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PART 5/11

COMMISSION STAFF WORKING DOCUMENT

EVALUATION

**Evaluation of the Nitrates Directive
(Council Directive 91/676/EEC)**

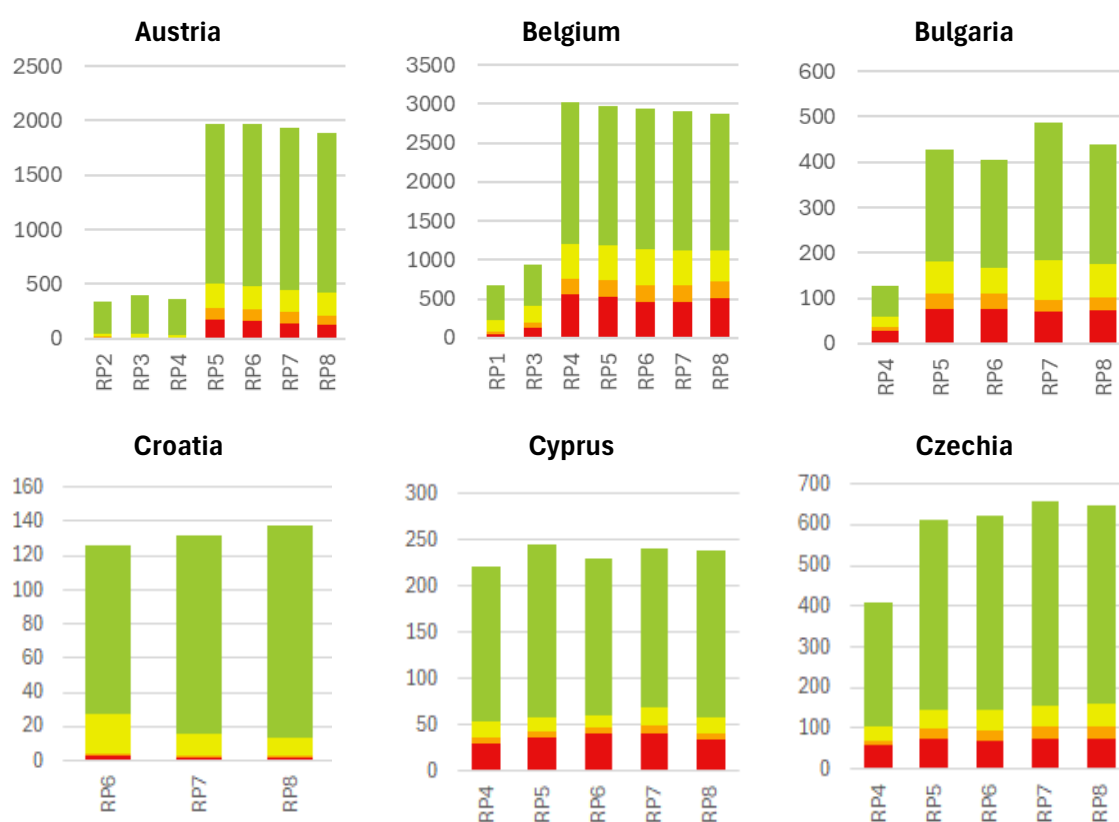
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ANNEX XIII. TEMPORAL DISTRIBUTION OF NITRATES CONCENTRATIONS AND TROPHIC STATUS OF WATERS IN MEMBER STATES FROM 1992 TO 2023

This annex complements the section 3.3 describing the impacts of the Nitrates Directive on the evolution of water quality. It first provides the graphic evolution across the 8 reporting periods (RP)¹ of nitrates concentrations in groundwater, surface water and eutrophication per Member State, complementing the EU level graphs presented in sections 3.3.1, 3.3.2 and 3.3.3. In the second part, it provides the full set of maps of long-term trend analysis of nitrate concentration in surface and groundwater 2008-2023 prepared by the JRC, complementing the maps on trends in ground and surface waters nitrate concentrations in sections 3.3.1 and 3.3.2.

Nitrates pollution in groundwaters

Figure 1 - Evolution in nitrate concentration classes in groundwater between 1992 – 2023



Legend:

Nitrates concentration classes: ■ < 25 mg/l ■ 25 - 39.99 mg/l ■ 40 - 49.99 mg/l ■ ≥ 50 mg/l

X axis – reporting period, Y axis – number of groundwater monitoring points

¹ RP1: period 1992-1995, RP2: period 1996-1999, RP3: period 2000-2003, RP4: period 2004-2007, RP5: period 2008-2011, RP6: period 2012-2015, RP7: period 2016-2019, RP8: period 2020-2023.



Legend:

Nitrates concentration classes: ■ < 25 mg/l ■ 25 - 39.99 mg/l ■ 40 - 49.99 mg/l ■ ≥ 50 mg/l

X axis – reporting period, Y axis – number of groundwater monitoring points



Legend:

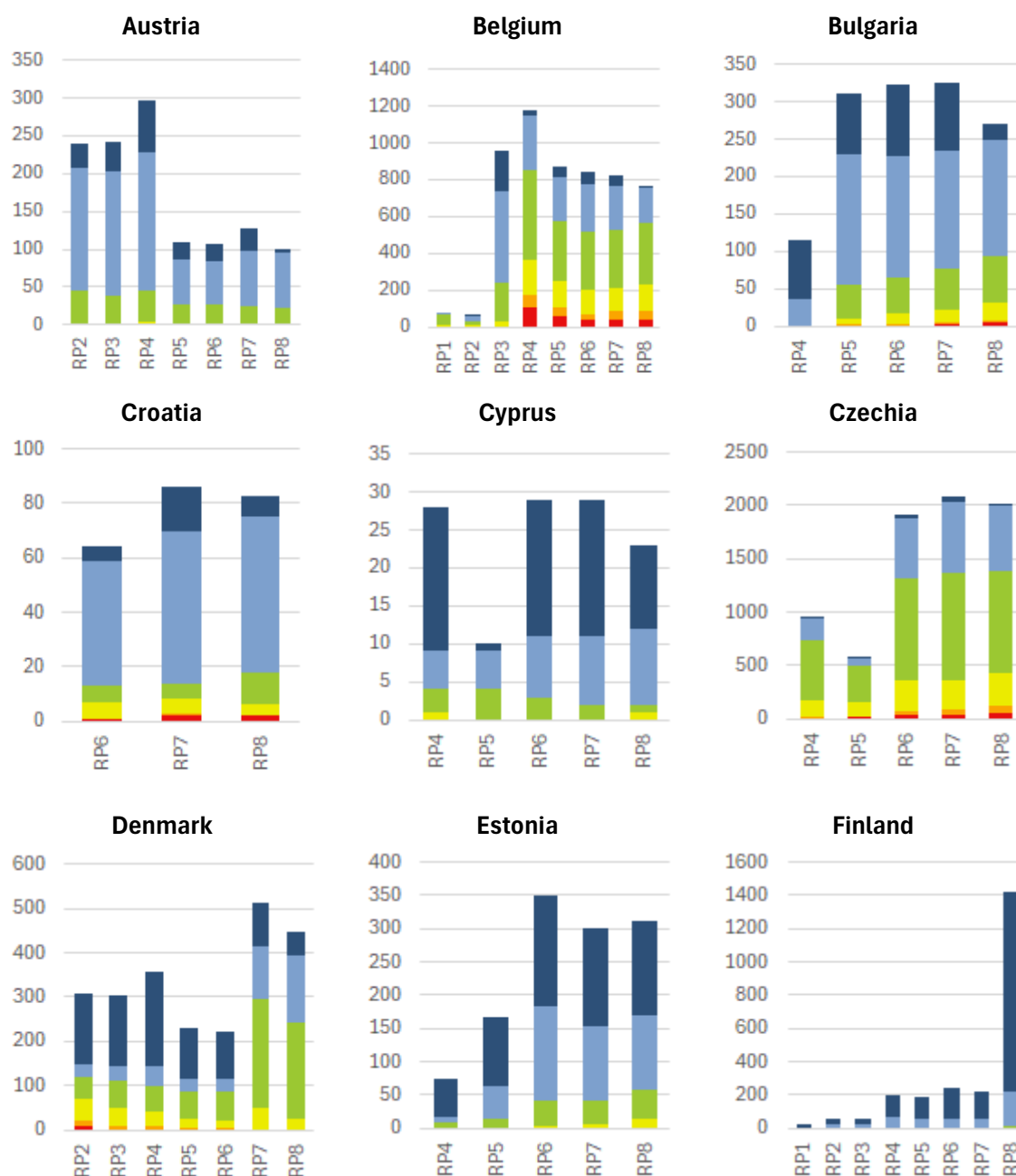
Nitrates concentration classes: ■ < 25 mg/l ■ 25 - 39.99 mg/l ■ 40 - 49.99 mg/l ■ ≥ 50 mg/l

X axis – reporting period, Y axis – number of groundwater monitoring points

² Stations for the reporting periods 2008-2011 and 2012-2015 contain previous errors in reporting. Although these reporting errors were resolved thereupon, it was not possible to include the new data in the subsequent reports.

Nitrates pollution in surface waters

Figure 2 - Evolution in nitrate concentration classes in surface waters between 1992 – 2023



Legend

Nitrates concentration classes: ■ < 2 mg/l ■ 2 - 9.99 mg/l ■ 10 - 24.99 mg/l
■ 25 - 39.99 mg/l ■ 40 - 49.99 mg/l ■ ≥ 50 mg/l

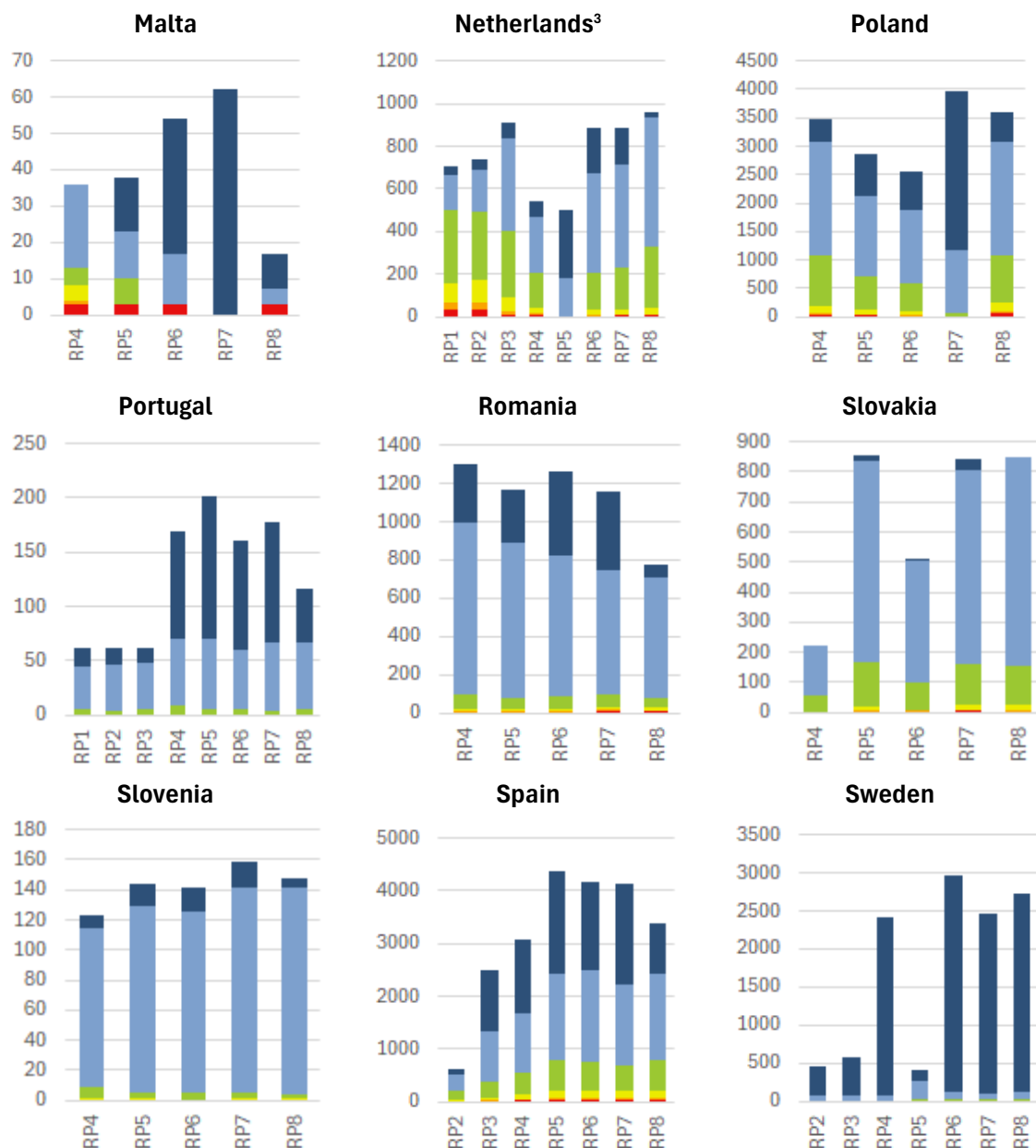
X axis – reporting period, Y axis – number of surface waters monitoring points



Legend

Nitrates concentration classes: ■ < 2 mg/l ■ 2 - 9.99 mg/l ■ 10 - 24.99 mg/l
■ 25 - 39.99 mg/l ■ 40 - 49.99 mg/l ■ ≥ 50 mg/l

X axis – reporting period, Y axis – number of surface water monitoring points



Legend

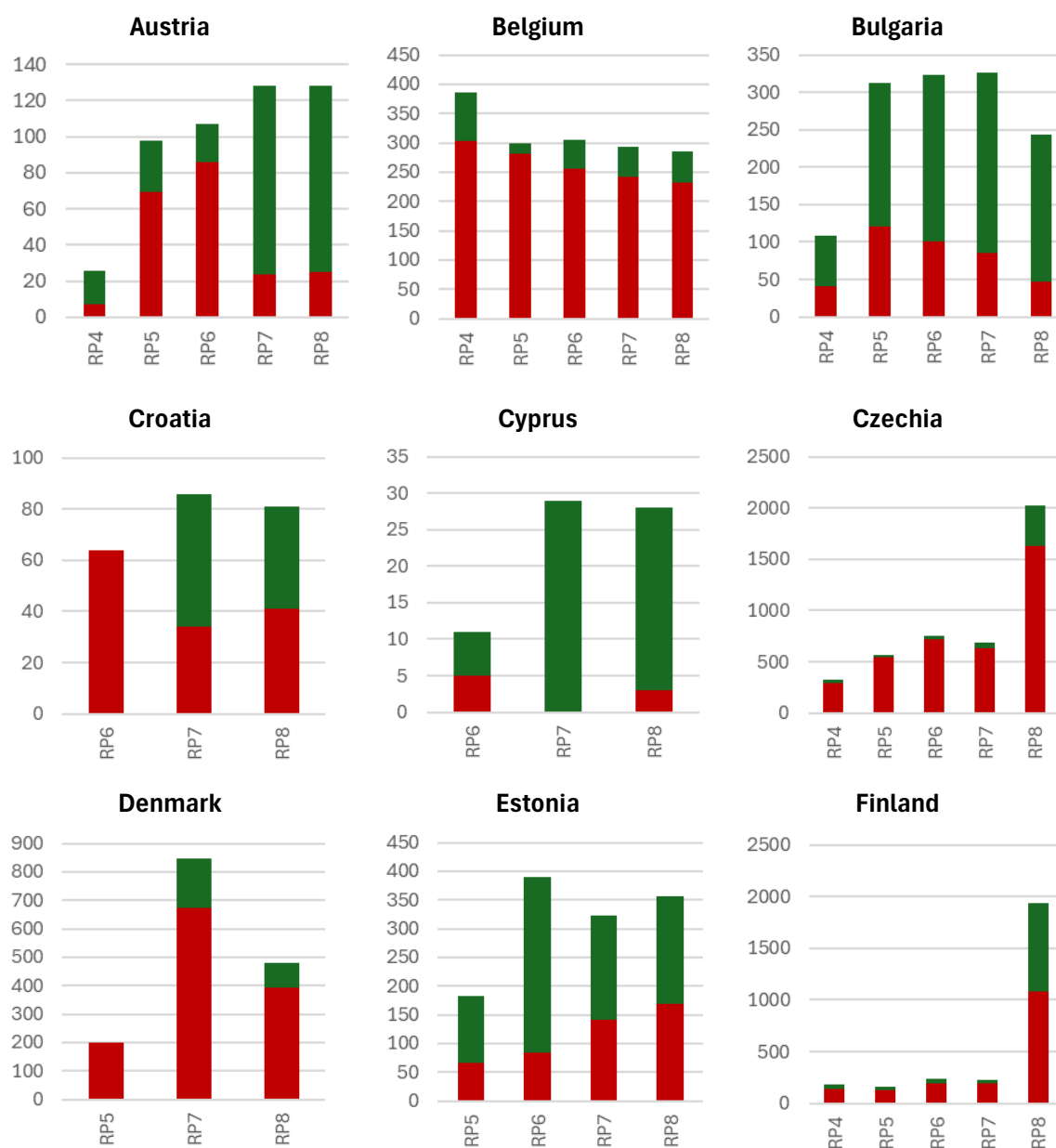
Nitrates concentration classes: ■ < 2 mg/l ■ 2 - 9.99 mg/l ■ 10 - 24.99 mg/l
 ■ 25 - 39.99 mg/l ■ 40 - 49.99 mg/l ■ ≥50 mg/l

X axis – reporting period, Y axis – number of surface water monitoring points

³ Stations for the reporting periods 2008-2011 and 2012-2015 contain previous errors in reporting. Although these reporting errors were resolved thereupon, it was not possible to include the new data in the subsequent reports.

Eutrophication in surface waters

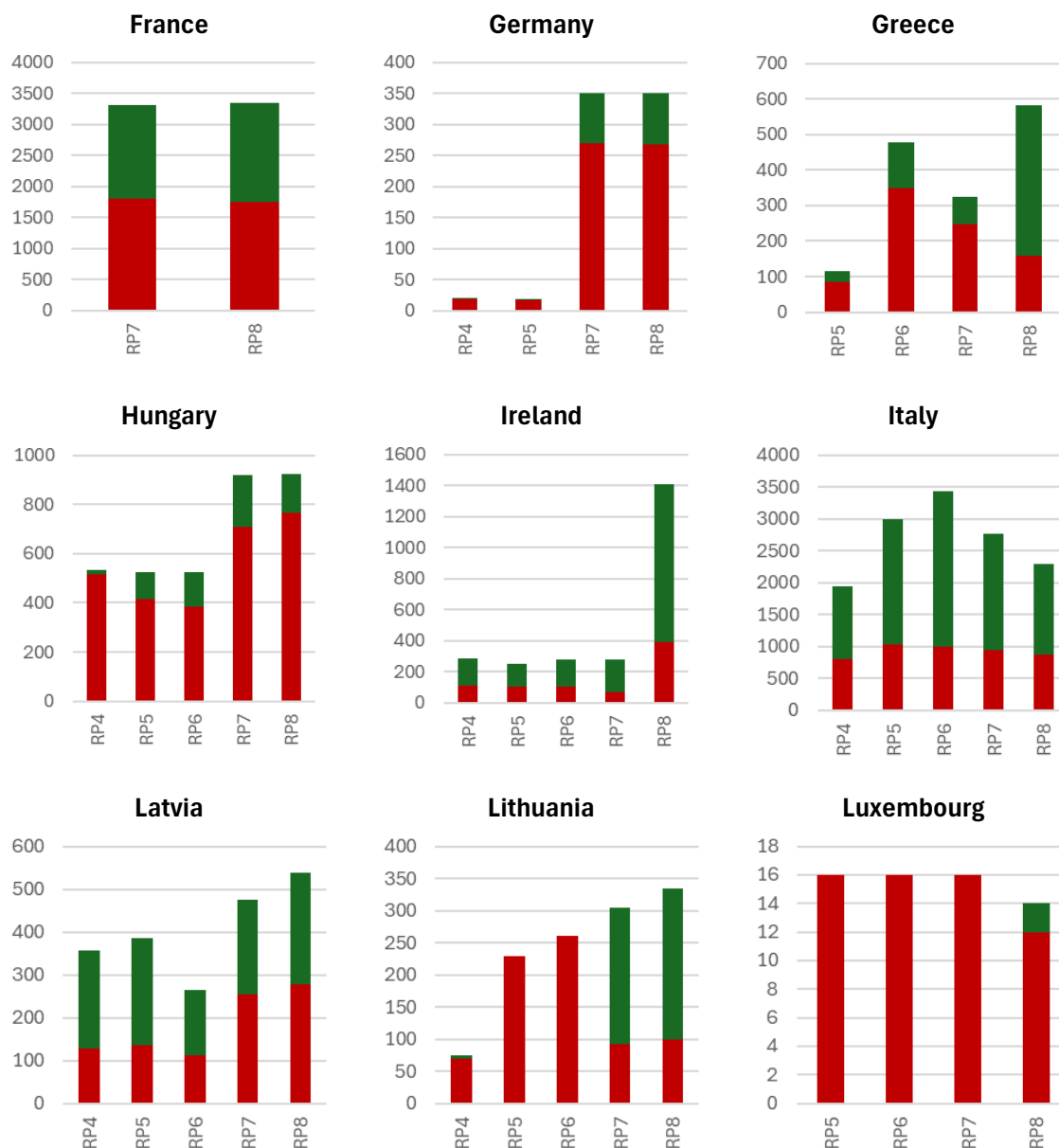
Figure 3 - Evolution of trophic status in surface waters between 2004 – 2023



Legend:

Nitrates concentration classes: ■ Non-eutrophic ■ Eutrophic/could become eutrophic

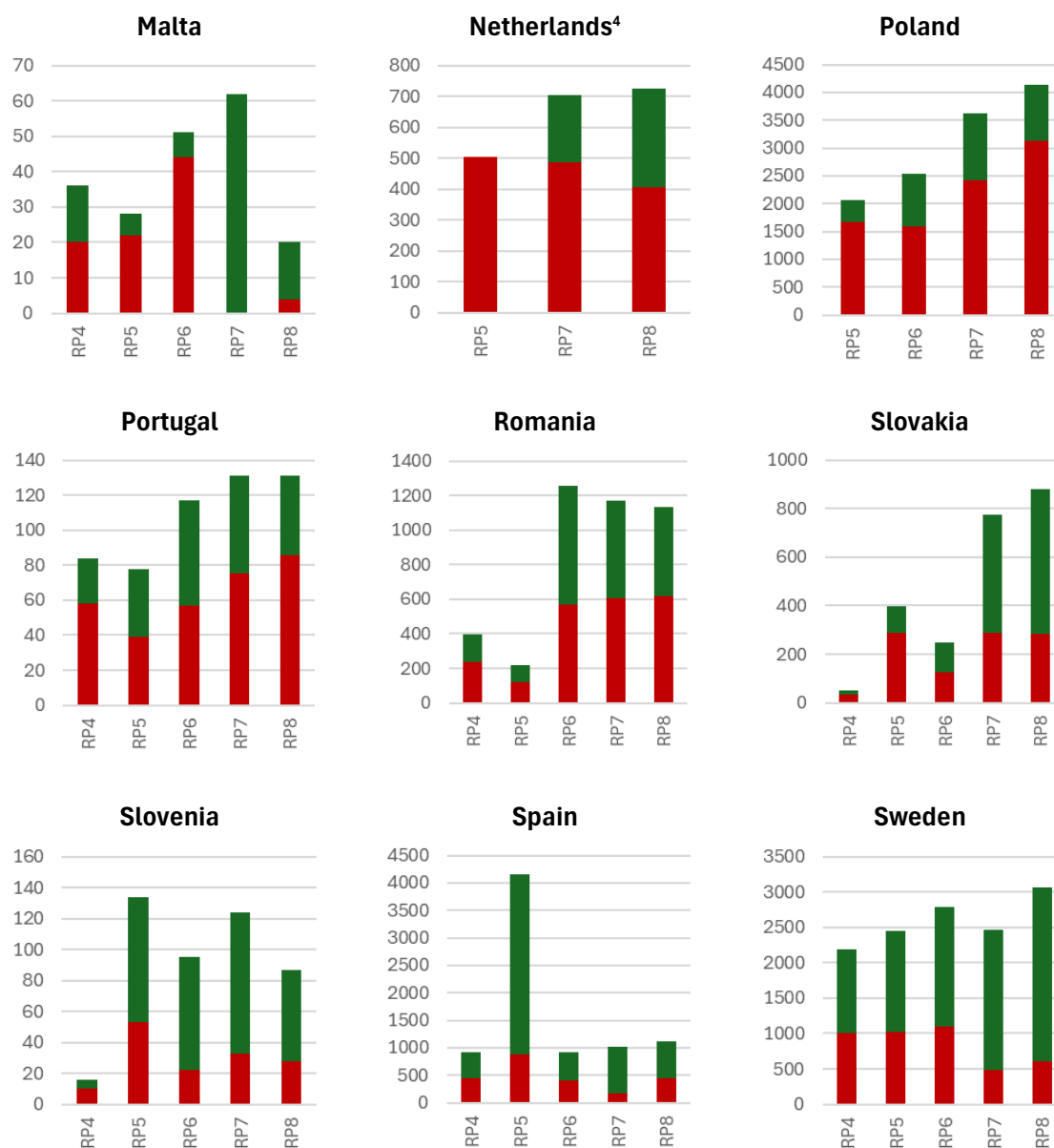
X axis – reporting period, Y axis – number of monitoring points with data on trophic status



Legend:

Nitrates concentration classes: ■ Non-eutrophic ■ Eutrophic/could become eutrophic

X axis – reporting period, Y axis – number of monitoring points with data on trophic status



Legend:

Nitrates concentration classes: ■ Non-eutrophic ■ Eutrophic/could become eutrophic

X axis – reporting period, Y axis – number of monitoring points with data on trophic status

⁴ Stations for the reporting periods 2008-2011 and 2012-2015 contain previous errors in reporting. Although these reporting errors were resolved thereupon, it was not possible to include the new data in the subsequent reports.

Long-term trend analysis of nitrate concentration in surface and groundwater 2008-2023

Initially, the analysis below aimed to assess **long-term trends in nitrate concentrations** using the official monitoring points reported by the Member States. However, it proved technically challenging to reconstruct a consistent time series for each individual station. This difficulty stemmed from common data management issues, including:

- **Turnover of monitoring points** (stations being discontinued and new ones opened),
- **Changes in station names** or codes over time,
- **Slight shifts in reported coordinates**, which complicated the matching of sites across reporting cycles.

Because of these inconsistencies, using single monitoring points risked producing fragmented time series that would not reliably reflect the underlying dynamics.

To overcome this, the data was aggregated at **NUTS3 region**, and the **average nitrate concentration** was calculated at this scale, which was then used to construct continuous time series for trend analysis.

Although this approach involves a level of spatial aggregation, it remains **pertinent and robust** for several reasons:

1. **Preserves comparability over time** – averaging across all available points in each NUTS3 region ensures that the effects of turnover or minor changes in stations are reduced or evened out in most cases⁵.
2. **Reflects regional water quality status** – the NUTS3 scale aligns with a policy-relevant level of analysis, offering insights into regional patterns rather than site-specific noise.
3. **Reduces bias from station changes** – the aggregation minimizes the artificial variability introduced by name/coordinate changes, allowing the focus to remain on genuine water quality trends.
4. **Enables consistent trend detection** – statistical analyses of average values are still valid for assessing whether nitrate concentrations are rising, stable, or declining over time.

In sum, while the ideal method would rely on continuous individual monitoring records, the aggregated NUTS3 approach is a **methodologically sound and policy-relevant alternative**, ensuring that the analysis captures meaningful temporal trends despite technical constraints in the raw monitoring dataset.

⁵ There may still be exceptions in cases where the density of monitoring stations is very low.

Figure 4 Trend analysis of NUTS3 average annual concentration in **groundwater** for the period 2008-2023

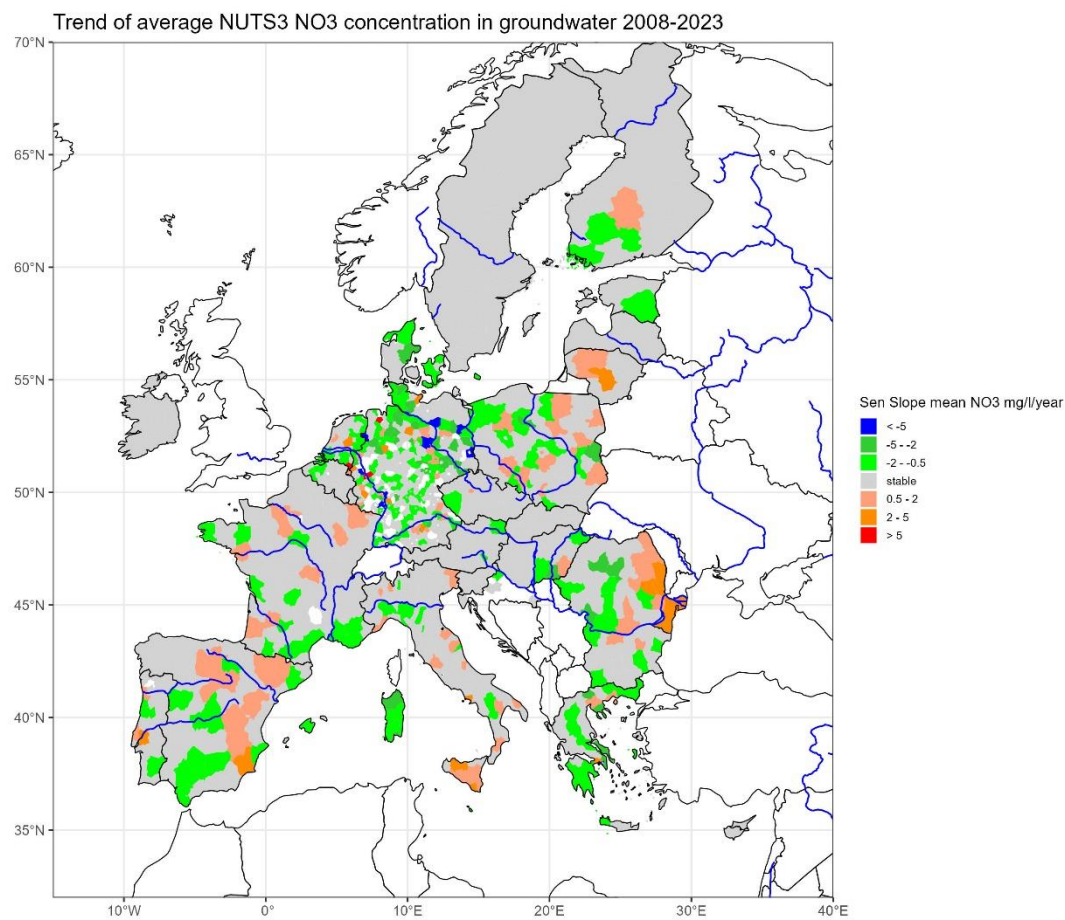


Figure 5 Trend analysis of NUTS3 average annual concentration in **surface water** for the period 2008-2023

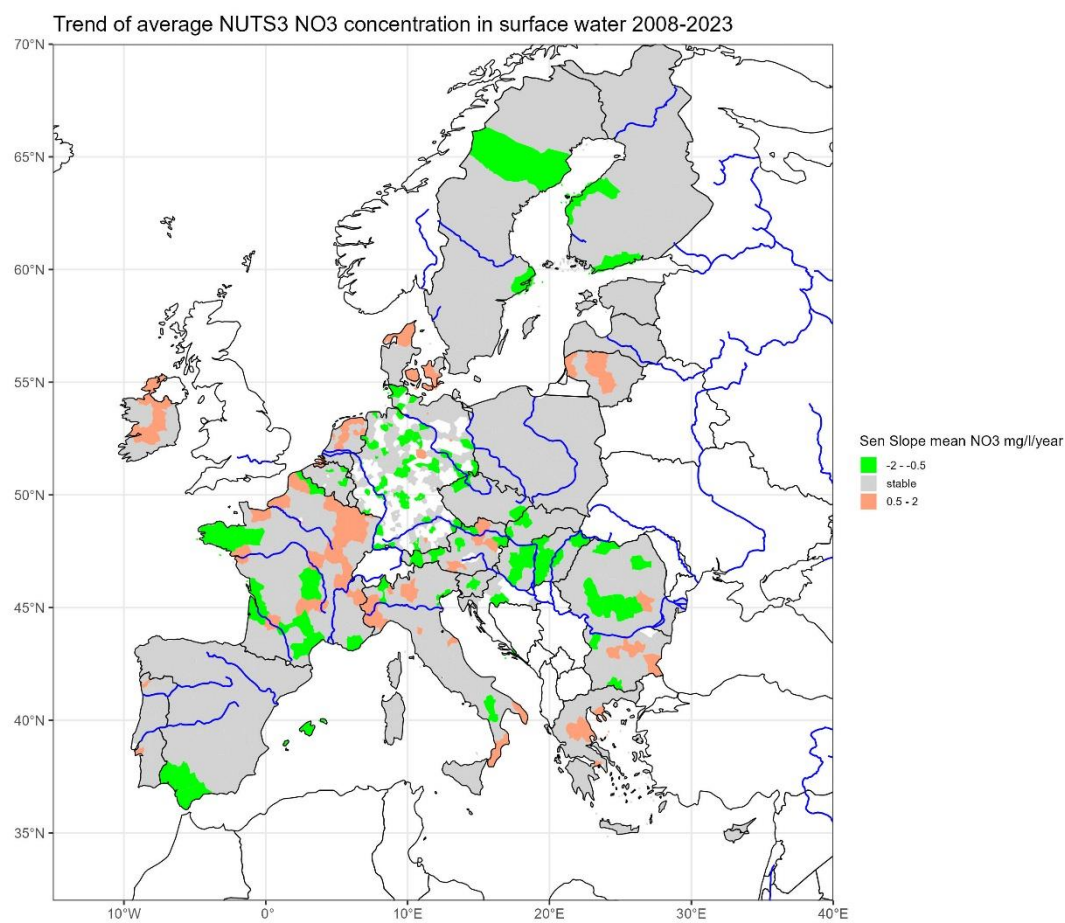


Figure 6 Latest reported NUTS3 average annual concentration in groundwater in the period 2008-2023 for regions with decreasing trends

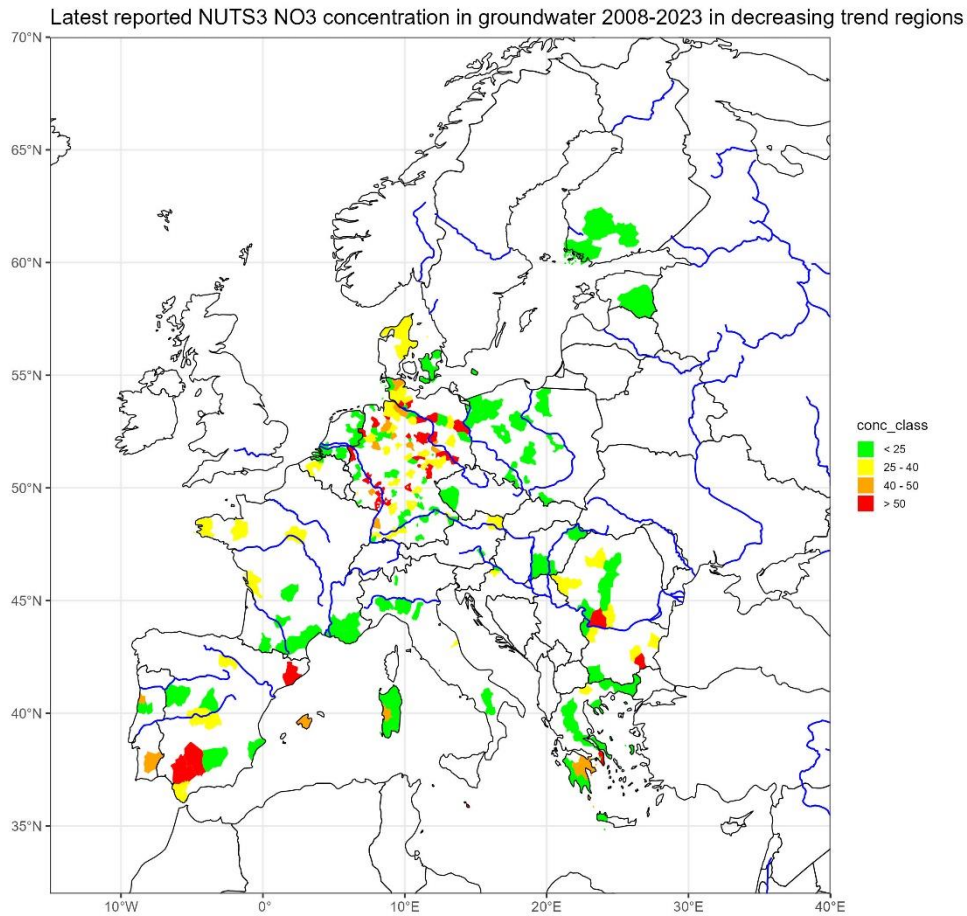


Figure 7 Latest reported NUTS3 average annual concentration in groundwater in the period 2008-2023 for regions with stable concentrations

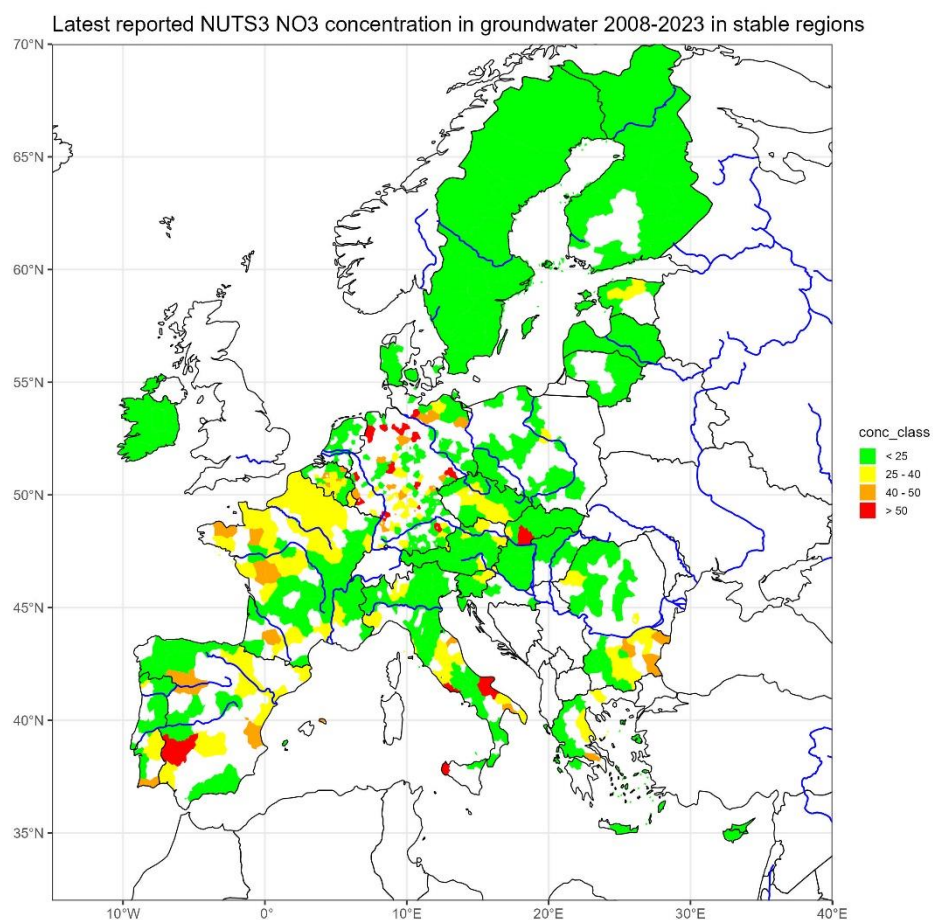


Figure 8 Latest reported NUTS3 average annual concentration in groundwater in the period 2008-2023 for regions with increasing trends

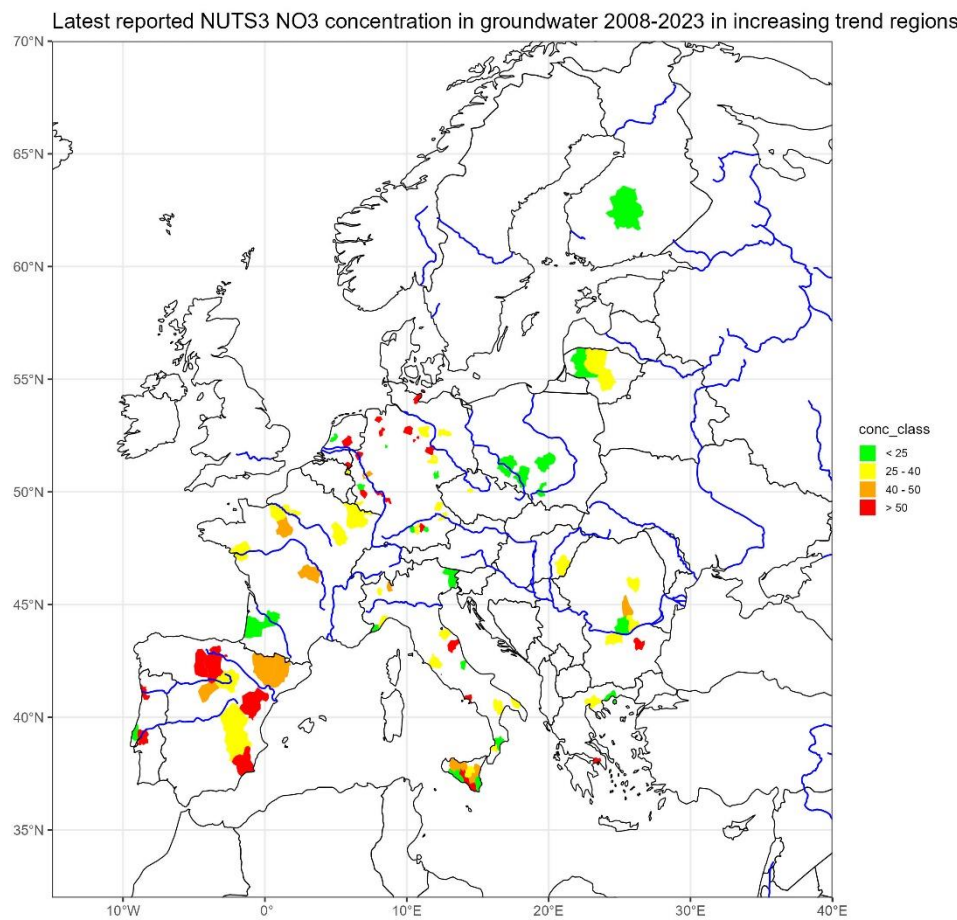


Figure 9 Latest reported NUTS3 average annual concentration in surface water in the period 2008-2023 for regions with decreasing trends

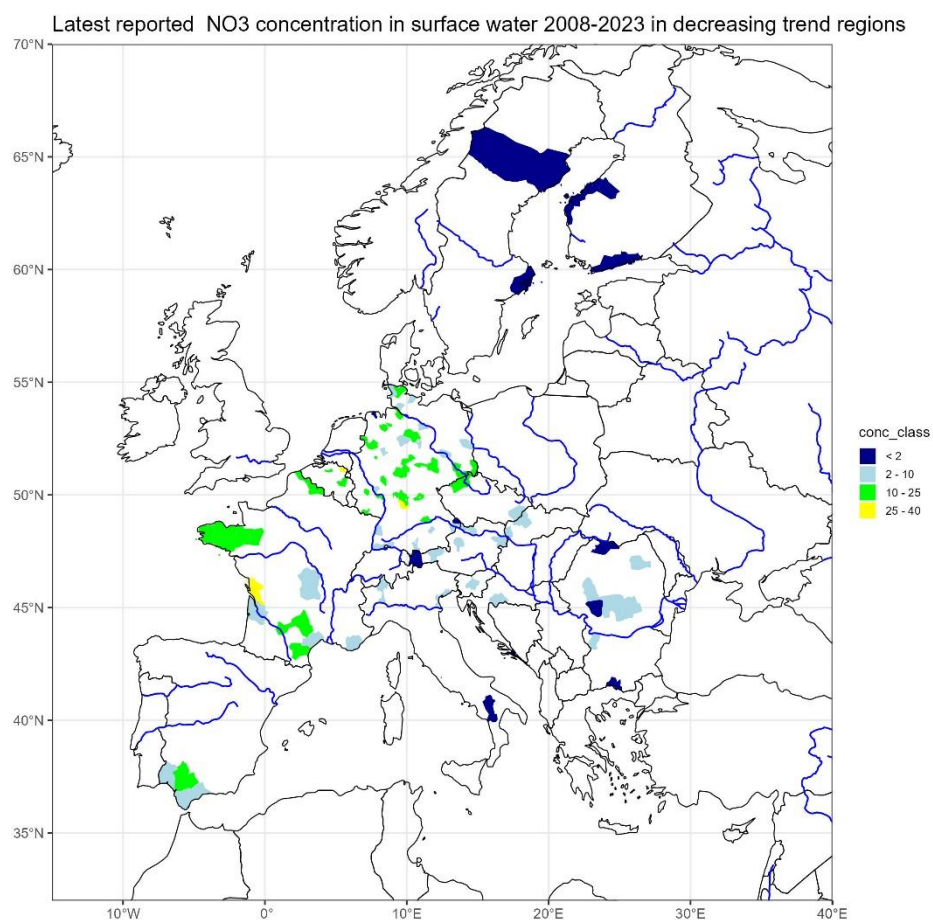


Figure 10 Latest reported NUTS3 average annual concentration in surface water in the period 2008-2023 for regions with stable concentrations

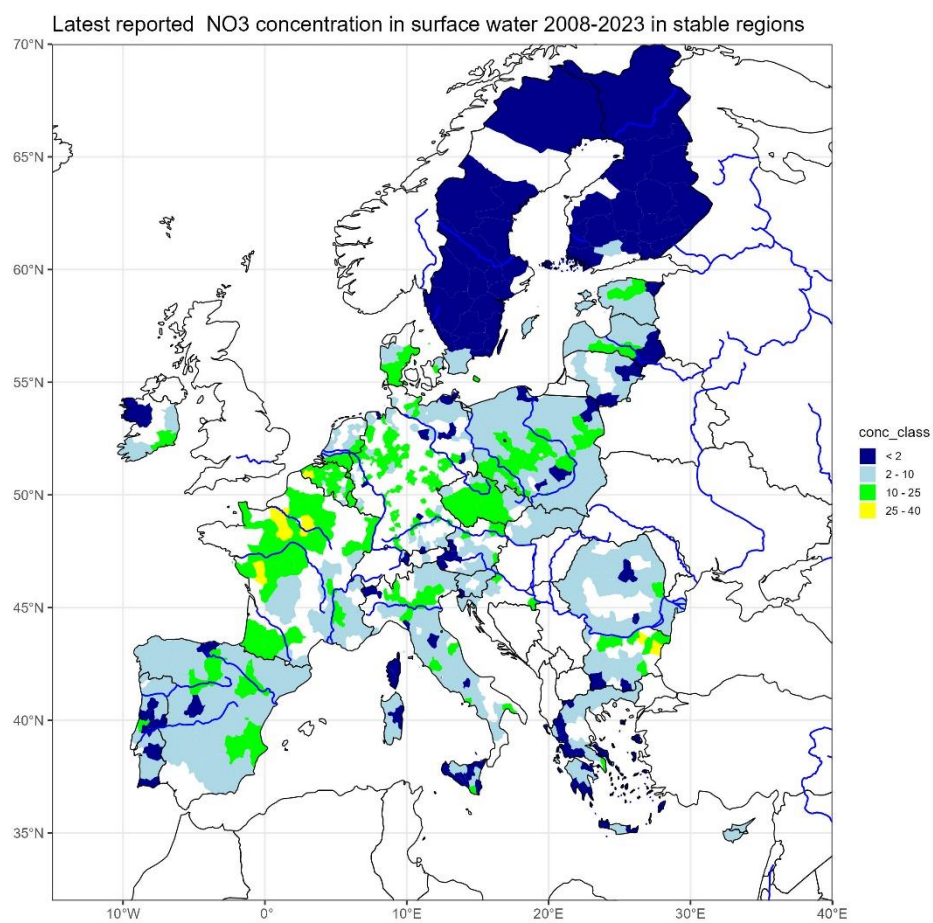
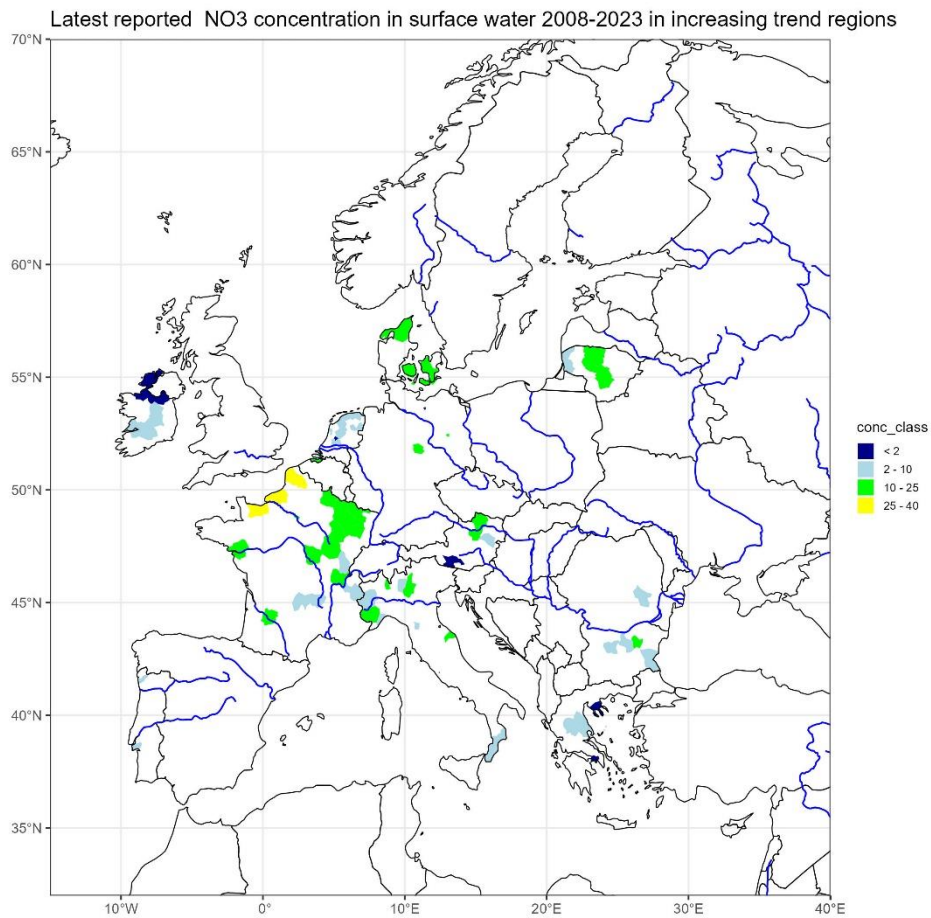


Figure 11 Latest reported NUTS3 average annual concentration in surface water in the period 2008-2023 for regions with increasing trends



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