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COMMISSION STAFF WORKING DOCUMENT

Accompanying the document

REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

on the implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources based on Member State reports for the period 2016–2019

{COM(2021) 1000 final}

PRESSURE FROM AGRICULTURE

Belgium's utilised agricultural area amounts to 1353 Mha, representing 44% of the total land area and has remained stable since 2007. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order: cereals (24.8%), industrial crops (13.5%) and milk (12%).

Eurostat

Major land use statistics for Belgium

Table 1.Utilized agricultural area (abbreviated as UAA)

Belgium	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	1370	1358	1339	1353
arable land (1000 ha)	NA	840	836	818	855
permanent grass (1000 ha)	NA	507	500	498	478
permanent crops (1000 ha)	NA	21	18	18	19
kitchen gardens (1000 ha)	NA	0	0	NA	0

Note:

Eurostat (FSS)

Belgium's arable land has remained stable since 2007, while permanent grassland decreased slightly with 4%.

Animal distribution in Belgium

Belgium's live poultry has increased by 21.4% since 2013. The livestock density index (livestock unit per hectare of Utilized Agricultural Area) has increased by 1.9% since 2013 and is significantly higher than the EU average of 0.8.

Table 2. Livestock statistics

Belgium	2005	2007	2010	2013	2016
Livestock index	2.80	2.76	2.80	2.74	2.79
dairy cows (10^6 heads)	0.55	0.52	0.52	0.52	0.53
live bovines (10^6 heads)	2.60	2.57	2.51	2.44	2.50
live pigs (10^6 heads)	6.25	6.20	6.18	6.35	6.18
live poultry (10^6 heads)	NA	NA	34.37	35.11	42.63

Note:

Eurostat (FSS)

Nitrogen and phosphorus fertilizers and surplus (kg/ha UUA)

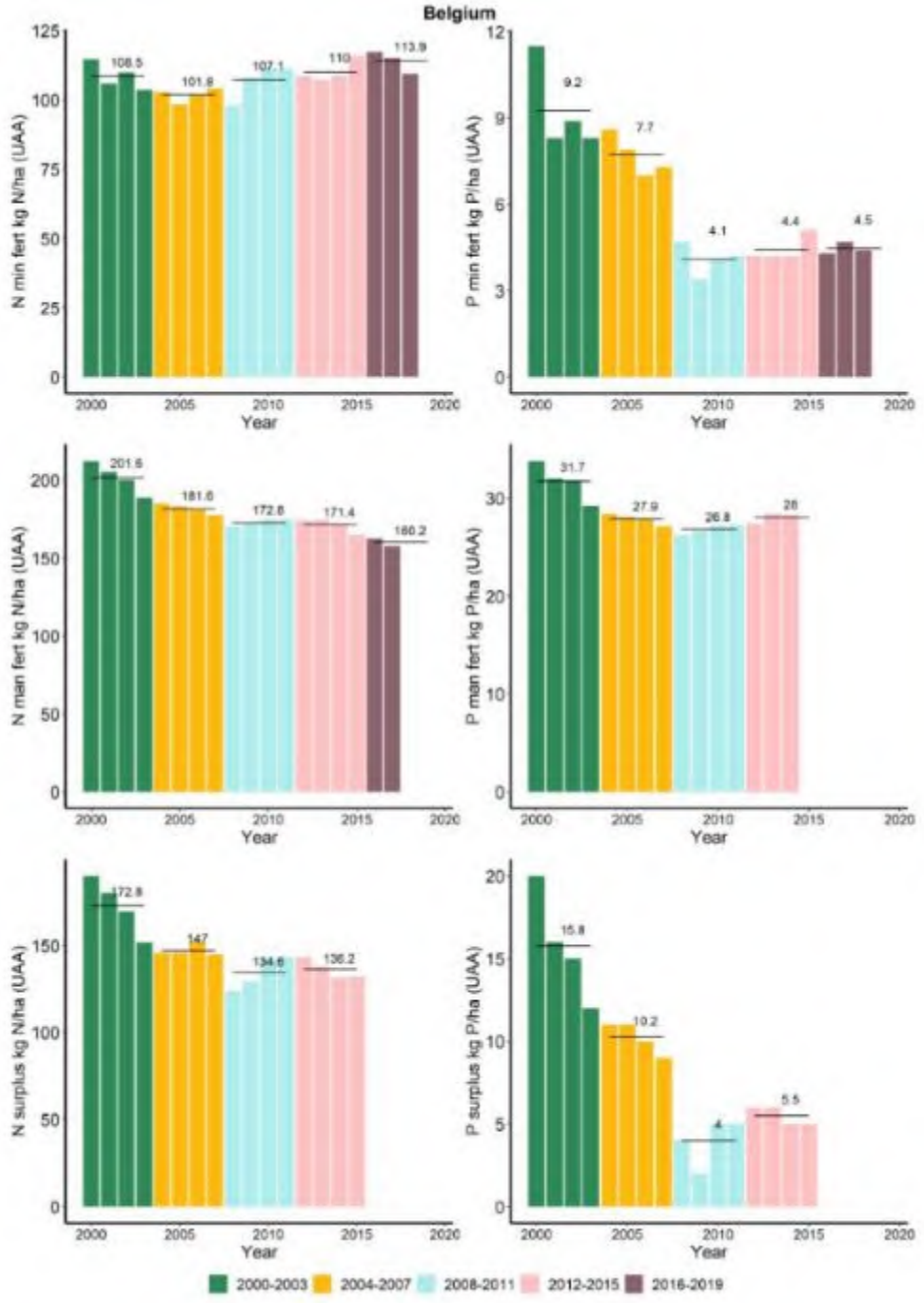


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate form EUROSTAT data for the years 2000-2014. It is noteworthy that Belgium provided also other statistics for N and P mineral fertilizers. However, comparing these statistics with Eurostat values for common years, they differ significantly. Consequently, the data of Eurostat were kept. N and P mineral fertilizers, manure and N surplus remained stable since 2010, while P surplus increased. In the plots: N/P min and N/P man are respectively the N/P mineral fertilizers and N/P manure.

Livestock unit - LSU /ha – Belgium Flanders

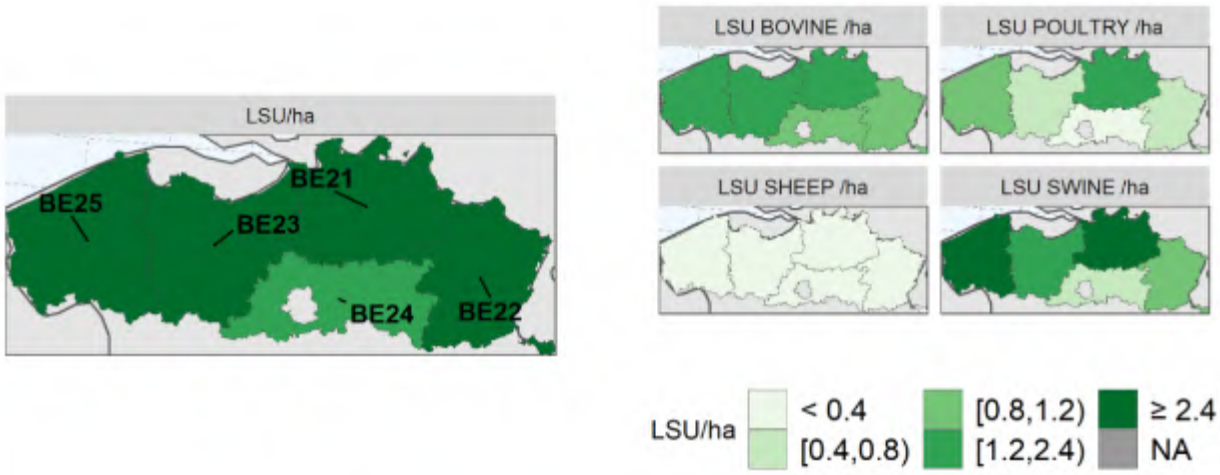


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in BE25 and BE21 with highest value of LSU/ha of bovine, swine, followed by poultry (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

Livestock unit - LSU /ha – Belgium Wallonia

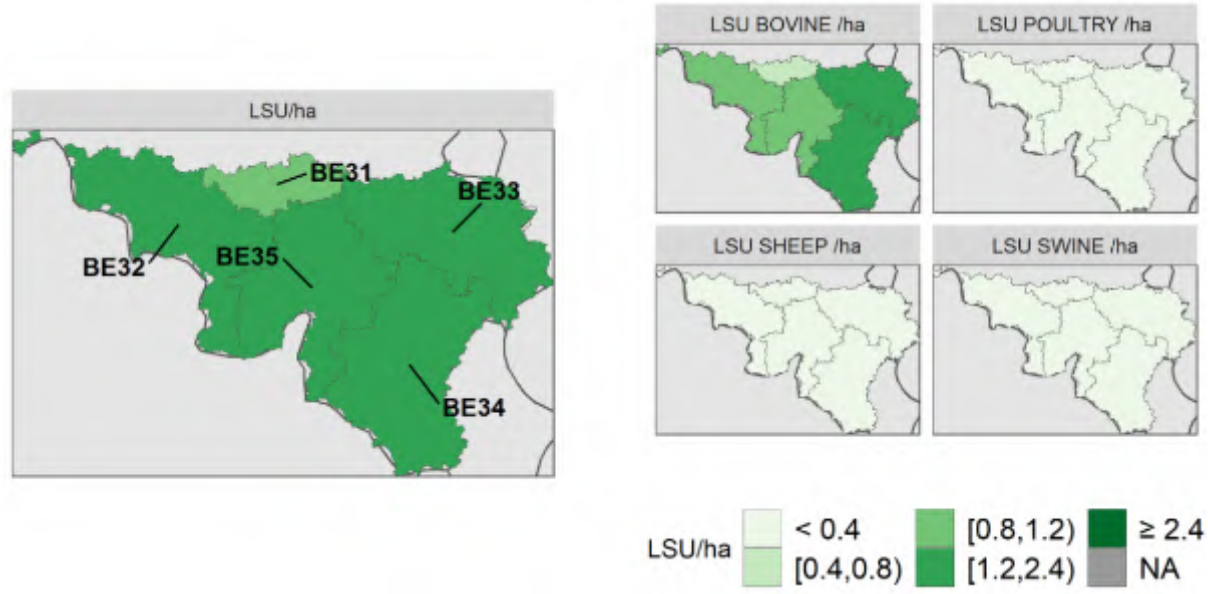


Figure 3. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the eastern part with highest values of LSU/ha of bovine (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring - Flanders

Monitoring for the Nitrates Directive is managed by The Flanders Environment Agency (Vlaamse Milieumaatschappij, VMM) who maintains the Manure Action Plan (MAP) monitoring network. Samples are taken from the MAP surface sampling points on a monthly basis. For those points with concentrations lower than 40 mg nitrate/l for at least three consecutive years, samples are taken only three times per winter year. The MAP monitoring network was extended specifically to assess the impact of agricultural activities on the nitrate concentration in small water systems. The results are used to report on the most recent reporting period (2016-2019) and the previous periods. The monitoring network for eutrophication assessment is that of the Water Framework Directive. For groundwater, samples are taken twice a year for all wells.

For groundwater water measurements, some stations have same coordinates due to different depths. In this case, the average values covers different measurements in time, but also location. In maps providing the spatial distribution of monitoring points, it is not possible to distinguish stations with the same coordinated: for NO3 concentration, the average value is shown; for trends and trophic status the worst case was considered.

It is noteworthy that in some cases in the bar charts the total value can differ from 100% due to rounding errors.

Groundwater quality monitoring network

Table 3. Number of GW stations with measurements and trends per type

		Number of stations with measurements			Number of stations with Trends		
Station Type	Description	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
0	Phreatic groundwater (shallow): 0-5 m	999	991	992	967	950	979
1a	Phreatic groundwater (deep) 5-15 m	751	752	747	735	719	743
1b	Phreatic groundwater (deep) 15-30 m	219	221	219	209	209	217
1c	Phreatic groundwater (deep) >30 m	106	109	109	100	103	107
2	Captive groundwater	0	0	0	0	0	0
3	Karstic groundwater	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0
	Total	**2075**	**2073**	**2067**	**2011**	**1981**	**2046**

Surface water quality monitoring network

Table 4. Number of SW stations with measurements, trends and trophic status per type

		Number of stations with measurements			Number of stations with Trends			Number of stations with Trophic status		
Station Type	Description	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
4	River water	793	769	760	789	757	753	227	222	214
5	Lake/reservoir water	0	0	0	0	0	0	13	11	11
6	Transitional water	0	0	0	0	0	0	7	7	7
7	Coastal water	0	0	0	0	0	0	0	0	0
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**793**	**769**	**760**	**789**	**757**	**753**	**247**	**240**	**232**

Groundwater Quality - Flanders

Groundwater average annual nitrate concentration

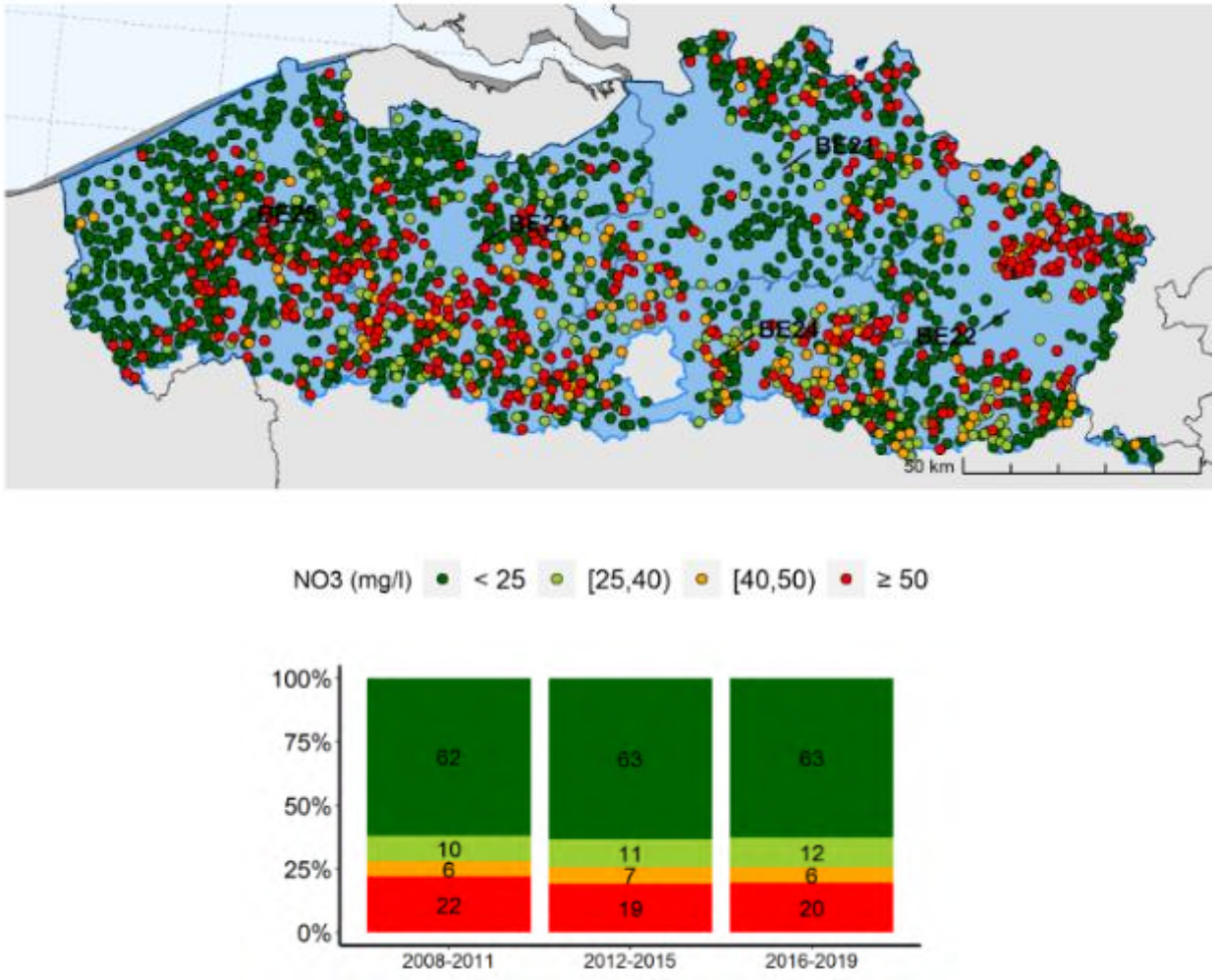


Figure 4. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). In the map in blue the NVZ.

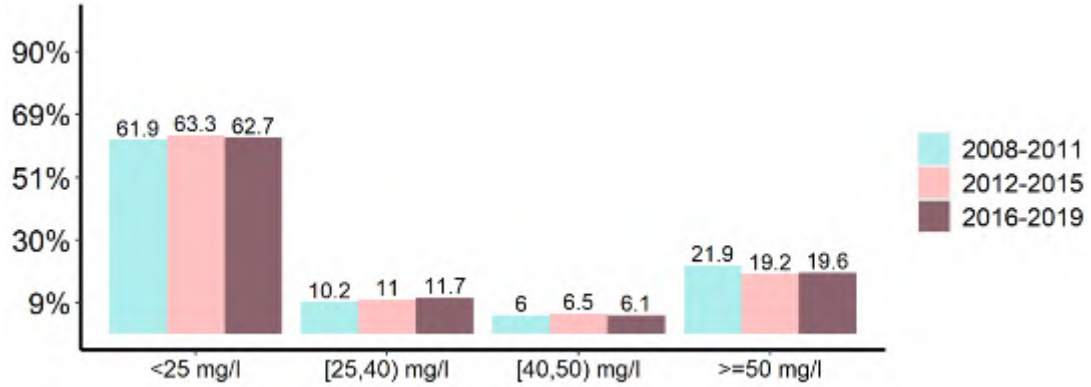


Figure 5. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

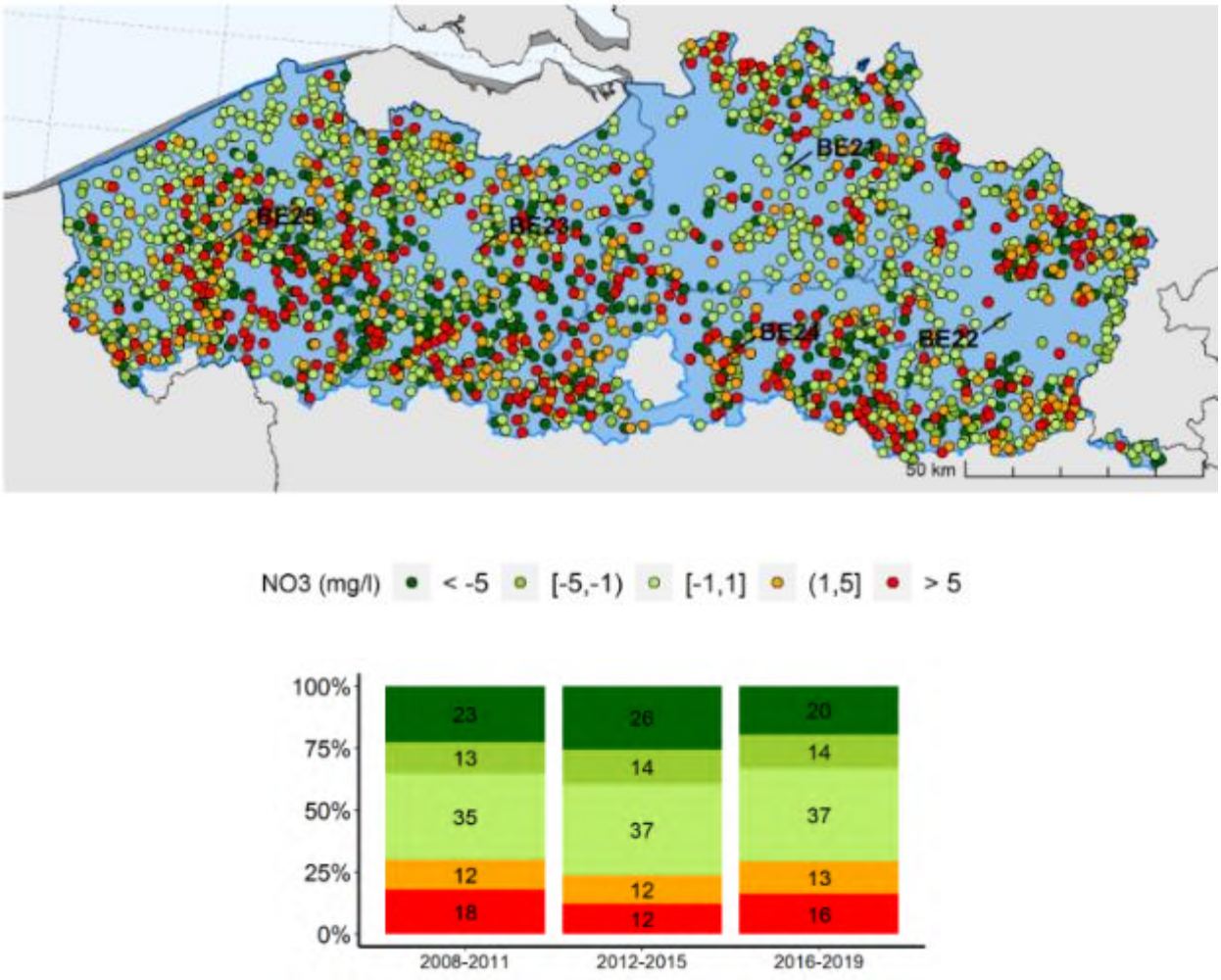


Figure 6. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

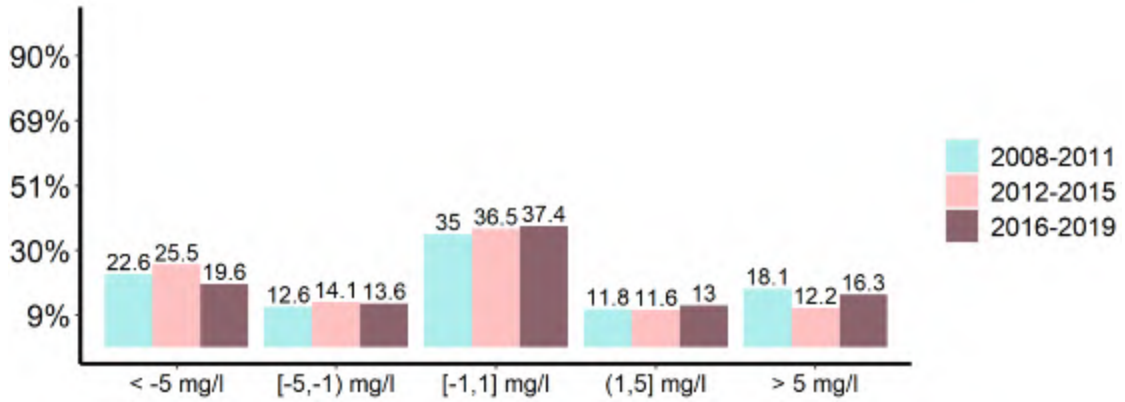
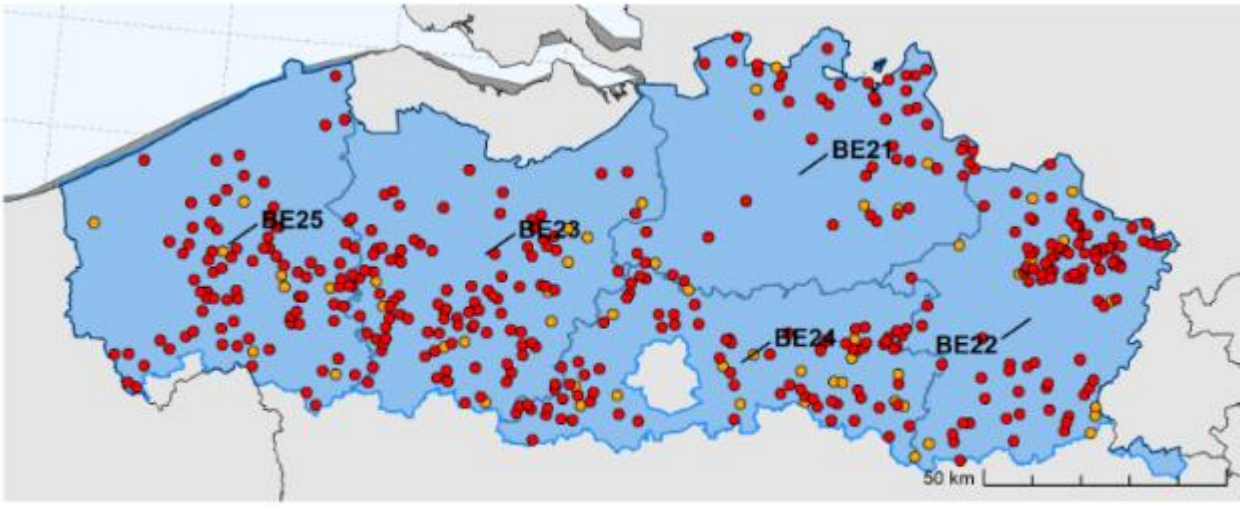


Figure 7. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot



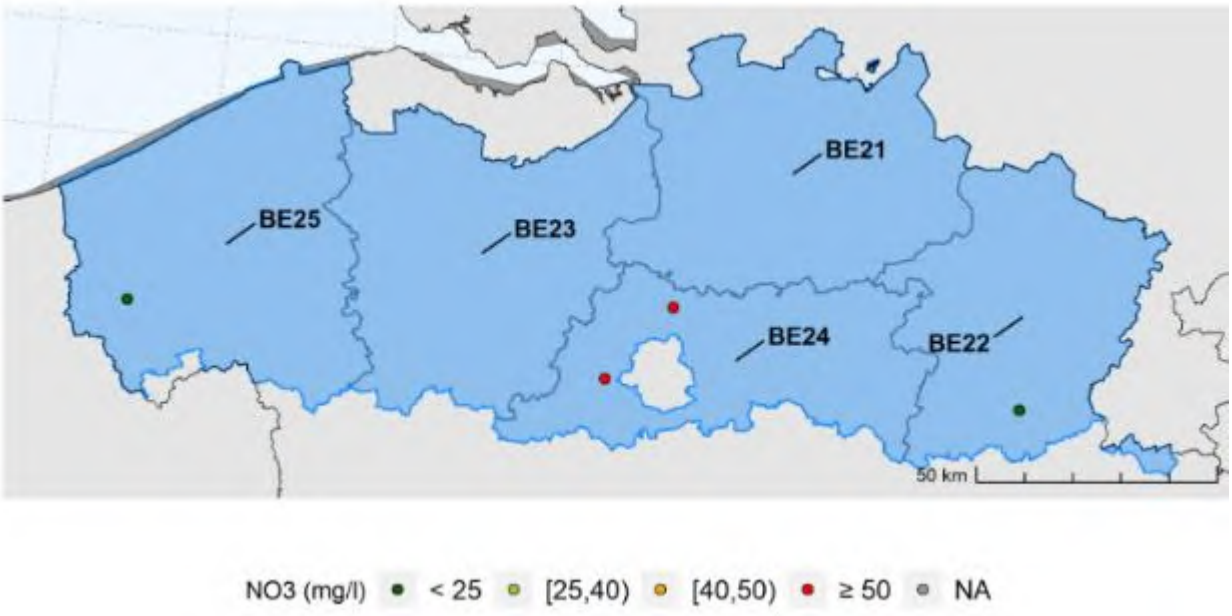
NO3 (mg/l) [40,50) incr. trend ≥ 50

NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
BE21	Prov. Antwerpen	7	49
BE22	Prov. Limburg (BE)	13	97
BE23	Prov. Oost-Vlaanderen	11	101
BE24	Prov. Vlaams-Brabant	16	75
BE25	Prov. West-Vlaanderen	9	83
	Total	**56**	**405**

Figure 8. GW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l. In the map in blue the NVZ.

The hotspot analysis identifies all the GW monitoring stations that have NO3 concentration in the range of 40-50 mg/l with increasing trends and above 50 mg/l. The map shows the spatial distribution of these points, and the table reports the number of stations by NUTS inside and outside NVZ. Only the NUTS of interest are reported.

Groundwater stations removed



Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	1	1	0
1a	Phreatic groundwater (deep) 5-15 m	2	2	1
1b	Phreatic groundwater (deep) 15-30 m	1	1	0
1c	Phreatic groundwater (deep) >30 m	0	0	0
2	Captive groundwater	0	0	0
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**4**	**4**	**1**

Figure 9. GW removed stations map (top graph) and by groundwater type (lower graph). In the map in blue the NVZ.

The removed stations analysis identifies all the GW monitoring stations that were removed in the current reporting period. The map shows the spatial distribution of these points with the concentrations of the previous reporting period, and the table reports the number of stations with measurements and trends per type.

Surface Water Quality - Flanders

Surface water average annual nitrate concentration

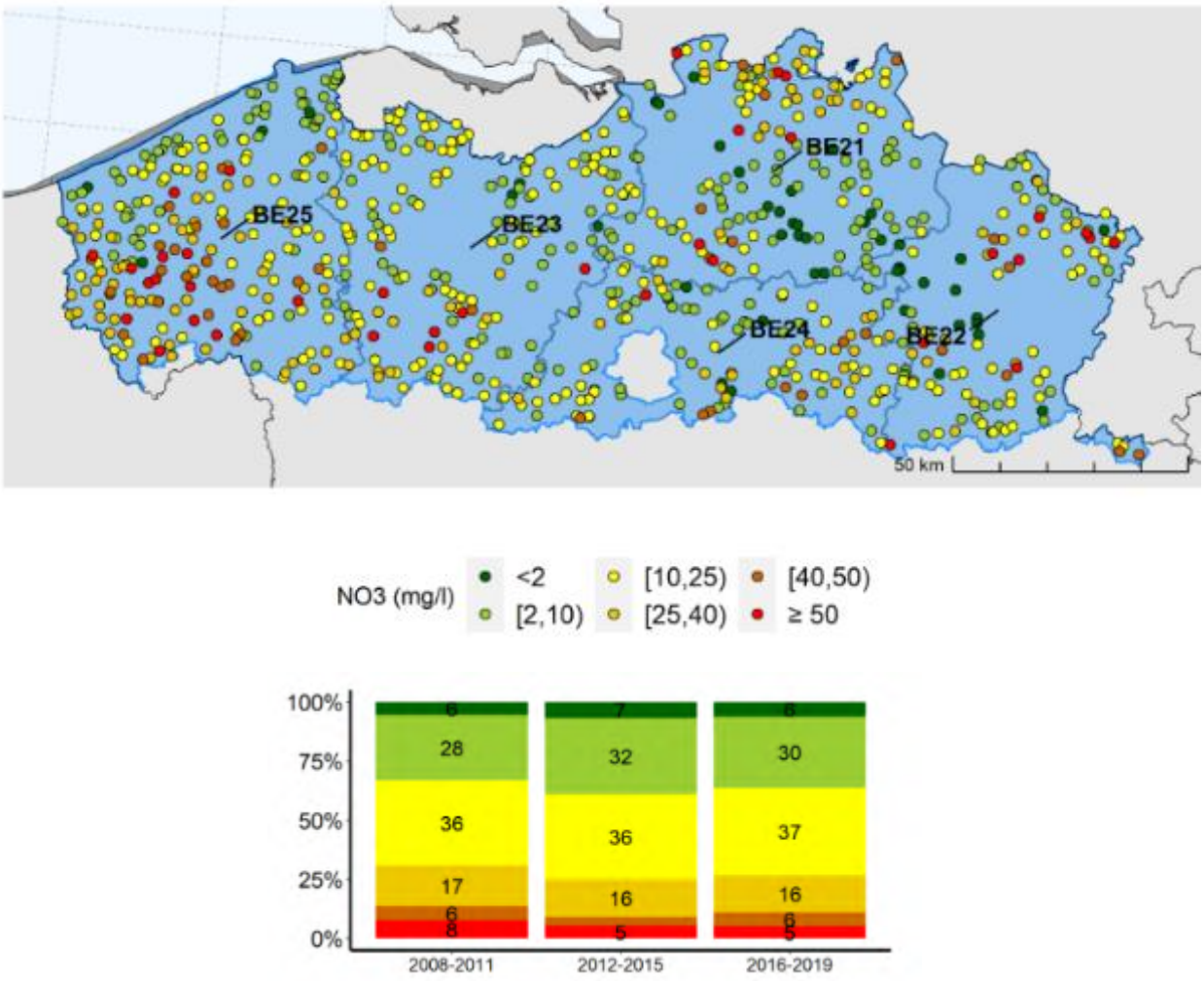


Figure 10. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

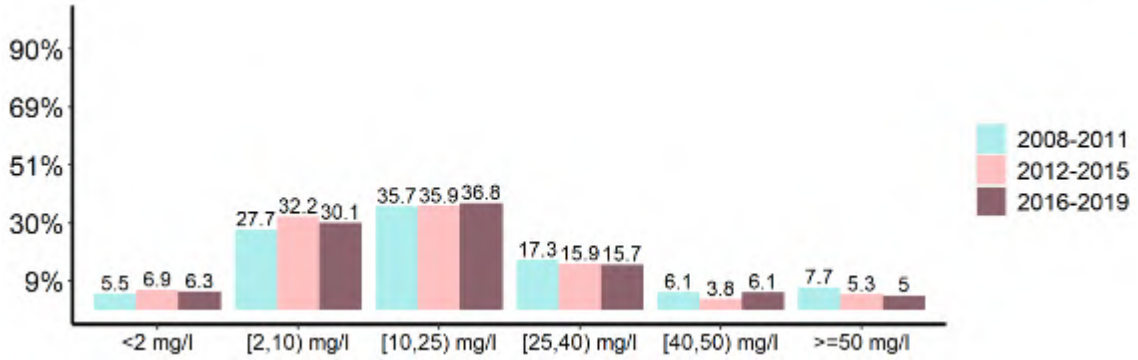


Figure 11. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

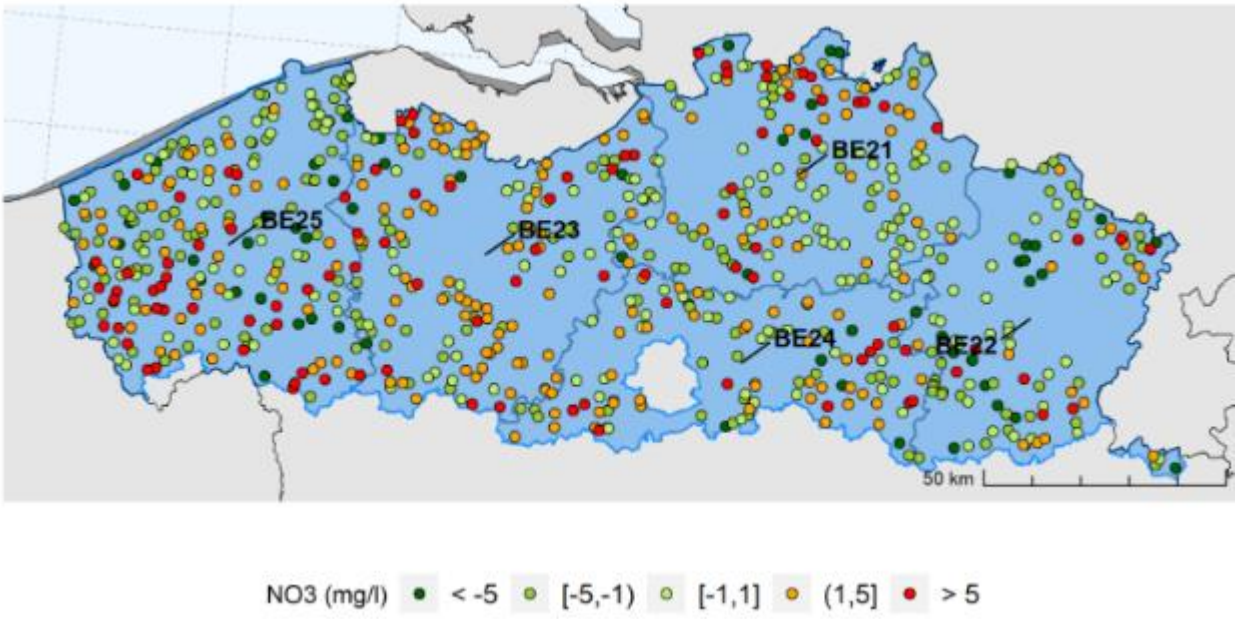


Figure 12. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

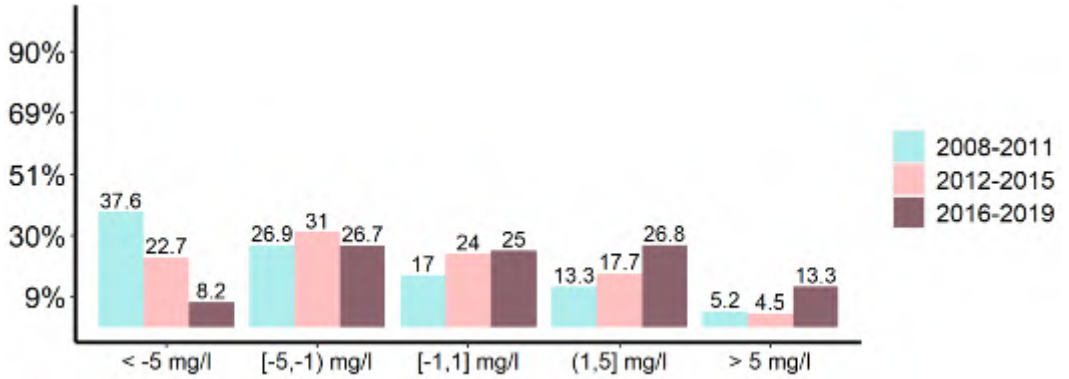


Figure 13. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

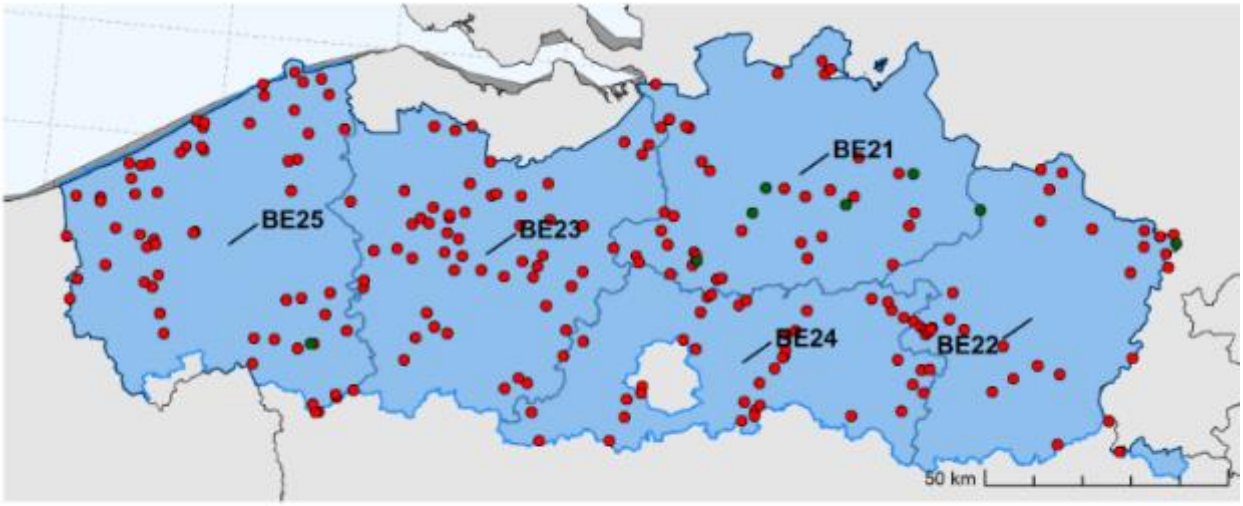


Figure 14. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

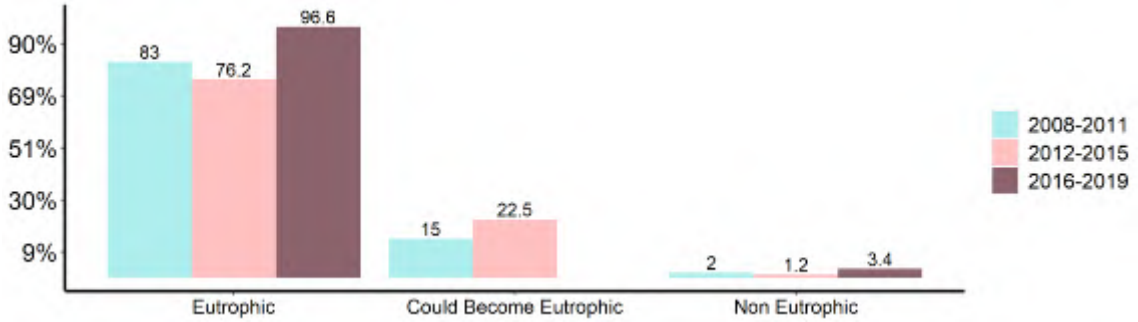


Figure 15. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration

High trophic status · <2 · [2,10) · [10,25) · [25,40) · [40,50) · ≥ 50 mg/l · Unclassified

			Number of stations by classes of concentration						
NUTS ID	NUTS NAME	High trophic status	<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
BE21	Prov. Antwerpen	33	0	0	1	0	0	0	32
BE22	Prov. Limburg (BE)	32	0	0	1	0	0	0	31
BE23	Prov. Oost-Vlaanderen	54	0	0	1	0	0	0	53
BE24	Prov. Vlaams-Brabant	42	0	0	0	0	0	0	42
BE25	Prov. West-Vlaanderen	56	0	0	0	0	0	0	56
NO_NUTS	SALINE	7	0	0	0	0	0	0	7
	Total	**224**	**0**	**0**	**3**	**0**	**0**	**0**	**221**

Figure 16. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration. In the map in blue the NVZ.

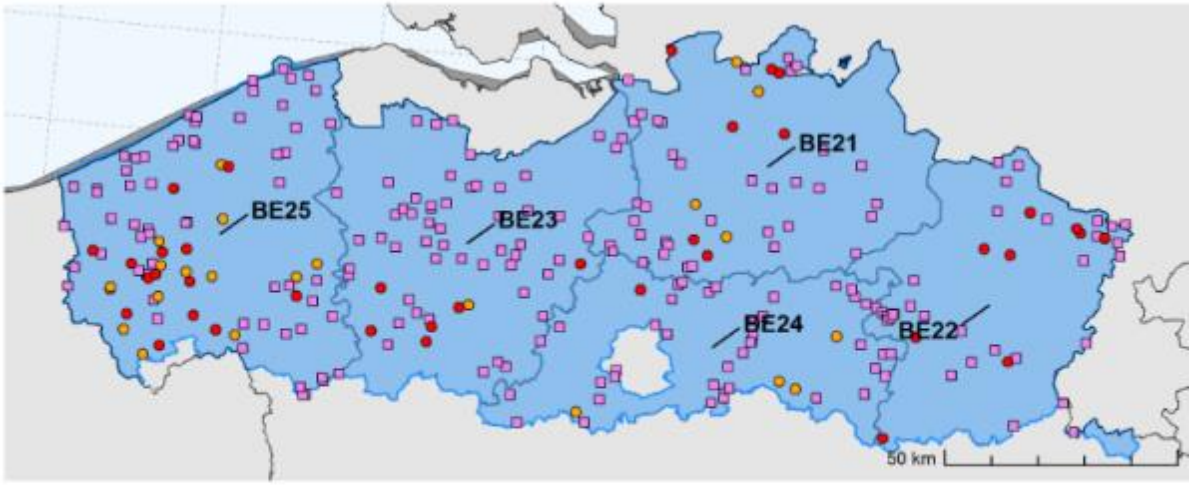
The analysis shows all the SW monitoring stations with the highest trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations by classes of NO3 concentration. Only the NUTS of interest are reported.

Like for the previous report the eutrophication criteria are those used for the Water Framework Directive. For all river types except mesotidal lowland estuaries, eutrophication is evaluated based on total phosphorus. For mesotidal lowland estuaries nitrate, nitrite and ammonium are used in addition to total phosphorus to assess the trophic state. Lakes are also evaluated using total phosphorus as criteria. The large majority of rivers is classified as eutrophic (97.2%) while all transitional waters are eutrophic. Only 20% of lakes are non-eutrophic while the rest is eutrophic. No surface water body type was classified as “may become eutrophic”.

Table 5. Summary of SW stations by classes of trophic status and type.

		Number of stations with Trophic status		
Station Type	Description	Eutrophic	Could become eutrophic	Non Eutrophic
4	River water	208	0	6
5	Lake/reservoir water	9	0	2
6	Transitional water	7	0	0
7	Coastal water	0	0	0
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**224**	**0**	**8**

Surface Water quality hotspot



NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
BE21	Prov. Antwerpen	33	4	7
BE22	Prov. Limburg (BE)	32	0	10
BE23	Prov. Oost-Vlaanderen	54	1	6
BE24	Prov. Vlaams-Brabant	42	4	1
BE25	Prov. West-Vlaanderen	56	14	14
NO_NUTS	SALINE	7	0	0
	Total	**224**	**23**	**38**

Figure 17. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status. In the map in blue the NVZ.

The hotspot analysis identifies all the SW monitoring stations that have high eutrophic status, NO3 concentration in the range of 40-50 mg/l with increasing trends and above 50 mg/l. The map shows the spatial distribution of these points, and the table reports the number of stations by NUTS inside and outside NVZ.
Only the NUTS of interest are reported.

Surface Water Stations Removed

Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	21	15	15	6
5	Lake/reservoir water	0	0	0	0
6	Transitional water	0	0	0	0
7	Coastal water	0	0	0	0
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**21**	**15**	**15**	**6**

Figure 18. SW removed stations map (top graph) and distribution by type (lower graph). In the map in blue the NVZ.

The removed stations analysis identifies all the SW monitoring stations that were removed in the current reporting period. The map shows the spatial distribution of these points with the concentrations of the previous reporting period, and the table reports the number of stations with measurements and trends per type.

Measures in the Action Programme – Flanders

For Belgium-Flanders the 5th AP was valid between 2015 and 2018 and was followed up by the 6th AP for the period 2019-2022 adopted on May 2019. The 5th Action Programme contains stricter measures to reduce the pollution of water by nitrates and phosphates from agricultural sources and to prevent further pollution. The 5th action programme aims to have a maximum of 5% of surface water sites exceeding 50 mg/l by the end of 2018 and the overall target for groundwater is a 10% reduction of the nitrate concentration in the shallow groundwater, compared to 2010. In addition, measures for phosphorus, aligned with the objectives of the Water Framework Directive, were also adopted in the 5th Action Programme. The measures of the 5th Action Programme were summarised using four core concepts: area-oriented approach, judicious fertilisation with nitrogen and phosphorus, farm approach and better compliance with the manure legislation.

In the period during which the action programme for 2015-2018 was executed, no further improvement in water quality was observed. The 6th Action Programme therefore contains stricter measures to reduce nutrient losses from agriculture and horticulture and to bring water quality in line with the European targets. To guarantee good area-oriented monitoring of water quality, the mean nitrate concentration of the sampling points in each of the run-off zones of the Flemish water bodies is used as the key indicator. The main objectives of 6th AP are for surface water a decrease of 4 mg of nitrate per litre in the mean distance to the target (18 mg/l), and for groundwater an overall downward trend of at least 0.75 mg nitrate/l per year in all run-off zones with inadequate groundwater quality.

The specific measures, in accordance with Article 5 of the Nitrates Directive, are valid for the entire territory. It is noteworthy that during 2016-2019, the provisions of the Manure Decree amended by the Decree of 12 June 2015 apply for the 2016-2018 period, and the provisions of the Manure Decree amended by the Decree of 26 April 2019 apply from 2019 onwards.

The details of measures are reported in the Table below.

Table 6. Details of the Flemish Action Programme

Measure	General details in Action Programme
Period of prohibition of fertiliser application	• Provisions valid from 2016 to 2018: Section 3.2.2.1.1 MS report
	• Amended provisions from 2019 onwards: Section 3.2.2.1.2 MS report
Restrictions for application on sloped soils	• Provisions valid from 2016 to 2018: 15% or more (except for grazing). Section 3.2.2.2.1 MS report
	• Amended provisions from 2019 onwards: no amendments
Restrictions for application on soaked, frozen, or snow-covered soils	• Provisions valid from 2016 to 2018: not on water-saturated, flooded, frozen or snow-covered ground. Section 3.2.2.3.1 MS report
	• Amended provisions from 2019 onwards: no amendments
Restrictions for application near watercourses (buffer strips)	• Provisions valid from 2016 to 2018: 5-10 m. Section 3.2.2.4.1 MS report
	• Amended provisions from 2019 onwards: no amendments
Effluent storage works	• Provisions valid from 2016 to 2018: section 3.2.2.5.1 MS report
	• Amended provisions from 2019 onwards: section 3.2.2.5.2 MS report
Capacity of manure storage	• Provisions valid from 2016 to 2018: section 3.2.2.5.1 MS report
	• Amended provisions from 2019 onwards: section 3.2.2.5.2 MS report
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Provisions valid from 2016 to 2018: section 3.2.2.6.1 MS report
	• Amended provisions from 2019 onwards: section 3.2.2.6.2 MS report
Crop rotation, permanent crop enhancement	• Provisions valid from 2016 to 2018: section 3.2.2.7.1 MS report
	• Amended provisions from 2019 onwards: section 3.2.2.7.2 MS report
Vegetation cover in rainy periods, winter	• Provisions valid from 2016 to 2018: section 3.2.2.8.1 MS report
	• Amended provisions from 2019 onwards: section 3.2.2.8.2 MS report
Fertilisation plans, spreading records	• Provisions valid from 2016 to 2018: section 3.2.2.9.1 MS report
	• Amended provisions from 2019 onwards: section 3.2.2.9.2 MS report
Other measures	NA
Date for application limit of 170 kg N/ha/year:	• Not specified

Controls- Flanders

The number of checks on the application of fertilisers on agricultural land varied from 2398 in 2016 to 3409 in 2019 (large increase from the previous reporting period). The non-compliance went down from 10% in 2016 to 7% in 2019. The largest number of non-compliance deals with no low application emission and fertilisation too close to water courses. The percentage of checks with infringements of the fertlisation transport rules ranges from 7% in 2016 to 9% in 2019.

Designation of NVZ - Flanders

Flanders adopted a whole territory approach (13,522 km^2). Since 2011, Flanders uses focus areas to indicate areas with poor surface water quality (based on the evaluation of the exceedance of the threshold of 50 mg nitrate per L) or poor groundwater quality. The focus area went from 2720 km^2 for the previous reporting period to 2250 km^2 for the current period (2016-2018). Stricter measures are applied in focus areas including provisions relating to the fertiliser spreading prohibition period, requirement under certain conditions to sow catch crops, maintain stricter nitrate residue thresholds at parcel level.

Forecast of Water Quality - Flanders

No information is yet available regarding the future evolution of water quality in Flanders. A model setup is being developed to provide answer for the next reporting period.

Summary – Flanders

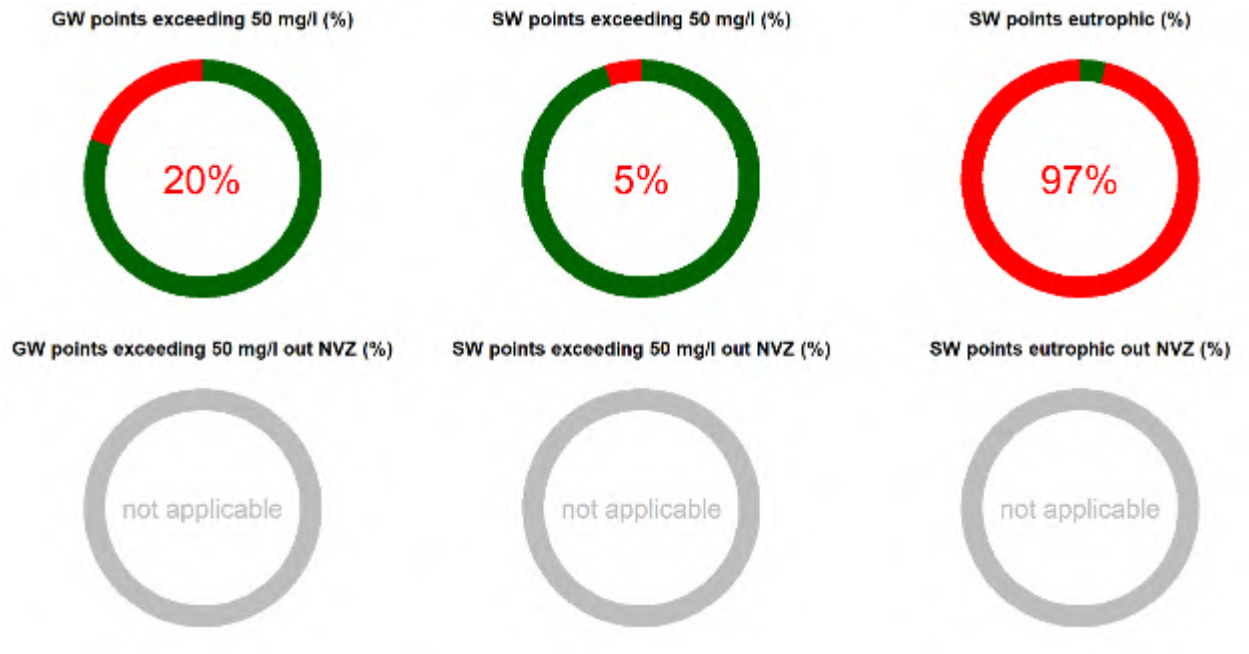


Figure 19. The summary plot for the period 2016-2019

This plot provides in the first row the percentage of stations exceeding 50 mg/l with respect to the total stations with measures and the percentage of eutrophic SW stations with respect to the total for which the trophic status is reported. In the second row, the percentage of stations exceeding 50 mg/l that are outside NVZ with respect to the total of stations exceeding 50 mg/, and the percentage of SW eutrophic stations that are outside NVZ with respect to the total that are eutrophic.

Long term analysis - Flanders

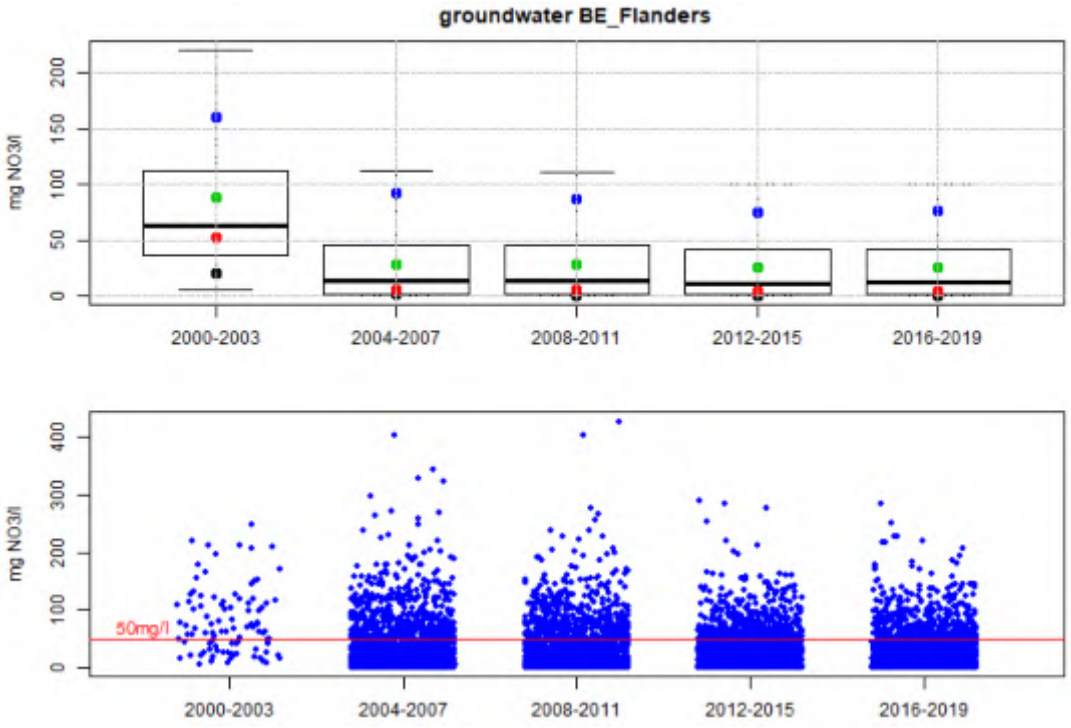


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

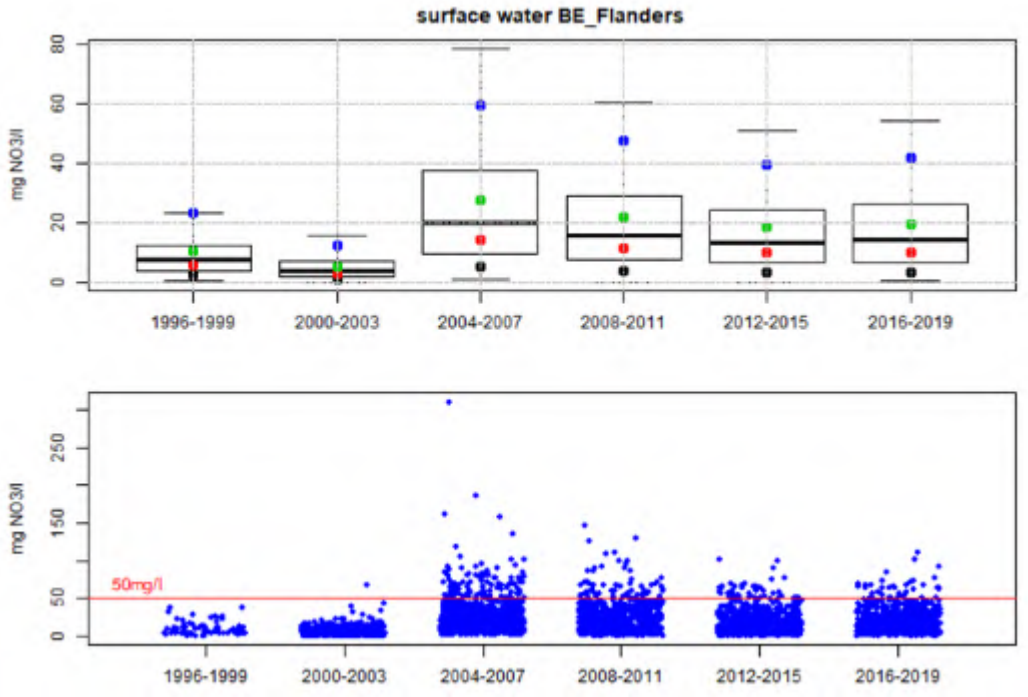


Figure 21. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.