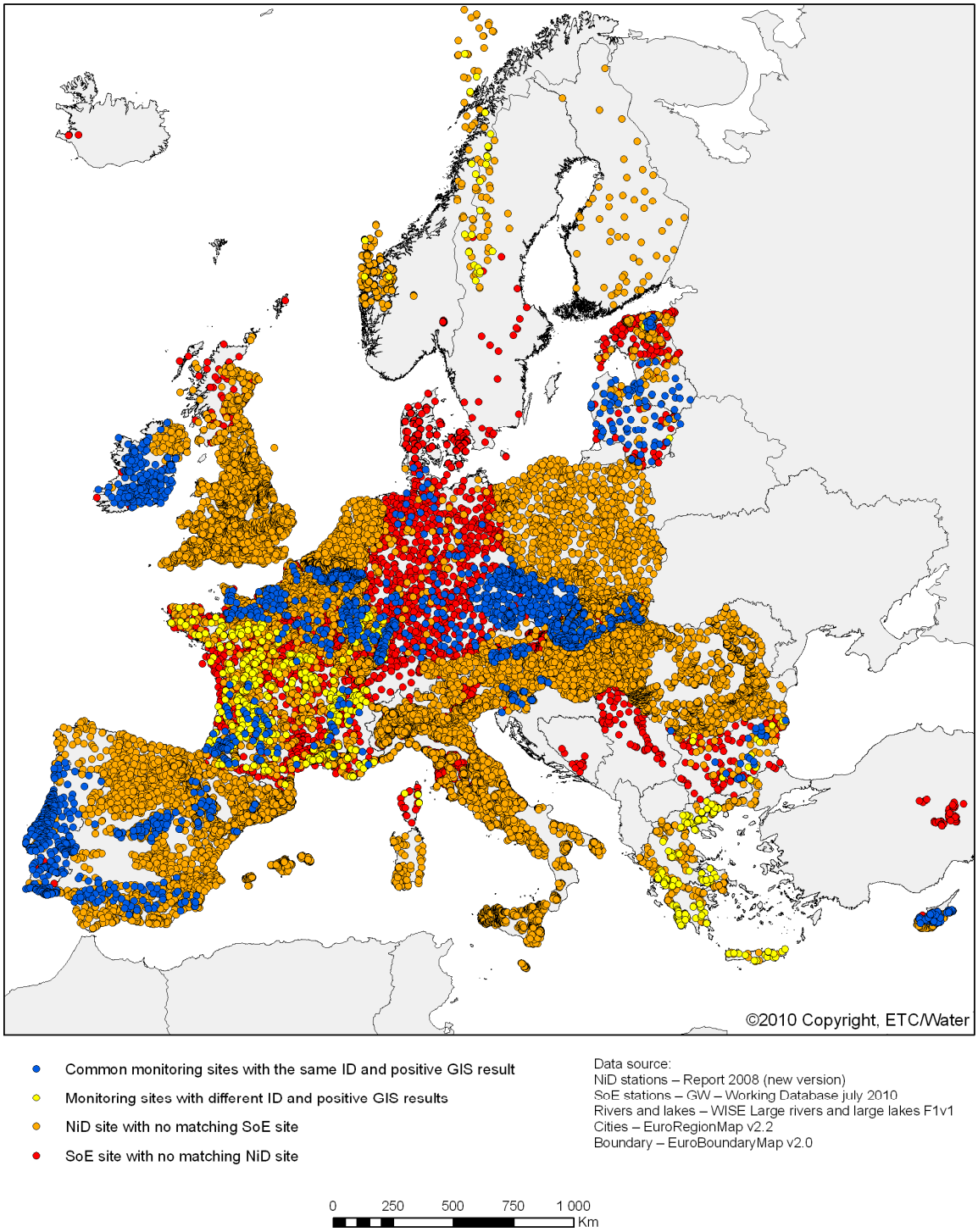
2010 compared countries

↑	improvement
→	stabilisation
↓	deterioration

Results of the comparison of common lake monitoring sites:

Two of the newly compared countries show an improvement in the number of identical monitoring sites with both positive results (Estonia and The Netherlands). Results are the same for Denmark (problems with coordinates), France, Lithuania and UK (probably different IDs). Slovakia could not be assessed because of lack of NiD data.

Figure 1: Comparison of common groundwater monitoring sites SoE and NiD



Note: Denmark and Sweden provided NiD data in different projection (not ETRS89).

Figure 2: Comparison of common river monitoring sites SoE and NiD

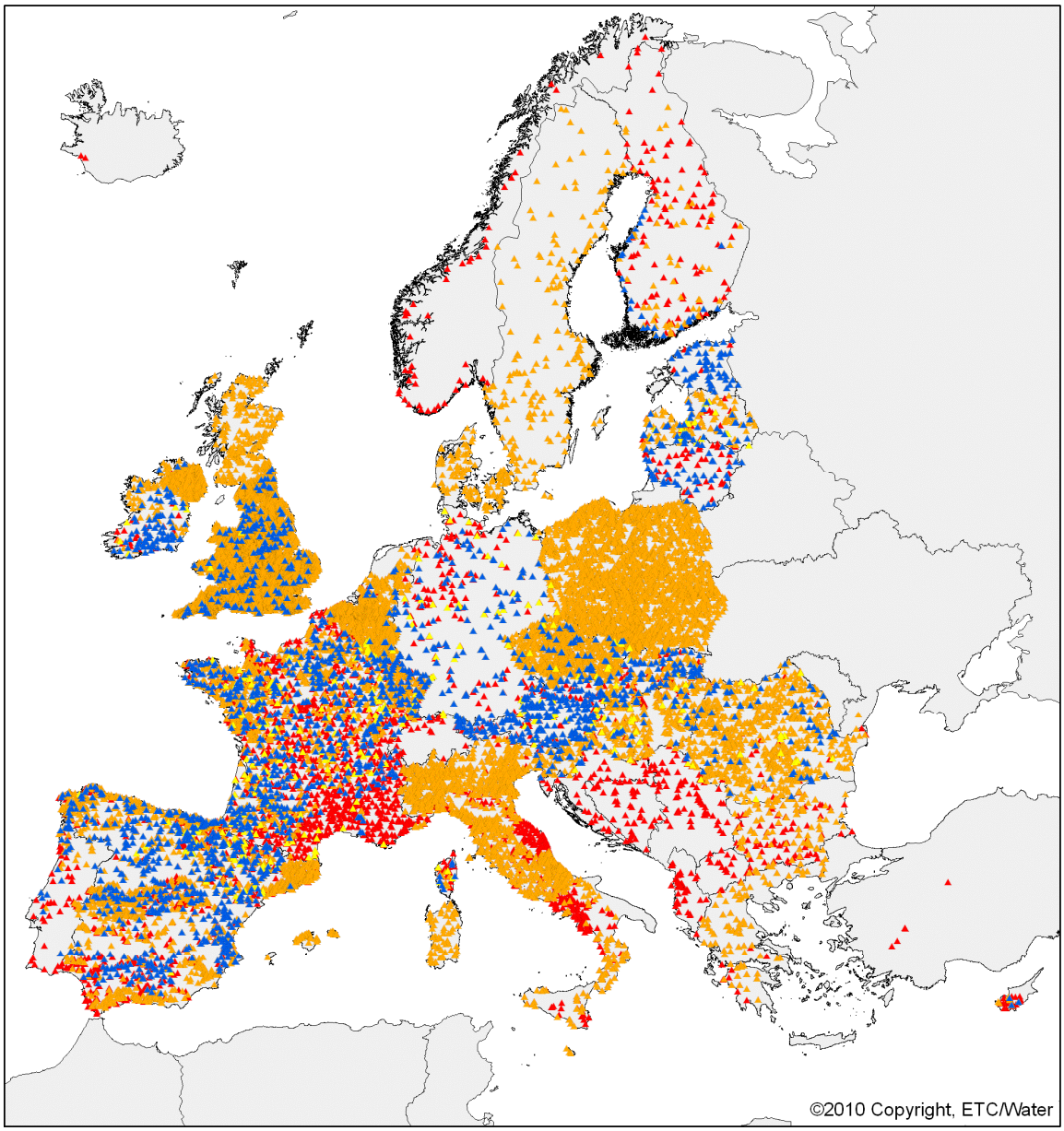
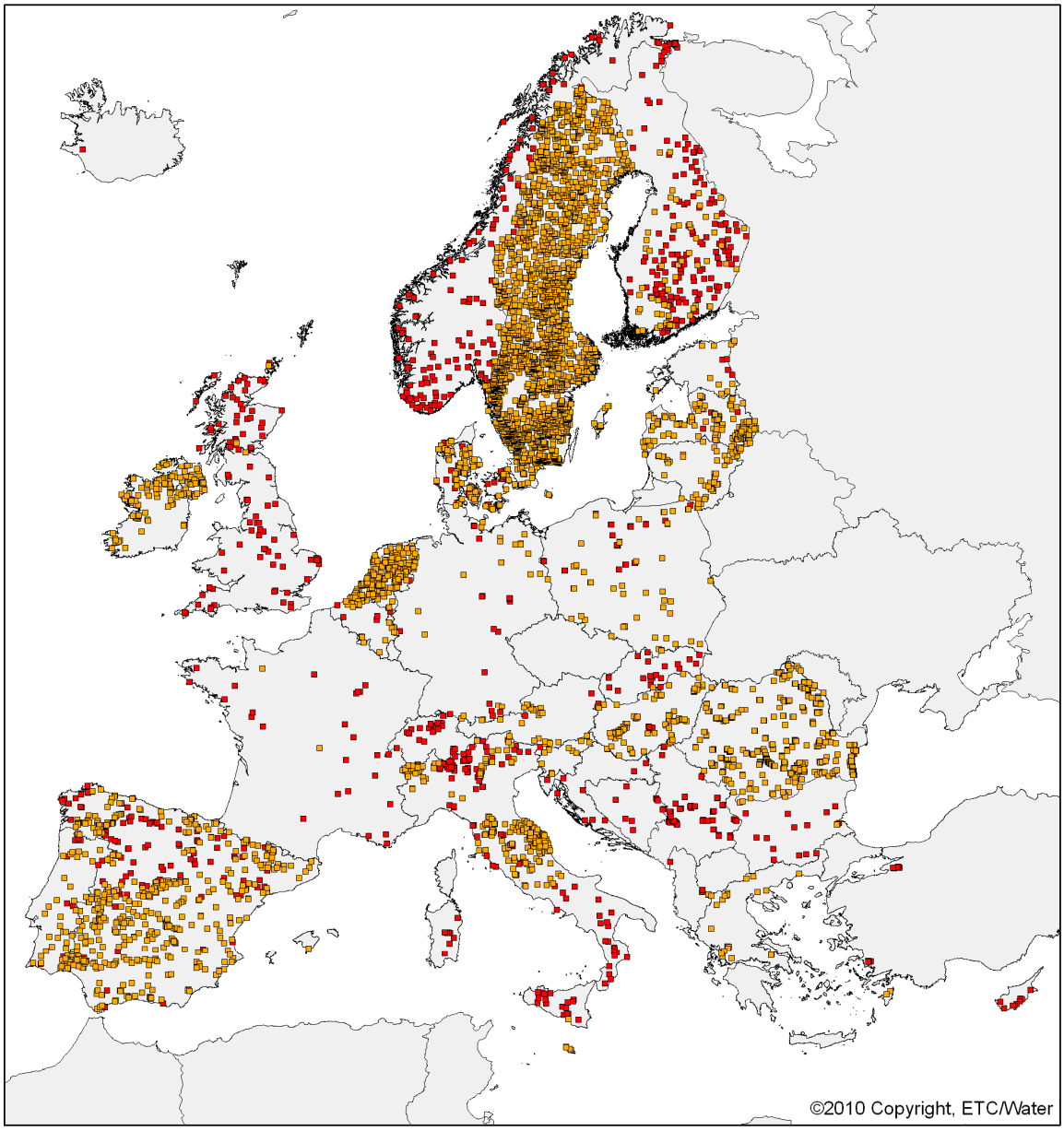


Figure 3: Comparison of common lake monitoring sites SoE and NiD



4. Nitrates pollution comparison of NiD/WFD/SoE quality data

4.1. Methodology

This part of the analysis is focused on the assessment of nitrates at water body level from data provided for the NiD, SoE and WFD. It is not a comparison of nitrate concentrations in monitoring sites, but a nitrate status assessment in water bodies.

While NiD and SoE data contain information about NO_3 concentration in monitoring sites, the Water Framework Directive (WFD) is focused on water body status only. On the other hand, only WFD should provide information about all water bodies including a list of water bodies.

The basis of the analysis was the status assessment according to the Water Framework Directive. Nitrates are part of the ecological status of surface waters (rivers, lakes, transitional and coastal waters) and they are included in general physico-chemical elements (group of nutrients, temperature, oxygen conditions, acidification etc.) For groundwater nitrates are part of the chemical status which is based on all chemical substances and parameters put together.

When the WFD groundwater chemical status is not good, information about substances, the reasons for failure etc. are part of the electronic reporting process of the WFD (see Table 16). Surface water ecological status has more detailed information for quality elements only (see Table 17). This means, we can identify groundwater bodies with a bad status because of a high level of nitrate, but the same information for surface water bodies is not available.

Table 16: Data about groundwater chemical status under WFD electronic reporting (example)

Ground water body status

ChemicalStatus

Chemical status value: 3

Reasons for failure:

- exceedance
- water quality

Pollutants causing failure:

- 1 Nitrates
- 3 Annex II pollutant

Other relevant pollutant exceedance:

OtherRelevantPollutantCASNumber	OtherRelevantPollutantName

Table 17: Data about elements for ecological status under WFD electronic reporting (example from a Member State)

Ecological Status or potential

TargetStatusOrPotential	P
ValueEcologicalStatusOrPotential	3
Confidence	3
CommentConfidence	Confidence of Less than Good
ValueQE1-1PhytoplanktonStatusOrPotential	U
ValueQE1-2OtherAquaticFloraStatusOrPotential	U
ValueQE1-2-1MacroalgaeStatusOrPotential	U
ValueQE1-2-2AngiospermsStatusOrPotential	U
ValueQE1-2-3MacropyhtesStatusOrPotential	U
ValueQE1-2-4PhytobenthosStatusOrPotential	U
ValueQE1-3MacroinvertabratesStatusOrPotential	5
ValueQE1-4FishStatusOrPotential	U
ValueQE1-5OtherBiologicalQEStatusOrPotential	U
ValueQE2HydromorphStatusOrPotential	2
ValueQE3-1GeneralPhysicoChemStatusOrPotential	3

Countries can use different limits (national threshold) for good status according to the types of water bodies. This information is available separately for all types and categories of surface water bodies – natural, heavily modified and artificial; rivers, lakes, transitional and coastal water (see Table 18). For groundwater only the range is provided (see Table 19).

Table 18: Data about boundaries between high, good, moderate, poor and bad status) for surface water ecological status under WFD electronic reporting (example for rivers from a Member State)

QEParameterTypes	QEOtherParameterDescription	TypologyCode	MatrixType	Units	StatisticalExpression	ReferenceCondition	HighGoodBoundary	GoodModerateBoundary	ModeratePoorBoundary	PoorBadBoundary
QE3-1 Other	N-NO3	D2(P1V)	water	mg/l	90-percentile	<2	-7777	0.01	-7777	-7777
QE3-1 Other	N-NO3	M1(P1V)	water	mg/l	90-percentile	<2.5	-7777	9	-7777	-7777
QE3-1 Other	N-NO3	V3(P1V)	water	mg/l	90-percentile	<2	-7777	1.1	-7777	-7777
QE3-1 Other	N-NO3	R2(P1V)	water	mg/l	90-percentile	<2	-7777	7.8	-7777	-7777
QE3-1 Other	N-NO3	I1(P1V)	water	mg/l	90-percentile	<2	-7777	10	-7777	-7777
QE3-1 Other	N-NO3	B1(P1V)	water	mg/l	90-percentile	<1.5	-7777	48	-7777	-7777
QE3-1 Other	N-NO3	V2(K2V)	water	mg/l	90-percentile	<1.5	-7777	0.38	-7777	-7777

Table 19: Data about national threshold values (boundaries between good and poor status) for groundwater chemical status under WFD electronic reporting (example from a Member State)

PollutantOrIndicator	Value	LowerThreshold	ReportingUnits	ThresholdValueScale
Arsenic	17.15	5.5	µg/l	Groundwater body
Cadmium	0.2222		µg/l	Groundwater body
Chloride	55.5	55.5	mg/l	Groundwater body
Conductivity	888	888	µS/cm	Groundwater body
Lead	8		µg/l	Groundwater body
Mercury	0.75		µg/l	Groundwater body
Nitrates	7.5	18.2	mg/l	Groundwater body
Tetrachloroethylene	7.5		µg/l	Groundwater body
Trichloroethylene	7.5		µg/l	Groundwater body

NiD and SoE data contain monitored nitrate concentrations at monitoring sites including water body identification.

Regarding the structure of WFD data, the nitrates status assessment was focused mainly on groundwater bodies. Unfortunately, because crucial WFD data was not yet available in the database, all information had to be prepared manually from xml files.

National River Basin Districts were used for the analysis with all necessary information (groundwater status assessment, range of used limits and SoE and NiD data as well). The boundaries of groundwater bodies do not need to be the same as boundaries of the RBD; however every groundwater body belongs to one RBD only.

Groundwater assessment was done for 4 national RBDs – Austria – Danube, France – Seine and Normandy coastal waters, Czech Republic – Elbe and Ireland – South Eastern. Surface water analysis was prepared for 1 RBD only - Ireland – South Eastern.

WFD data:

An overview of groundwater body chemical status in the pilot area was prepared at first with information, if nitrates are the reason for the poor status. The information about the applied national threshold value of NO_3 (boundary between good and poor status) was used.

SoE and NiD data:

The assessment was done for every monitoring site – comparison of monitored NO_3 concentrations with 1.) a 50 mg/l limit and 2.) a different limit (national threshold) according to the WFD. Information about the number of existing monitoring sites, number of sites above and below the limit is included. The nitrates state was derived from the predominant results - equal or more than 50% of monitoring sites above the limit (Water body marked with red stripes in map).

4.2. Results

Because WFD data were prepared from primary xml files, the results were not quality checked yet. Therefore the final data could be different. Some information about used national threshold values or about the boundaries between high, good, moderate, poor and bad status are missing or are not clear. Different horizons of groundwater bodies had to be taken into account as well.

The summary tables (see Table 20 and 21) provide a short overview of all of the results; detailed results are shown for every country separately.

Table 20: Summary of nitrates assessment according to WFD, NiD and SoE data - groundwater

Country		Austria	France	Czech Republic	Ireland
River Basin District		Danube	FRH	Elbe	SE
WFD classification	# GWBs	128	53	99	151
	# GWBs poor status	3	42	78	3
	# GWBs poor status - NO3	3	15	49	1
	% GWBs poor status NO3	2%	28%	49%	1%
NiD data assessment	# GWBs with monitoring site(s)	119	30	81	44
	# GWBs poor state - NO3 (national threshold)	8	7	15	6
	# GWBs poor state - NO3 (50 mg/l)	5	NR	NR	0
	# GWBs poor state (NO3) for WFD and NiD (national threshold)	3	5	15	1
	# GWBs poor state (NO3) for WFD and NiD (50 mg/l)	3	NR	NR	0
	%GWBs poor state - NO3 (national threshold)	6%	13%	15%	4%
	%GWBs poor state - NO3 (50 mg/l)	4%	NR	NR	0%
	% GWBs poor state (NO3) for WFD and NiD (national threshold)	2%	9%	15%	1%
	% GWBs poor state (NO3) for WFD and NiD (50 mg/l)	2%	NR	NR	0%
SoE data assessment	# GWBs with monitoring site(s)	14	53	81	45
	# GWBs poor state - NO3 (national threshold)	2	7	16	9
	# GWBs poor state - NO3 (50 mg/l)	2	NR	NR	2
	# GWBs poor state (NO3) for WFD and SoE (national threshold)	1	3	13	1
	# GWBs poor state (NO3) for WFD and SoE (50 mg/l)	1	NR	NR	1
	%GWBs poor state - NO3 (national threshold)	2%	13%	16%	6%
	%GWBs poor state - NO3 (50 mg/l)	2%	NR	NR	1%
	% GWBs poor state (NO3) for WFD and SoE (national threshold)	1%	6%	13%	1%
	% GWBs poor state (NO3) for WFD and SoE (50 mg/l)	1%	NR	NR	1%

NR not relevant

Table 21: Summary of nitrates assessment according WFD, NiD and SoE data – surface water – Ireland SE RBD

	WFD			NiD				
surface water type	# WBs	# WBs poor physico - chemical status	% WBs poor status	# WBs with monitoring site(s)	# WBs poor state - NO3	# WBs poor state for WFD and NiD	% WBs poor state	% WBs poor state for WFD and NiD
rivers	672	24	4%	50	0	0	0%	0%
lakes	12	5	42%	not relevant	not relevant	not relevant	not relevant	not relevant
transitional waters	21	12	57%	not relevant	not relevant	not relevant	not relevant	not relevant
coastal waters	9	3	33%	not relevant	not relevant	not relevant	not relevant	not relevant

	SoE				
surface water type	# WBs with monitoring site(s)	# WBs poor state - NO3	# WBs poor state for WFD and SoE	% WBs poor state	% WBs poor state for WFD and SoE
rivers	50	0	0	0%	0%
lakes	not relevant	not relevant	not relevant	not relevant	not relevant
transitional waters	not relevant	not relevant	not relevant	not relevant	not relevant
coastal waters	not relevant	not relevant	not relevant	not relevant	not relevant

4.2.1. Groundwater

Austria – Danube RBD

Groundwater bodies (GWBs) are layered out in three different horizons (see Figure 4). Horizon 1 covers the entire area of the Danube RBD, so all maps were prepared for this horizon; however an assessment was prepared for all of the groundwater bodies.

There are 128 groundwater bodies in the Danube RBD according to WFD reporting and all water bodies contain information about chemical status. Nitrates are a reason for a poor status for all 3 GWBs. National nitrates threshold value for all groundwater bodies was 45 mg/l and the groundwater bodies were assessed as a poor status if more than 50% of the monitoring sites were above the limit (information from WFD electronic reporting). The same limit and number of monitoring sites was used for NiD and SoE data as well and then 50 mg/l limit as well. The lower national limit than the Nitrates Directive limit was used for better comparability between WFD and other NO_3 data.

NiD monitoring sites represent 119 groundwater bodies and 8 of them have a “poor” state according to the national threshold (3 GWBs have the same results in WFD) – see Figure 6. Only 5 out of all groundwater bodies have a “poor” state when we use the 50 mg/l limit – see Figure 7.

8 GWBs in SoE reporting do not exist in WFD reporting – the inconsistency could be because of the different time periods for NiD (2003 – 2007) and WFD (2009) reporting.

Austria provided SoE monitoring sites for 14 GWBs only (2006 and 2007) and 2 of them have a “poor” state at least in one year according to the national threshold limit and the same results occur for the 50 mg/l limit. However, only 1 GWB with SoE “poor” state is the same as WFD – see Figures 8 and 9.

GWBs with and without at least 1 NiD or SoE monitoring site are in Figure 5.

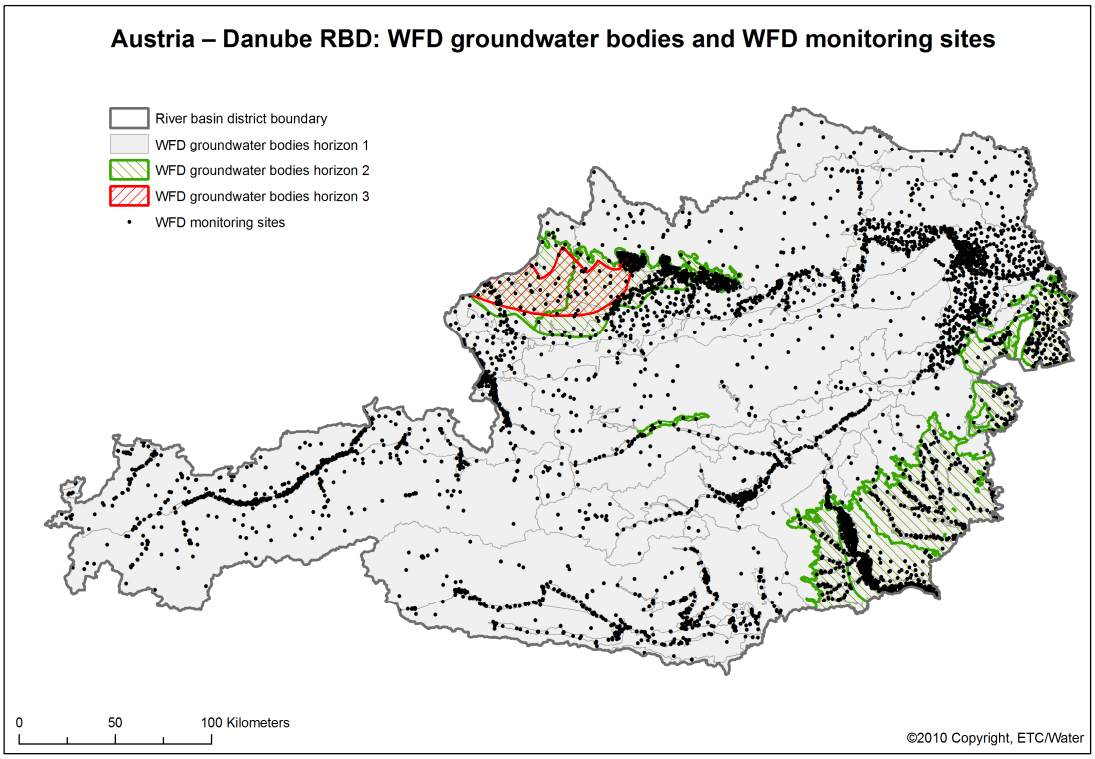
The proportion of identical monitoring sites NiD and SoE is very small - only 45 sites out of the 368 NiD sites or 663 SoE sites for the entire area of Austria.

Conclusions for Austria – Danube RBD:

The WFD assessment of groundwater body status identifies fewer water bodies of poor status caused by nitrates than the assessment of groundwater bodies based on NiD or SoE data. The results were similar for national threshold value and 50 mg/l limit of nitrates. The main reason for this can be a different number of NiD monitoring sites used in the assessment. Austria probably used more sites for WFD assessment.

SoE monitoring sites represent only 14 groundwater bodies out of 128 in total and therefore do not provide a comparable coverage of groundwater bodies.

Figure 4: WFD groundwater bodies in the Danube RBD and WFD monitoring sites



Note: Monitoring sites were used from geographical layer only (without any attributes)

Figure 5: NiD and SoE monitoring sites in the Danube RBD

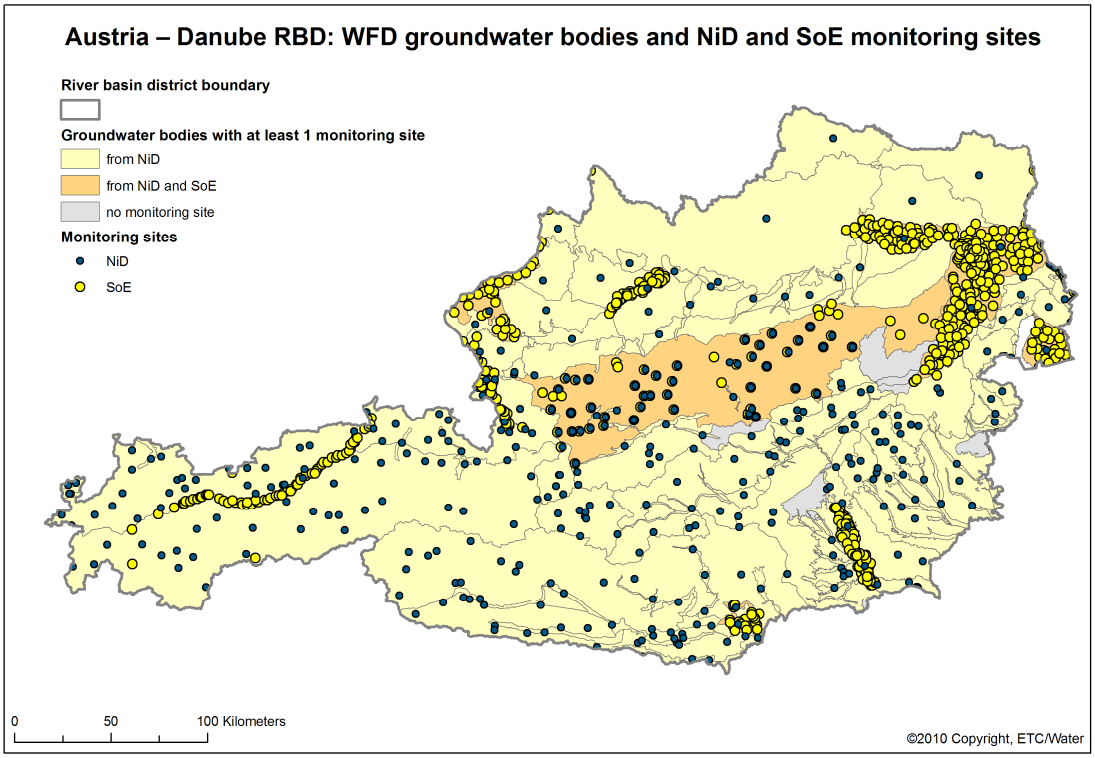


Figure 6: Quality of WFD groundwater bodies under WFD classification and NiD data (national threshold)

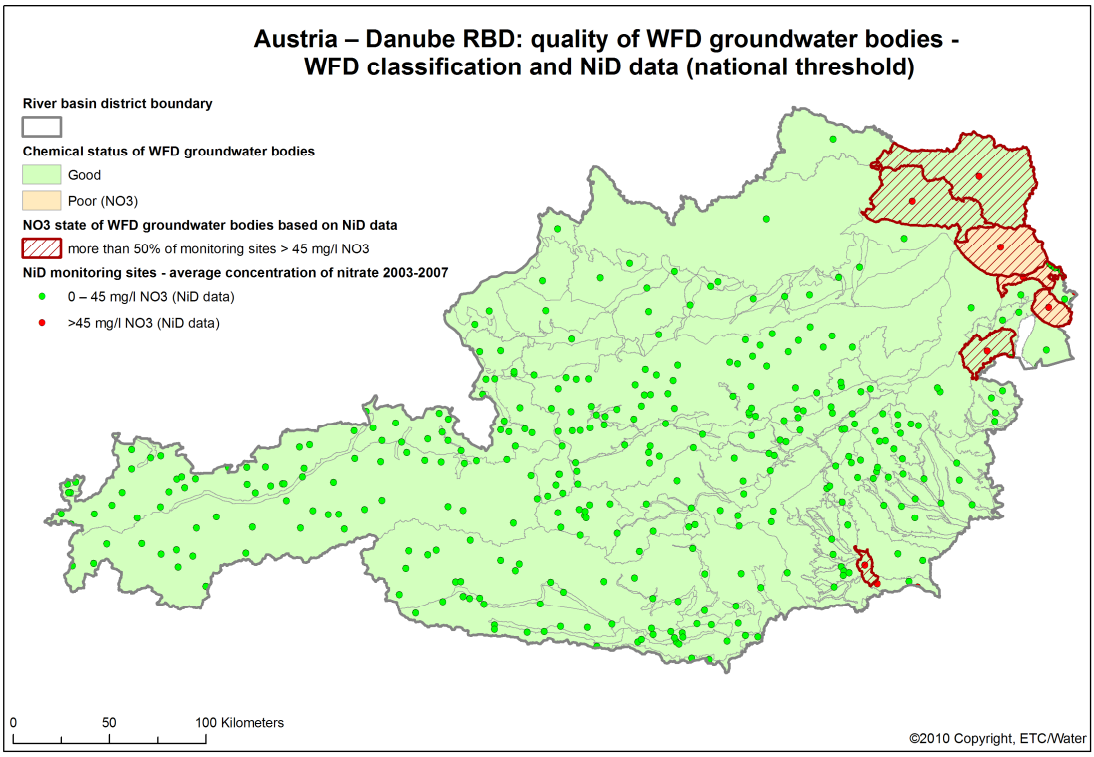


Figure 7: Quality of WFD groundwater bodies under WFD classification and NiD data (50 mg/l)

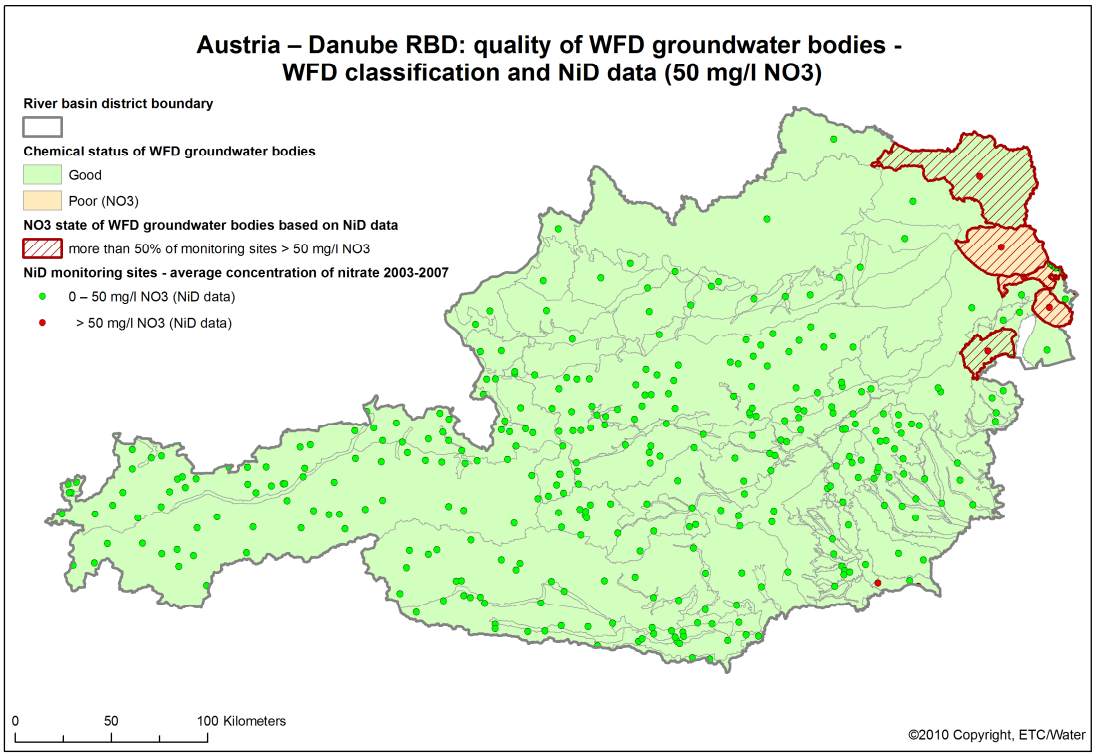


Figure 8: Quality of WFD groundwater bodies under WFD classification and SoE data (national threshold)

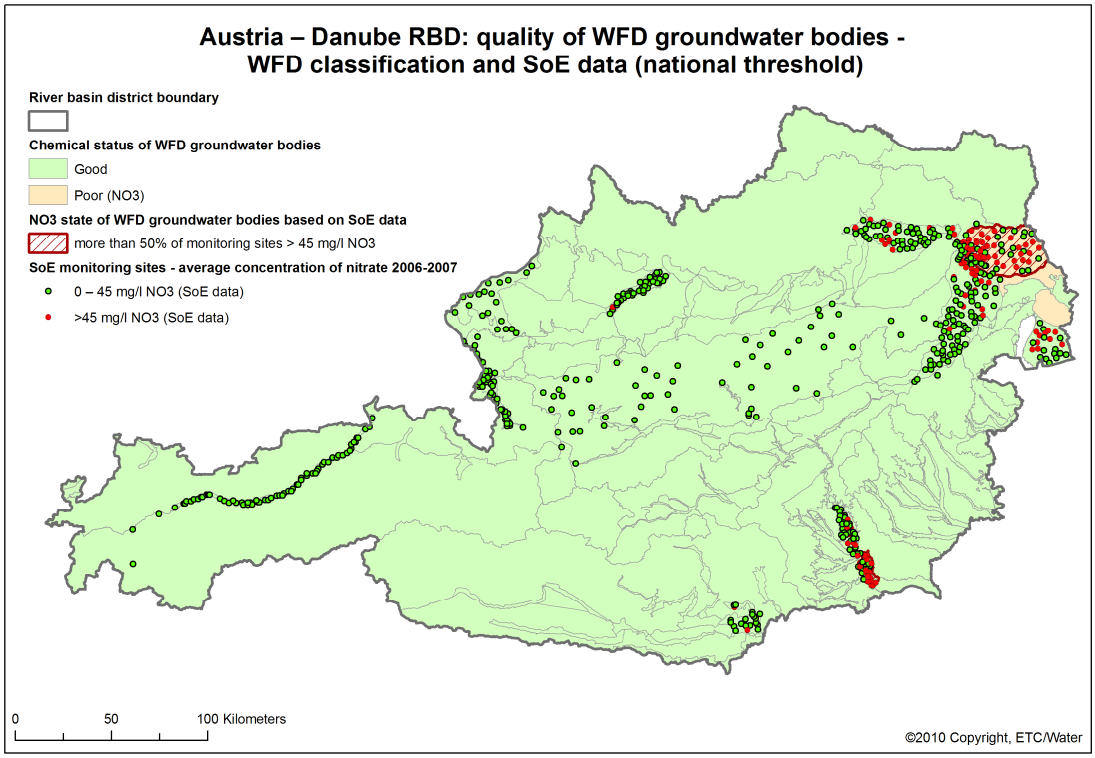
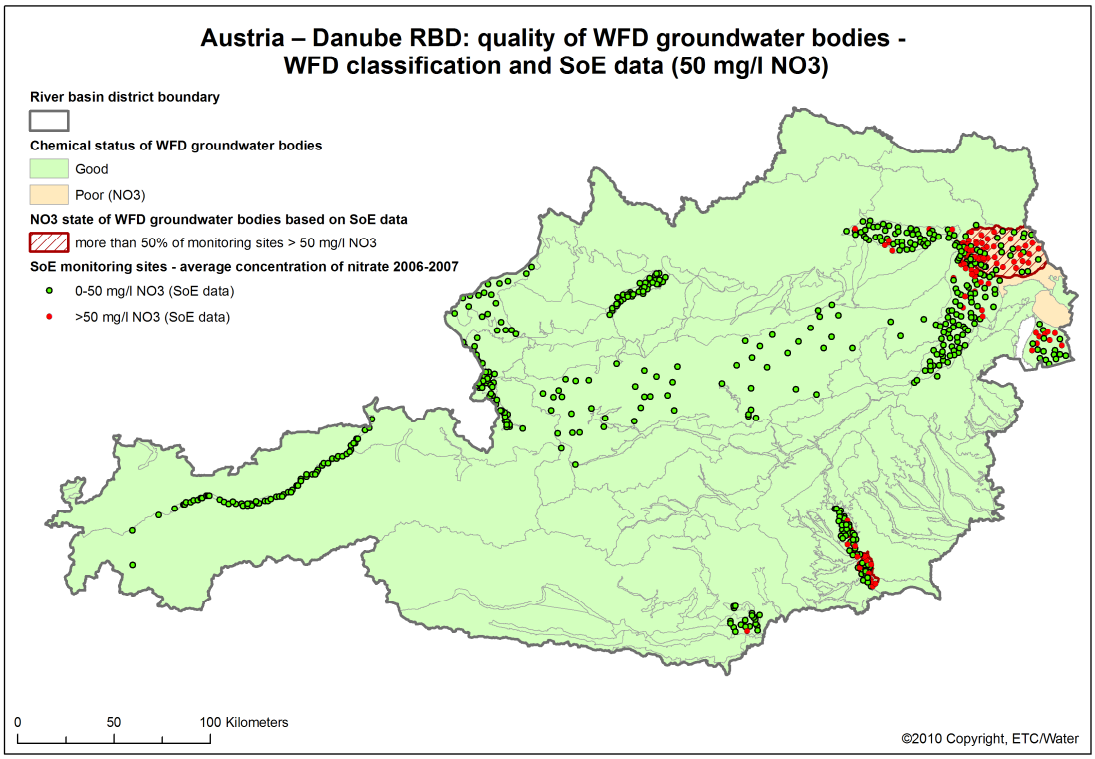


Figure 9: Quality of WFD groundwater bodies under WFD classification and SoE data (50 mg/l)



France - Seine and Normandy coastal waters RBD

Groundwater bodies (GWBs) are in 4 different horizons (see Figure 10). Horizons 1 and 2 cover the entire area of FRH River basin district, so all maps were prepared for the two horizons; however, an assessment was prepared for all groundwater bodies. IDs for some groundwater bodies in different horizons are the same.

There are 53 groundwater bodies in the FRH river basin district according to WFD reporting and all water bodies have information about chemical status. Nitrates are the reason for a poor status for 15 GWBs out of the 42 GWBs with a poor status. The nitrates threshold value for all groundwater bodies was not mentioned in WFD electronic reporting, so the limit of 50 mg/l was used for NiD and SoE data. Groundwater body state because of nitrates was evaluated as poor if 50% or more of the monitoring sites were above the limit.

Many NiD monitoring sites (628 out of 722) have no information about groundwater bodies. The sites were excluded from the assessment, so the results can be negatively affected by this fact. NiD monitoring sites represent 30 groundwater bodies and 7 of them have a “poor” state (5 GWBs have the same results in WFD) – see Figure 12.

France provided SoE monitoring sites for all 53 GWBs (2006, 2007 and 2008) and 7 of them have a “poor” state at least in one year. However, only 3 GWBs with a SoE “poor” state are the same as WFD – see Figure 13. 39 monitoring sites (out of 483) are without a groundwater body ID.

GWBs with and without at least 1 NiD or SoE monitoring site are in Figure 11.

The proportion of identical monitoring sites (NiD and SoE) is very small - only 198 sites out of 2666 NiD sites or 1957 SoE sites for the entire area of France.

Conclusions for France - Seine and Normandy coastal waters RBD:

The 50 mg/l limit for nitrates was used for the analysis. Only 2 water bodies are classified differently, in NiD “poor” status but WFD “good status”. The difference could be due to a different number of monitoring sites and/or different monitoring network.

The situation is similar for water bodies classified by SoE data compared to WFD ones. The higher number of groundwater bodies with WFD “poor status” can be caused by different origin of nitrates pollution or other aspects such as impact of groundwater quality to surface water body status or dependent terrestrial ecosystems.

SoE data are reported from all groundwater bodies in the RBD, whereas NiD data are reported only for half of the groundwater bodies.

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Figure 10: WFD groundwater bodies in FRH RBD

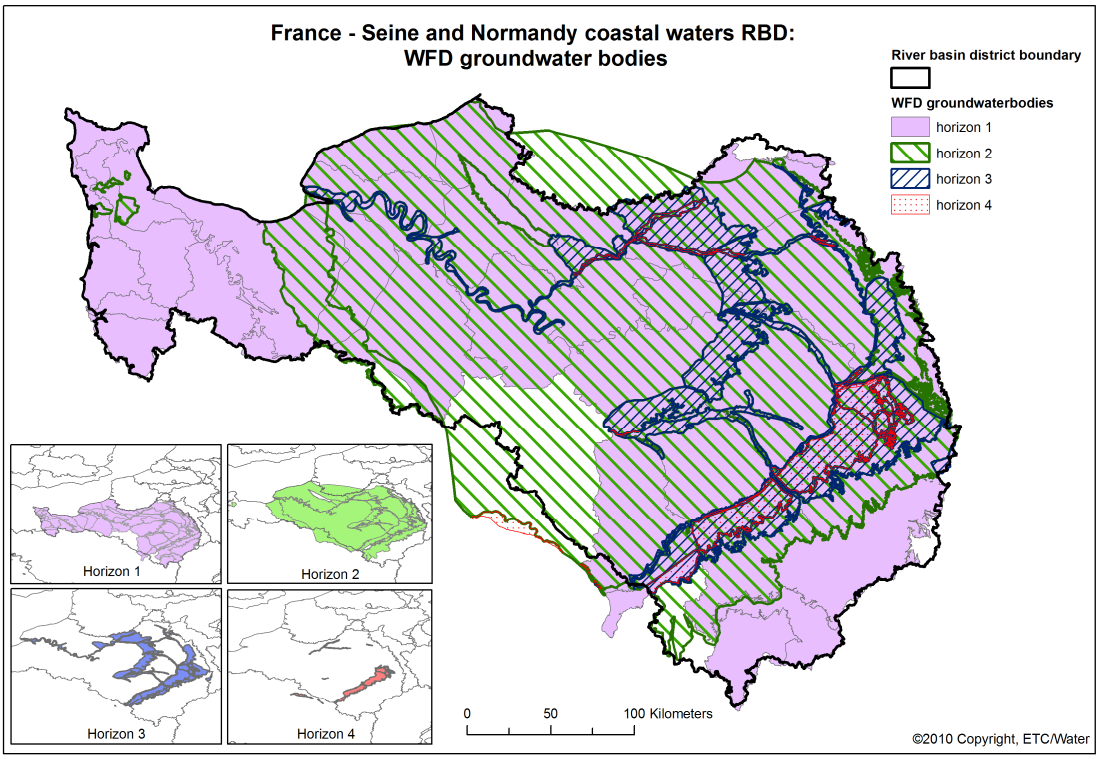


Figure 11: NiD and SoE monitoring sites in FRH RBD

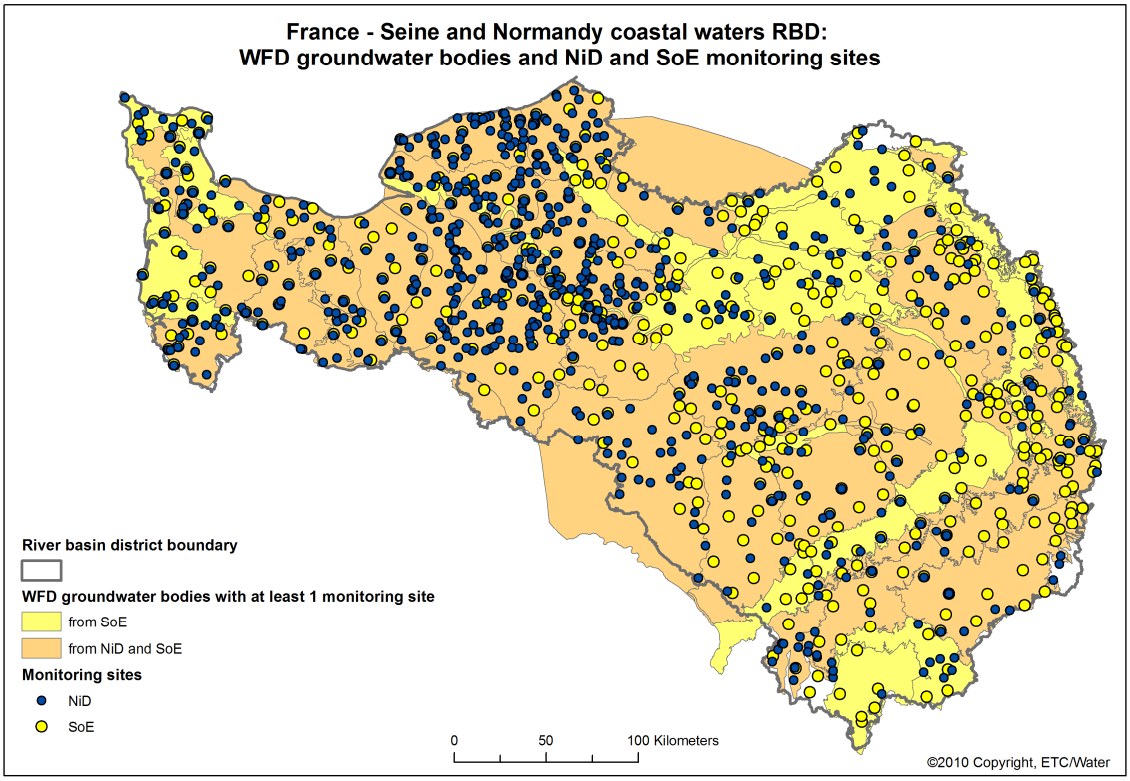


Figure 12: Quality of WFD groundwater bodies under WFD classification and NiD data (50 mg/l)

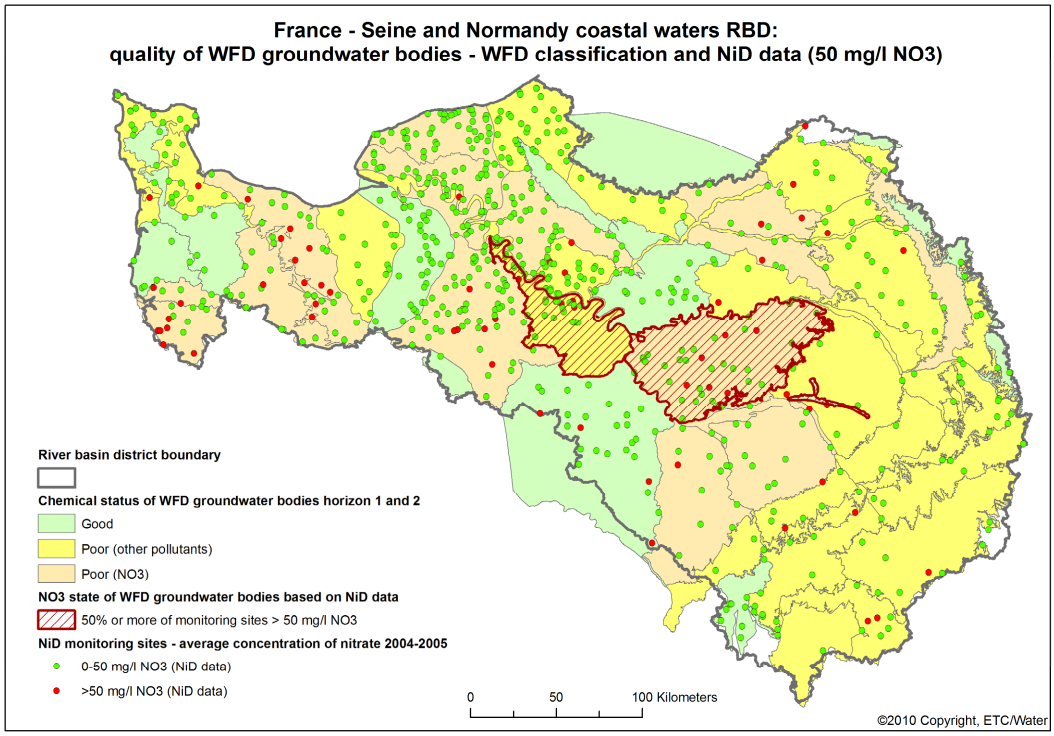
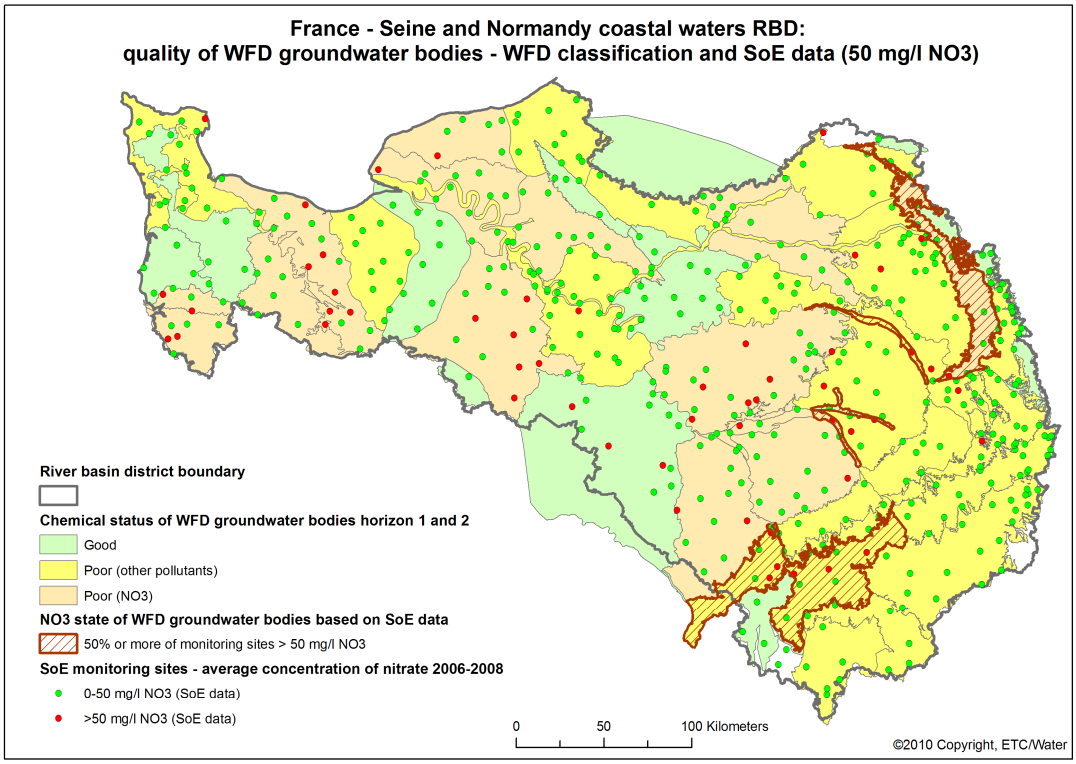


Figure 13: Quality of WFD groundwater bodies under WFD classification and SoE data (50 mg/l)



Czech Republic – Elbe RBD

Groundwater bodies (GWBs) are in 3 different horizons (see Figure 14). Horizon 2 covers the entire area of the Elbe RBD, so all maps were prepared for horizons 1 and 2. However, an assessment was prepared for all groundwater bodies.

There are 99 groundwater bodies in the Elbe RBD according to WFD reporting and all water bodies have information about chemical status. Nitrates are the reason for a poor status for 49 GWBs out of 78 GWBs with a poor status. National nitrates threshold value for all groundwater bodies was 50 mg/l and groundwater bodies were assessed as having a poor status if equal or more than 50% of monitoring sites were above the limit (information from WFD electronic reporting). The same limit and number of monitoring sites was used for NiD and SoE data as well.

NiD monitoring sites represent 81 groundwater bodies and 15 of them have a “poor” state (all GWBs have the same results in WFD) – see Figure 16. 14 monitoring sites (out of 289) are without a groundwater body ID.

The Czech Republic provided SoE monitoring sites for 81 GWBs (2004, 2005, 2006, 2007 and 2008) and 16 of them have a “poor” state at least in one year. 13 GWBs with the SoE “poor” state is the same as WFD – see Figure 17.

GWBs with and without at least 1 NiD or SoE monitoring site are in Figure 15.

A proportion of identical monitoring sites of NiD and SoE is very high - 406 sites out of 408 NiD sites or 499 SoE sites for the entire area of Czech Republic.

Conclusions for Czech Republic – Elbe RBD:

All groundwater bodies in NiD “not good” status are in the same status in the WFD classification. However, many groundwater bodies in WFD ‘poor status’ are in NiD or SoE “good state” classification. This can be caused by different origin of nitrates pollution or other aspects such as impact of groundwater quality to surface water body status or dependent terrestrial ecosystems.

SoE data and NiD data are reported from almost all groundwater bodies in the RBD.

Figure 14: WFD Groundwater bodies in the Elbe RBD

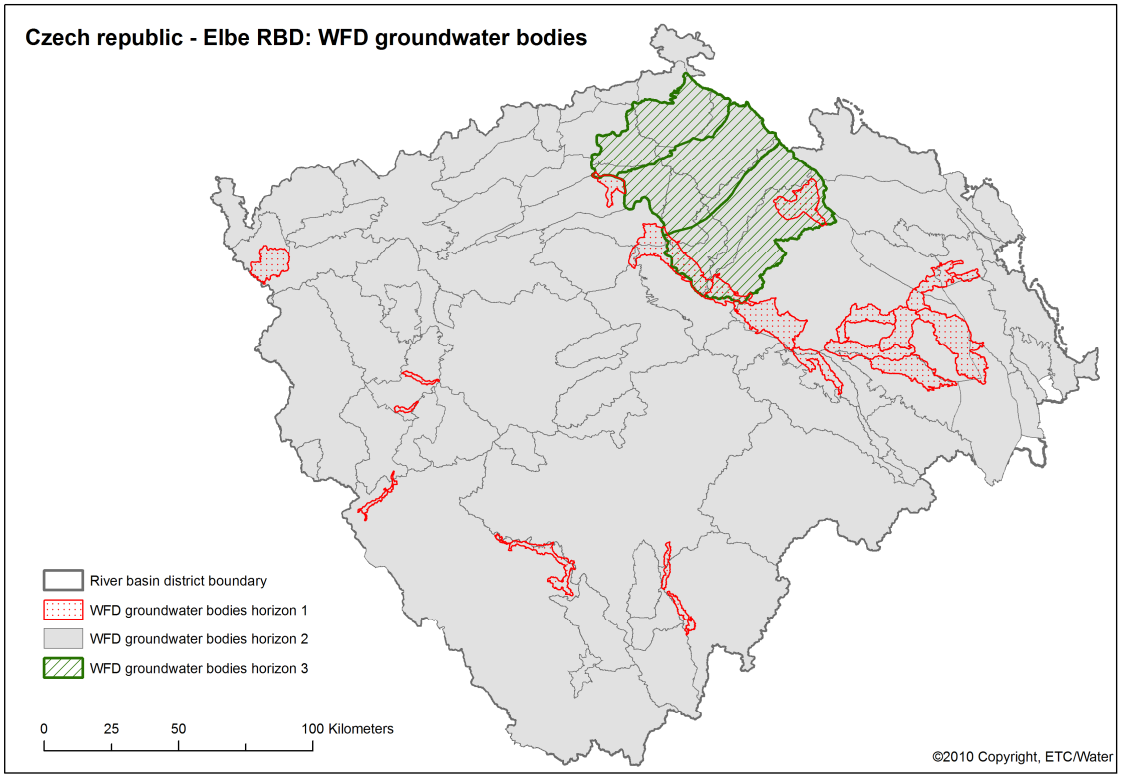


Figure 15: NiD and SoE monitoring sites in Elbe RBD

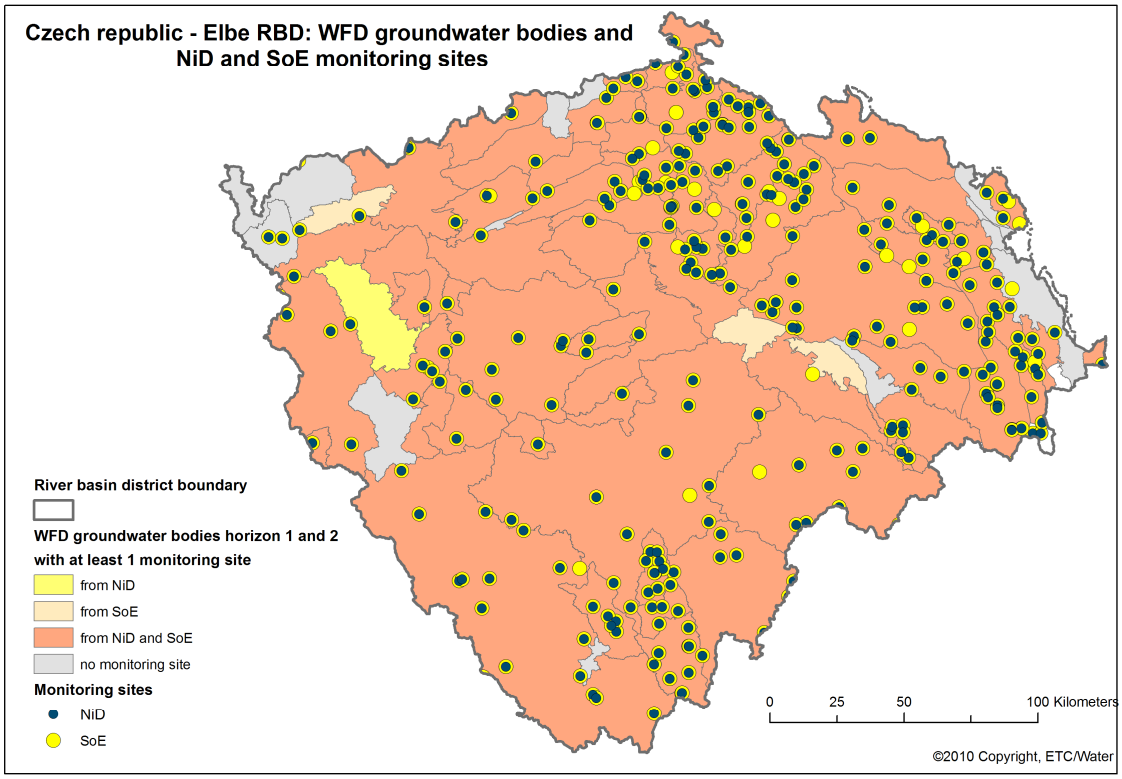


Figure 16: Quality of WFD groundwater bodies under WFD classification and NiD data (50 mg/l)

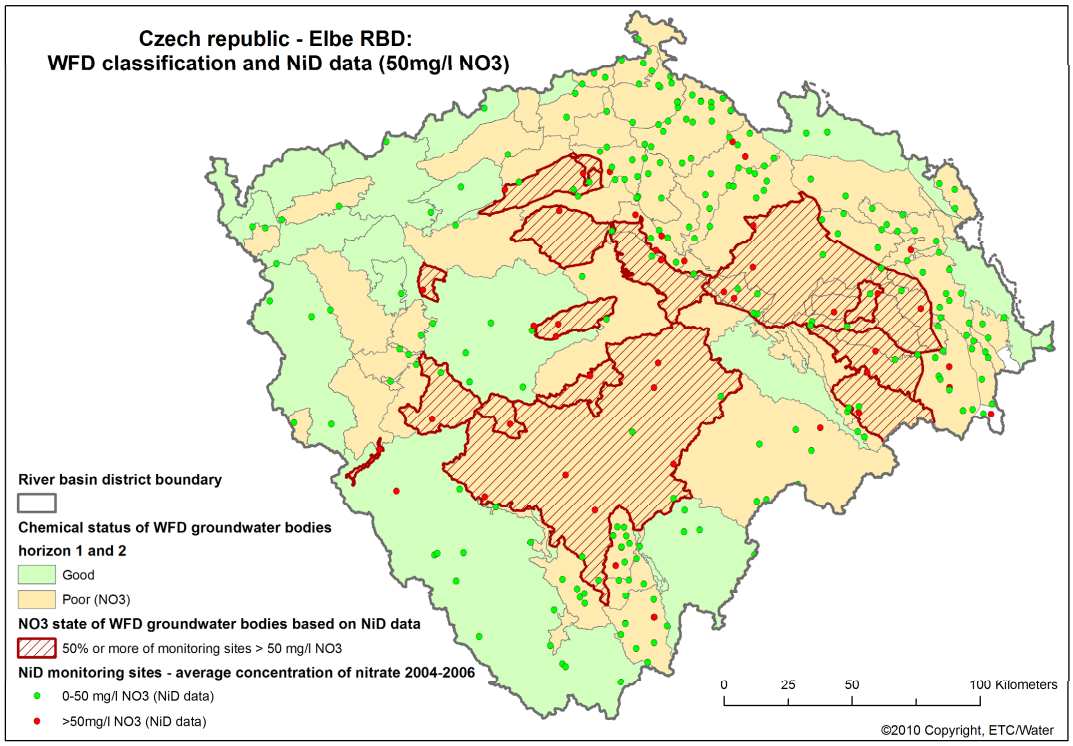
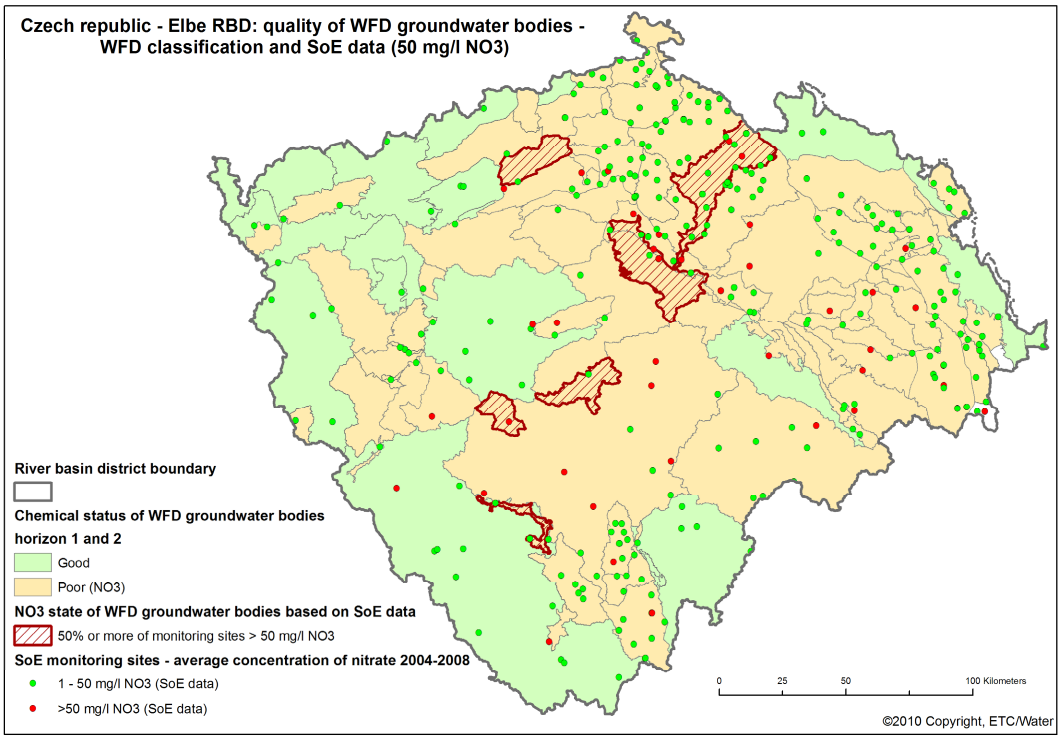


Figure 17: Quality of WFD groundwater bodies under WFD classification and SoE data (50 mg/l)



Ireland - South Eastern RBD

Groundwater bodies (GWBs) are in one horizon only (see Figure 18).

There are 151 groundwater bodies in the SE RBD according to WFD reporting and all water bodies have information about chemical status. Nitrates are the reason for the poor status for 1 GWB out of 3 GWBs with a poor status. National nitrates threshold value for all groundwater bodies was 37.5 mg/l (information from WFD electronic reporting). The same limit and number of monitoring sites was used for NiD and SoE data as well and then 50 mg/l limit. The lower boundary than Nitrates Directive was used for better comparability between WFD and other data. Groundwater body state, because of nitrates, was evaluated as poor if 50% or more of the monitoring sites were above the limit.

NiD monitoring sites represent 44 groundwater bodies and 6 of them have a “poor” state with national threshold (1 GWB has the same results in WFD) – see Figure 20. No groundwater body has a poor status when using the 50 mg/l limit – see Figure 21.

Ireland provided SoE monitoring sites for 55 GWBs (2004, 2005, 2006, 2007 and 2008) and 9 of them have a “poor” state at least in one year with national threshold– see Figure 22. Only 2 groundwater bodies have “poor” state with 50 mg/l limit – see Figure 23.1 GWB with a SoE “poor” state is the same as WFD for both limits.

GWBs with and without at least 1 NiD or SoE monitoring site are shown in Figure 19.

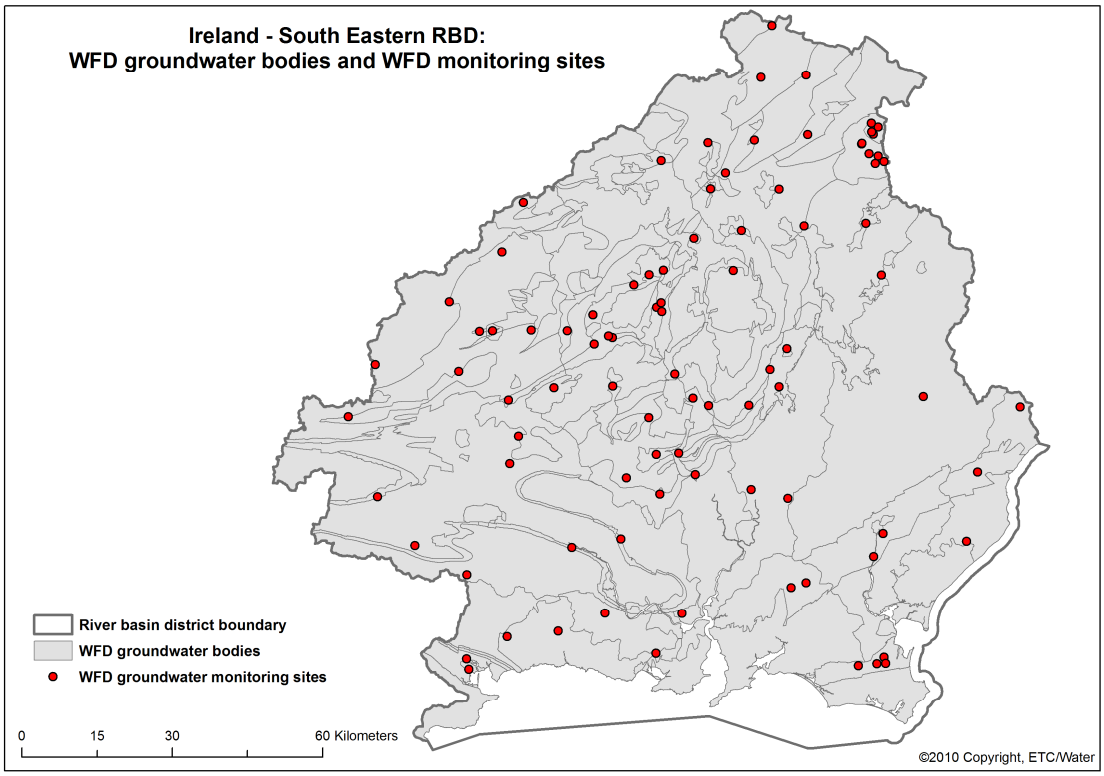
The proportion of identical monitoring sites NiD and SoE is very high - 189 sites out of 210 NiD sites or 216 SoE sites for the entire area of Ireland.

Conclusions for Ireland - South Eastern RBD:

Groundwater bodies are almost not affected by nitrates from all three reported streams.

SoE data and NiD data are reported from only 30% of the groundwater bodies in the RBD.

Figure 18: WFD groundwater bodies in the SE RBD and WFD monitoring sites



Note: Monitoring sites were used from geographical layer only (without any attributes)

Figure 19: NiD and SoE monitoring sites in the SE RBD

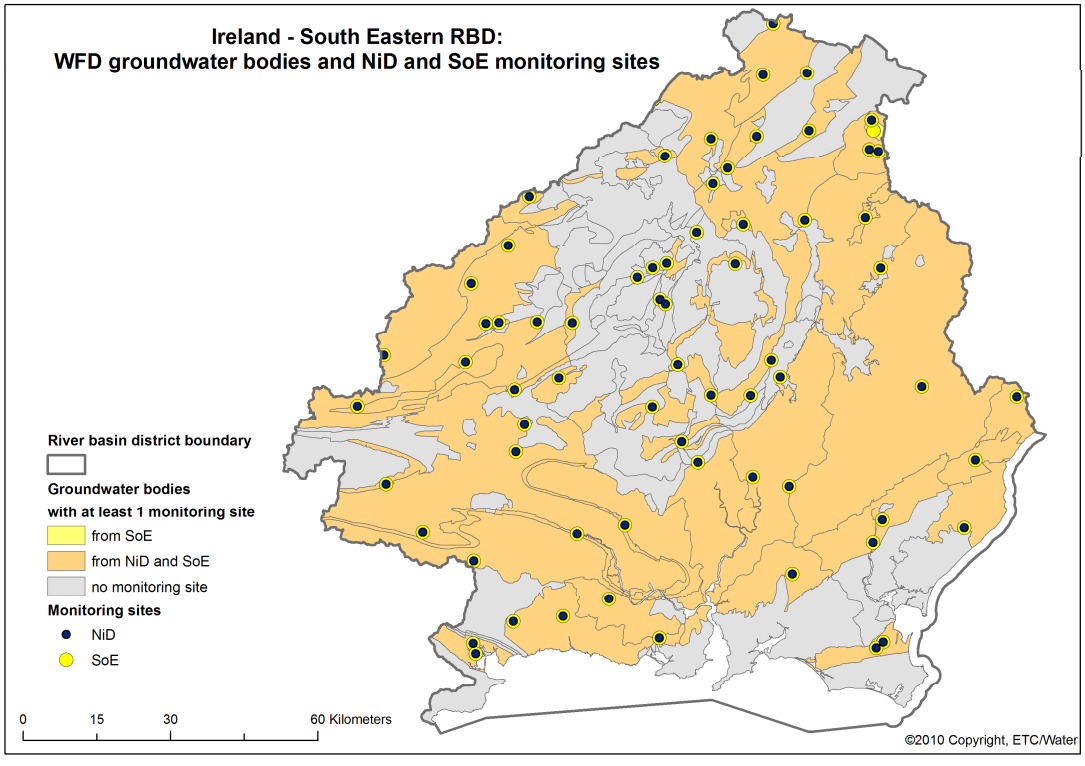


Figure 20: Quality of WFD groundwater bodies under WFD classification and NiD data (national threshold)

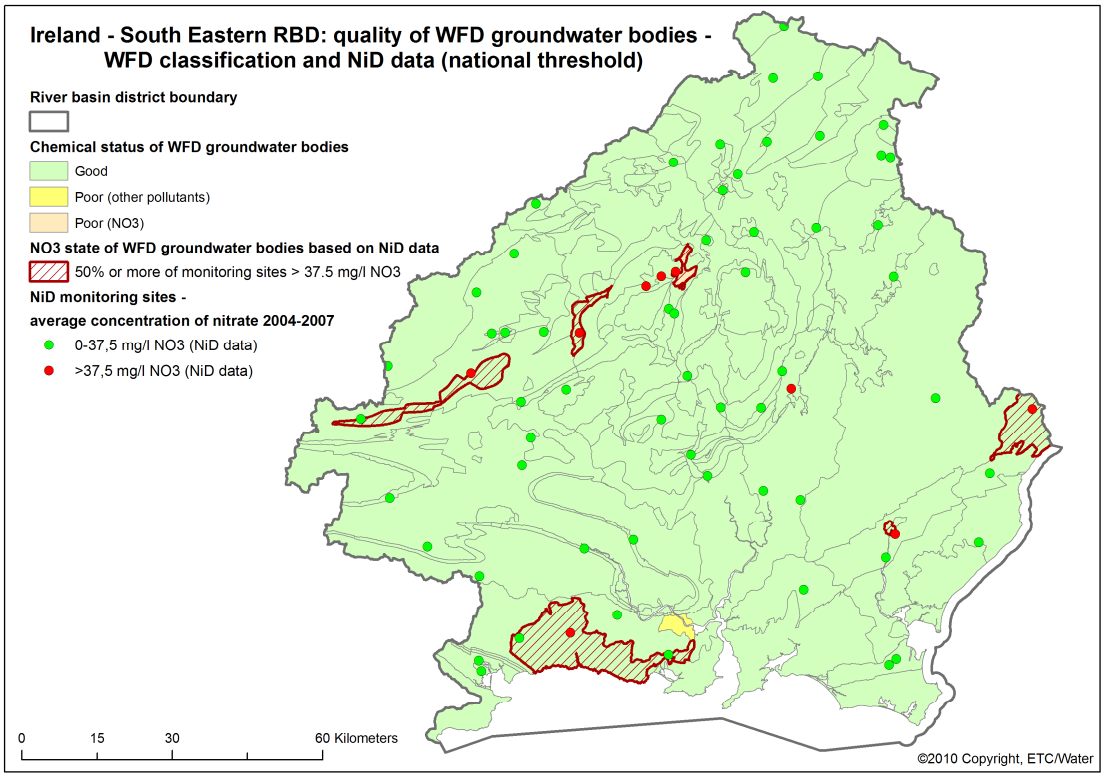


Figure 21: Quality of WFD groundwater bodies under WFD classification and NiD data (50 mg/l)

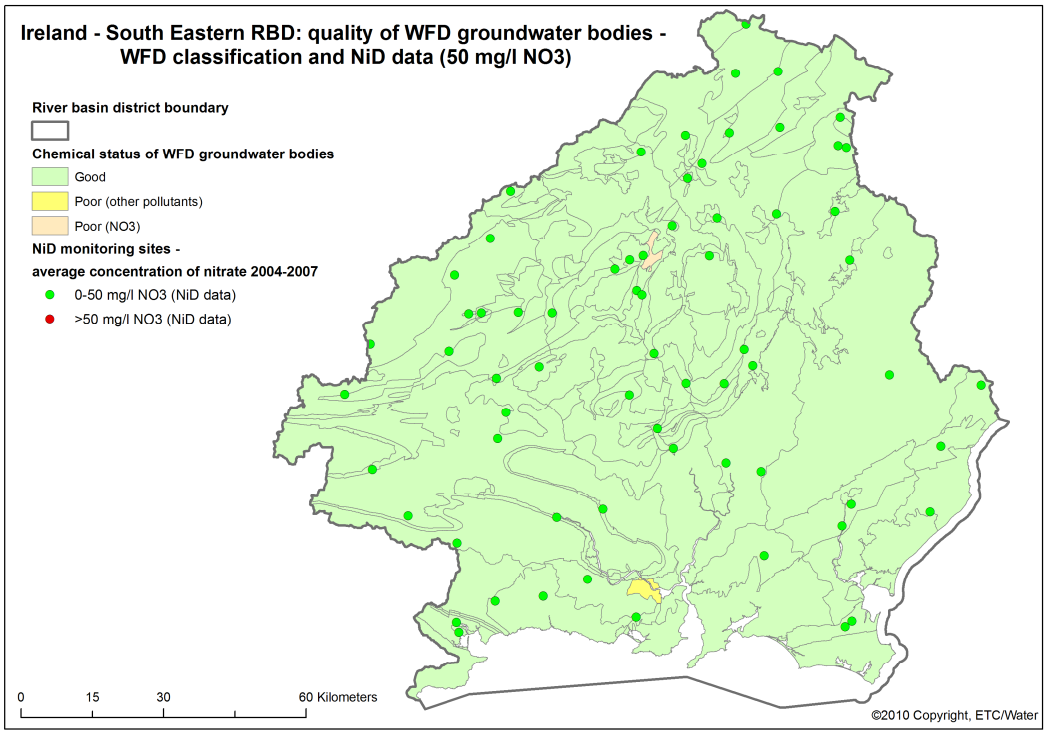


Figure 22: Quality of WFD groundwater bodies under WFD classification and SoE data (national threshold)

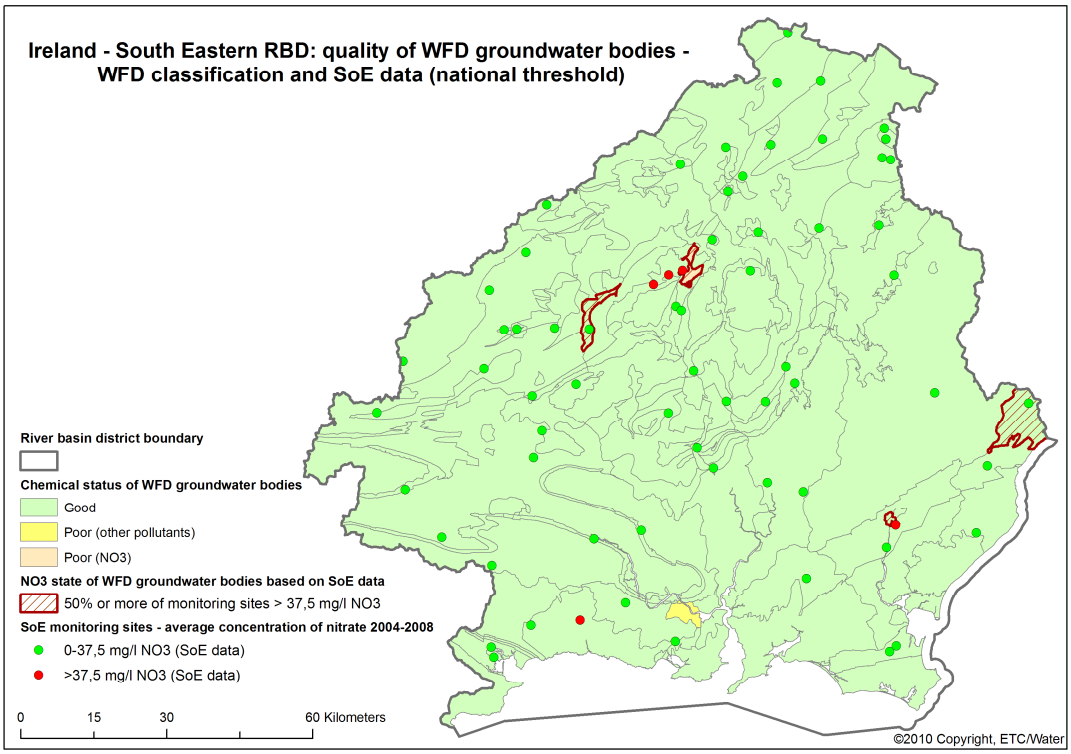
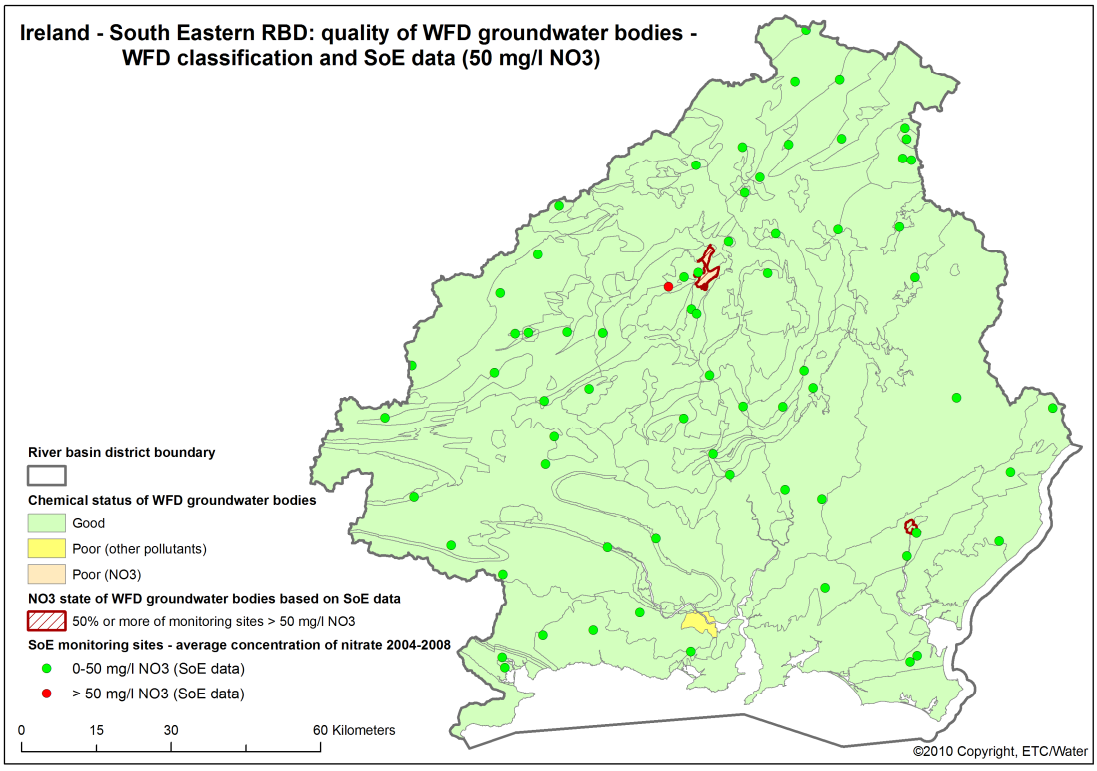


Figure 23: Quality of WFD groundwater bodies under WFD classification and SoE data (50 mg/l)



4.2.2. Surface waters

As mentioned above, nitrates assessment can be part of ecological status (or potential) for surface water bodies. The Water Framework Directive requires the assessment of general chemical and physico-chemical elements supporting the biological elements. Nutrient conditions are part of them; however every country can select appropriate determinands for rivers, lakes, transitional and coastal waters.

Ireland – South Eastern RBD applied the assessment of NO_3 for rivers only (from WFD electronic reporting). Lakes were evaluated according to ammonium and total phosphorus, dissolved inorganic nitrogen in coastal waters and molybdate reactive phosphorus (MRP) in transitional waters. Boundaries of nitrates between high, good and moderate status for rivers were not found out, so a limit 50 mg/l was used for NiD and SoE assessment.

SE RBD contains 714 water bodies – 672 rivers, 12 lakes, 21 transitional water bodies and 9 coastal water bodies (see Figure 24). An assessment was completed for rivers only, because nitrates are not relevant for the ecological status assessment for lakes, transitional and coastal waters. 24 rivers have relevant lines in the geographical layer and are shown in the map with assessment.

24 out of 672 rivers were classified as a moderate status of general chemical and physico-chemical element; however 395 rivers had no information about their status (unknown respectively). The moderate status of the general chemical and physico-chemical element might not mean “poor” status of nitrates because the assessment was produced for BOD, total ammonia, ortho-phosphate and nitrate together in Ireland.

NiD monitoring sites represent 50 surface water bodies (rivers) and none of them have a “poor” state – see Figure 25.

Ireland provided SoE monitoring sites for 50 WBs – rivers (2004, 2005, 2006, 2007 and 2008) and none of them have a “poor” state - see Figure 26.

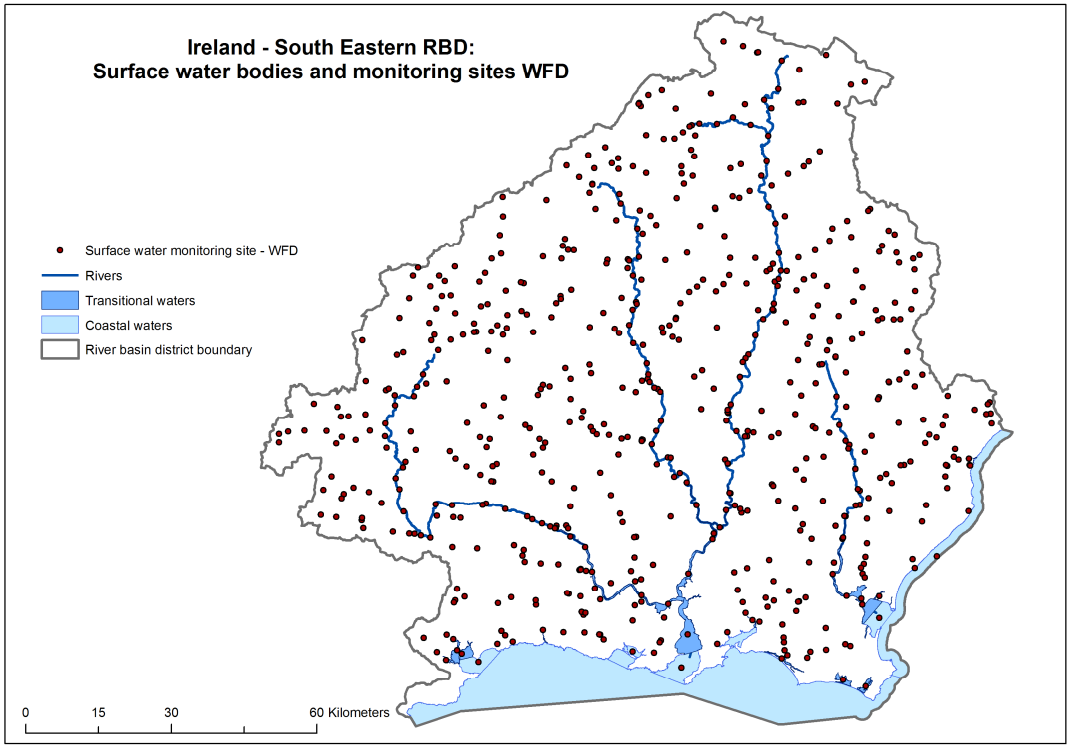
The proportion of identical monitoring sites NiD and SoE is very high - 123 sites out of 148 NiD sites or 153 SoE sites for the entire area of Ireland.

Conclusions for Ireland - South Eastern RBD:

WFD water body classification is comparable with neither NiD nor SoE nitrates concentration assessment. Nitrates are part of WFD ecological status assessment for rivers only and no river water body is polluted by nitrates according to the NiD or SoE data. The moderate status of general physico-chemical elements can be caused by other determinands such as BOD, total ammonia or ortho-phosphate.

SoE data and NiD data are reported from only 7% of surface water bodies in the RBD.

Figure 24: Surface water bodies in the SE RBD and WFD monitoring sites



Note: Monitoring sites were used from geographical layer only (without any attributes)

Figure 25: Quality of river SW bodies under WFD and NiD data

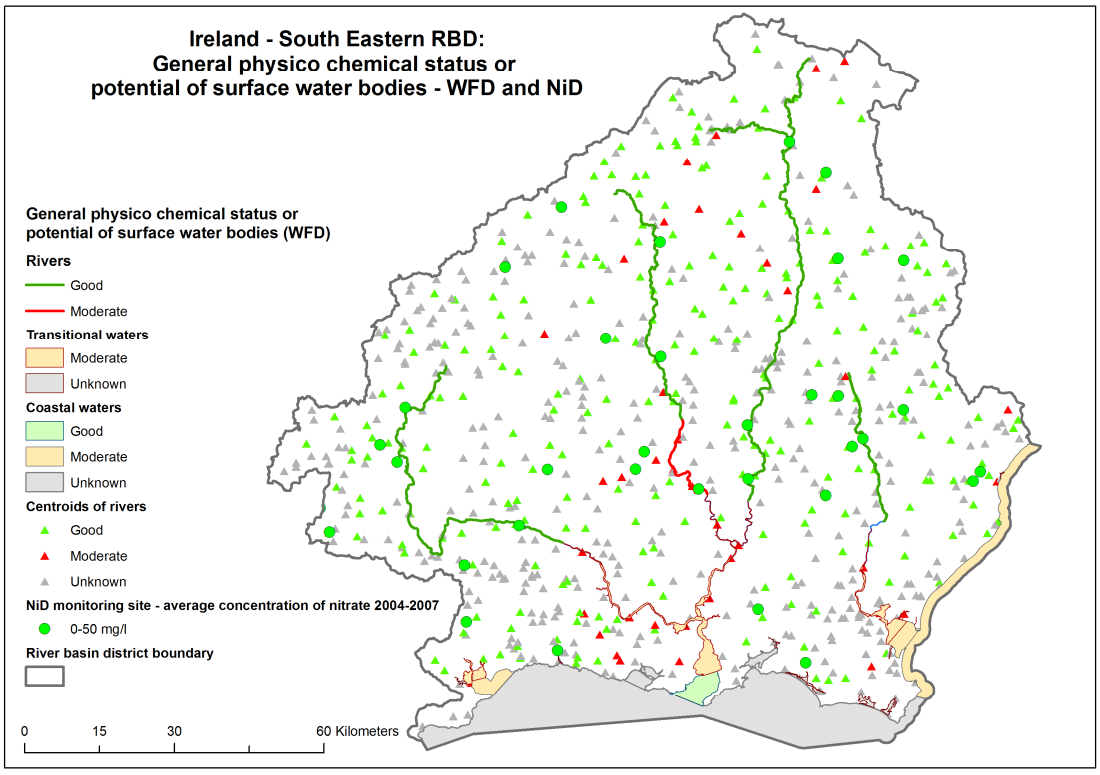
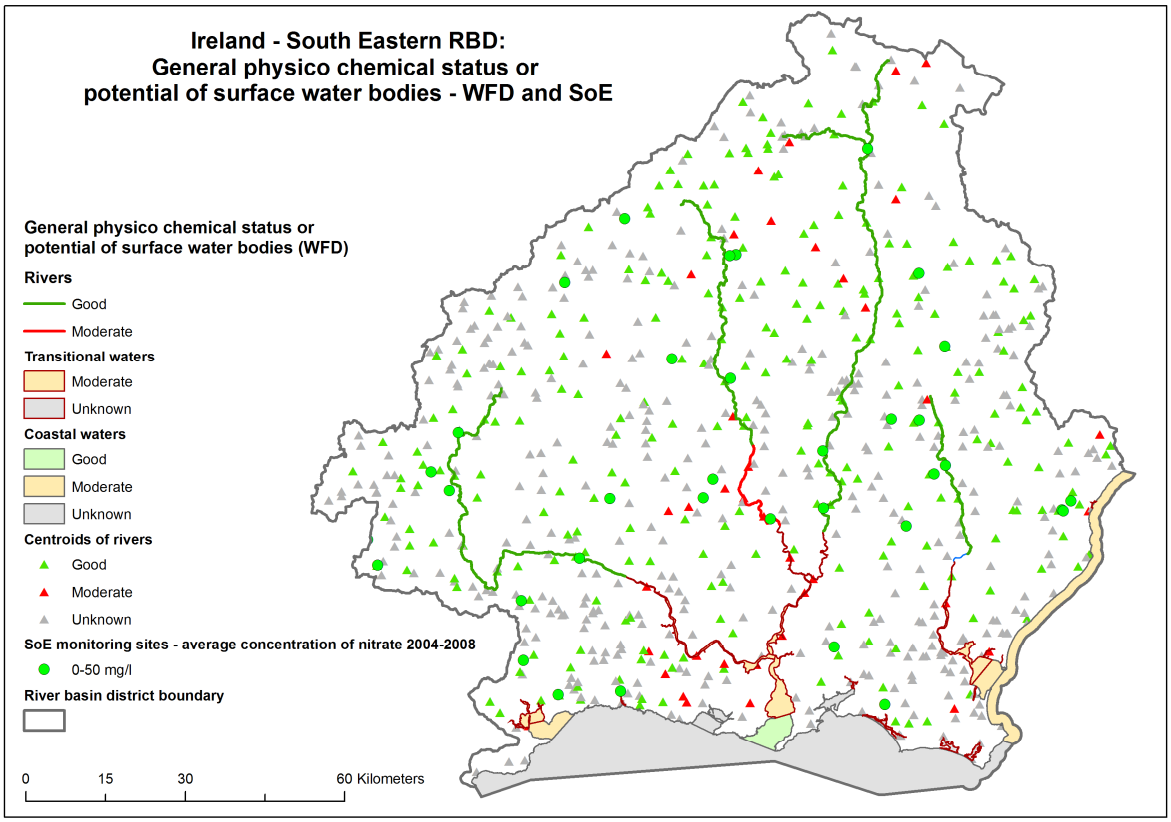


Figure 26: Quality of river SW bodies under WFD and SoE data



5. Conclusions

Comparison of the Nitrates Directive, the Water Framework Directive and the SoE can be done for nitrogen or nitrates only. Other data (e.g. phosphorus, BOD, COD, chlorophyll-a) have not been compared in this report.

Data from the **WFD** reporting provide information on the status of water bodies and pollutants responsible for poor status (for groundwater only) or monitoring site characteristics, but no information about nitrates or other pollutants concentration. Information if the status of a water body was assessed from concentrations at monitoring site(s) or derived from other information is also missing. Water body status data are provided every 6 years, updating of monitoring sites should be done any time.

Nitrates Directive data provide a nitrogen concentration value for every monitoring site. The reporting period is every 4th year and one characteristic nitrogen value (average) for the whole period is reported. The last reporting period was 2004 – 2007 and reporting was done in 2008, therefore, some countries did not include data from 2007. Time period of characteristic nitrogen concentration value (mean, maximum of nitrates concentration) differs per country – e.g. Bulgaria provided means for rivers from 2004 -2007, Czech Republic from 2004 – 2006, Hungary from 2004 – 2005 and Malta from November 2007 to April 2008. The

time period varies according to the water category (rivers, lakes, and groundwater and TCM waters) and /or monitoring site.

SoE data contains information of nitrates (or other determinands) – characteristic values (mean, median, maximum and minimum) of every monitoring site and every year separately for rivers, lakes and TCM. Groundwater data are provided as disaggregated (individual measurements for monitoring sites) or aggregated at water body level. The reporting is annual.

Only SoE reporting specifies the method of data aggregation (mainly replacement of concentrations below quantification limit with a value equivalent to half the limit of quantification). Aggregation is not relevant for WFD reporting.

Monitoring site comparison showed low overlap among SoE, NiD and WFD reported monitoring sites. It is partly because of different monitoring networks, selection of monitoring sites for SoE, NiD and WFD and inconsistencies between IDs and coordinates (different projection). New comparison SoE and NiD monitoring sites was done for selected countries (with more than 10% greater number of reported monitoring sites). Changes of the 2010 analysis compared to the 2009 analysis documented improvement for groundwater and rivers, less for lakes.

Nitrates pollution comparison in groundwater was done for 4 river basin districts (Austria – Danube, France – Seine and Normandy coastal waters, Czech Republic – Elbe and Ireland – South Eastern).

The comparison was prepared on water body level. Information about status assessment was used from the WFD. Nitrates state was assessed based on NiD data as well as from SoE data. The same national threshold limits for good and “poor” status as WFD national approach were used if available. In addition, the 50 mg/l NO3 limit was applied for all river basin districts as well. Results differ for NiD, WFD and SoE data:

- Two countries out of four tested RBDs used national threshold limit for nitrates in groundwater lower than 50 mg/l – Austria 45 mg/l and Ireland 37,5 mg/l. The Czech Republic and probably France (information was missing in WFD reporting) used 50 mg/l limit for groundwater

- Water bodies with NiD/SoE “poor state” but WFD “good status”: The reason is a different number of monitoring sites per the same water body in NiD, SoE and WFD reporting. Per example: If WFD groundwater body status is assessed from 30 monitoring sites and NiD or SoE reporting includes 5 sites only, the results could be different.

- Water bodies with NiD/SoE “good state” but WFD “poor status”: the reason is pollution of groundwater bodies which could be also from non- agricultural sources.

- Our nitrates pollution comparison of water bodies differs from national assessment. Although we used national threshold values and percentage of sites

above the threshold to classify with “not good” state, this European level assessment differs from national ones.

Nitrates pollution comparison in surface water was done for 1 RBD only - Ireland – South Eastern. The number of compared RBDs could not be higher because data was not quality assured and stored in a database yet. Comparison of nitrates assessment for surface water bodies is not very reliable because of the following reasons:

- WFD reporting includes information about quality element (e.g. fish, phytoplankton, macrophytes or general physico-chemical) status only, not pollutants such as NO_3
- General physico-chemical elements are supporting biological quality elements in ecological status analysis and countries can choose determinands which they find relevant for biological elements. For example, Ireland assessed nitrates in rivers only. Lakes were evaluated according ammonium and total phosphorus. Dissolved inorganic nitrogen was used in coastal waters and molybdate reactive phosphorus in transitional waters.
- WFD ecological status should be assessed at representative monitoring sites. NiD or SoE monitoring sites do not need to be representative for the whole water body.

The list of reasons above can be extended.

Another interesting result was detected: The matching number of reported stations is not the only important information from monitoring sites comparison – the number of water bodies with at least one reported monitoring sites is also important. If only some water bodies were selected for SoE monitoring sites reporting, it would be useful to know the reasons for the water bodies’ selection.