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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}

Water Quality Monitoring - Scotland

Since the country report of Scotland is not available no descriptions are reported in the following sections. 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 9. 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	77	99	99	25	88	93
1a	Phreatic groundwater (deep) 5-15 m	59	41	40	25	39	39
1b	Phreatic groundwater (deep) 15-30 m	86	61	61	40	58	60
1c	Phreatic groundwater (deep) >30 m	47	80	78	22	71	74
2	Captive groundwater	48	33	28	20	33	28
3	Karstic groundwater	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0
	Total	**317**	**314**	**306**	**132**	**289**	**294**

Surface water quality monitoring network

Table 10. 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	223	388	555	223	179	422	0	0	554
5	Lake/reservoir water	86	42	95	2	29	80	0	0	96
6	Transitional water	69	27	27	28	27	27	0	0	27
7	Coastal water	101	12	3	25	12	3	0	0	3
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	**479**	**469**	**680**	**278**	**247**	**532**	**0**	**0**	**680**

Groundwater Quality - Scotland

Groundwater average annual nitrate concentration

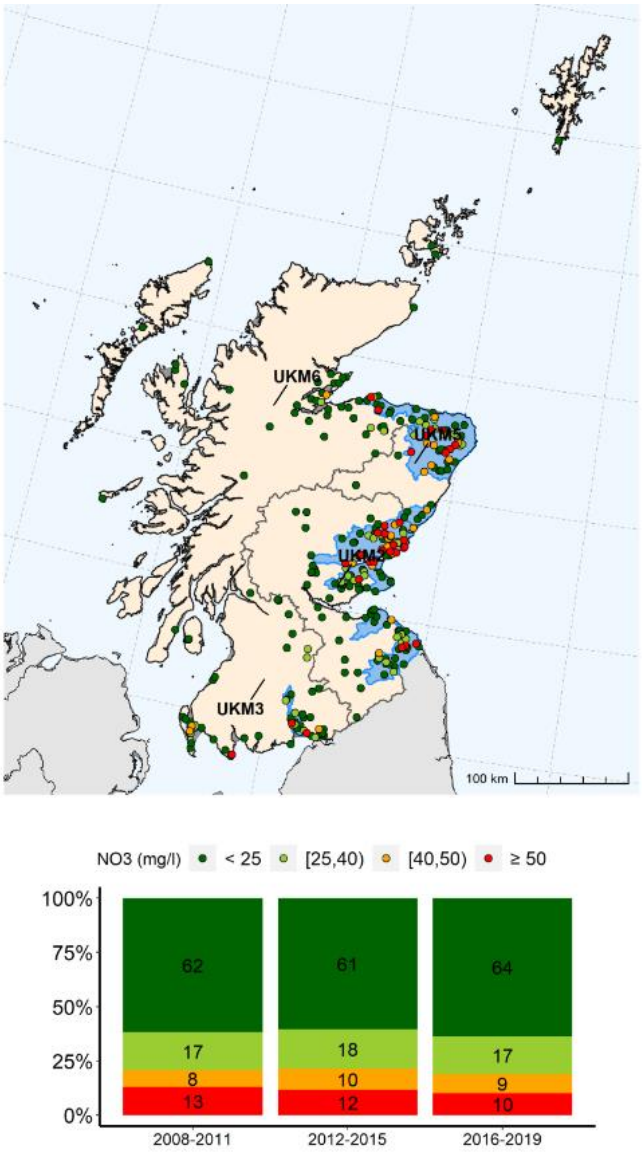


Figure 37. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). In the map in blue the NVZ.

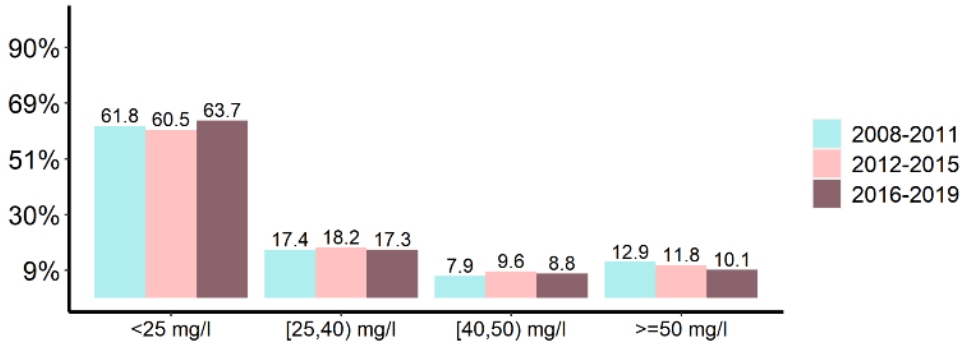


Figure 38. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Groundwater average annual nitrate concentration trend

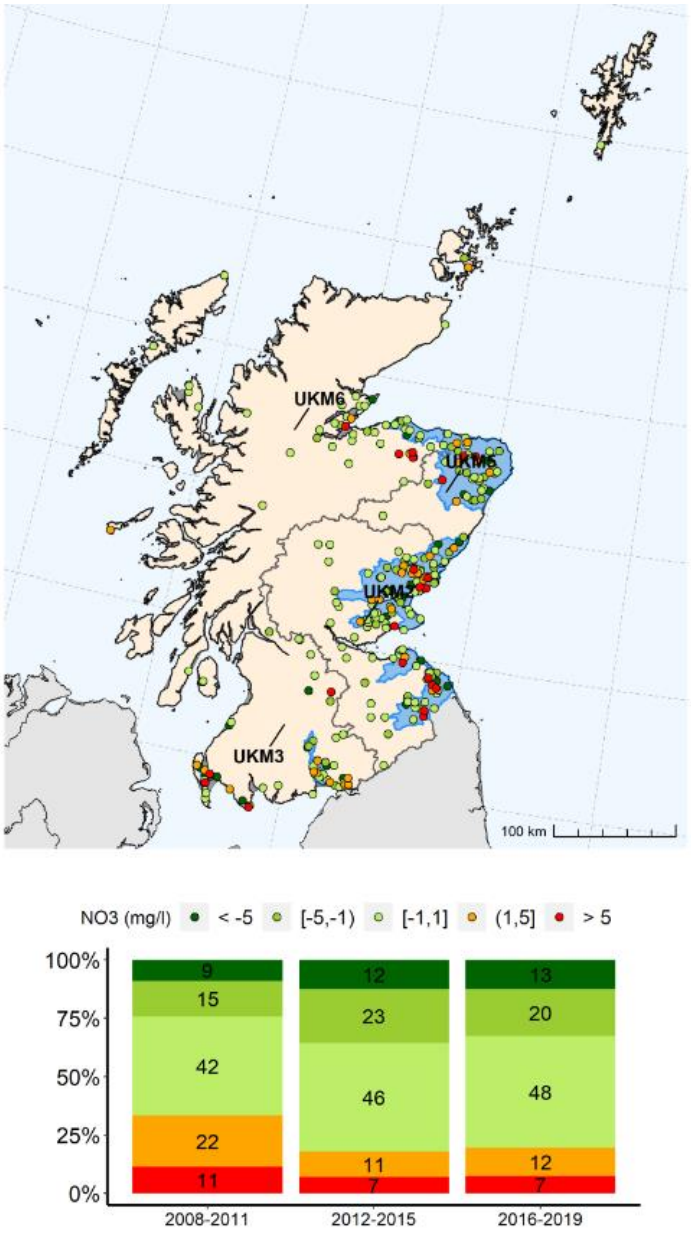


Figure 39. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

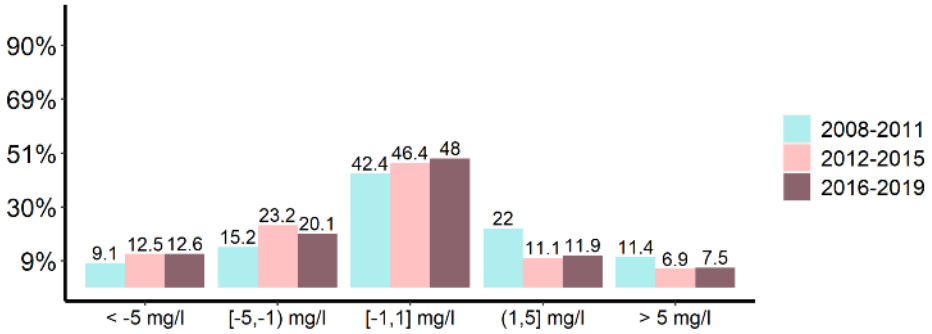
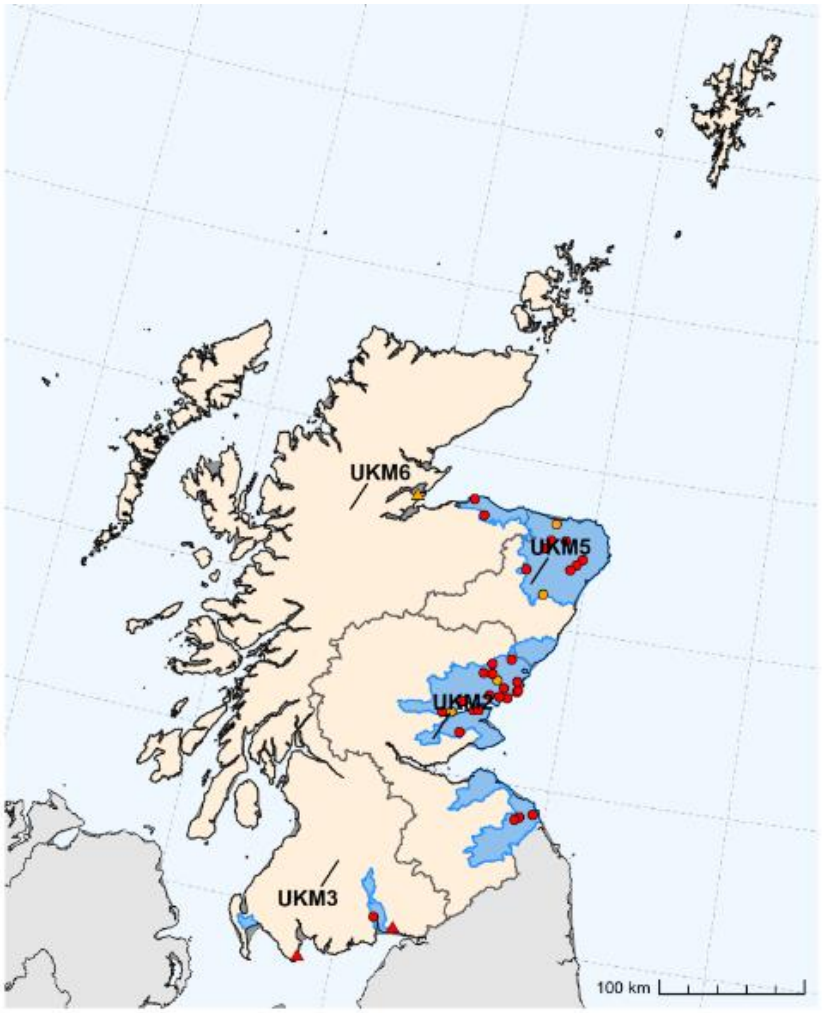


Figure 40. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Groundwater hotspot



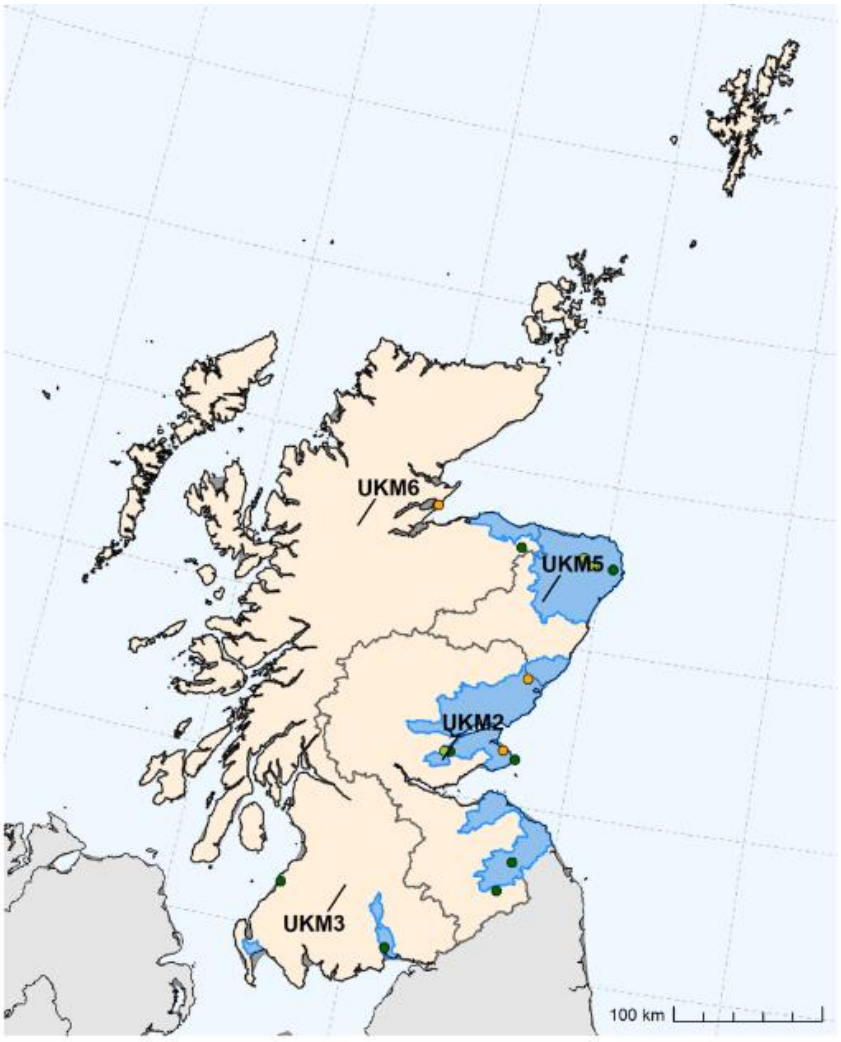
NO3 (mg/l) [40,50) incr. trend InNVZ [40,50) incr. trend OutNVZ ≥ 50 InNVZ ≥ 50 OutNVZ

		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
UKM2	Eastern Scotland	2	0	19	0
UKM3	South Western Scotland	0	0	1	2
UKM5	North Eastern Scotland	2	0	7	0
UKM6	Highlands and Islands	0	1	2	0
	Total	**4**	**1**	**29**	**2**

Figure 41. 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	6	6	5
1a	Phreatic groundwater (deep) 5-15 m	0	0	0
1b	Phreatic groundwater (deep) 15-30 m	0	0	0
1c	Phreatic groundwater (deep) >30 m	5	5	5
2	Captive groundwater	3	3	3
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**14**	**14**	**13**

Figure 42. GW removed stations map (top graph) and distribution 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 - Scotland

Surface water average annual nitrate concentration

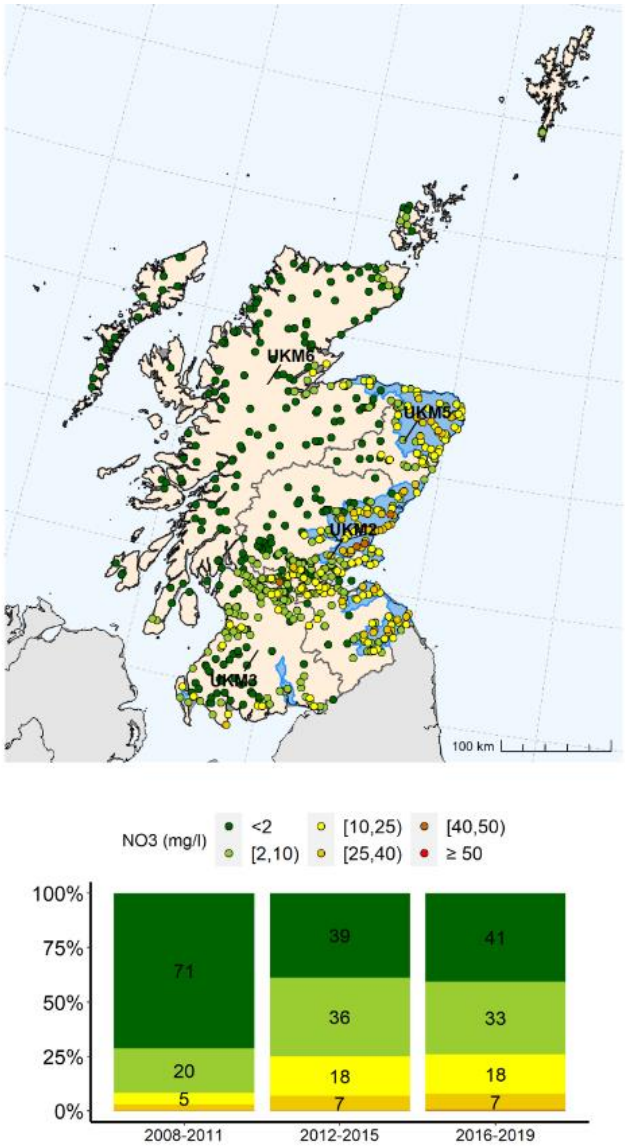


Figure 43. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

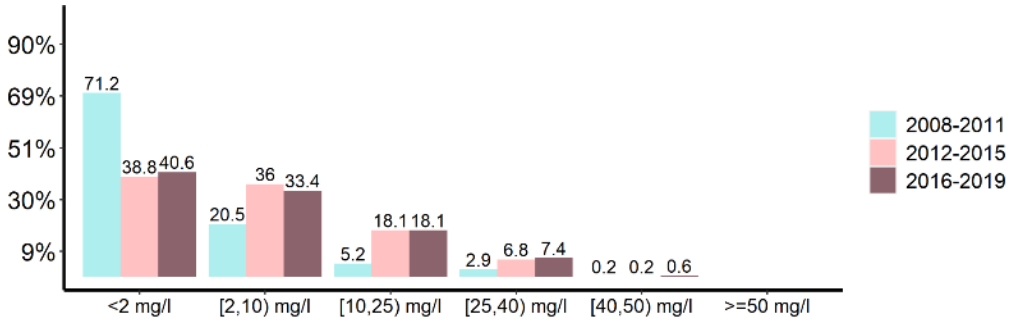


Figure 44. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Surface water average annual nitrate concentration trend

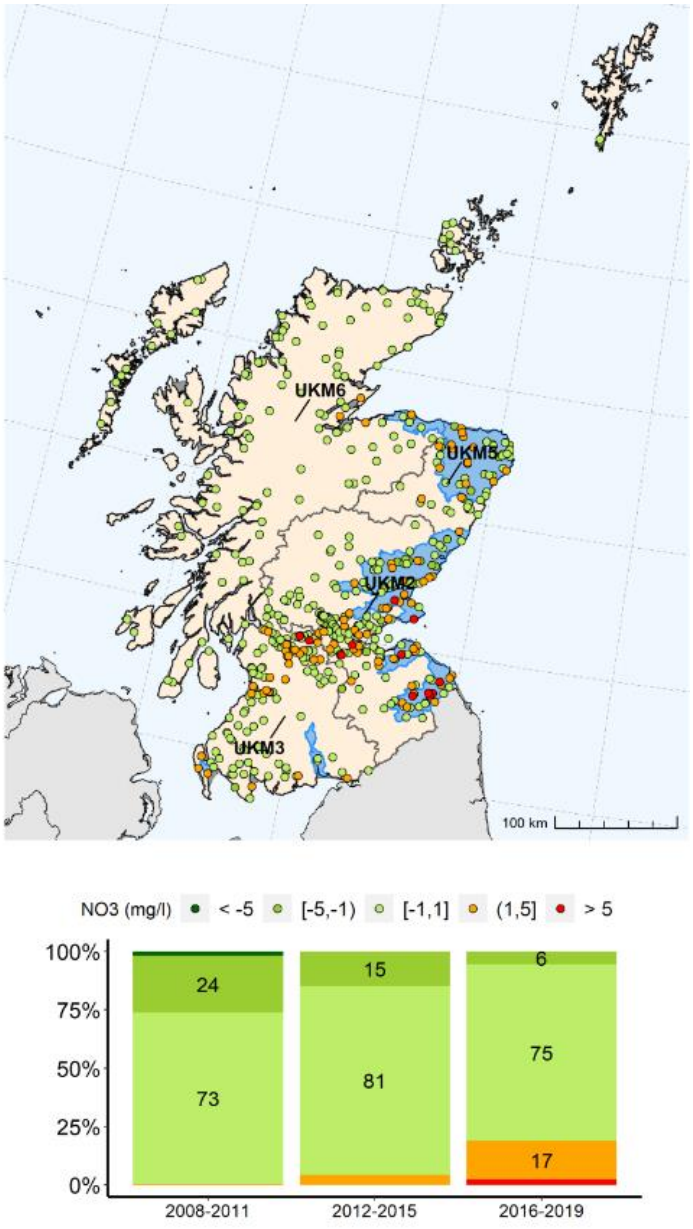


Figure 45. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

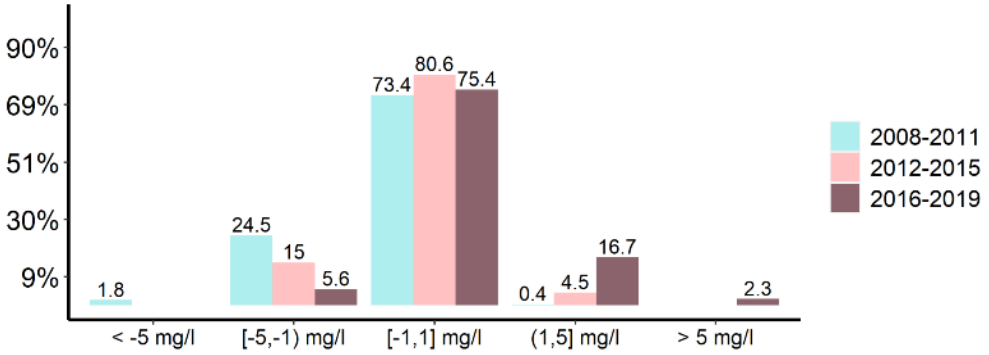


Figure 46. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Surface Water Eutrophication

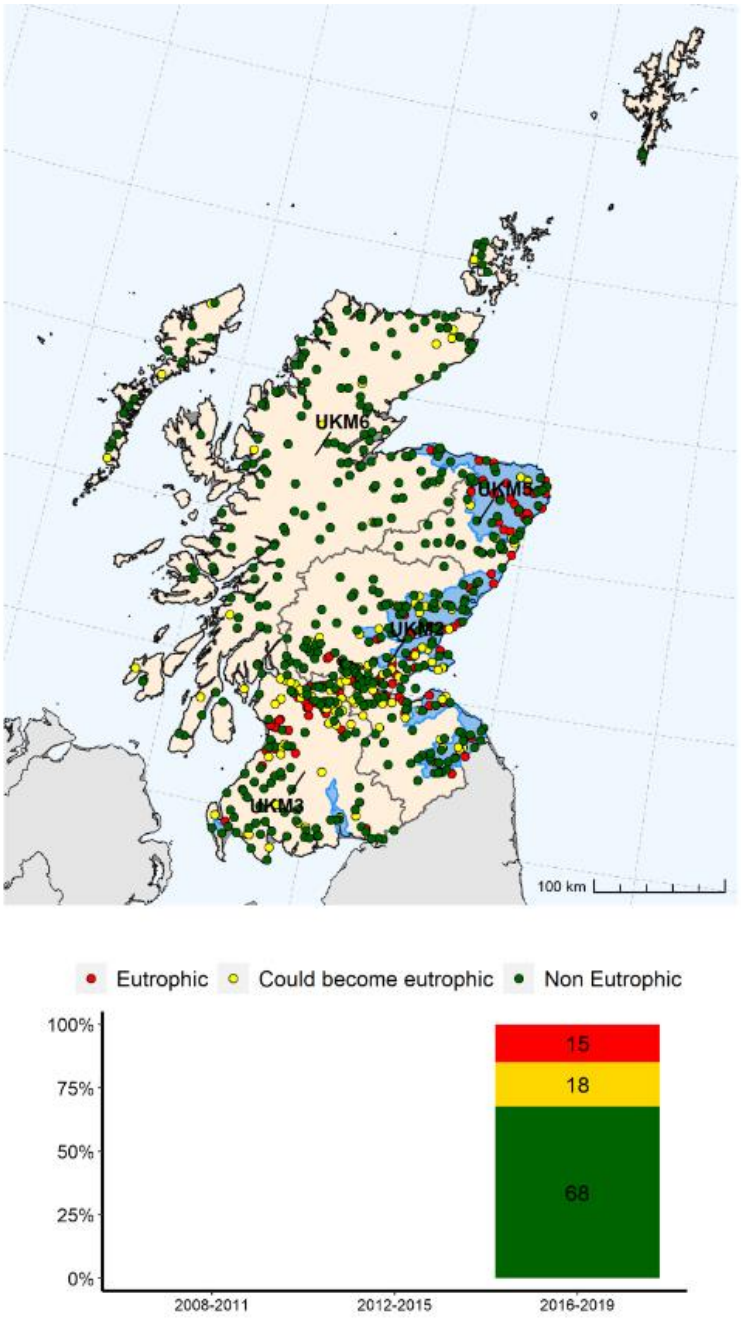


Figure 47. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

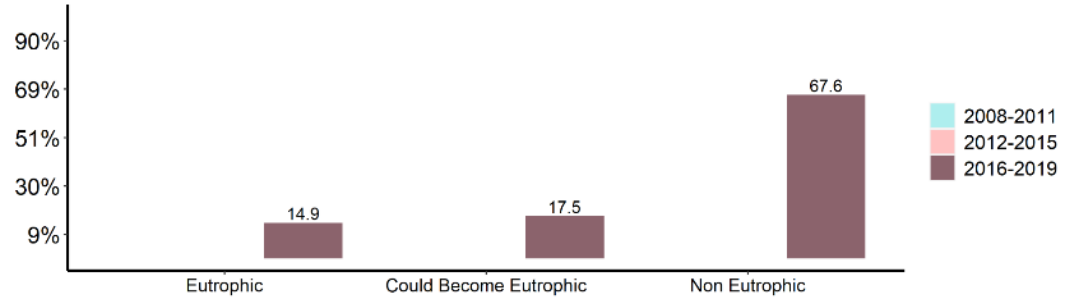
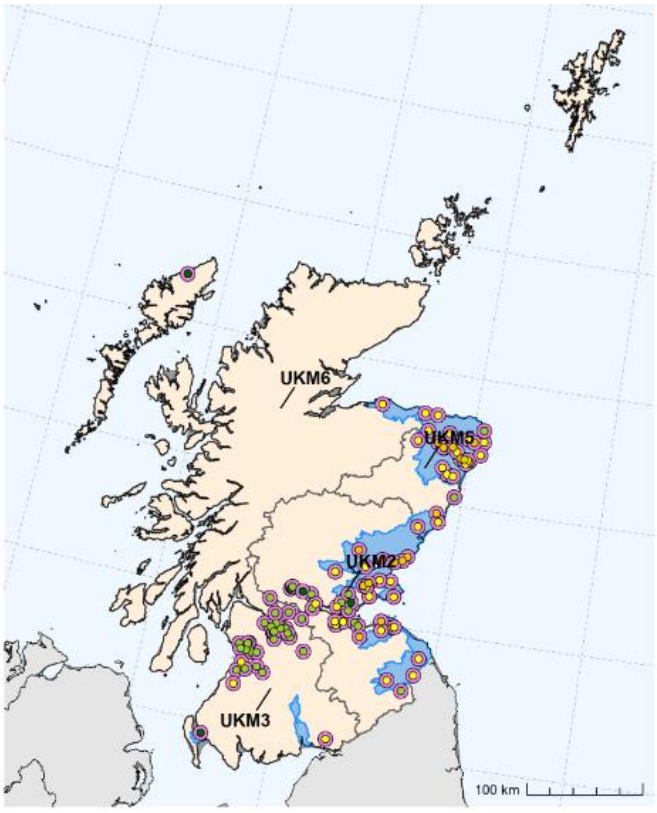


Figure 48. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



			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
UKM2	Eastern Scotland	40	3	10	18	9	0	0	0
UKM3	South Western Scotland	32	1	28	3	0	0	0	0
UKM5	North Eastern Scotland	27	0	2	17	8	0	0	0
UKM6	Highlands and Islands	2	1	0	1	0	0	0	0
	Total	**101**	**5**	**40**	**39**	**17**	**0**	**0**	**0**

Figure 49. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration. In the map in blue the NVZ.

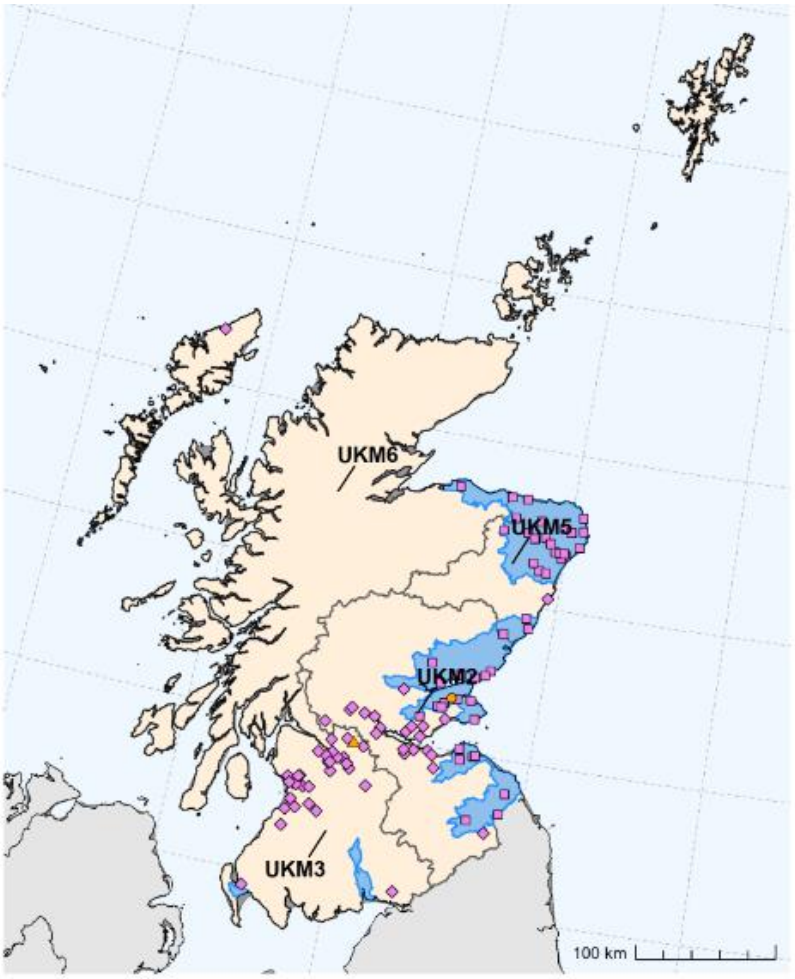
The analysis shows all the SW monitoring stations with high trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations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

In the following table the count of stations by classes of trophic status and type is reported.

Table 11. 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	96	72	386
5	Lake/reservoir water	5	36	55
6	Transitional water	0	11	16
7	Coastal water	0	0	3
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**101**	**119**	**460**

Surface Water quality hotspot



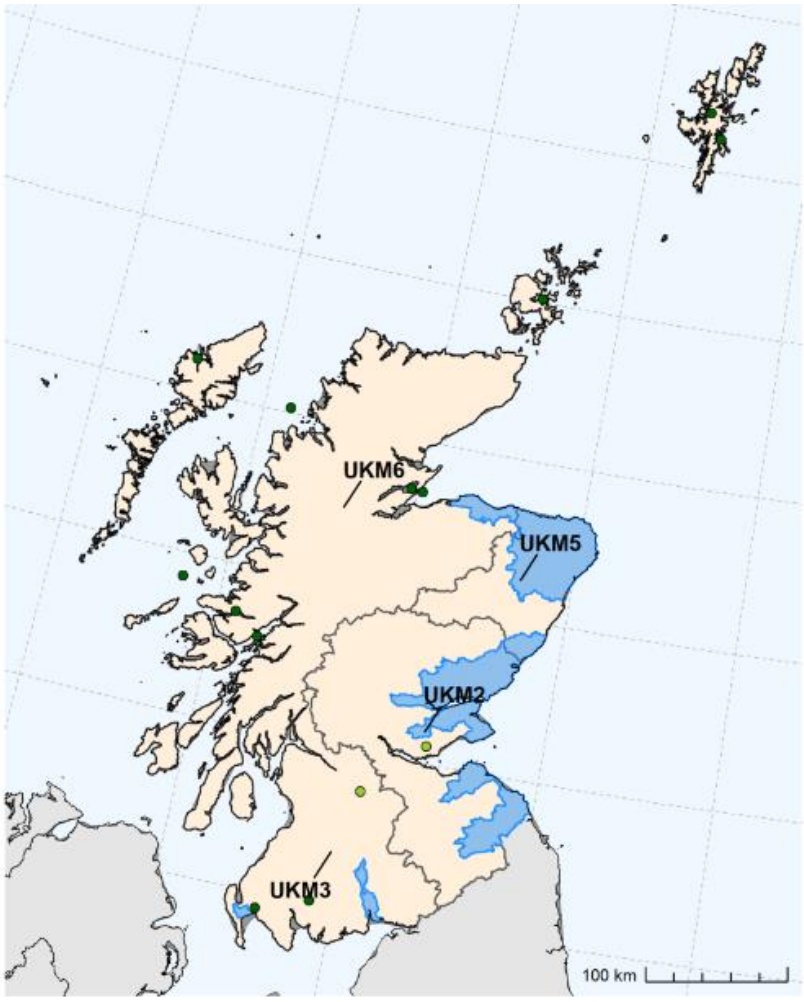
High Trophic Status InNVZ
High Trophic Status OutNVZ
[40,50) mg/l incr. trend InNVZ
[40,50) mg/l incr. trend OutNVZ
≥ 50 InNVZ
≥ 50 OutNVZ

		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
UKM2	Eastern Scotland	20	20	1	0	0	0
UKM3	South Western Scotland	0	32	0	1	0	0
UKM5	North Eastern Scotland	26	1	0	0	0	0
UKM6	Highlands and Islands	1	1	0	0	0	0
	Total	**47**	**54**	**1**	**1**	**0**	**0**

Figure 50. SW 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 SW monitoring stations that have high trophic status (eutrophic and hypertrophic), 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



NO3 (mg/l) <2 [2,10) [10,25) [25,40) [40,50) ≥ 50 NA

Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	3	3	1	0
5	Lake/reservoir water	1	1	0	0
6	Transitional water	1	1	1	0
7	Coastal water	9	9	9	0
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**14**	**14**	**11**	**0**

Figure 51. SW removed stations map (top graph) and distribution by surface water 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, trends and trophic status per type.

Measures in the Action Program - Scotland

The Measures in the Action Program are not available since the country report of Scotland was not submitted.

Controls - Scotland

The information about the controls are not available since the country report of Scotland was not submitted.

Designation of NVZ - Scotland

Scotland decreased the NVZ areas since the last reporting period. The total area is 8409 km^2, 25% lower with respect to the previous reporting period (11263 km^2).

Forecast of Water Quality - Scotland

Forecast analysis are not available since the country report of Scotland was not submitted.

Summary – Scotland

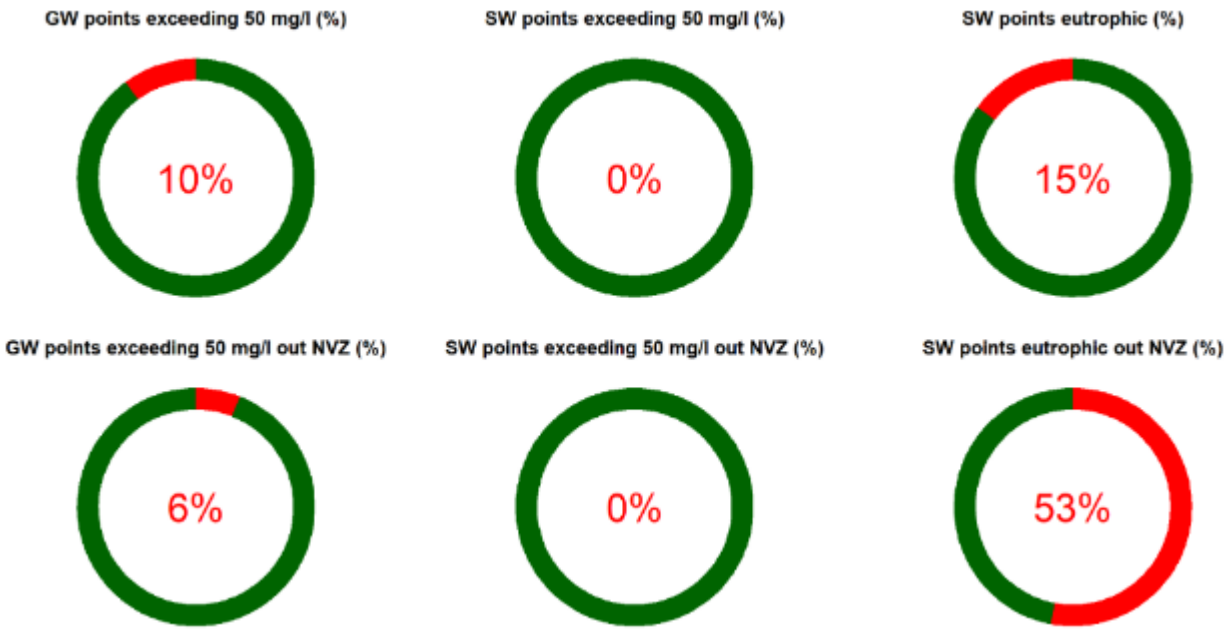


Figure 52. The summary plot for the period 2016-2019

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/l, and the percentage of SW eutrophic stations that are outside NVZ with respect to the total that are eutrophic.

Long term analysis - Scotland

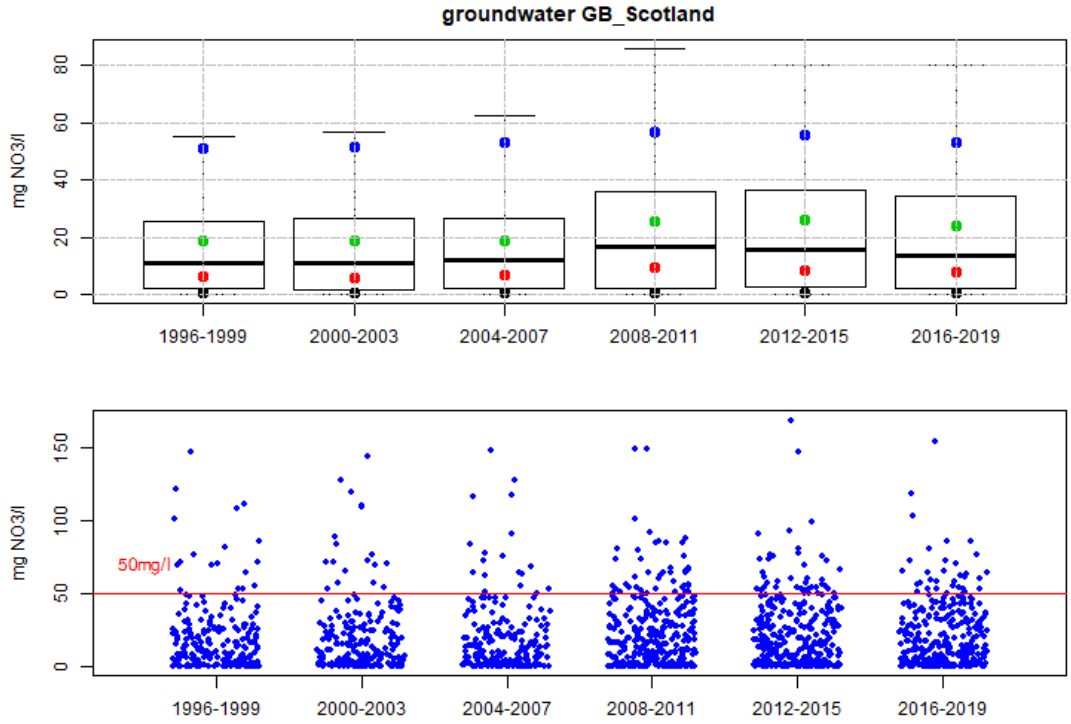


Figure 53. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

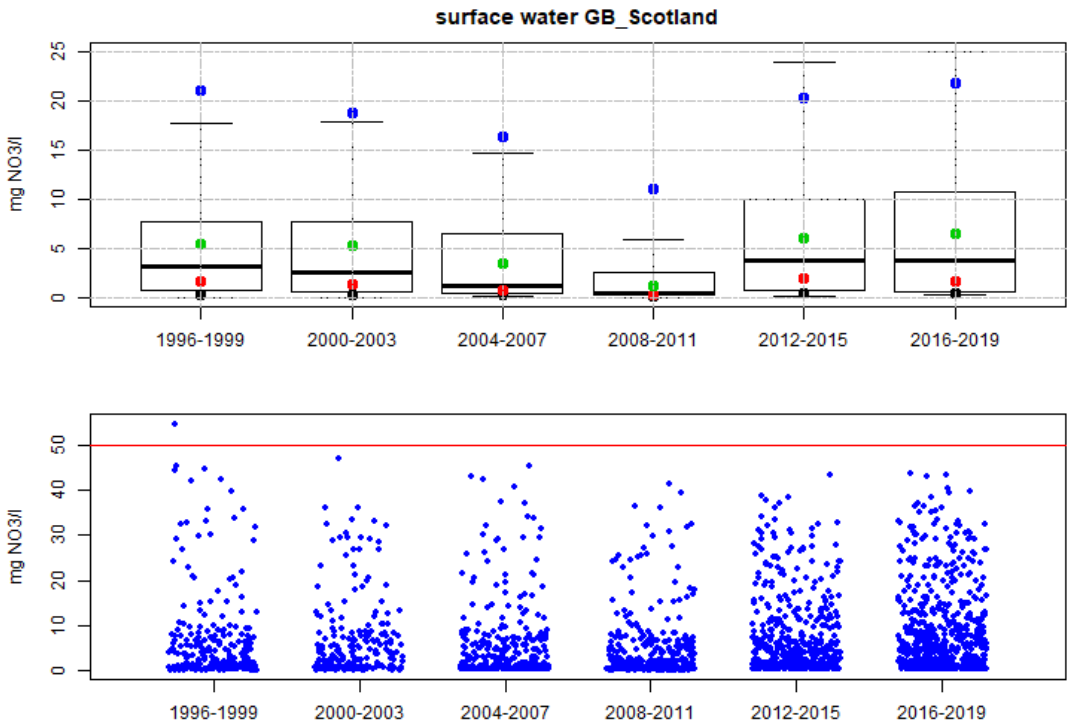


Figure 54. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Water Quality Monitoring - Wales

Since the country report Wales report was not available no descriptions are reported in the following sections. Wales, as in previous reporting periods, did not provide the trophic status for the current reporting period.

For groundwater and surface water measurements, some stations have same coordinates due to different depths. In this case, the average values cover 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 coordinates: 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 12. 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	0	103	74	0	43	62
1a	Phreatic groundwater (deep) 5-15 m	87	60	61	87	54	53
1b	Phreatic groundwater (deep) 15-30 m	0	7	7	0	7	7
1c	Phreatic groundwater (deep) >30 m	31	54	34	31	45	34
2	Captive groundwater	7	18	11	7	13	11
3	Karstic groundwater	0	5	4	0	5	4
9	Not specified	0	0	0	0	0	0
	Total	**125**	**247**	**191**	**125**	**167**	**171**

Surface water quality monitoring network

Table 13. 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	1171	1174	671	845	790	608	0	0	0
5	Lake/reservoir water	0	0	0	0	0	0	0	0	0
6	Transitional water	0	0	0	0	0	0	0	0	0
7	Coastal water	127	185	181	72	97	142	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	**1298**	**1359**	**852**	**917**	**887**	**750**	**0**	**0**	**0**

Groundwater Quality- Wales

Groundwater average annual nitrate concentration

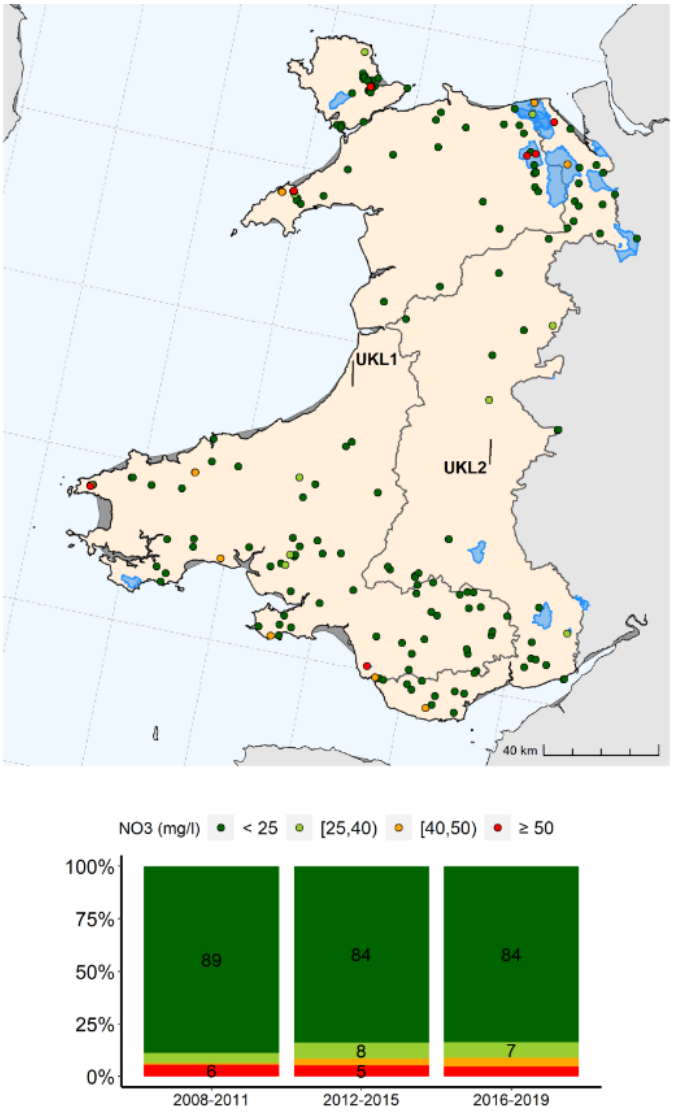


Figure 55. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

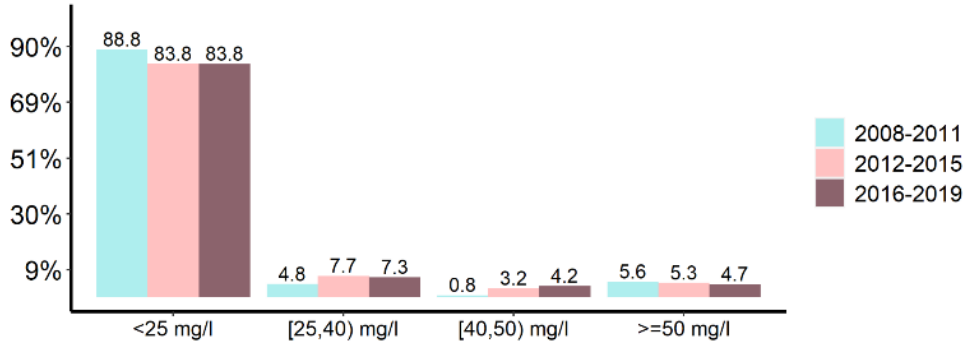


Figure 56. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Groundwater average annual nitrate concentration trend

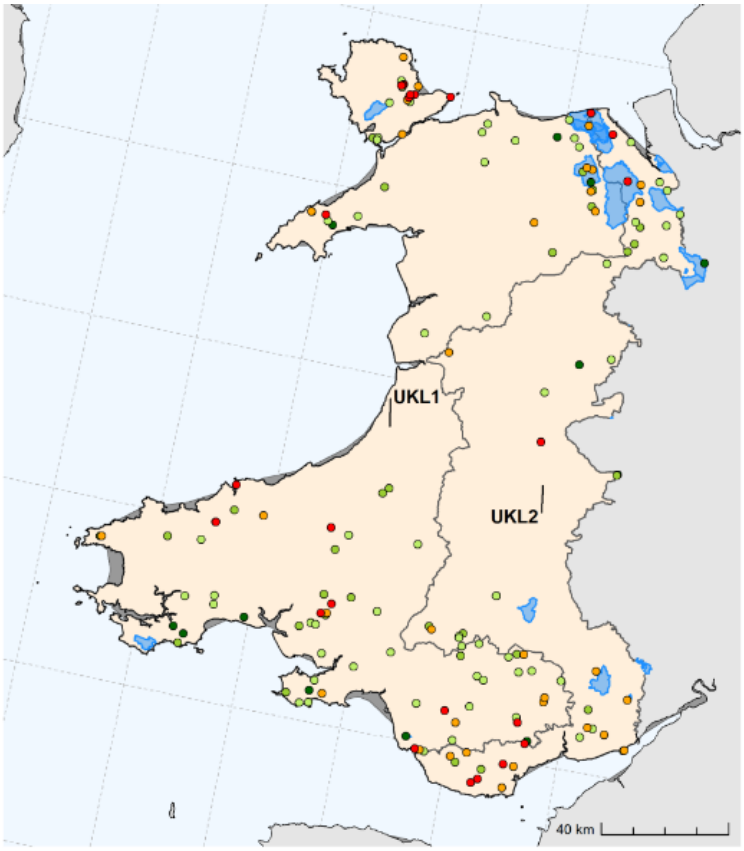


Figure 57. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

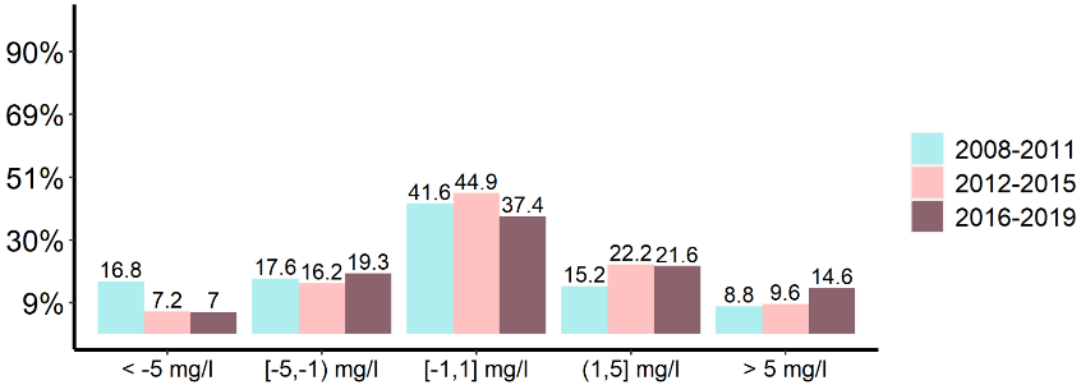
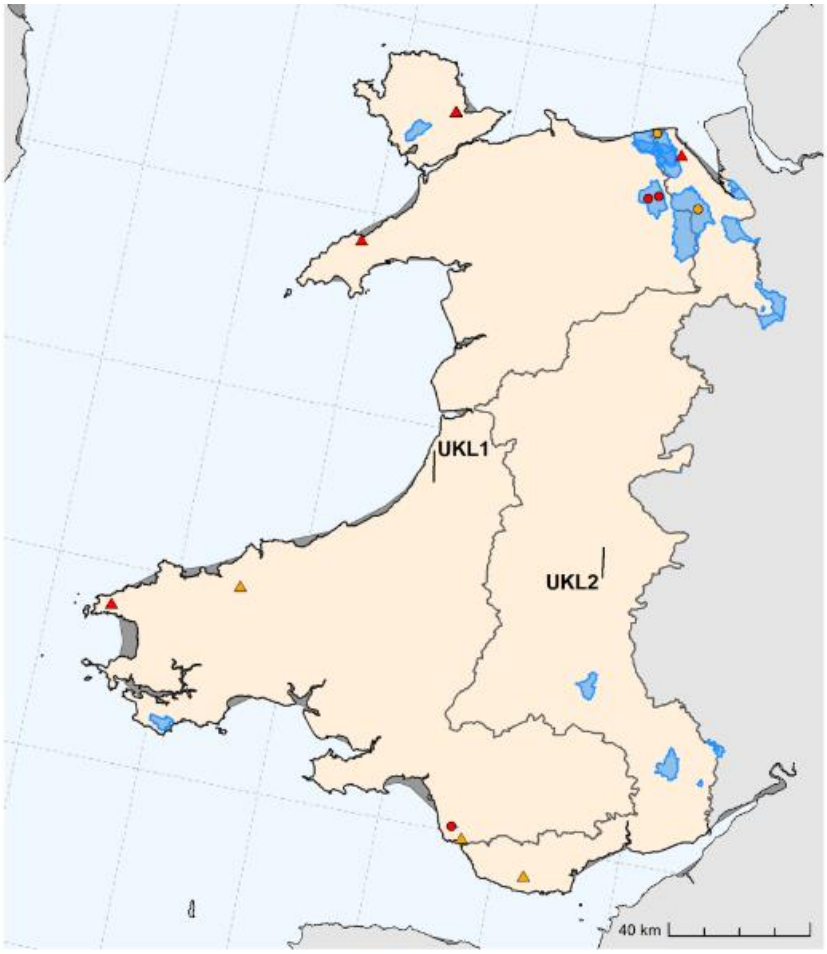


Figure 58. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Groundwater hotspot



		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
UKL1	West Wales and The Valleys	1	2	3	5
UKL2	East Wales	1	1	0	1
	Total	**2**	**3**	**3**	**6**

Figure 59. 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.

Surface Water Quality- Wales

Surface water average annual nitrate concentration

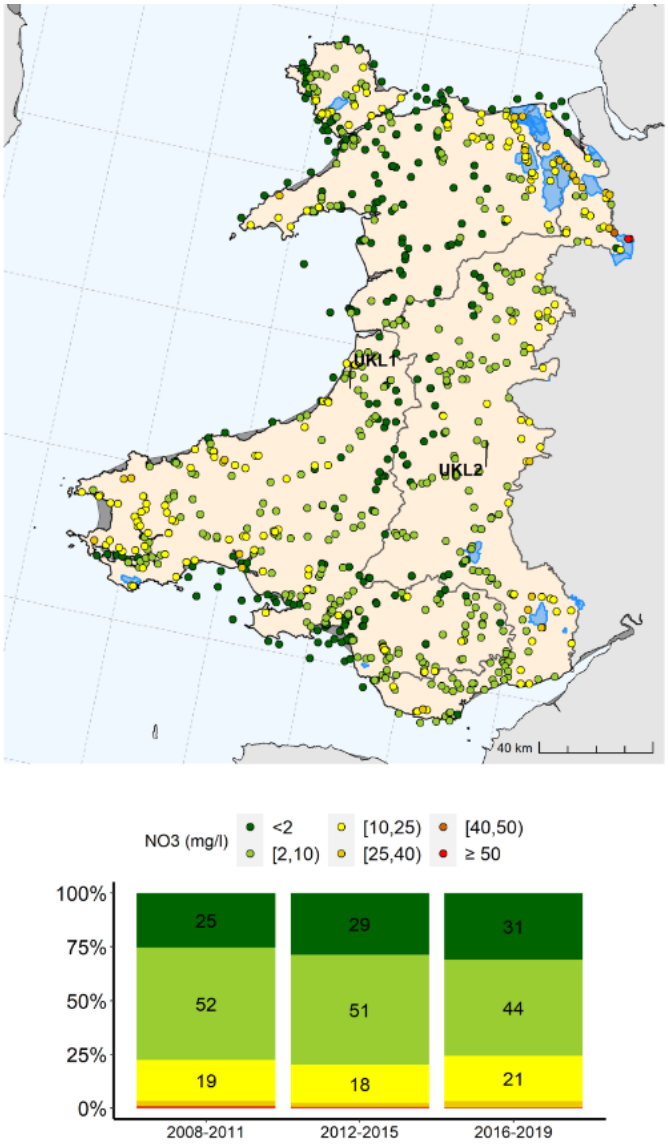


Figure 60. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

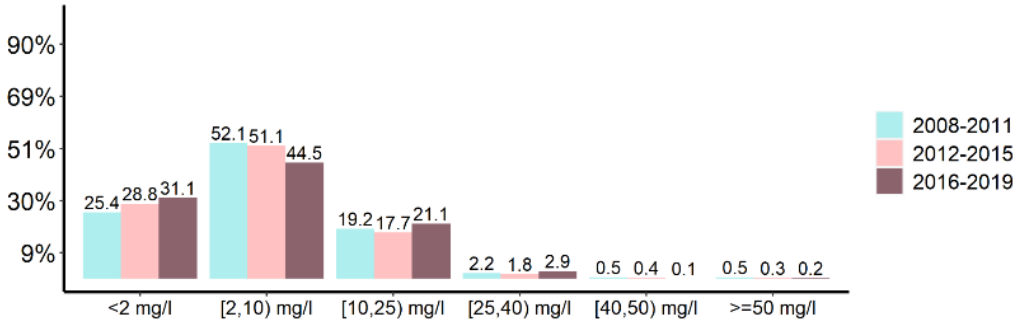


Figure 61. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Surface water average annual nitrate concentration trend

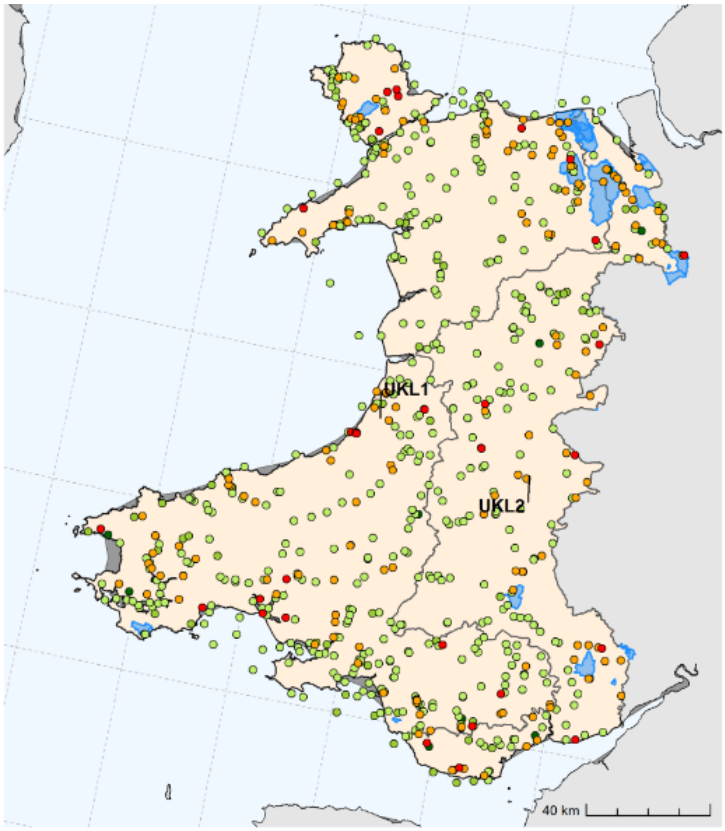


Figure 62. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

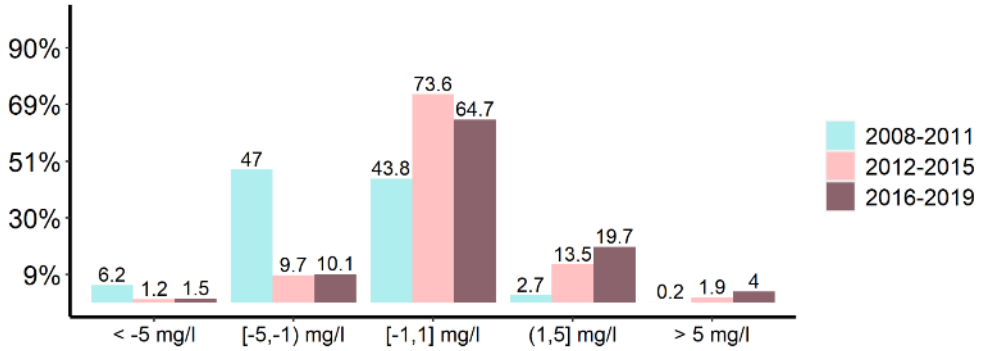
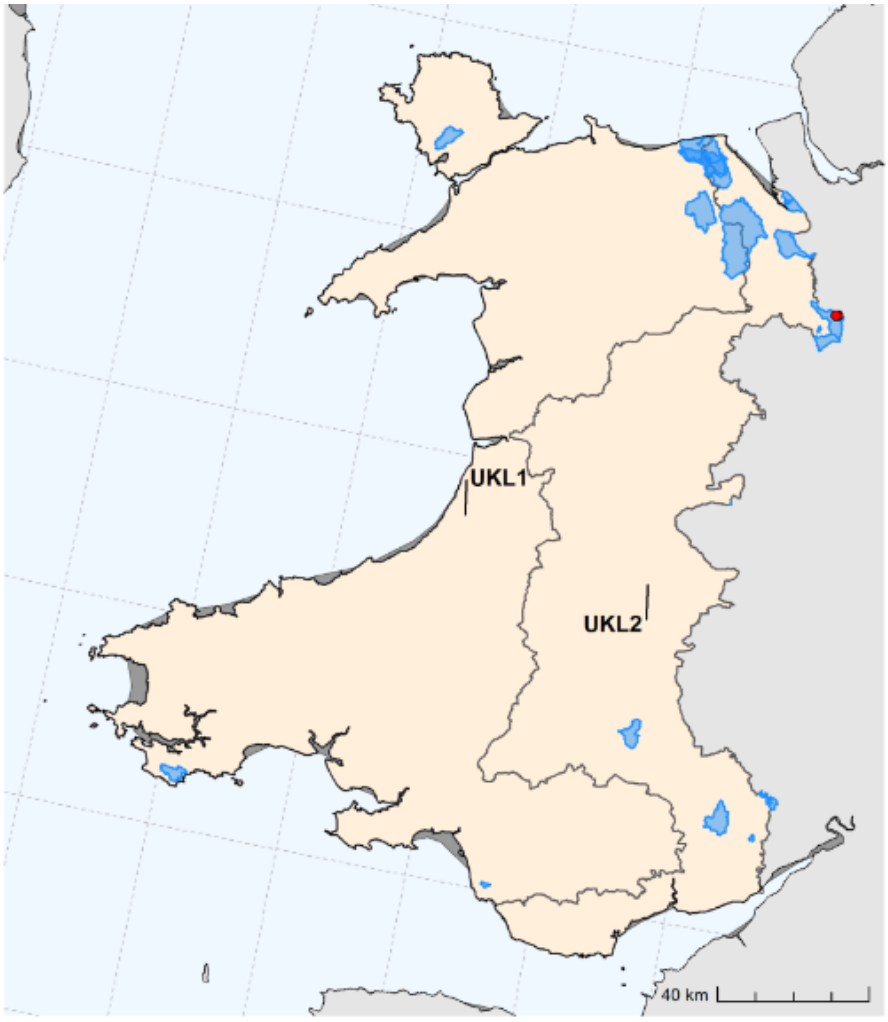


Figure 63. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Surface Water quality hotspot



		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
UKL2	East Wales	0	0	0	0	2	0
	Total	**0**	**0**	**0**	**0**	**2**	**0**

Figure 64. 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 trophic status (eutrophic and hypertrophic), 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.

Measures in the Action Program- Wales

The Measures in the Action Program are not available since the country report of Wales was not submitted.

Controls - Wales

The information about the controls are not available since the country report of Wales was not submitted.

Designation of NVZ - Wales

Wales NVZ areas did not change and is equal to 479 km^2.

Forecast of Water Quality - Wales

Forecast analysis are not available are not available since the country report of Wales was not submitted.

Summary- Wales

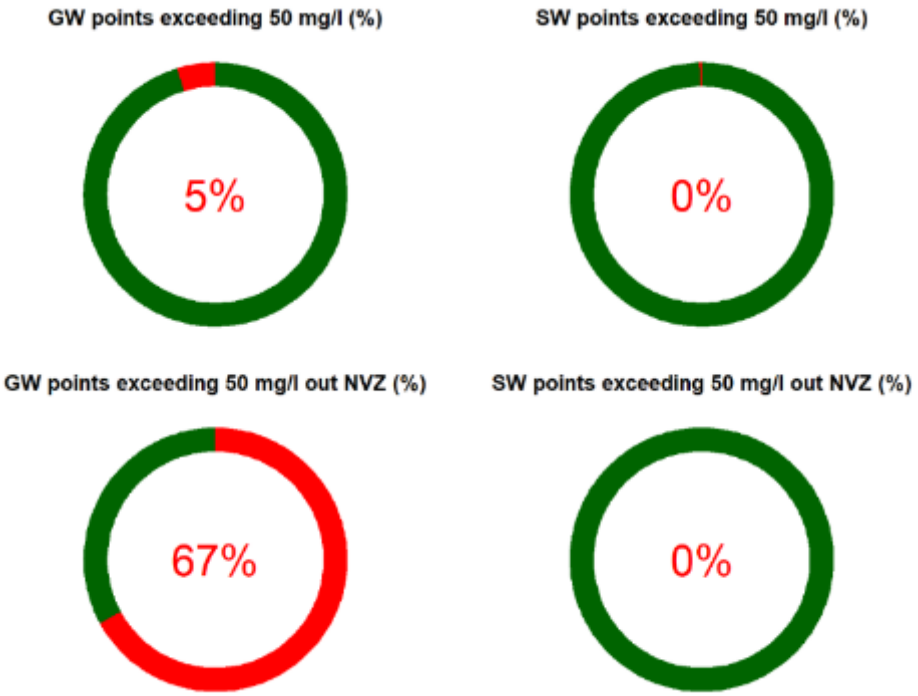


Figure 65. The summary plot for the period 2016-2019

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/l, and the percentage of SW eutrophic stations that are outside NVZ with respect to the total that are eutrophic.

Long term analysis – Wales

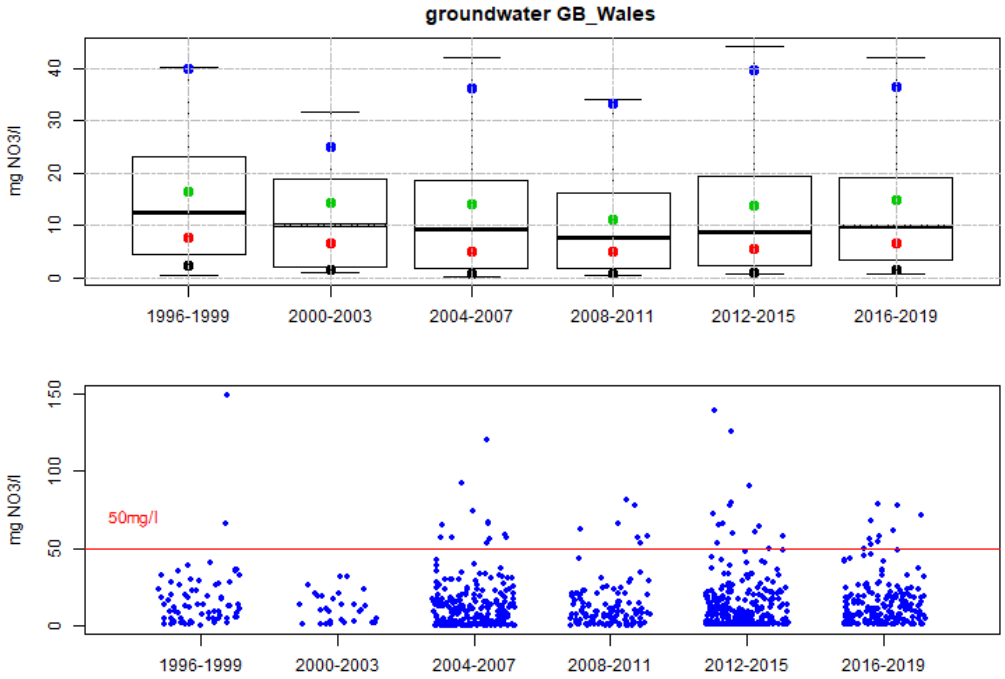


Figure 66. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

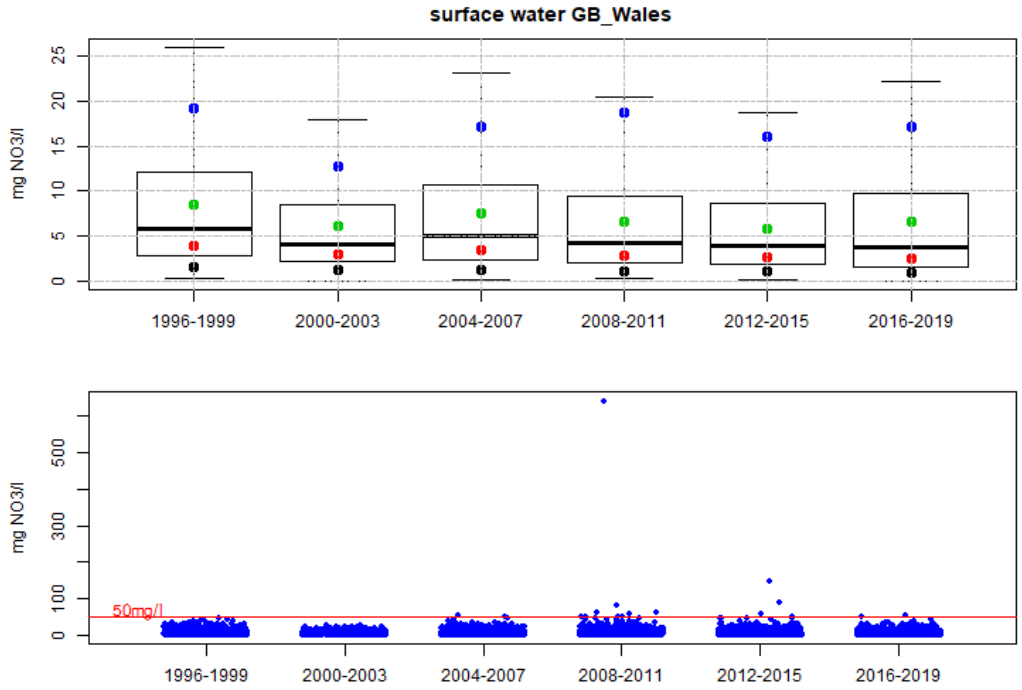


Figure 67. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions

The United Kingdom has a Livestock pressure that is close to the EU average. The nitrogen and phosphor surplus is above average for the EU.

There is a well-elaborated network of monitoring stations.

In Northern Ireland, nitrate content of ground- and surface water is low. However, there is an increasing trend of nitrate in surface water and of waters that are eutrophic.

In Scotland and Whales there are a number of groundwater hotspots with nitrate levels above 50 mg/l. Nitrate content of surface waters is low, however there is an increasing trend.

In England there is a higher number of groundwater hotspots with nitrate levels above 50 mg/l. The Nitrate content of surface waters is high and is increasing. 8 % of the surface water monitoring stations have nitrate concentrations above 50 mg/l. Compared to the European Member States, this is the highest percentage.