



Water quality monitoring report on nitrogen and phosphorus concentrations in Irish waters 2024



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ENVIRONMENTAL PROTECTION AGENCY

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Background to this Report

Regulation 37 of the European Union (Good Agricultural Practice for the Protection of Waters) (Amendment) Regulations ([S.I. 393 of 2022](#)) requires the EPA to prepare an annual report of the results of water quality monitoring, which is used by the Department of Agriculture, Food and the Marine (DAFM), and the Department of Housing, Local Government and Heritage (DHLGH) in their evaluation of the nitrates derogation, as required by the [Commission Implementing Decision \(EU\) 2022/696](#).

In preparing this report, the EPA has used phosphorus and nitrate data from the national water quality monitoring programme for groundwater, rivers, lakes, estuarine and coastal waters. The assessment is based on data from monitoring stations that are representative of the impact of agriculture on water quality, i.e., monitoring stations that also reflect the impacts of predominantly urban or industrial pressures are not included.

Nitrogen results are expressed as nitrate or dissolved inorganic nitrogen and phosphorus results are measured as molybdate reactive phosphate. The results are expressed as annual means in the case of rivers, lakes, and groundwater or as winter medians for estuarine and coastal waters. The figures and tables in this report summarise the mean annual concentrations during 2024 for groundwater, rivers and lakes and the relative deviation from the threshold median concentration for 2022-2024 in transitional and coastal waters. Nitrate data are also presented to show the annual concentrations since 2010.

While both nitrate and phosphorus are important drivers of nutrient enrichment and pollution (eutrophication), their impact should be considered in conjunction with the overall ecological condition of our waters. The latest [EPA Water Quality in Ireland](#) report, covering the period 2016-2021, provides a full assessment of the chemical and ecological water quality and ecological status of Irish waters.

Public access to the nutrient data for the sites in the water monitoring programme is available on www.catchments.ie and the [EPA website](#).

Water Quality Summary

The latest EPA Water Quality in Ireland report ([EPA, 2022](#)), covering the period 2016-2021, found that 54% of our surface waters were in satisfactory ecological health, and that overall water quality was in decline. The picture for our estuaries is even more stark with only 36% in satisfactory ecological condition. The assessment indicated that the main problem impacting our waters was the presence of too much phosphorus and nitrogen, leading to increased eutrophication in these waters. The most recent EPA Water Quality Indicators report ([EPA, 2024](#)) highlighted that there was no significant change in the nutrient concentrations or in the biological quality of our rivers and lakes in 2023, and that water quality was not improving. The data in these EPA reports showed that nitrate concentrations remained too high in rivers, groundwater, and estuaries in the south east, south west and midlands & eastern regions.

Subsequently, the EPA early insights indicator report on nitrogen concentrations in the 20 major Irish rivers ([EPA, 2025](#)) noted a reduction in nitrate concentration during 2024, but, despite this reduction, nitrogen concentrations remained too high in the southeastern half of the country.

This report, which is based on data from the wider network of monitoring stations that are representative of the impact of agriculture on water quality, confirms that nutrient concentrations have reduced in rivers. There has been a 10% reduction in riverine nitrate concentrations in most regions, however, nitrate concentrations in rivers remain too high in the southeastern half of the country. There has been an 8% reduction in nitrate concentration in groundwater in the south east region, although groundwater nitrate concentrations have not reduced in other regions. When compared to last year, lake nitrate concentrations have also reduced, but there has been a 2% increase in the number of estuarine and coastal waters exceeded the median winter nitrogen threshold needed to achieve good ecological status in marine waters. The marine waters can take longer to respond to changes in nutrient levels than rivers. It is expected that it may take a few years before the reductions seen in rivers in 2024 are reflected in the downstream marine waters.

In 2024, five percent of groundwater monitoring sites exceeded the regulatory groundwater threshold value of 37.5 mg/l NO₃. Twenty one percent of groundwater monitoring sites have mean nitrate concentrations greater than 25 mg/l NO₃. Mean concentrations above 25 mg/l NO₃ in groundwater are of concern because they are a significant deviation from natural conditions and are approaching the threshold where drinking water quality may be compromised. Higher concentrations of nitrate in groundwater can also impact on the ecological health of rivers and associated marine waters in those catchments.

In 2024, 38% of river monitoring stations had concentrations higher than 8 mg/l NO₃ which is the level at which impacts to the ecological health of these rivers and associated downstream marine waters occurs. All lakes had nitrate concentrations lower than 10 mg/l NO₃, and nineteen percent of our estuarine and coastal waters exceeded the good status environmental quality standard for marine waters.

Phosphorus concentrations in rivers are stable, with no significant change in the last year. In 2024, 21% of river monitoring stations have phosphorus concentrations which are greater than the good status environmental quality standard (0.035 mg/l P). The highest river phosphorus concentrations are in areas with poorly draining soils. The elevated phosphorus concentrations are impacting the ecological health of these rivers and are contributing to nutrient enrichment in the downstream marine waters.

Results of Water Quality Monitoring

The following section sets out the results of monitoring for groundwater, rivers, lakes and transitional and coastal waters. Groundwater, lake and river monitoring data are presented as an annual mean concentration for monitoring undertaken during 2024, while the estuarine and coastal data presented represents the median winter concentration during 2022-2024.

The water quality data are referenced against environmental quality standards and/or environmental limits of concern for different water types and parameters.

Groundwater

Nitrate in Groundwater

Figure 1 summarises the mean nitrate concentrations for 178 groundwater monitoring sites monitored in 2024. Map 1 shows that most sites with concentrations greater than 25 mg/l NO₃ are in the river catchments draining the south east and south west regions.

Percentage of Groundwater sites in each Nitrate Concentration (mg/l NO₃) Category

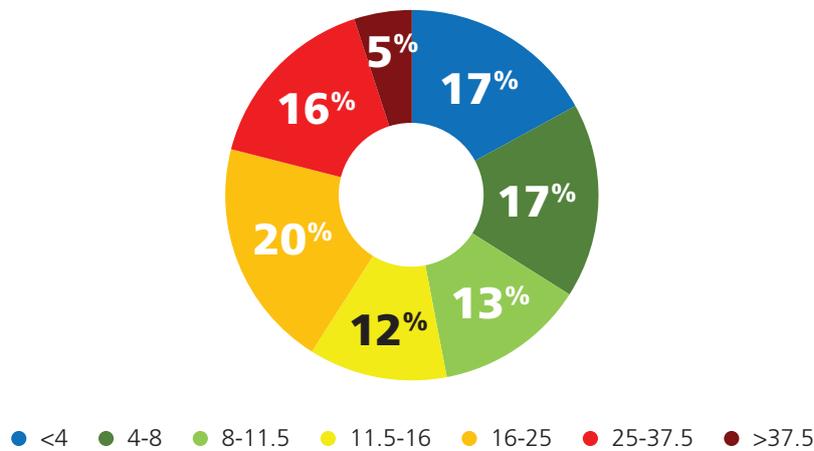
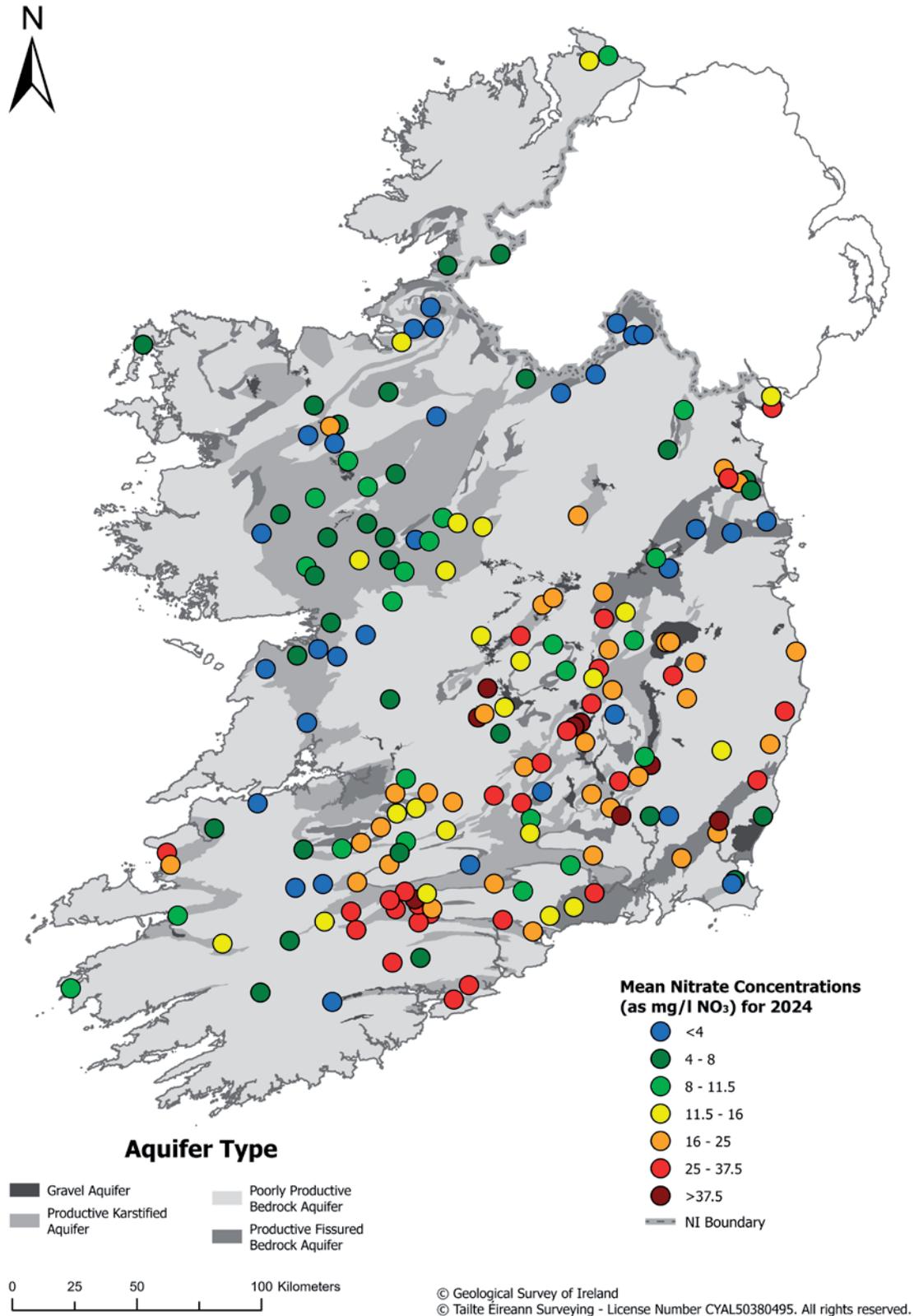


Figure 1: Mean nitrate concentrations in groundwater during 2024



Map 1: Mean nitrate concentrations in groundwater during 2024

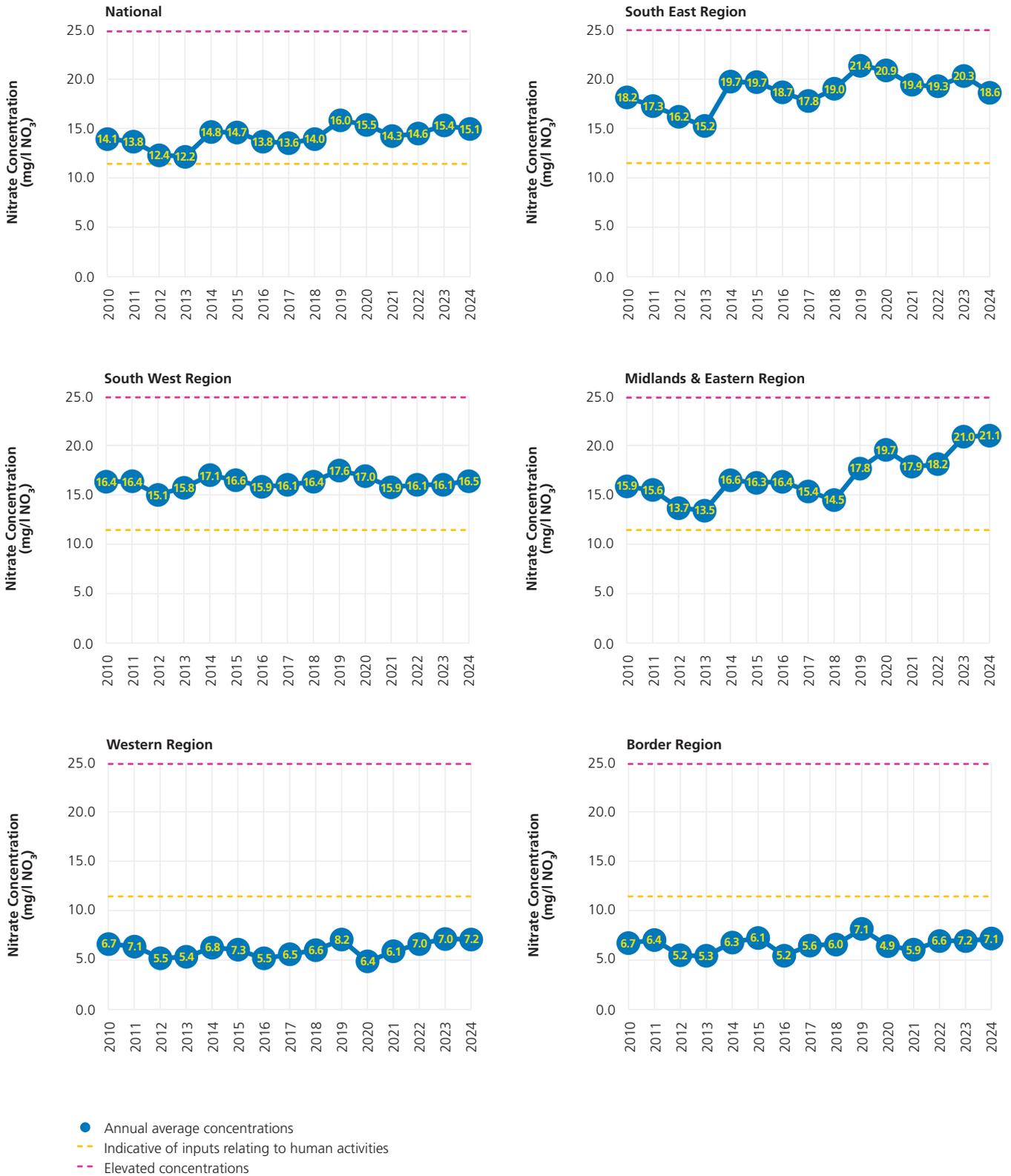


Figure 2: Mean groundwater nitrate concentrations since 2010

In 2024, 21% of groundwater monitoring sites had a mean nitrate concentration greater than 25 mg/l NO₃. Mean concentrations above 25 mg/l NO₃ in groundwater are of concern because they are a significant deviation from natural conditions and are approaching the threshold where drinking water quality may be compromised. Nine (5%) monitoring sites exceeded the Irish threshold value of 37.5 mg/l NO₃. Mean concentrations above the threshold value are an indication that there may be exceedances of the drinking water standard of 50 mg/l NO₃ during the year. One of the nine monitoring sites had a mean nitrate concentration greater than 50 mg/l NO₃. All four sites that had a mean nitrate concentration greater than 50 mg/l NO₃ in 2023 have seen a reduction in mean nitrate concentration, with three of the four sites now having a concentration lower than 50 mg/l NO₃. The site with a mean nitrate concentration greater than 50 mg/l NO₃ is used to supply drinking water and has appropriate water treatment systems in place to ensure the provision of safe drinking water.

Figure 2 shows that the national mean nitrate concentration in groundwater has not reduced significantly in the past 12 months, although an 8% reduction in nitrate concentration is noted in the south east region. Increased nitrate concentrations continue to be observed in the midlands and eastern region and this region now has the highest mean groundwater nitrate concentration.

As groundwater contributes to surface water flow across the catchment, elevated nutrient concentrations may be contributing to an increase in the growth of algae and aquatic plants in rivers and the downstream marine waters.

Phosphorus in Groundwater

Figure 3 summarises the mean phosphorus concentrations (measured as molybdate reactive phosphorus (MRP)) for 178 sites in the national groundwater monitoring programme during 2024. Figure 3 shows that 7% of monitoring sites had mean phosphorus concentrations greater than the Irish good ecological status threshold value of 0.035¹ mg/l P. Groundwater phosphorus concentrations have remained relatively stable in the last decade and Map 2 indicates groundwater phosphate concentrations show significant spatial variability. This is because the soils and geological setting have a large influence on whether phosphorus applied at the land surface can reach groundwater.

Percentage of Groundwater sites in each Phosphorus Concentration (mg/l P) Category

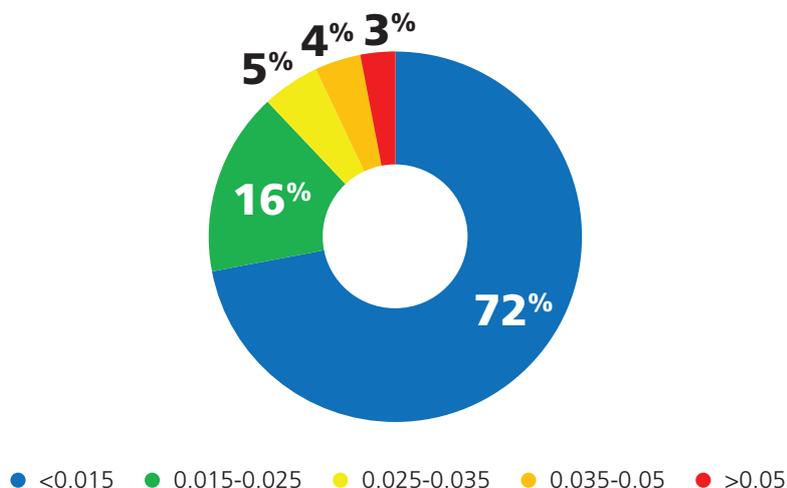
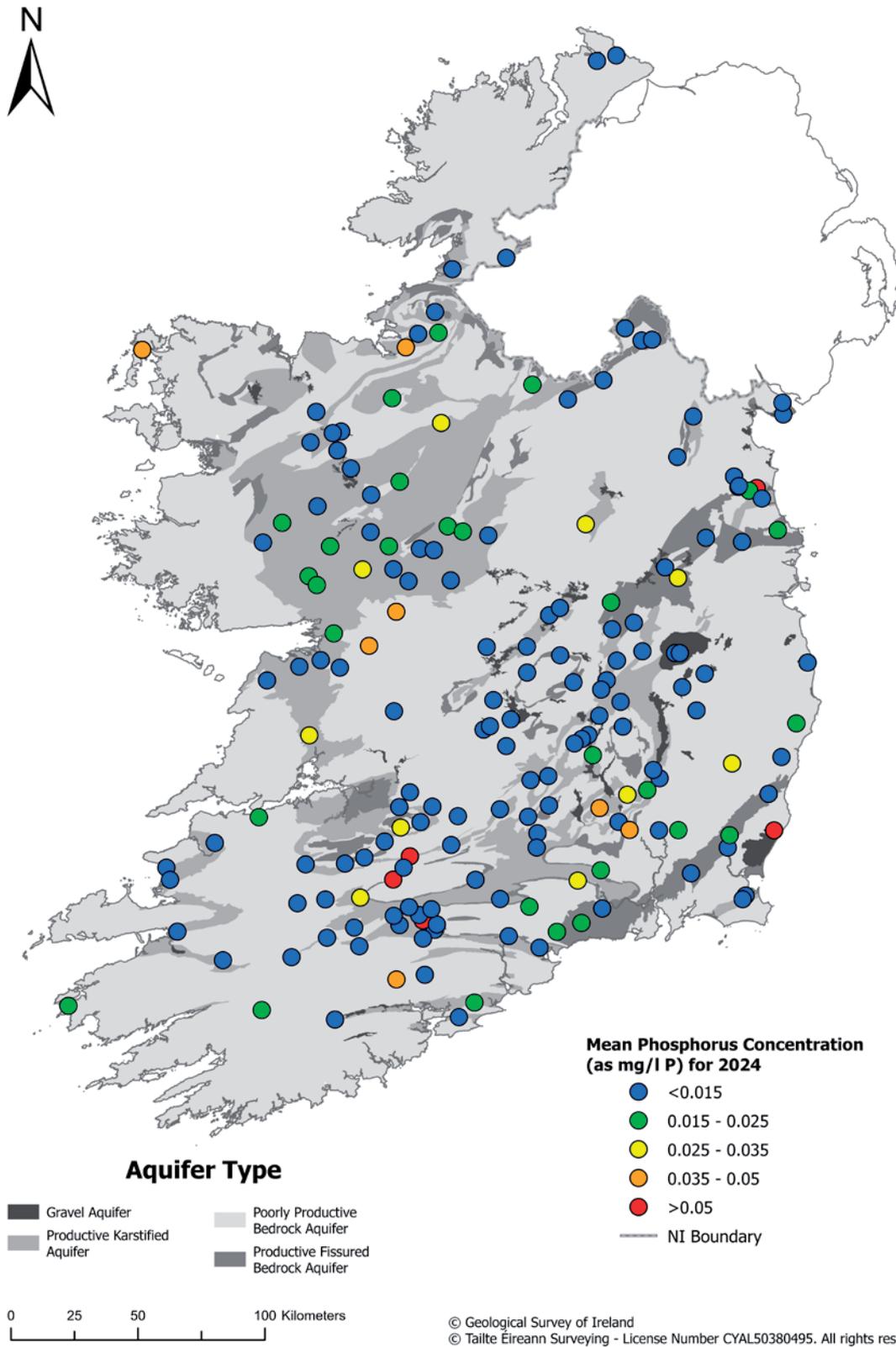


Figure 3: Mean phosphorus concentrations in groundwater during 2024

1 This groundwater threshold value is the WFD Good Status EQS for rivers.



Map 2: Mean phosphorus concentrations in groundwater during 2024

Rivers

Nitrate in Rivers

Figure 4 summarises the mean nitrate concentrations at 1,036 river monitoring sites from the national river monitoring programme in 2024. The assessment is based on data from monitoring stations that are representative of the impact of agriculture on water quality, i.e., monitoring stations that also reflect the impacts of predominantly urban or industrial pressures are not included.

Percentage of Rivers in each Nitrate Concentration (mg/l NO₃) Category

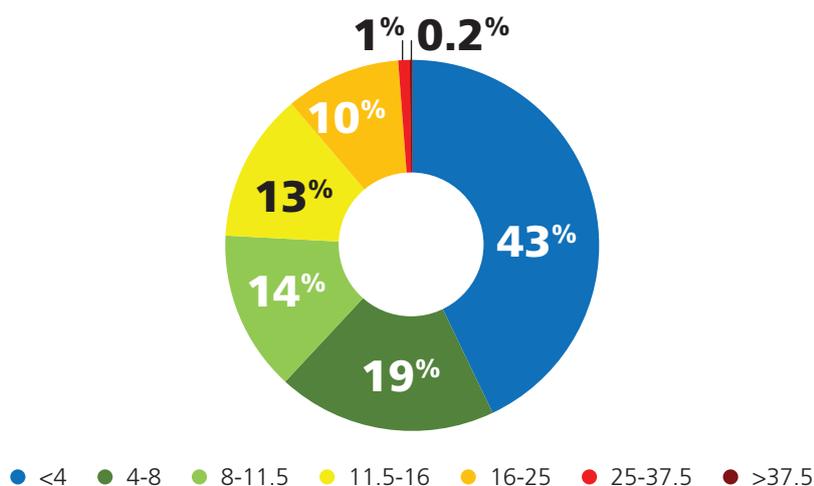
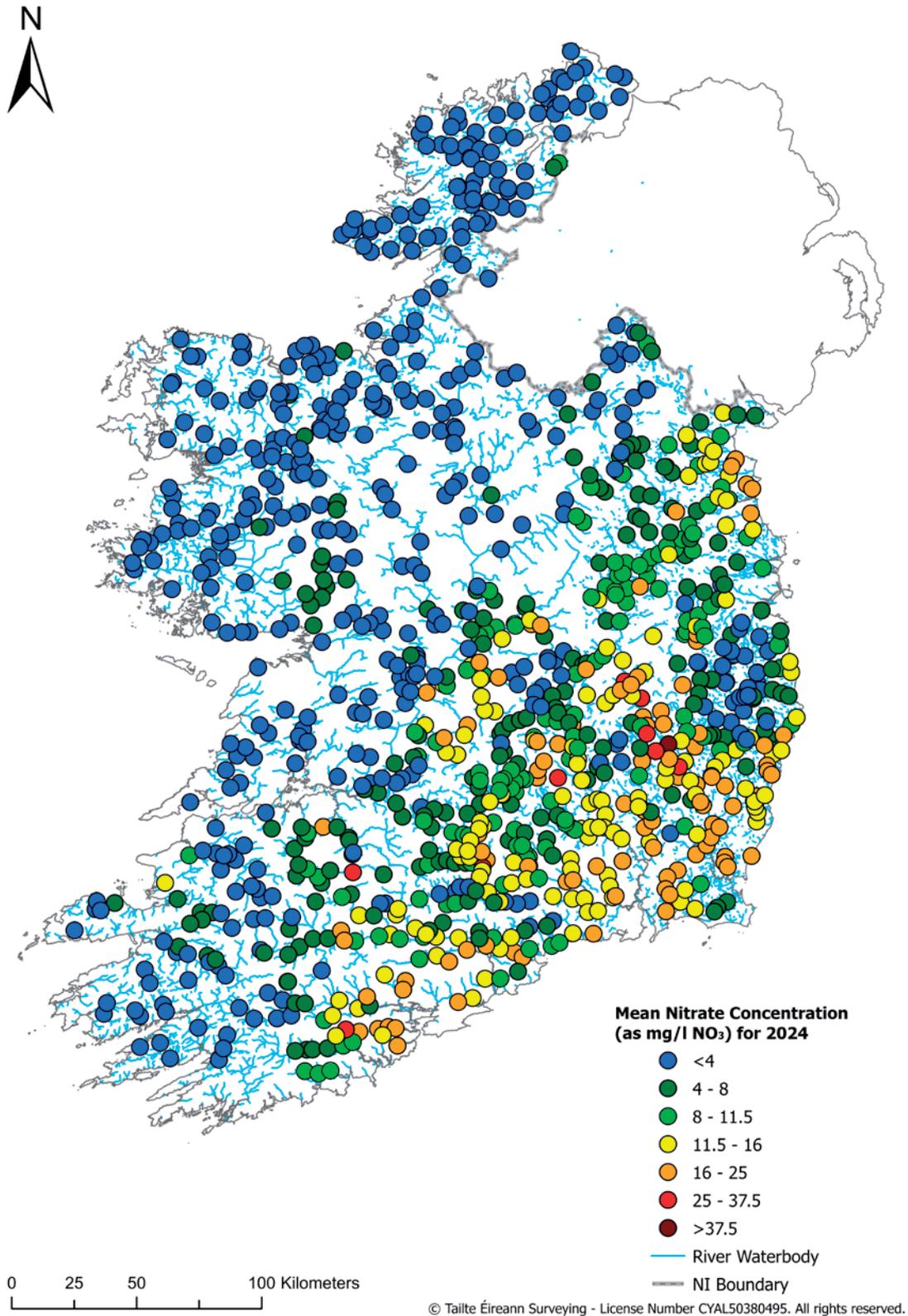


Figure 4: Mean nitrate concentrations at river monitoring sites in 2024

Figure 4 shows that 38% of our rivers had mean nitrate concentrations above 8 mg/l NO₃ in 2024. Concentrations above 8 mg/l NO₃ may have a water quality impact on the ecological health of these rivers. Mean concentrations greater than 11.5 mg/l NO₃ may result in a breach of the marine waters EQS which could impact the ecological health of the downstream marine waters. Map 3 shows that most of the rivers in the south east and along the southern seaboard have concentrations above 11.5 mg/l NO₃.

Figure 5 shows that there was a 10% national reduction in river nitrate concentrations during 2024, with reductions observed in all regions. Overall, nitrate concentrations in the south east and midlands & eastern regions remain too high. The south east region has consistently had the highest nitrate concentrations over time; the annual mean concentrations in this region exceed concentrations that are likely to have a negative impact on marine water quality. The western and border regions have the lowest overall river nitrate concentrations.



Map 3: Mean nitrate concentrations in rivers during 2024

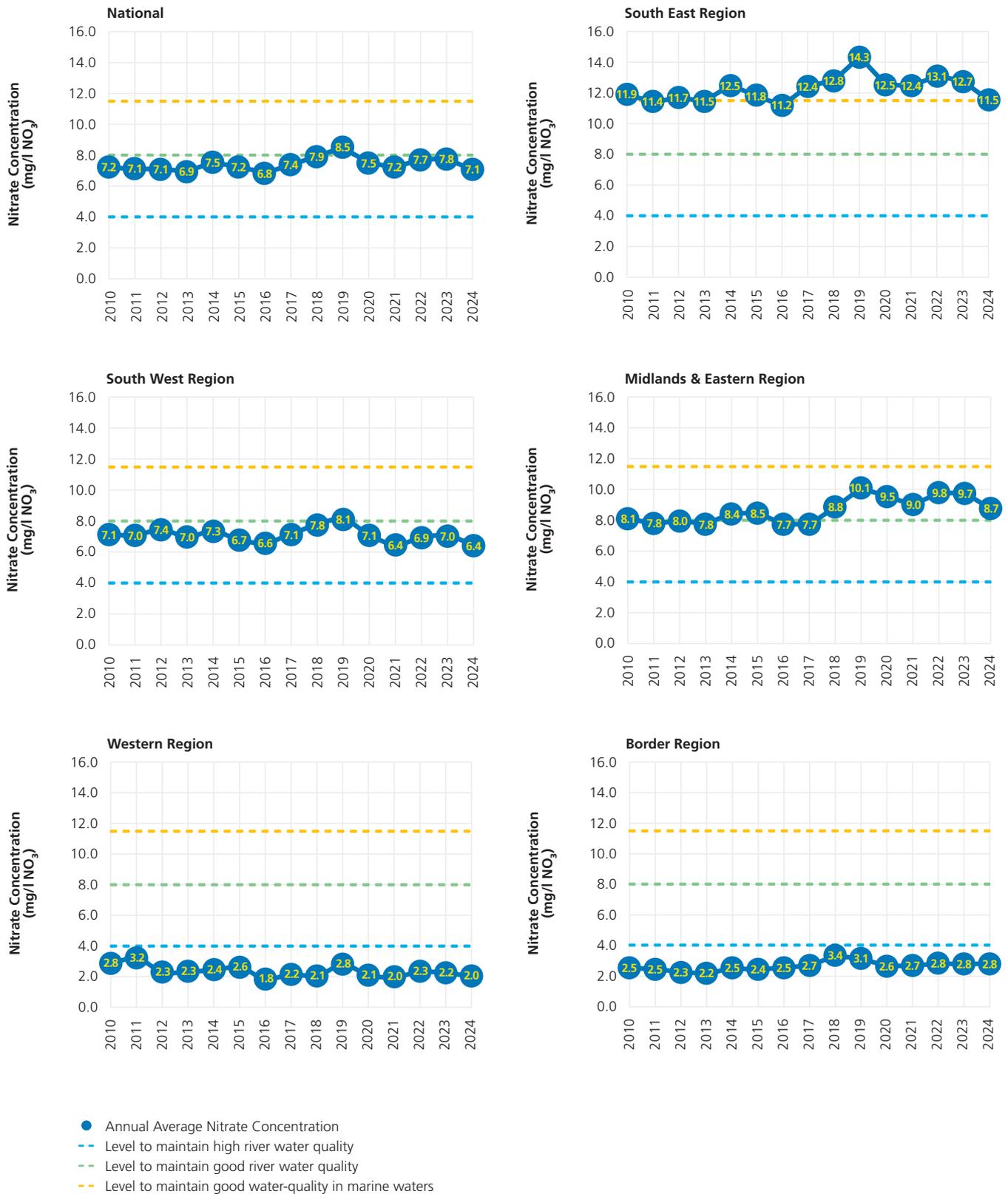


Figure 5: Mean riverine nitrate concentrations since 2010

Phosphorus in Rivers

Figure 6 summarises the mean phosphorous concentrations at 1,036 river monitoring sites from the national river monitoring programme for 2024.

During 2024, mean river concentrations exceeded the good status EQS (0.035 mg/l P) in 21% of rivers. There has been no significant change in mean riverine phosphorus concentrations the last 12 months. Map 4 shows that the highest phosphorus concentrations i.e., greater than 0.05 mg/l P, are found in areas that have a high proportion of poorly draining soils e.g., Limerick, Monaghan and the north east.

Percentage of Rivers in each Phosphorus Concentration (mg/l P) Category

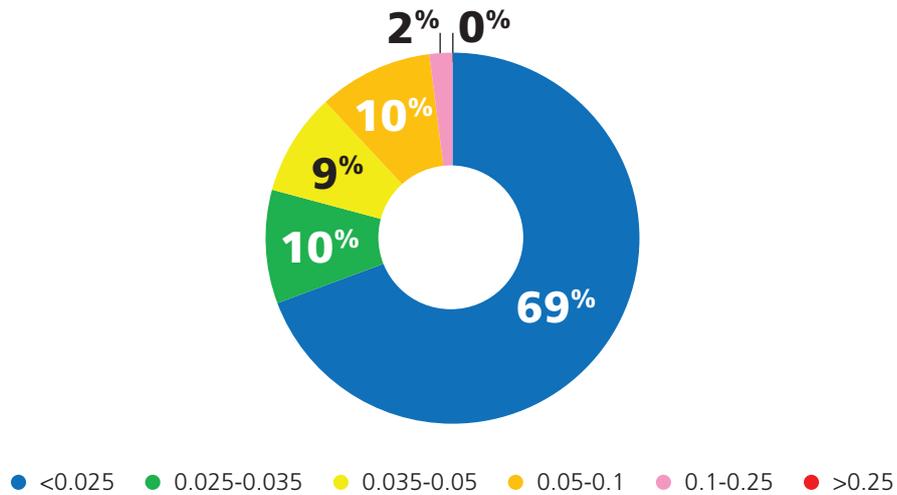
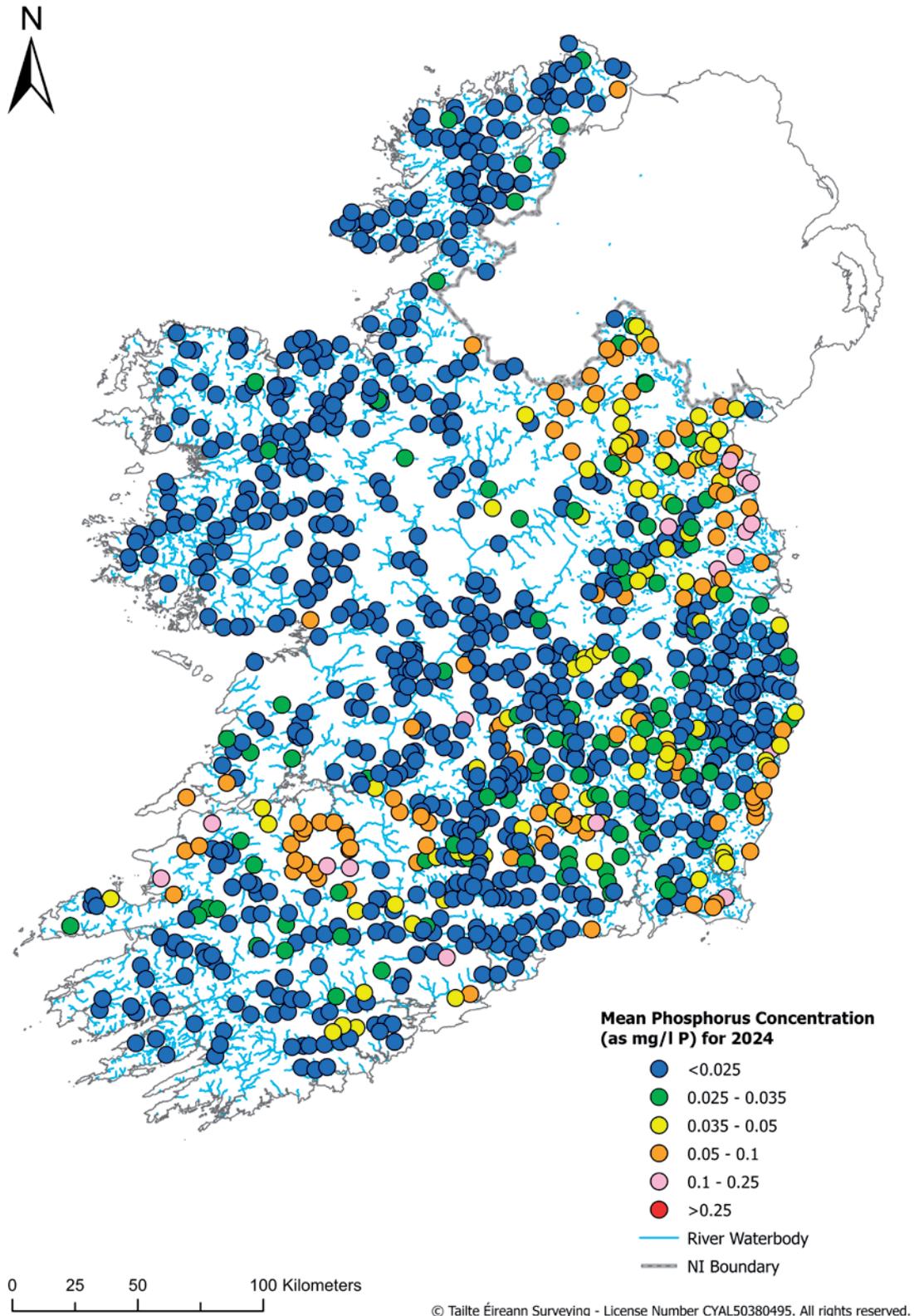


Figure 6: Mean phosphorus concentrations at river monitoring sites in 2024



Map 4: Mean phosphorus concentrations in rivers during 2024

Lakes

Nitrate in Lakes

Figure 7 summarises the mean nitrate concentrations from the national lake monitoring programme for 2024. Data were available for a total of 223 lakes. In summary, Figure 7 and Map 5 show that mean nitrate concentrations in lakes remain low, with the highest concentrations observed in the lakes of the south east.

Percentage of Lakes in each Nitrate Concentration (mg/l NO₃) Category

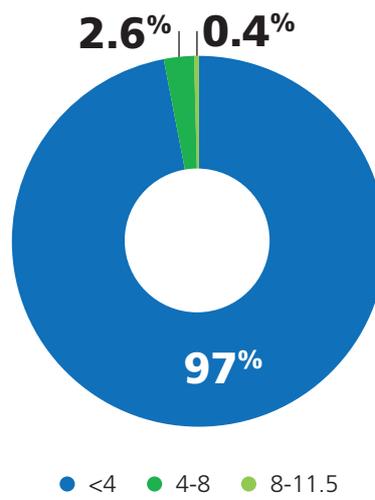
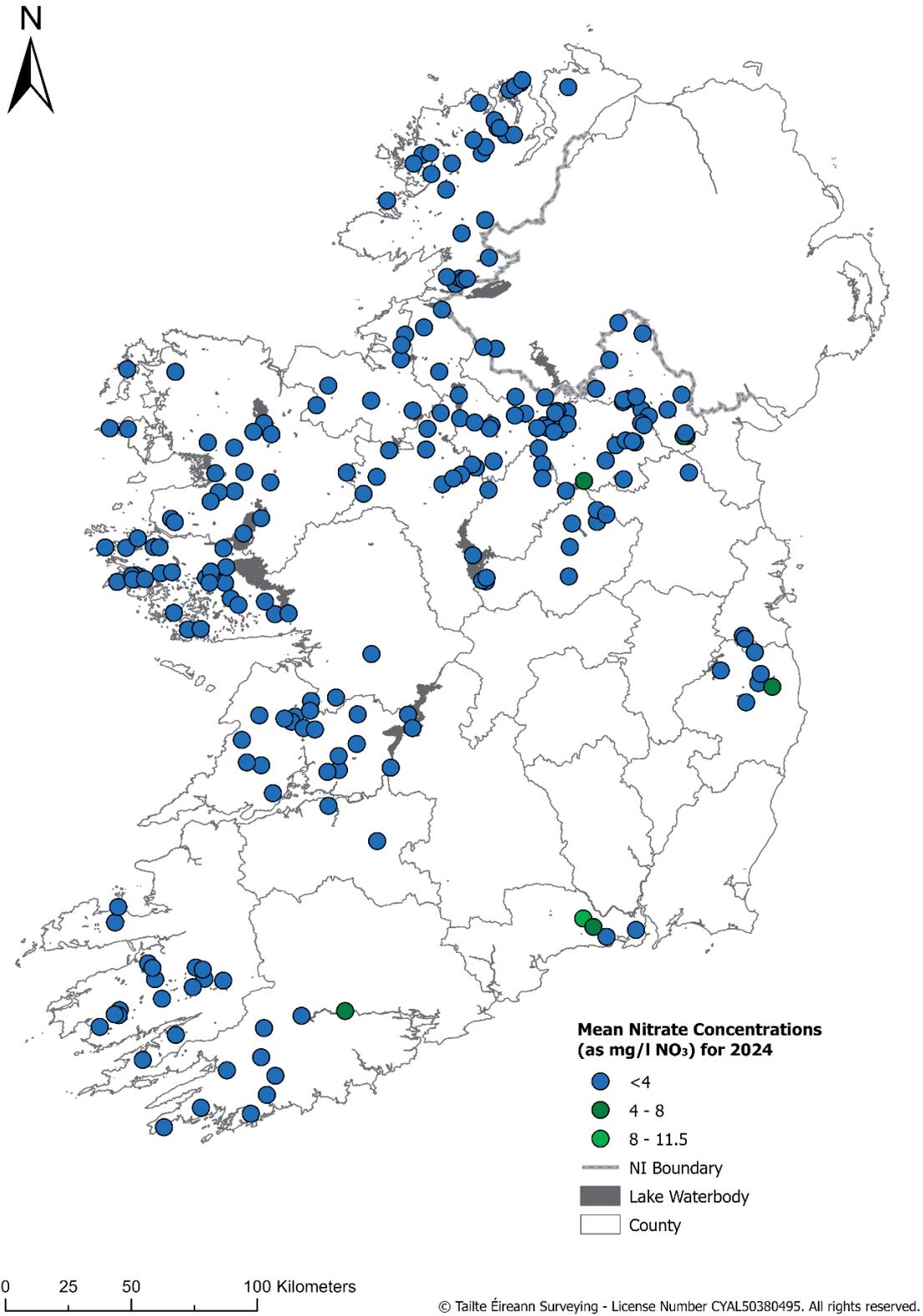


Figure 7: Mean nitrate concentrations in lakes during 2024



Map 5: Mean nitrate concentrations in lakes during 2024

Estuarine and Coastal Waters

Nitrogen in Estuarine and Coastal Waters

Figure 8 summarises the relative percentage deviation from the median winter nitrogen threshold² from the national transitional and coastal monitoring programme during 2022 to 2024. The median winter nitrogen concentration in marine waters is measured as dissolved inorganic nitrogen (DIN) and it is assumed that all measured nitrogen is present as nitrate. The concentration of DIN is expected to be at its highest in winter because of the absence of any significant plant or algal growth at that time of year; therefore, less nitrogen is used up and remains in the water. The most recent assessment was carried out on 119 estuarine and coastal water bodies. Twenty three of the 119 (19%) estuarine and coastal water bodies assessed were in unsatisfactory condition for DIN.

Map 6 shows that the marine waters with the highest concentrations above the assessment thresholds for DIN were in the south and south east of the country, which are the areas with the highest groundwater and river nitrate concentrations.

No. of estuarine and coastal waters and their relative percentage deviation from the median winter nitrogen threshold

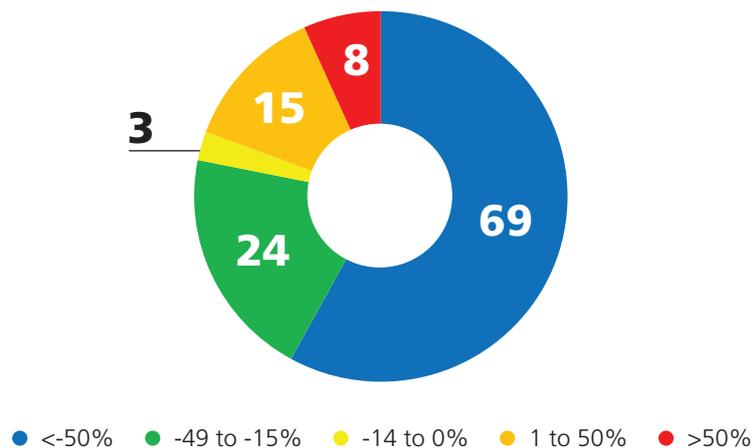
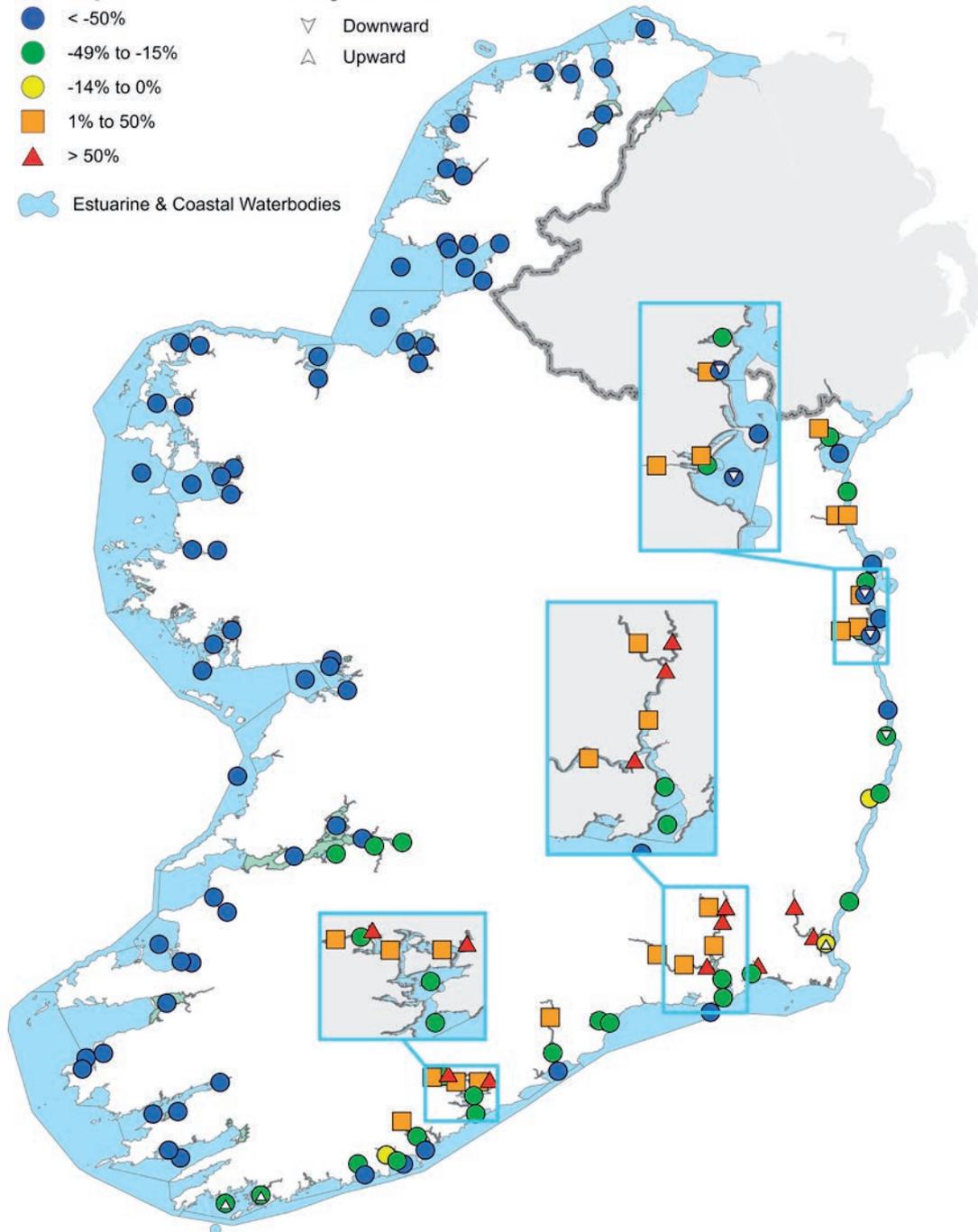
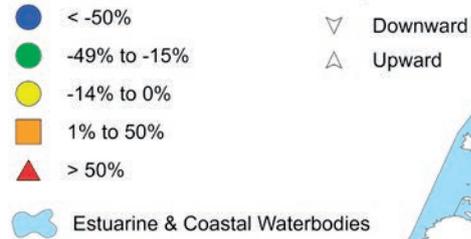


Figure 8: Number of estuarine and coastal waters and their relative percentage deviation from the median winter nitrogen threshold during 2022-2024

² For marine waters, the percentage deviation from the median winter nitrogen threshold is used because the nitrogen threshold varies with the salinity of the waters. The thresholds range from 2.6 mg/l N in freshwater to 0.25 mg/l N in fully saline waters. DIN concentrations (exceedances) above these thresholds can indicate pollution.

**Estuarine and Coastal Water Winter
Dissolved Inorganic Nitrogen
2022 - 2024**

Percentage above threshold Change 2014-2024



Licence number CYAL50380495. © Tailte Éireann

Map 6: Relative percentage deviation from the median winter nitrogen threshold in marine waters during 2022-2024

Phosphorus in Estuarine and Coastal Waters

Figure 9 summarises the relative percentage deviation from the median winter phosphorus threshold for 119 estuaries and coastal waters in the national monitoring programme for 2022 to 2024. In winter the concentration of phosphate is expected to be at its highest due to the absence of any significant plant or algal growth.

Nearly all (97.5%) estuaries and coastal waters assessed were in satisfactory condition for phosphate. Three waterbodies were in unsatisfactory condition, having exceeded the relevant threshold³.

Map 7 shows that the Cashen, Deel and Mague estuaries (Shannon) remain in an unsatisfactory condition due to median winter phosphorus exceedances.

No. of estuarine and coastal waters and their relative percentage deviation from the median winter Phosphate threshold

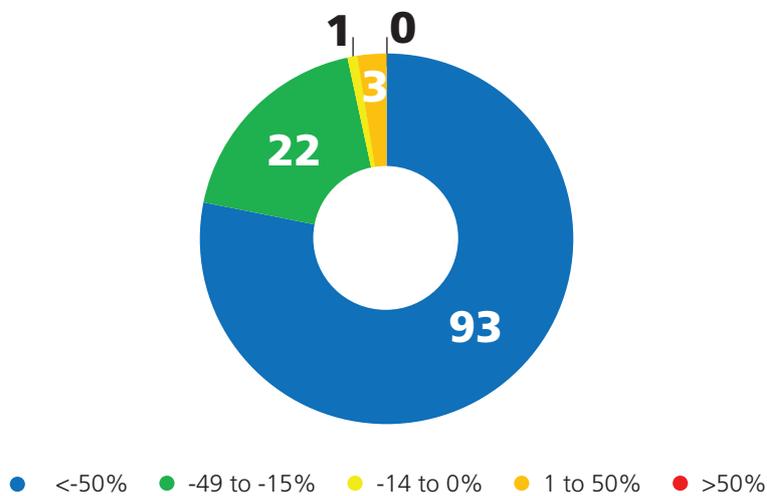
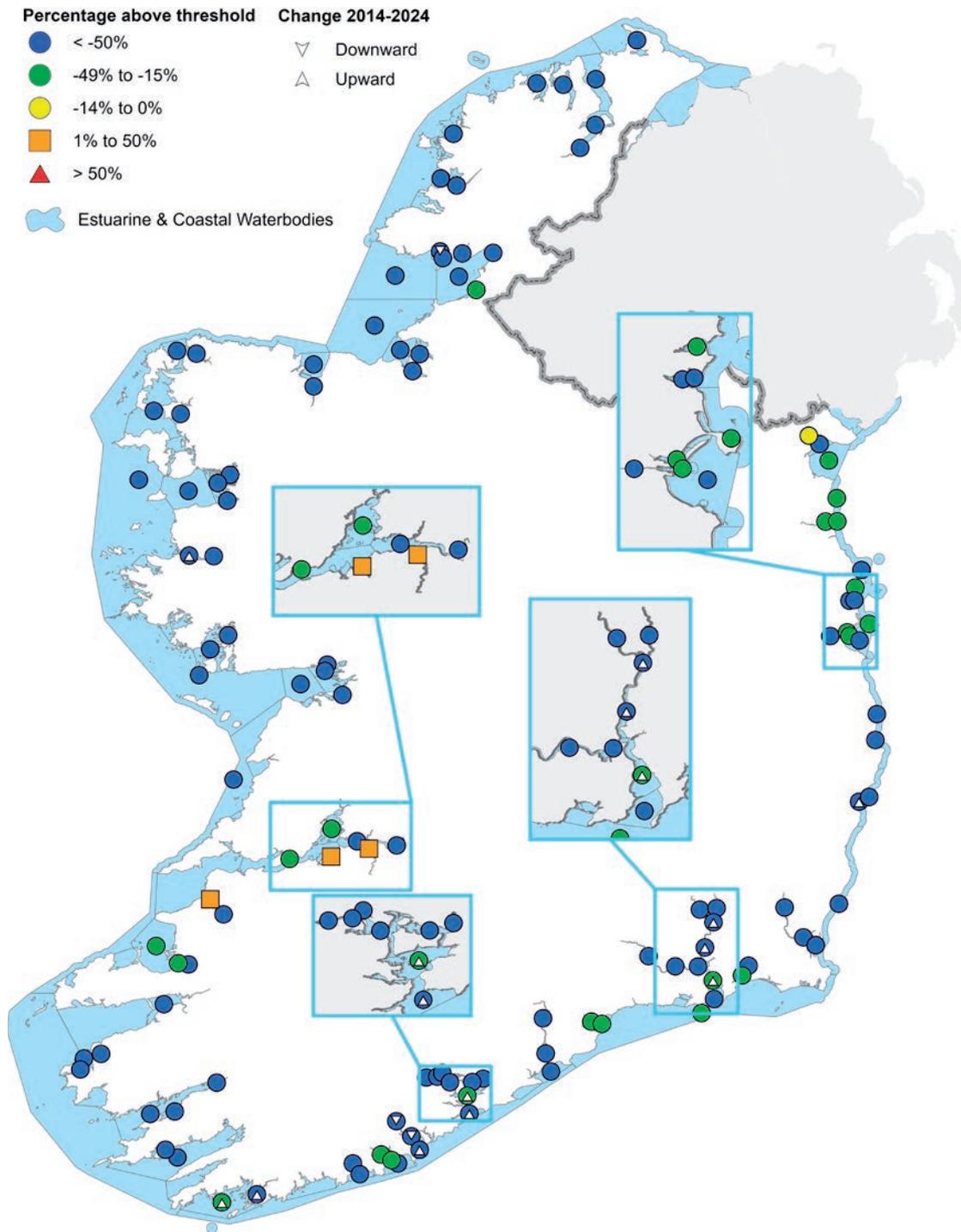


Figure 9: Number of estuarine and coastal waters and their relative percentage deviation from the median winter phosphorus threshold during 2022-2024

³ Salinity related thresholds have been defined for phosphate in estuaries and coastal waters. The thresholds range from 0.060 mg/l P for fresh and intermediate salinity waters to 0.040 mg/l P for fully saline waters. Phosphate concentrations above these thresholds can indicate pollution.

**Estuarine and Coastal Water
Winter Molybdate Reactive Phosphorus
2022 - 2024**



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Map 7: Relative percentage deviation from the median winter phosphorus threshold in marine waters during 2022-2024

Summary

Nutrient losses from agriculture are one of the significant drivers for waters not meeting their environmental objectives under the Water Framework Directive (WFD).

The most recent ecological status assessment (2016-21) indicates that just over half of our rivers and lakes and only 36% of our estuaries were in satisfactory ecological health, and overall water quality was in decline.

This report finds that there has been a 10% reduction in riverine nitrate concentrations in most regions in the past year. There has been an 8% reduction in nitrate concentration in groundwater in the south east region, although groundwater nitrate concentrations have not reduced in other regions. Lake nitrate concentrations have also reduced, but there has been a 2% increase in the number of estuarine and coastal waters exceeding the good status environmental quality standard for marine waters, when compared to last year. The marine waters can take longer to respond to changes in nutrient levels than rivers. It is expected that it may take a few years before the reductions seen in rivers in 2024 are reflected in the downstream marine waters.

However, nitrate concentrations remain too high in many parts of the country. In 2024, 38% of river monitoring stations had concentrations higher than 8 mg/l NO₃, which is the level at which the ecological health of rivers and their downstream marine waters are impacted. Nineteen percent of our estuarine and coastal waters exceeded the median winter nitrogen threshold needed to achieve good ecological status in marine waters.

Twenty one percent of groundwater monitoring sites had a mean nitrate concentration greater than 25 mg/l NO₃, which is of concern because they are a significant deviation from natural conditions and are approaching the threshold where drinking water may be compromised.

Phosphorus concentrations in rivers are stable, with no significant change in the last year. Riverine phosphorus concentrations exceeded the good status environmental quality standard in 21% of rivers, typically in areas associated with poorly draining soils. Elevated phosphorus concentrations are impacting the ecological health of these rivers and may be contributing to nutrient enrichment in the downstream estuaries.

While the recent improvement in nitrogen concentrations in rivers is very welcome, overall, to deliver improvements in ecological status and to achieve the WFD objectives, nutrient losses to water need to be further reduced. Mitigation measures need to be targeted to the water quality issues and physical settings where they occur, i.e., the critical source areas within sub-catchments. Within a catchment, the critical source areas for phosphorus and nitrate frequently occur in different locations because they are driven by the hydrological properties of the soils. Measures to reduce phosphorus losses need to focus on breaking the pathway for run off over land and measures to reduce nitrogen losses need to focus on reducing the nitrogen surplus.

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