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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 - Northern Ireland

The Department of Agriculture, Environment and Rural Affairs (DAERA) has the responsibility of monitoring water quality of surface waters (rivers, lakes, transitional waters) and groundwater across Northern Ireland. Groundwater quality in Northern Ireland is assessed in accordance with the Northern Ireland Environmental Agency (NIEA) groundwater monitoring programme through the collection of groundwater water samples from boreholes, wells and springs that are mostly owned and operated by third parties. This implies that the network can undergo changes due businesses closing or changing their groundwater usage. The surface freshwater monitoring network coverage in Northern Ireland aims to fulfil all monitoring obligations under multiple directives including the Nitrates Directive and the Water Framework Directive. A review of the surface freshwater monitoring programme undertaken for the second cycle of the River Basin Management Plans (RBMP), led to a modification of the network through a better targeting and adopting a risk based approach. However, the modification of the network also included the requirement to maintain long term data for nitrogen and phosphorus concentrations.

For surface measurements, two stations have same coordinates due to different station type (one for river and one for lake). In these cases, the average values cover different measurements in time, but also location. In the maps since 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 5. 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	2	2	2	2	2	2
1a	Phreatic groundwater (deep) 5-15 m	3	36	37	3	21	35
1b	Phreatic groundwater (deep) 15-30 m	0	0	0	0	0	0
1c	Phreatic groundwater (deep) >30 m	8	7	8	8	7	7
2	Captive groundwater	0	5	4	0	0	4
3	Karstic groundwater	0	6	5	0	5	5
9	Not specified	45	0	0	0	0	0
	Total	**58**	**56**	**56**	**13**	**35**	**53**

Surface water quality monitoring network

Table 6. 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	566	317	473	500	302	305	567	391	430
5	Lake/reservoir water	56	21	21	55	20	21	0	21	20
6	Transitional water	33	5	5	0	5	5	12	5	5
7	Coastal water	93	19	19	0	19	19	60	19	19
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	**748**	**362**	**518**	**555**	**346**	**350**	**639**	**436**	**474**

Groundwater Quality - Northern Ireland

Groundwater average annual nitrate concentration

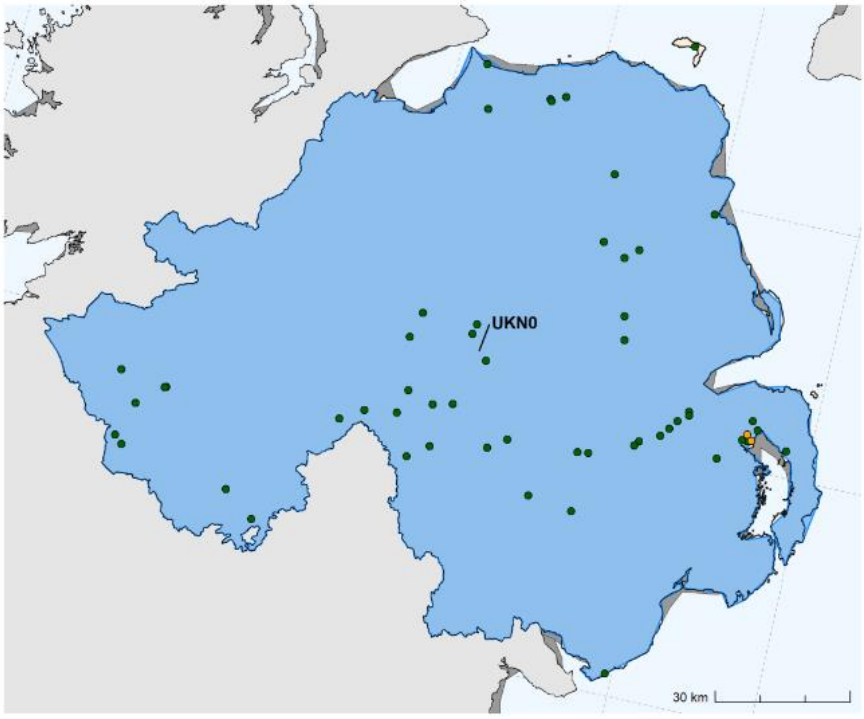


Figure 21. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

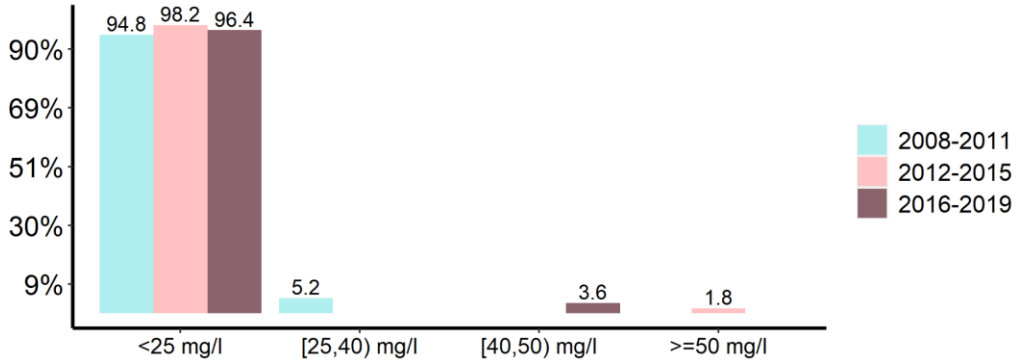


Figure 22. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Groundwater average annual nitrate concentration trend

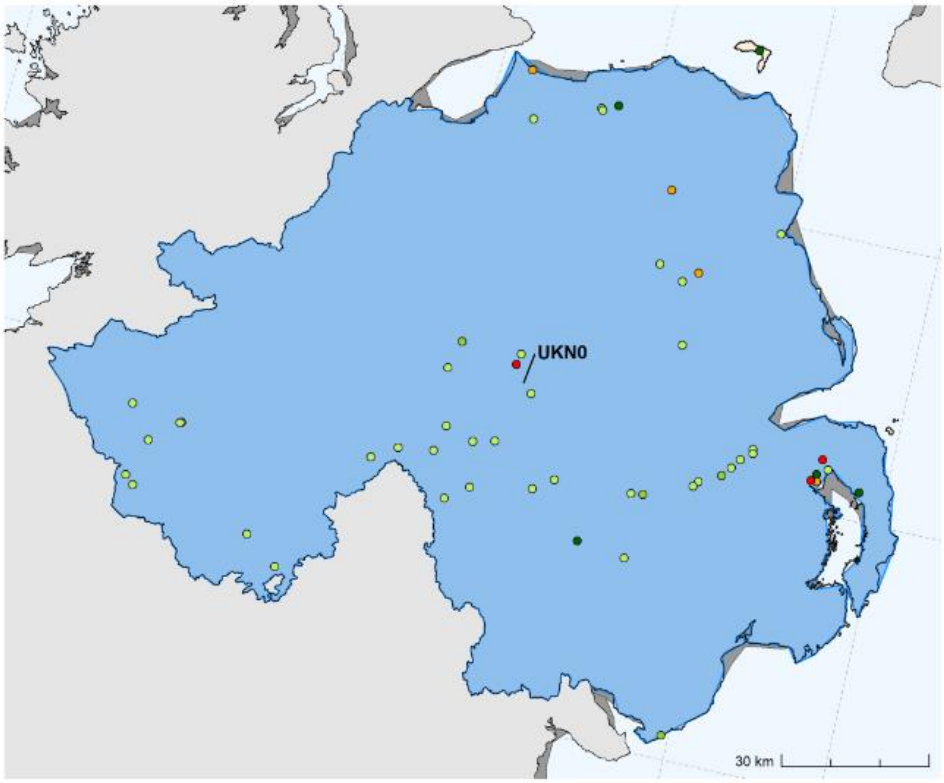


Figure 23. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

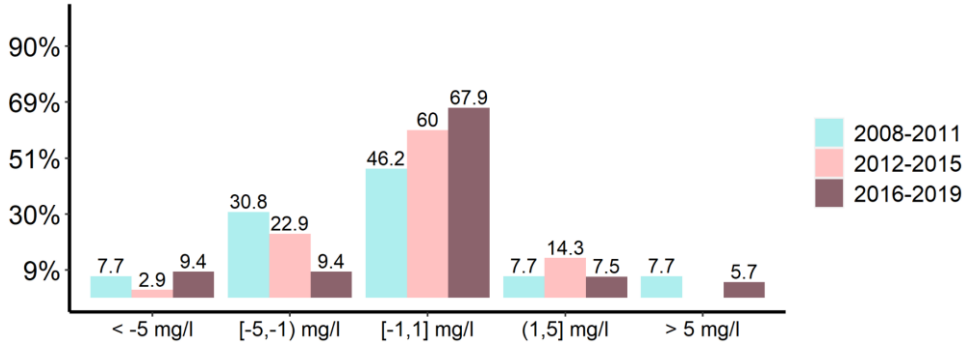


Figure 24. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Quality - Northern Ireland

Surface water average annual nitrate concentration

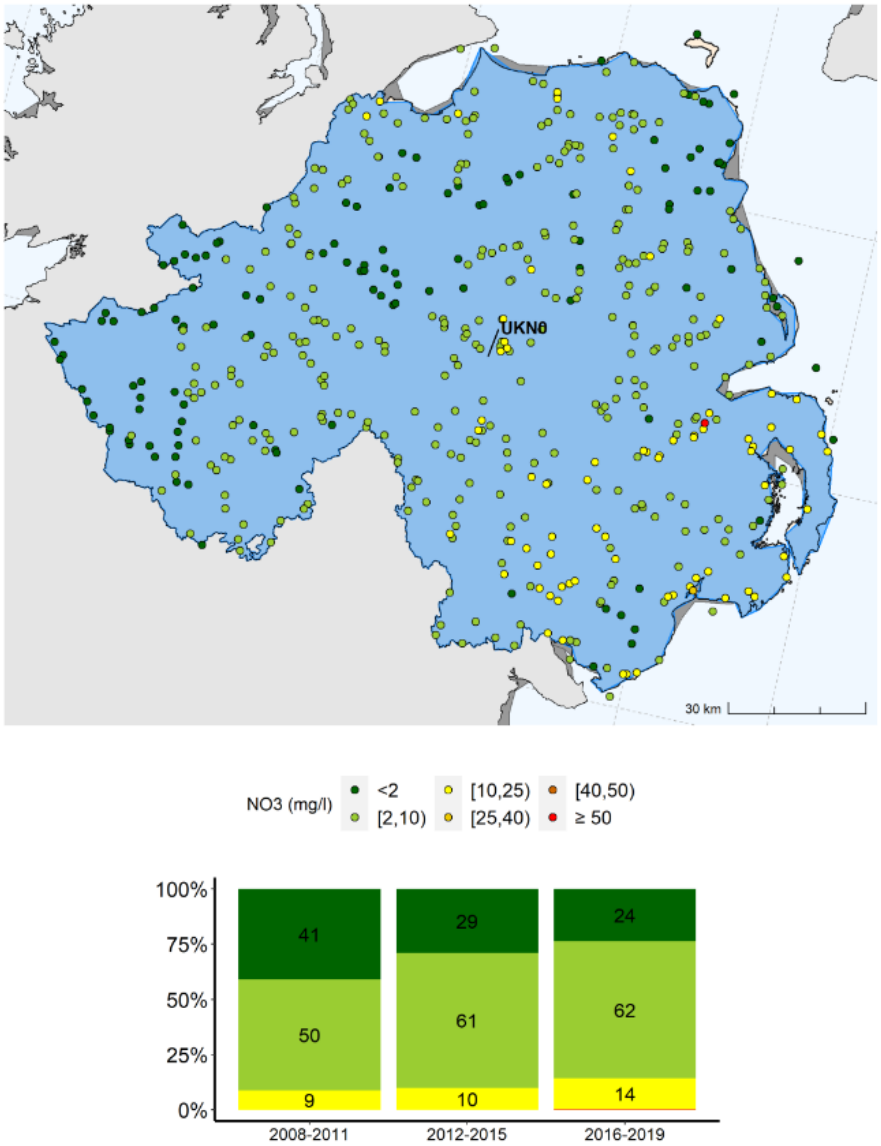


Figure 25. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

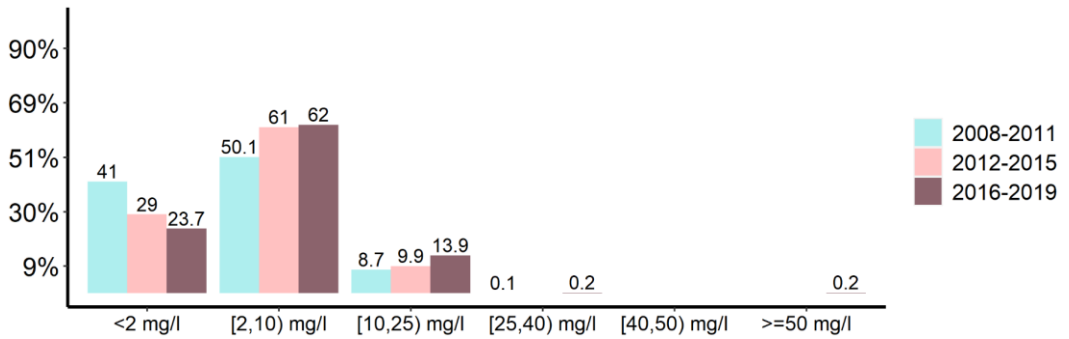


Figure 26. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Surface water average annual nitrate concentration trend

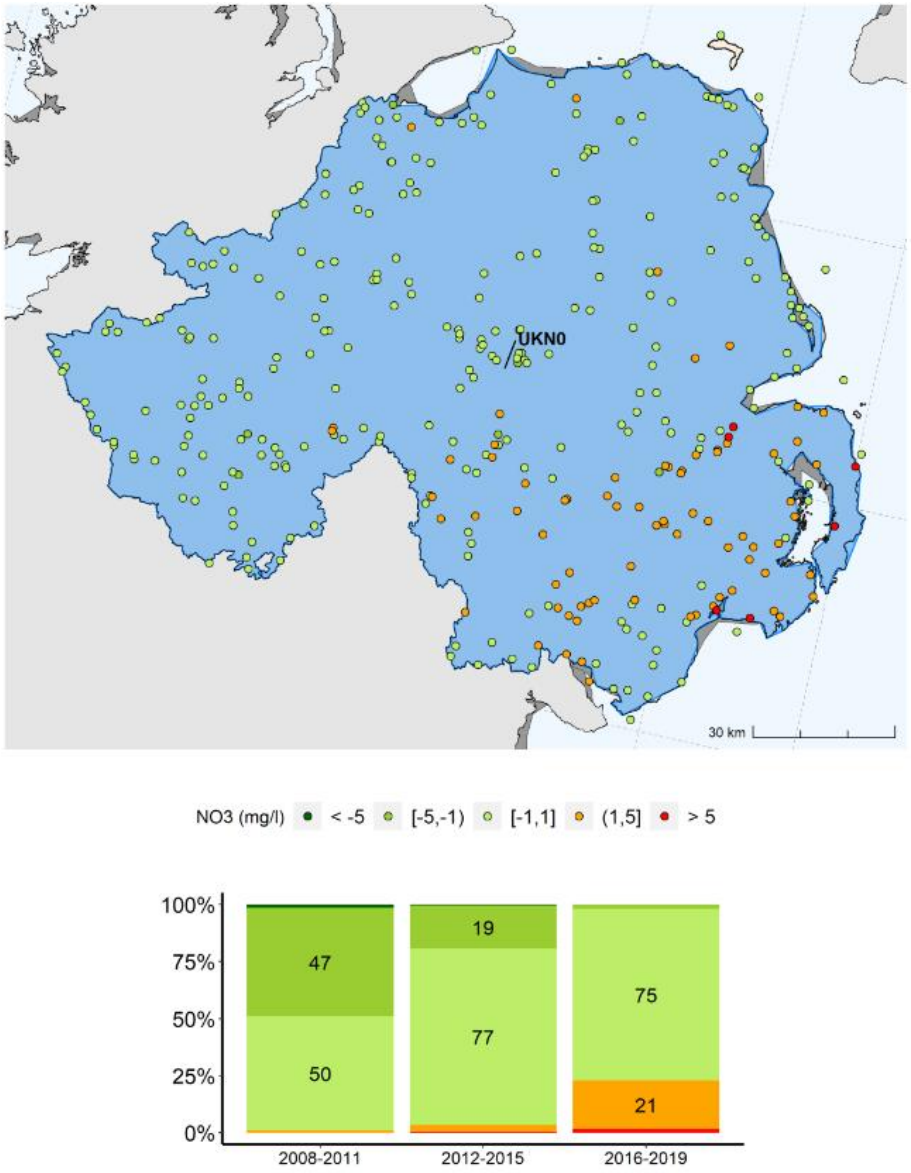


Figure 27. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

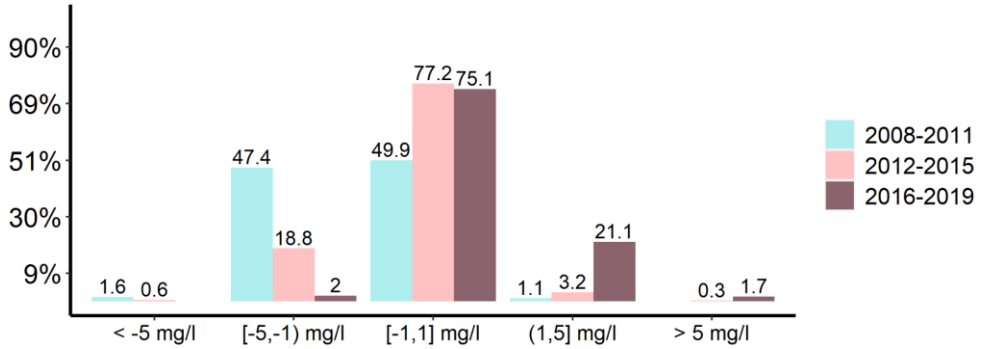


Figure 28. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Surface Water Eutrophication

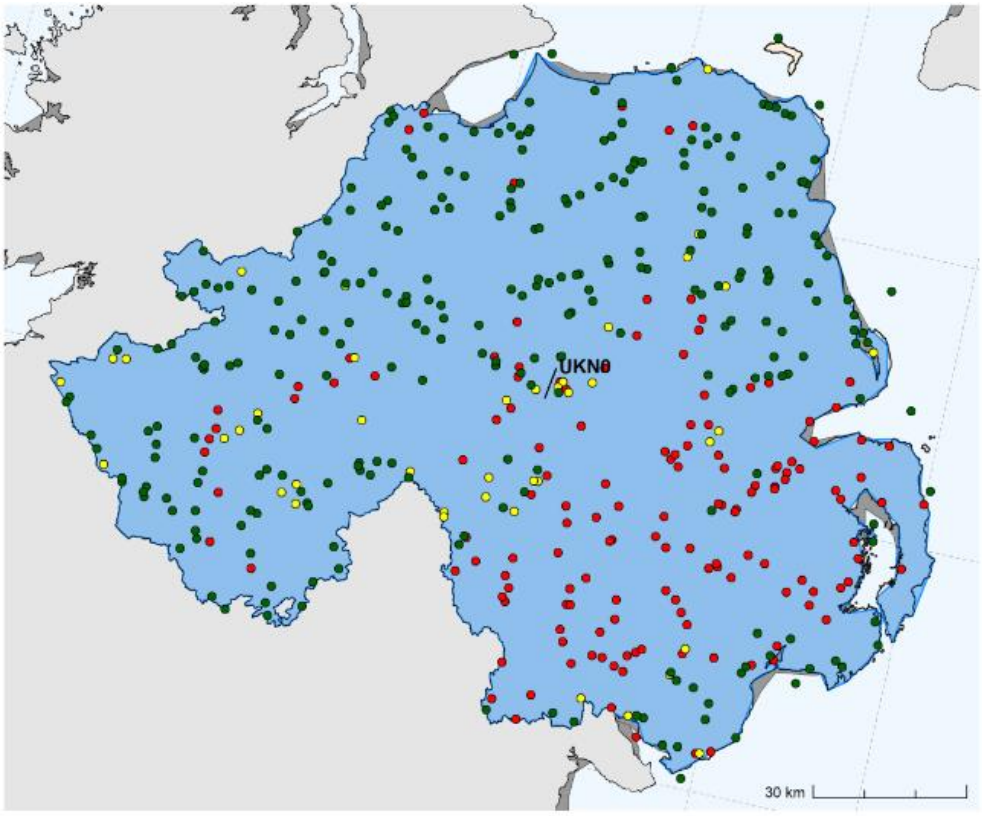


Figure 29. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis).

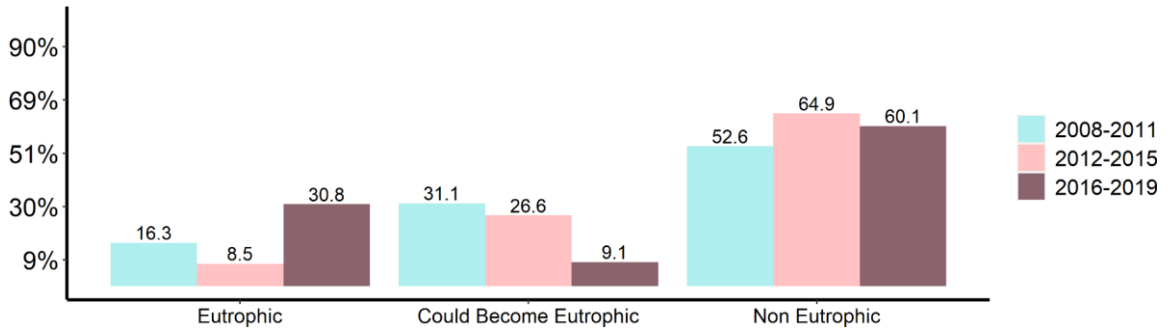
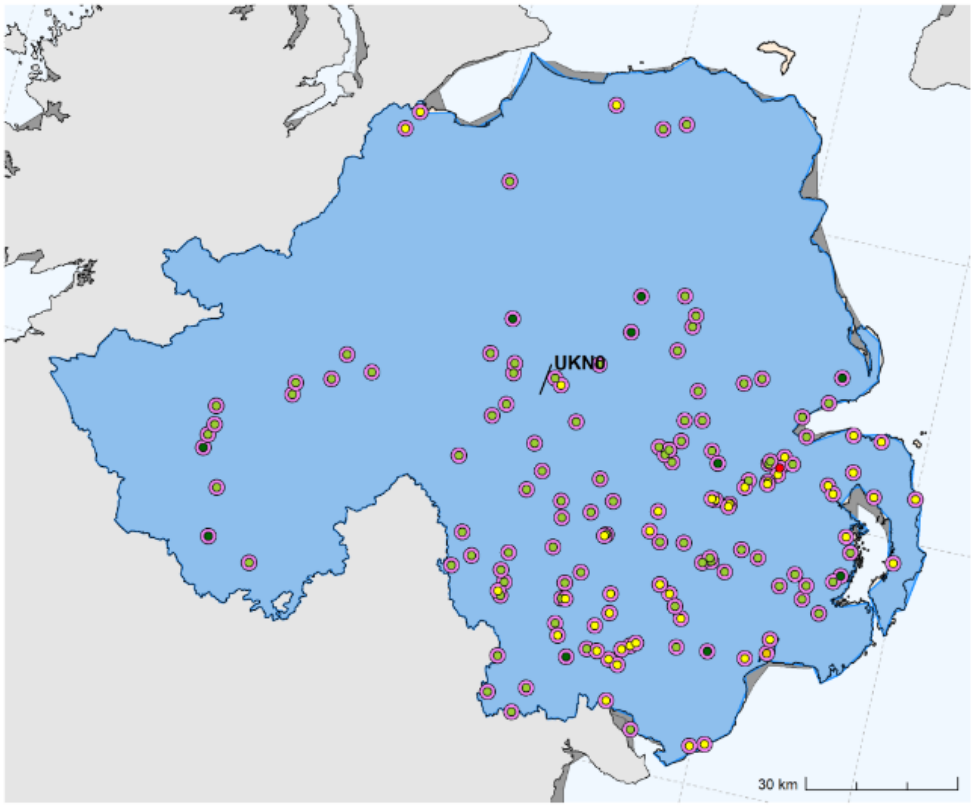


Figure 30. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis).

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
NO_NUTS	SALINE	9	0	2	5	1	0	1	0
UKN0	Northern Ireland	137	10	87	40	0	0	0	0
	Total	**146**	**10**	**89**	**45**	**1**	**0**	**1**	**0**

Figure 31. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration.

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.

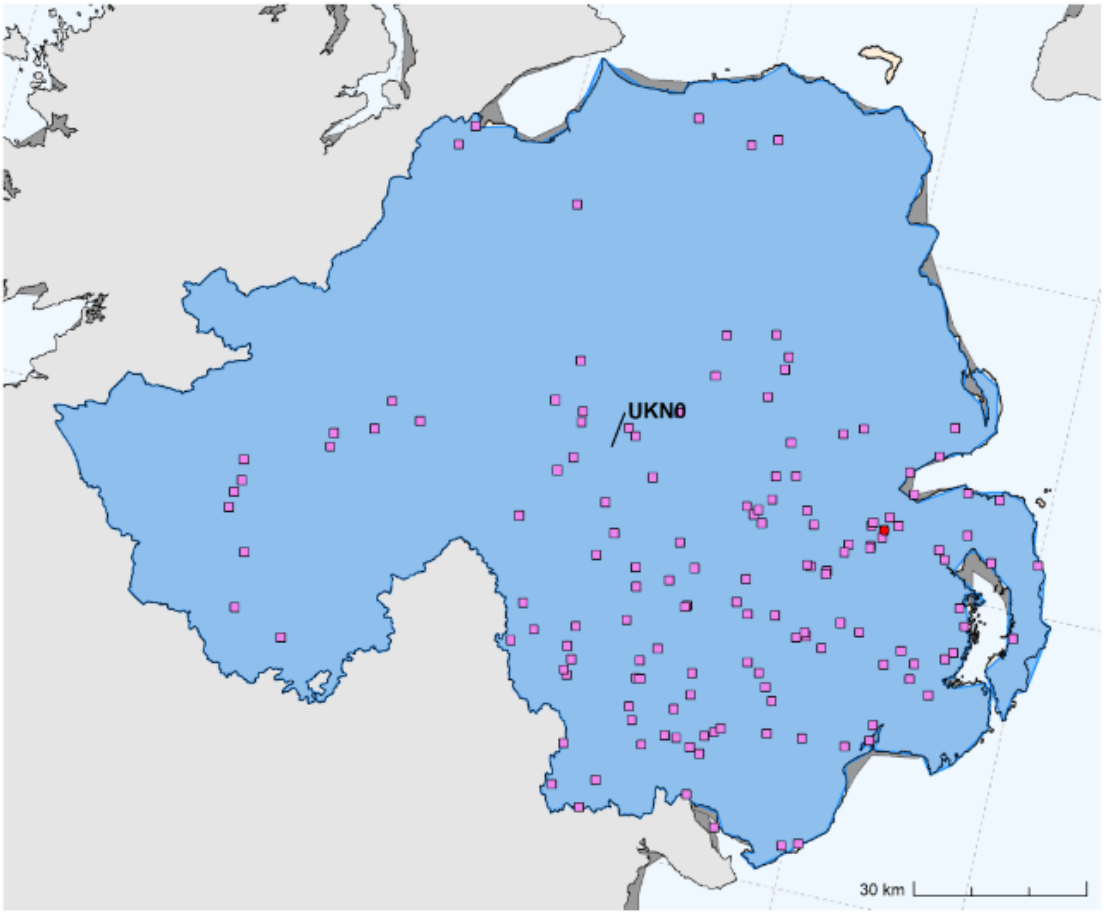
Eutrophication is assessed using WFD nutrient standards and Biological Quality Element (BQE) classification tools which are known to be sensitive to nutrient enrichment. The Water Framework Directive 2018 interim classification data was also be used to assess eutrophication in both rivers and lakes, and transitional and coastal marine waters. For rivers the assessment relies on the soluble reactive phosphorus, diatoms, and macrophytes. Freshwater lakes assessment is based on total phosphorus, chlorophyll-a, cyanobacteria phytoplankton and diatoms, and macrophytes. Both transitional and coastal water trophic status are evaluated based on dissolved inorganic nitrogen, dissolved oxygen, chlorophyll-a, and macroalgae.

All transitional waters were classified as eutrophic. Most of coastal waters were non-eutrophic. The large majority of lakes/reservoirs were eutrophic or could become eutrophic. Rivers were mostly non eutrophic (62%). Eutrophic rivers represent 29% of the total rivers.

Table 7. 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	124	38	268
5	Lake/reservoir water	13	4	3
6	Transitional water	5	0	0
7	Coastal water	4	1	14
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**146**	**43**	**285**

Surface Water quality hotspot

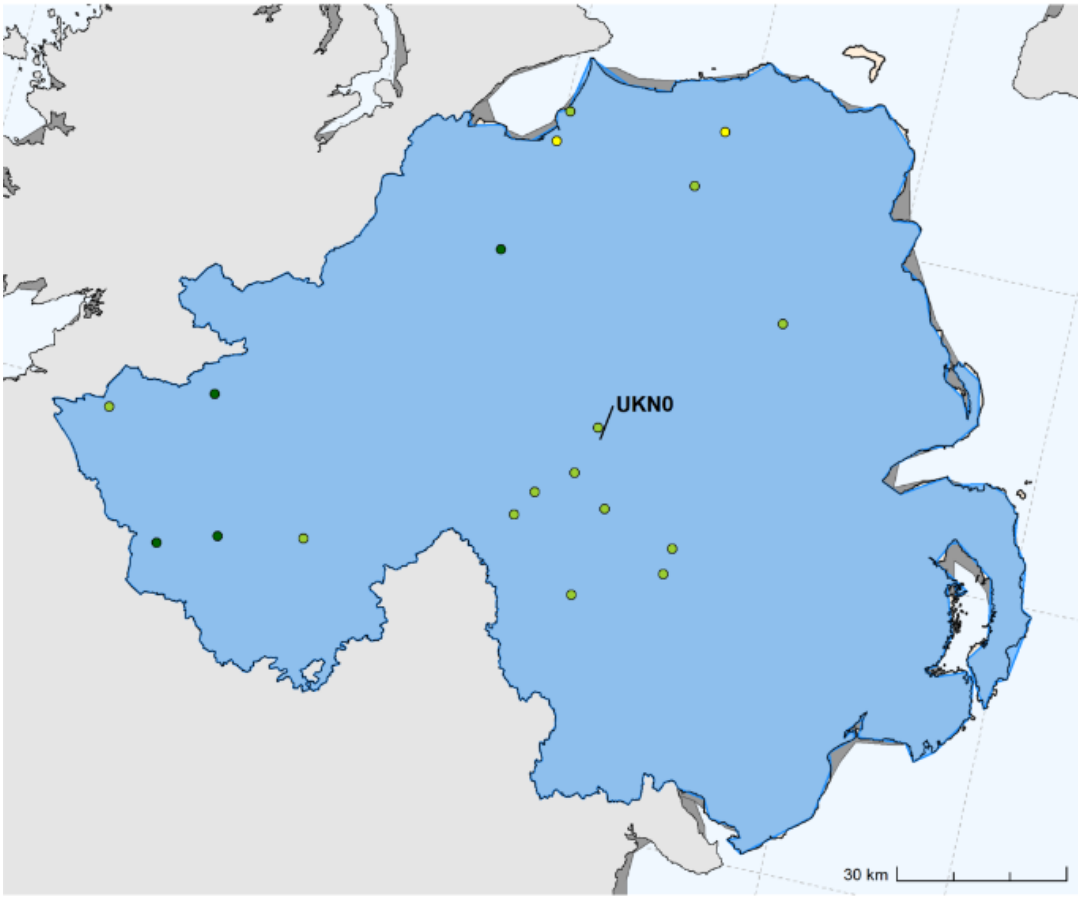


NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
NO_NUTS	SALINE	9	0	1
UKN0	Northern Ireland	137	0	0
	Total	**146**	**0**	**1**

Figure 32. 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.

The hotspot analysis identifies all the SW monitoring stations that have high eutrophic 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	17	17	15	17
5	Lake/reservoir water	1	1	1	1
6	Transitional water	1	1	1	1
7	Coastal water	0	0	0	0
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**19**	**19**	**17**	**19**

Figure 33. SW removed stations map (top graph) and distribution by surface water type (lower graph).

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 - Northern Ireland

The Nitrates Action Programme (NAP) is required to be reviewed and, where necessary, revised, at least every four years. There have been three NAPs implemented in Northern Ireland since 2006. Following a scientific review, public consultation and discussion with the Commission, a fourth NAP for the period 2019-2022 came into effect on 11 April 2019 through the Nutrient Action Programme Regulations (Northern Ireland) 2019 (the 2019 NAP Regulations). The Phosphorus Regulations 2015 – 2018 are now incorporated as part of the overall Action Programme. A Nitrates Derogation for Northern Ireland for the period 2019-2022 was also approved in Commission Decision EU 2019/1325 following a positive Member State vote at the Nitrates Regulatory Committee meeting in March 2019. This is the fourth derogation decision approved for Northern Ireland. Therefore the 2019 NAP Regulations were amended to include measures to allow derogation from the 170 kg/ha/year N limit up to a limit of 250 kg/ha/year N for intensive grassland farms which meet certain criteria. In the following table the details of AP.

Table 8. Details of Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• Chemical N and P fertiliser must not be applied to grassland from midnight 15 September to midnight 31 January (Part 3, section 7 of the NAP)
	• All types of chemical fertiliser must not be applied to arable land from midnight 15 September to midnight 31 January unless there is a demonstrable crop requirement (Part 3, section 7 of the NAP)
	• Organic manures must not be applied from midnight 15 October to midnight 31 January (Part 3, section 7 of the NAP)
	• Farmyard manure must not be applied from midnight 31 October to midnight 31 January (Part 3, section 7 of the NAP)
Restrictions for application on sloped soils	• On steep slopes (with an average incline of 20% or more on grassland or 15% or more on all other land) where other significant risks of water pollution exist (Part 3, section 8 of the NAP)
	• On other land (with an incline of less than 20% for grassland or less than 15% for all other land) where significant risks of water pollution exist.
	• The risk factors to be considered include the proximity to waterways/lakes, amount to be applied, soil conditions, weather forecast and time to incorporation if applied to arable land (Schedule 4 of the NAP)
Restrictions for application on soaked, frozen, or snow-covered soils	• Not on waterlogged soils, flooded land or land liable to flood, frozen ground or snow covered ground (Part 3, section 8 of the NAP)
Restrictions for application near watercourses (buffer strips)	•All types of chemical fertiliser must not be applied within 2m of any waterway (Part 3, section 8 of the NAP)
	• Several distances are applied for organic manures, including dirty water, depending on time period and type of waterbody (Part 3, section 8 of the NAP)
Effluent storage works	• Provide storage for dirty water during periods when conditions for land application are unsuitable (Part 4 of the NAP)
Capacity of manure storage	• Manure storage for pig and poultry enterprises minimum of 26 weeks (Part 4 of the NAP)
	• Storage for other enterprises minimum of 22 weeks (Part 4 of the NAP)
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Nitrogen and phosphate fertiliser application limits are defined in sections Part 3, sections 10, 13 and 14 of the NAP
Crop rotation, permanent crop enhancement	• Derogated farms only - Crop rotation must not include leguminous or other plants fixing N except for grassland with less than 50 % clover and to areas with cereals and peas undersown with grass
Vegetation cover in rainy periods, winter	• From harvest of certain crops until 15 January of the following year, the controller must manage the land to ensure minimum soil cover and to minimise soil erosion and nutrient run off (Part 4, section 25 of the NAP)
NA	• Residues of crops harvested late must be left undisturbed until just before sowing the following spring (Part 4, section 25 of the NAP)
Fertilisation plans, spreading records	• Records relating to export of organic manure to be submitted annually by 31 January of the following year and by 1 March for derogated holdings (Part 6, section 27 of the NAP)
	• From 1 January 2020 farms importing anaerobic digestate will require a nutrient content analysis (Part 6, section 27 of the NAP)
	• From 1 January 2020 a fertilisation plan must be prepared and kept up to date by all grassland farms using chemical phosphorus fertiliser, and all farms using phosphorus rich manure e.g. some poultry manures, pig FYM manures and anaerobic digestate. A soil analysis is required (Part 3, section 16)
	• From 1 January 2017, evidence of crop P requirement from soil analysis if organic manure with over 0.25 kg TP per 1 kg total nitrogen is applied (Part 3, section 14)
Other measures	• Limits for the application of chemical P fertiliser to crop requirement, based upon a soil analysis; and set values for P recommendations for extensively managed grassland (schedule 5 of the NAP)
Date for application limit of 170 kg N/ha/year:	• 2019

(*) NAP - The Nutrient Action Programme Regulations (Northern Ireland) 2019

Controls - Northern Ireland

The total number of inspections peaked in 2014 with 679 farms and was lowest in 2018 with 330 inspections being carried out as reflected respectively in the 2.1% and 1.4% inspection rates. In the current reporting period 2016-2019 the total number of inspections leveled out with an annual average of 346 equating to 1.4%. The annual number of referral inspections conducted in this reporting period was 72, ranging from 91 in 2016 to 59 in 2018. The most frequent areas of non-compliance related to water pollution, often associated with poorly managed or inadequate manure storage facilities, and exceeding livestock manure limits. Nitrogen fertiliser entering a waterway or water contained in underground strata, resulting in pollution is the most common non-compliance issue found in referral inspections.

Designation of NVZ - Northern Ireland

Northern Ireland applies a whole territory approach (13,500 km^2).

Forecast of Water Quality - Northern Ireland

Geo-statistical modelling techniques have been developed extensively in the last 10 years by Northern Ireland and analysis has been undertaken to explore changes in Nutrient Export Coefficients in recent years.

Forecasting of response in groundwater nitrate concentrations to changes in land use is particularly difficult in Northern Ireland given the dominance of locally discharging, shallow flow groundwater systems with relatively limited groundwater residence times. The extensive and variable cover of glacially-derived deposits, which strongly influences the vertical migration of nitrates from near surface to the underlying groundwater body, also complicates predictions.

Groundwater monitoring and results analysis to date have indicated that measured groundwater concentrations are, for the most part, below concentrations of significance (for 2014-2019 period 98 % of monitored boreholes with annual average < 25 mg/l NO3).

Summary - Northern Ireland

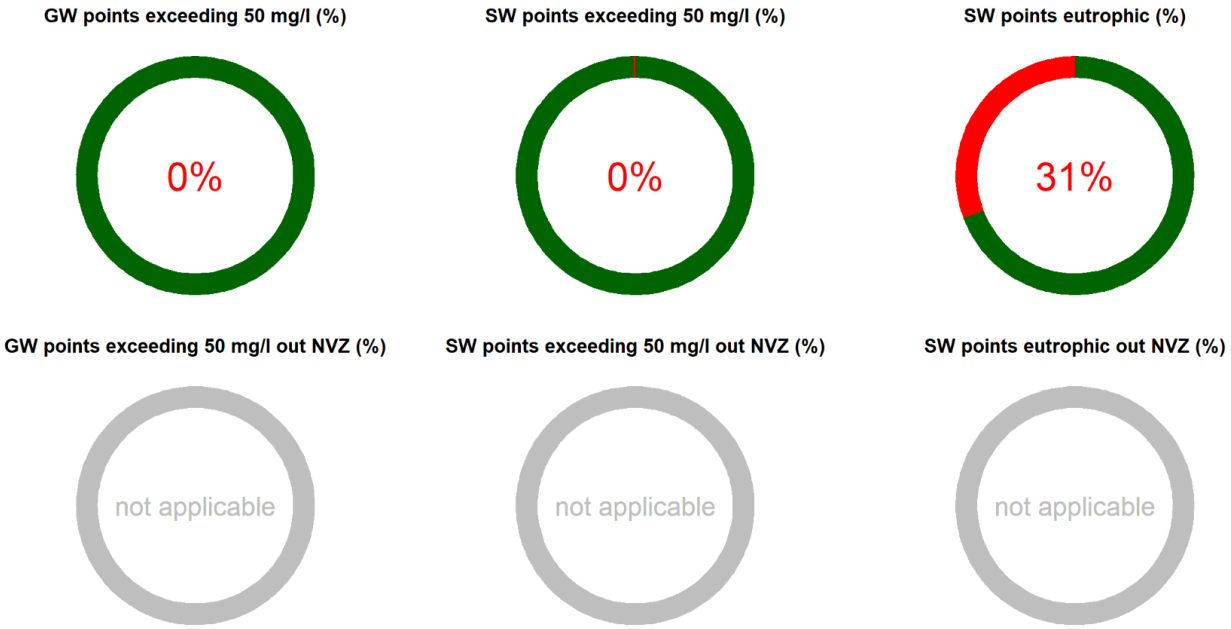


Figure 34. The summary plot for the period 2016-2019

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 - Northern Ireland

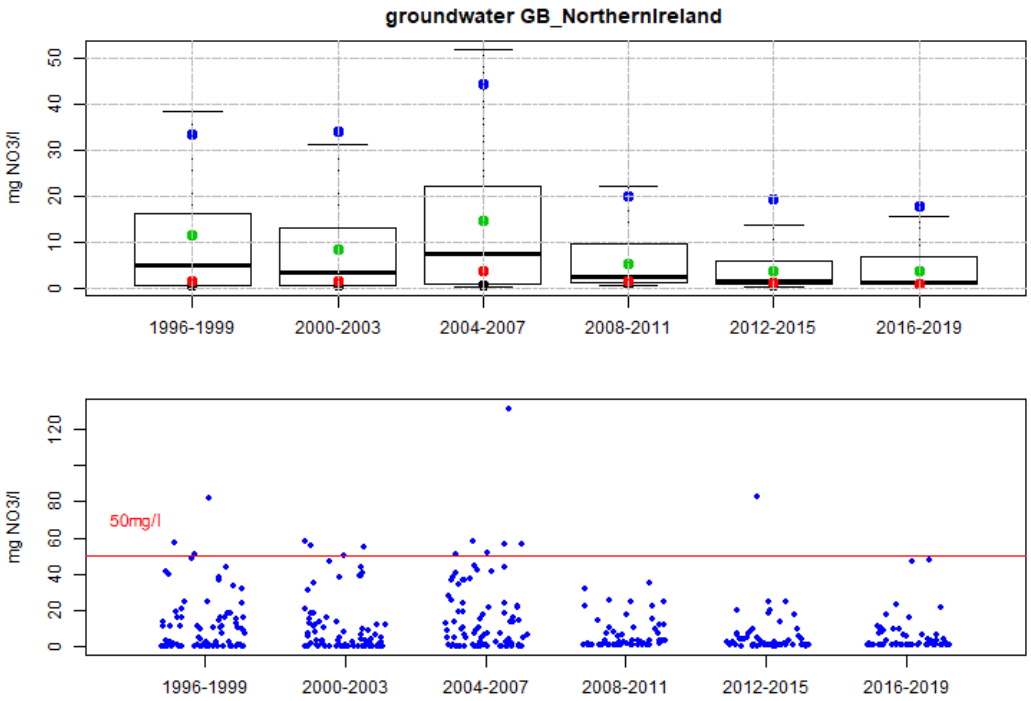


Figure 35. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

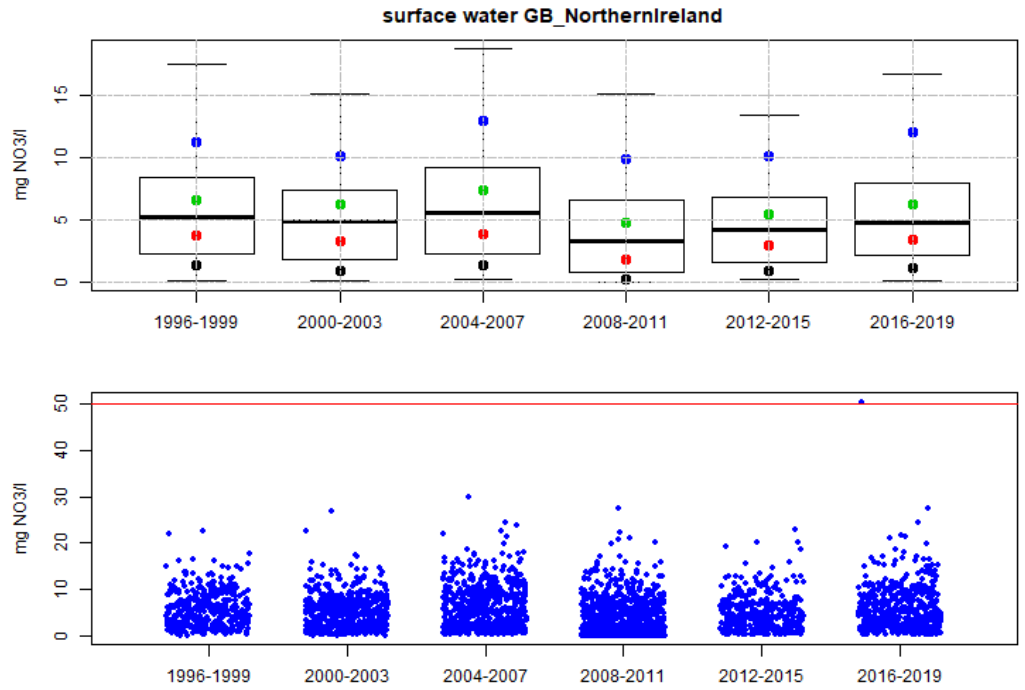


Figure 36. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.