Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Water quality monitoring report on nitrogen and phosphorus concentrations in Irish waters 2025

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Report published by Environmental Protection Agency, Ireland

The front cover image is provided courtesy of Orla O'Connell.

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ISBN: 978-1-80009-401-7 July / 2026 / Website

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Background to this Report

Regulation 39 of the European Union (Good Agricultural Practice for the Protection of Waters) (Amendment) Regulations (S.I. 119 of 2026) requires the EPA to prepare an annual report of the results of water quality monitoring. This report 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) 2026/67.

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 monitoring stations considered representative of the effects of agricultural activities on water quality. Stations subject to significant urban or industrial influences were excluded from the assessment to ensure that the results reflect agricultural pressures on the aquatic environment.

Nitrogen concentrations are reported as nitrate (for groundwater, rivers and lakes) or dissolved inorganic nitrogen (for estuarine and coastal waters), while phosphorus concentrations are reported as molybdate reactive phosphate. Results are presented as annual mean concentrations for rivers, lakes and groundwater, and as winter median concentrations for estuarine and coastal waters. The figures and tables in this report summarise mean concentrations during 2025 for groundwater, rivers and lakes.

For transitional and coastal waters, the nitrogen threshold is expressed as a median concentration, with the threshold value varying according to the salinity of the water. Consequently, the assessment is based on the percentage deviation from the applicable nitrogen threshold after accounting for the salinity at the time of sampling.

To account for interannual variability in nutrient concentrations, this assessment uses data from 2023-2025. This approach recognises that eutrophication responses may lag behind nutrient inputs, with elevated nutrient levels and associated ecological effects often resulting from nutrient surpluses accumulated in previous years.

Trends in nitrate concentrations are also presented, showing annual concentrations from 2010 to 2025.

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 2019-2024, 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, 2025), covering the period 2019-2024, found that 52% of our surface waters were in were in satisfactory ecological condition and that, overall, water quality had declined compared with the previous assessment period (2016-2021). The situation in estuarine waters is particularly concerning, with only 30% of estuaries classified as being in satisfactory ecological condition, representing a further 5% decline since the previous assessment. The report identified excess phosphorus and nitrogen as the principal pressures affecting water quality, contributing to increased eutrophication in rivers, lakes, estuaries and coastal waters.

Subsequently, the EPA *early insights indicator report on nitrogen concentrations in the 20 major Irish rivers* (EPA, 2026a) noted a 10% increase in annual nitrogen concentrations between 2024 and 2025. Furthermore, the most recent EPA *Water Quality Indicators* report (EPA, 2026b) used data collected from the full national monitoring network during 2023-2025 and found no evidence of an overall improvement in water quality and no clear indication of a sustained long-term reduction in nutrient concentrations. These findings suggest that nutrient pressures, particularly from nitrogen, continue to pose a significant challenge to achieving improvements in water quality.

The assessment presented in the remainder of this report uses data from the full network of monitoring stations that are representative of agricultural pressures on water quality. The results confirm that nutrient concentrations have increased in rivers. Nationally, river nitrate concentrations increased by 10% between 2024 and 2025, with concentration increases recorded across all regions. Nitrate concentrations in rivers remain particularly elevated in the south east of the country.

Lake nitrate concentrations showed a slight increase over the past 12 months. In estuarine and coastal waters, there was no change in the number of water bodies exceeding the median winter nitrogen threshold required to achieve good ecological status. Marine waters can take longer to respond to changes in nutrient inputs than rivers, and it is therefore likely that the impact of increased riverine nitrogen concentrations observed in 2025 will become evident in downstream estuarine and coastal waters over time.

At a national level, groundwater nitrate concentrations have remained broadly unchanged over the past three years, with a slight increase in concentration in 2025, which followed on from a decrease in concentration during 2024. However, there were notable regional differences. In the midlands & eastern region, groundwater nitrate concentrations decreased by 8% during the last 12 months. While this represents a positive development, nitrate concentrations in this region remain the highest in the country. In contrast, groundwater nitrate concentrations in the south east region increased by 3% over the same period, reversing some of the improvements observed in 2024.

Over the past year, groundwater nitrate concentrations have shown little overall change. In 2025, 6% of groundwater monitoring sites exceeded the regulatory groundwater threshold value of 37.5 mg/l NO_3. In addition, 21% of groundwater monitoring sites recorded mean nitrate concentrations greater than 25 mg/l NO_3. Concentrations above 25 mg/l NO_3 are of concern as they represent a significant departure from natural background conditions and indicate an increased risk of exceeding levels at which drinking water quality may be compromised. Elevated nitrate concentrations in groundwater

can also contribute to nutrient enrichment in connected rivers and downstream estuarine and coastal waters, adversely affecting their ecological health.

In rivers, 42% of monitoring stations recorded nitrate concentrations greater than 8 mg/l NO_3 in 2025. This concentration is considered indicative of a risk to the ecological health of rivers. The proportion of river monitoring stations exceeding this concentration increased by 4% compared with 2024, reflecting a deterioration in river water quality.

Nitrate concentrations in lakes remained comparatively low, with all monitored lakes recording concentrations below 10 mg/l NO_3. However, nutrient pressures remain evident in transitional and coastal waters, with 20% of these water bodies exceeding the environmental quality standard for nitrogen required to achieve good ecological status in marine waters.

Phosphorus concentrations in rivers remained relatively stable during 2025. Nevertheless, 22% of river monitoring stations recorded phosphorus concentrations above the good status EQS of 0.035 mg/l P. This represents a 1% increase in the proportion of rivers exceeding the standard compared with 2024.

The highest phosphorus concentrations continue to occur in areas characterised by poorly drained soils, where phosphorus is more readily transported to surface waters during rainfall events. Elevated phosphorus concentrations are adversely affecting the ecological health of these rivers by promoting excessive algal and plant growth and are also contributing to nutrient enrichment in downstream estuarine and coastal waters. These findings indicate that phosphorus remains a significant pressure on water quality in vulnerable catchments, despite the overall stability in national concentrations.

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 2025, while the estuarine and coastal data presented represents the median winter concentration during 2023-2025.

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 177 groundwater monitoring sites monitored in 2025. 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.

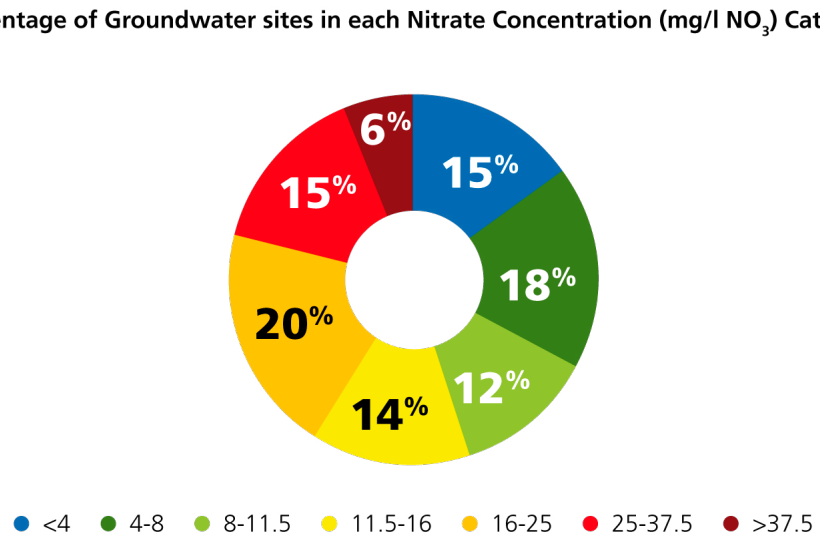
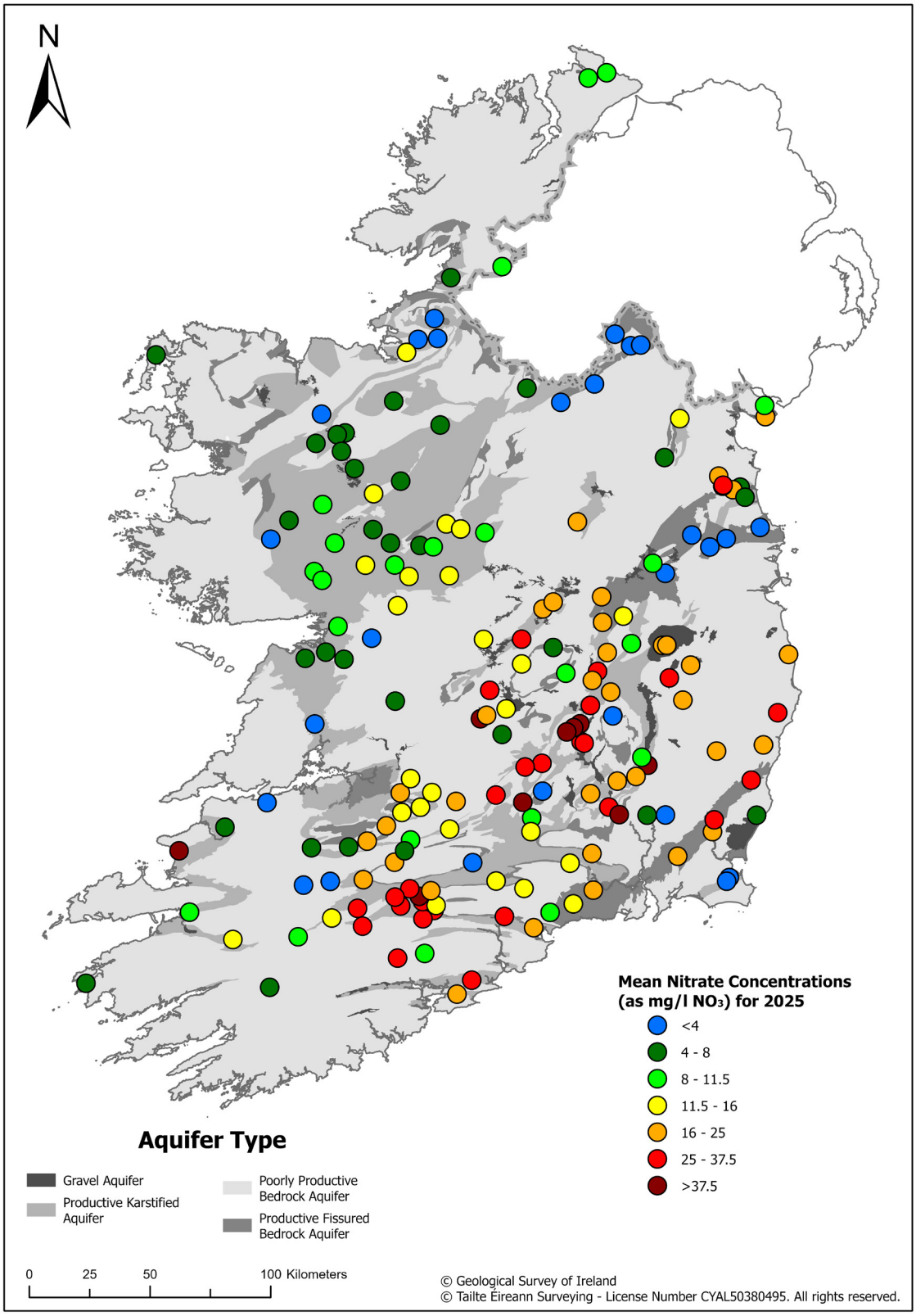


Figure 1: Mean nitrate concentrations in groundwater during 2025



Map 1: Mean nitrate concentrations in groundwater during 2025

Figure 2: Mean groundwater nitrate concentrations since 2010

In 2025, 21% of groundwater monitoring sites recorded a mean nitrate concentration greater than 25 mg/l NO_3. Concentrations above 25 mg/l NO_3 are of concern because they represent a significant departure from natural background conditions and indicate an increased risk of approaching levels at which drinking water quality may be compromised.

Ten monitoring sites (6%) exceeded Ireland's groundwater threshold value of 37.5 mg/l NO_3. Mean concentrations above this threshold indicate an increased likelihood that the drinking water standard of 50 mg/l NO_3 may be exceeded at certain times during the year. Of these ten sites, one recorded a mean nitrate concentration above 50 mg/l NO_3 in 2025. This site also exceeded 50 mg/l NO_3 in 2024. Although nitrate concentrations at the site remained above the drinking water standard in 2025, a slight reduction was observed over the past 12 months. As the site is used for public water supply, appropriate treatment measures are in place to ensure the continued provision of safe drinking water.

Figure 2 shows that mean groundwater nitrate concentrations at the national level have remained broadly stable over the past three years. However, regional trends differ. In the midlands & eastern region, mean groundwater nitrate concentrations decreased by 8% between 2024 and 2025, representing a positive development. Despite this reduction, the region continues to have the highest mean groundwater nitrate concentrations in the country.

In contrast, improvements observed in the south east region during 2024 were partially reversed in 2025, with mean groundwater nitrate concentrations increasing by 3% over the last 12 months. This highlights the continuing pressure from nitrogen losses to groundwater in some areas and the need for sustained measures to achieve long-term improvements in water quality.

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 mean phosphorus concentrations, measured as molybdate reactive phosphorus (MRP), at 177 groundwater monitoring sites in the national groundwater monitoring programme during 2025. The results show that 8% of monitoring sites recorded mean phosphorus concentrations above the Irish good ecological status threshold value of 0.035 mg/l P[1].

Groundwater phosphorus concentrations have remained relatively stable over the past decade. As shown in Map 2, elevated groundwater phosphorus concentrations are not located in the more intensively farmed areas of the country. This reflects the strong influence of soil characteristics and hydrogeological conditions on phosphorus transport to groundwater. Unlike nitrate, phosphorus is generally less mobile in the subsurface environment, and its movement to groundwater is largely dependent on local soil properties, geological pathways and groundwater flow characteristics. Consequently, areas with elevated groundwater phosphorus concentrations are not necessarily those associated with the highest levels of agricultural intensity.

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

These findings indicate that while elevated phosphorus concentrations are present at a proportion of groundwater monitoring sites, their occurrence is strongly influenced by natural environmental factors in addition to land-use pressures.

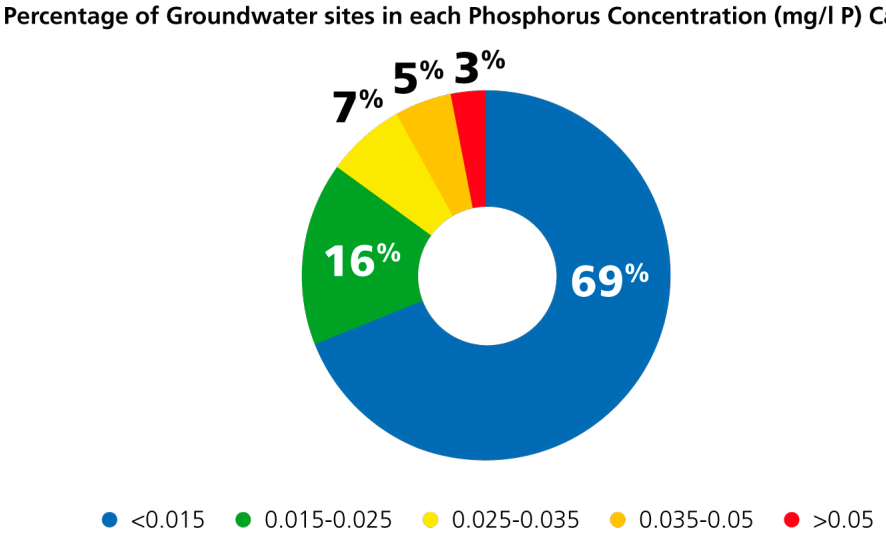
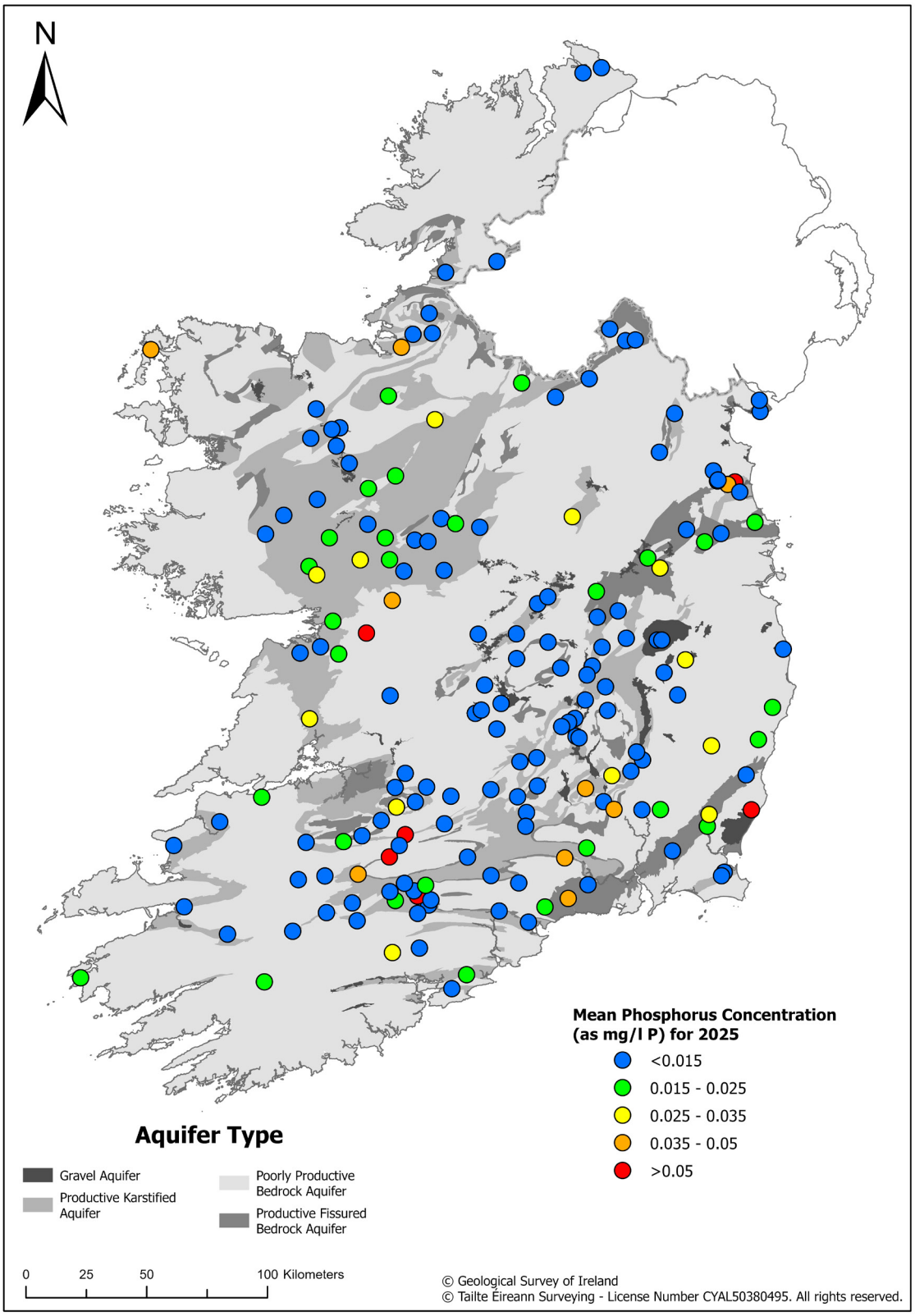


Figure 3: Mean phosphorus concentrations in groundwater during 2025



Map 2: Mean phosphorus concentrations in groundwater during 2025

Rivers

Nitrate in Rivers

Figure 4 summarises mean nitrate concentrations at 1,029 river monitoring sites included in the national river monitoring programme during 2025. The assessment is based on data from monitoring stations that are representative of agricultural pressures on water quality. Monitoring stations significantly influenced by predominantly urban or industrial pressures have been excluded to ensure that the results reflect the effects of agriculture on river water quality.

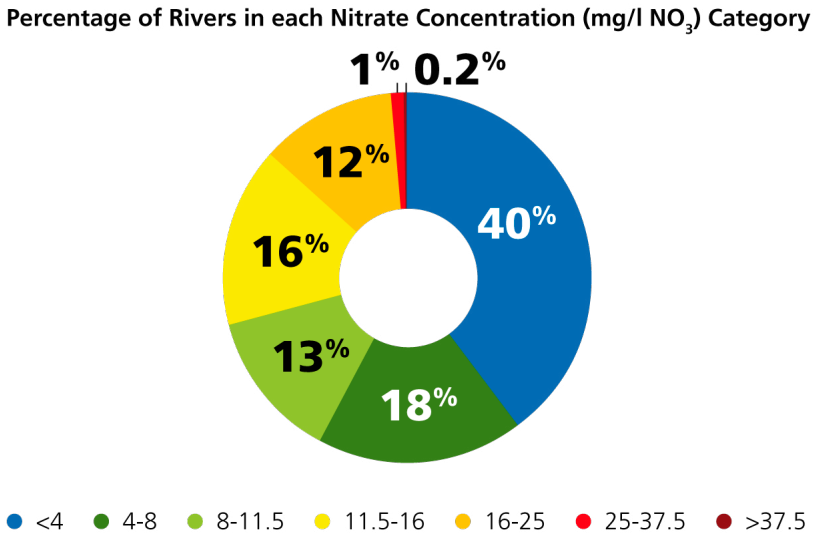
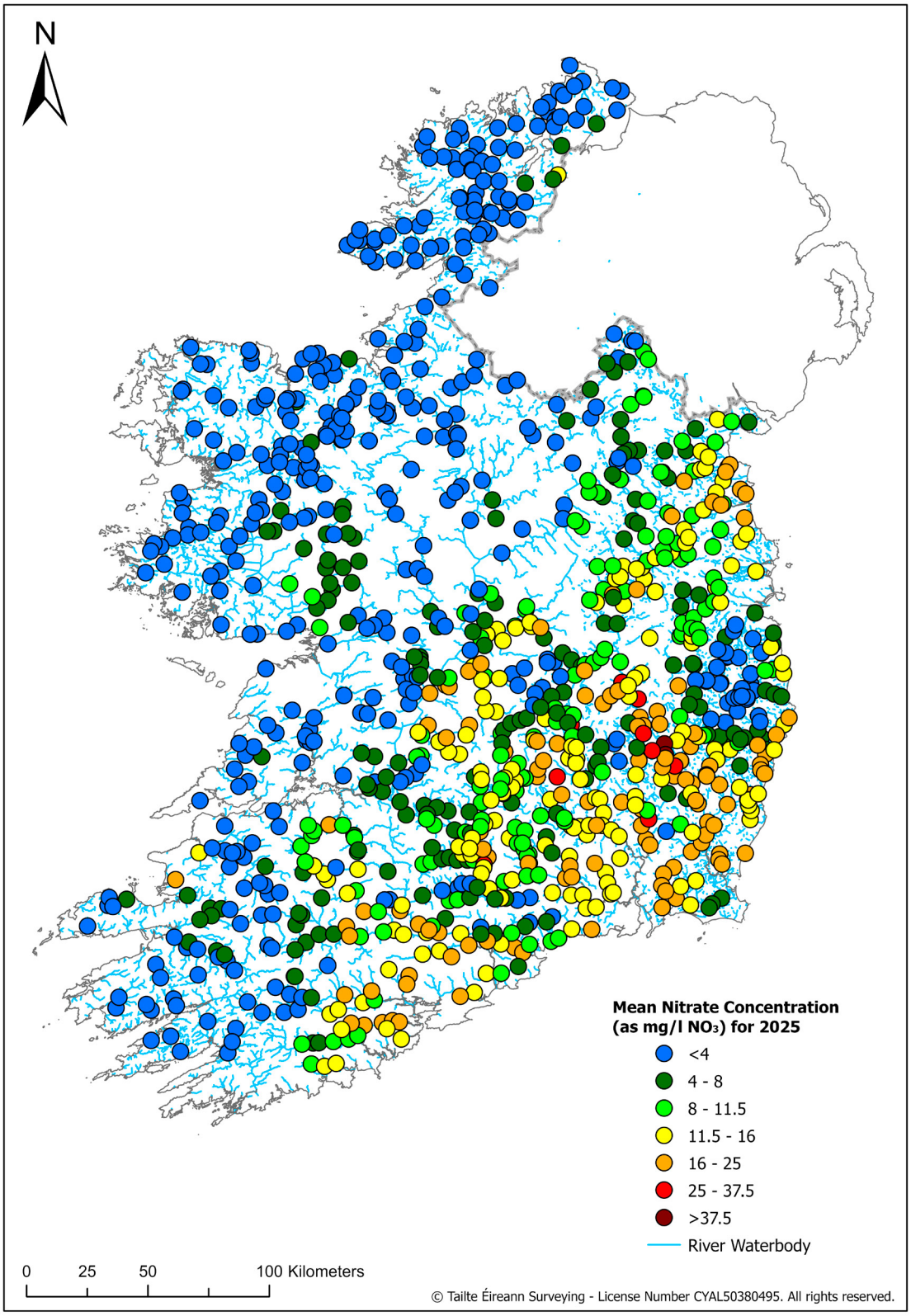


Figure 4: Mean nitrate concentrations at river monitoring sites in 2025

Figure 4 shows that 42% of river monitoring stations recorded mean nitrate concentrations above 8 mg/l NO_3 in 2025. Concentrations above this level are considered indicative of a risk to the ecological health of rivers, as elevated nitrate levels can contribute to excessive plant and algal growth and impact aquatic ecosystems. Mean nitrate concentrations exceeding 11.5 mg/l NO_3 in rivers may lead to a breach of the EQS for downstream marine waters and increase the risk of eutrophication in estuarine and coastal environments. As illustrated in Map 3, many rivers in the south east region and along the southern seaboard recorded nitrate concentrations above 11.5 mg/l NO_3, highlighting the continuing pressure from nitrogen in these catchments.

Figure 5 shows that mean river nitrate concentrations increased nationally by 10% between 2024 and 2025, fully reversing the improvement observed in 2024. Nitrate concentrations increased across all regions during the year, adding to already elevated concentrations in the south east and midlands & eastern regions. The south east region continues to record the highest river nitrate concentrations nationally and has consistently done so over the long term. Mean concentrations in this region exceed levels associated with an increased risk of adverse impacts on downstream estuarine and coastal waters. The western and border regions have the lowest overall river nitrate concentrations.



Map 3: Mean nitrate concentrations in rivers during 2025

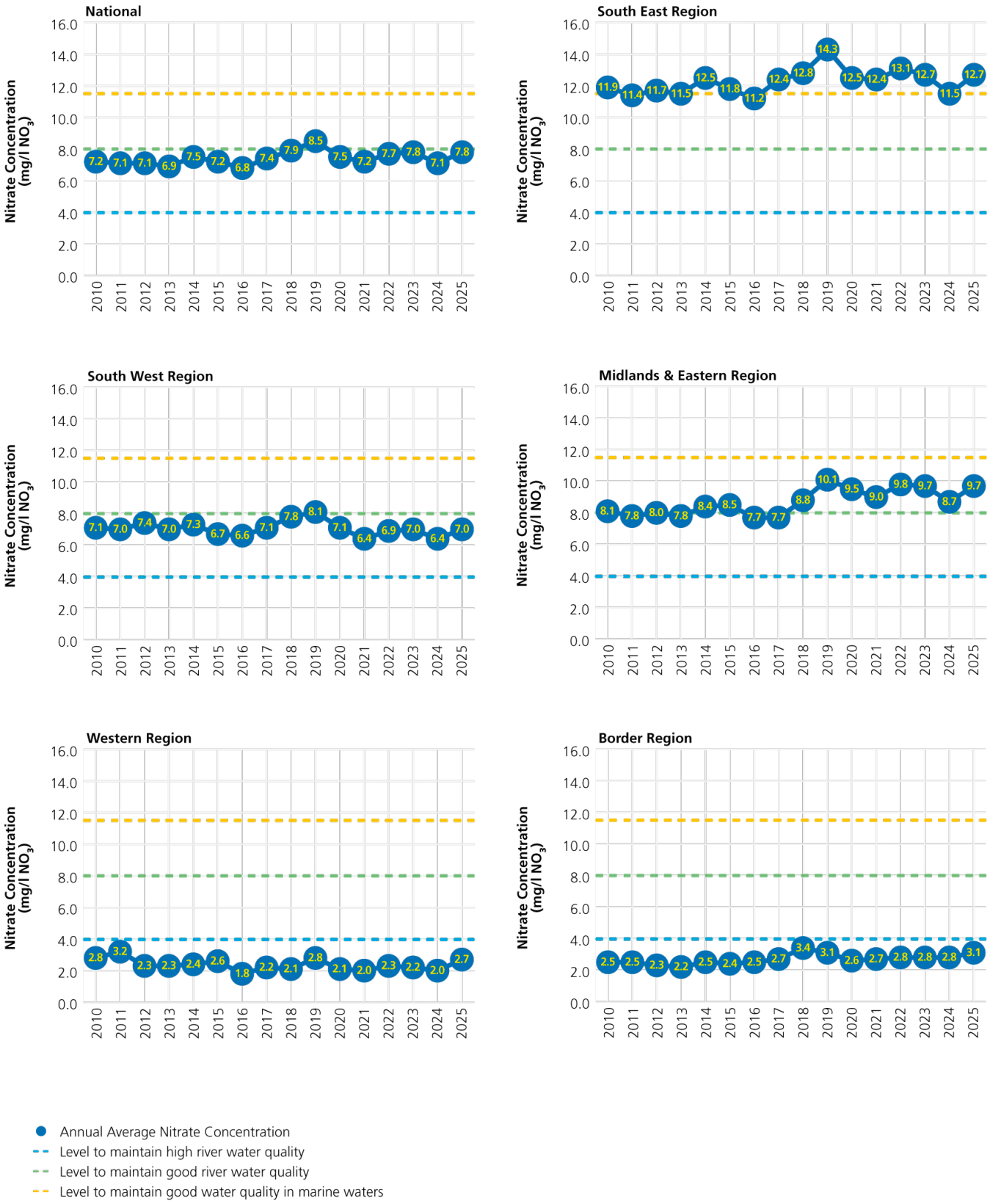


Figure 5: Mean riverine nitrate concentrations since 2010

Phosphorus in Rivers

Figure 6 summarises the mean phosphorous concentrations at 1,029 river monitoring sites from the national river monitoring programme for 2025.

During 2025, mean phosphorus concentrations exceeded the good status EQS of 0.035 mg/l P at 22% of river monitoring stations. This represents a 1% increase in the proportion of rivers exceeding the EQS compared with 2024, indicating a slight deterioration in river phosphorus levels over the past 12 months.

As shown in Map 4, the highest phosphorus concentrations, exceeding 0.05 mg/l P, are predominantly located in catchments characterised by a high proportion of poorly drained soils, including parts of Counties Limerick and Monaghan and areas in the north-east. In these areas, phosphorus is more readily transported to surface waters through overland flow and shallow subsurface pathways, particularly during periods of high rainfall.

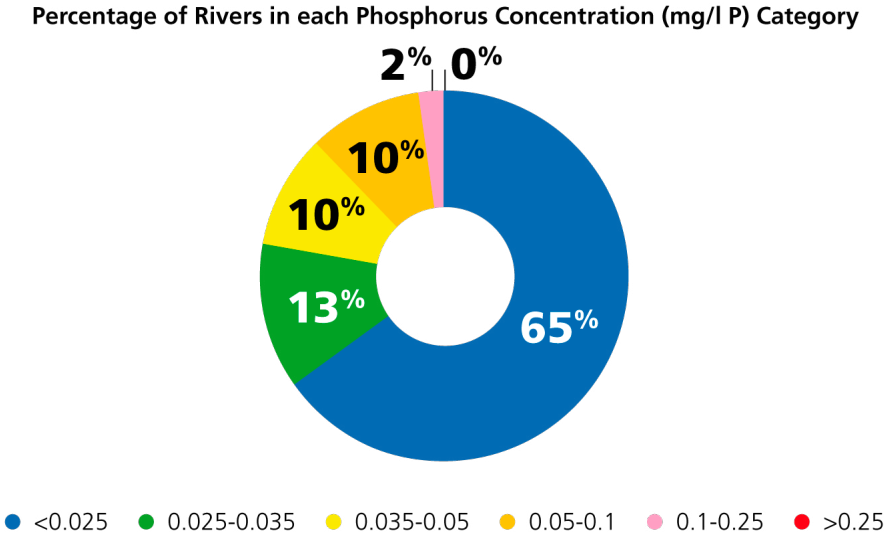
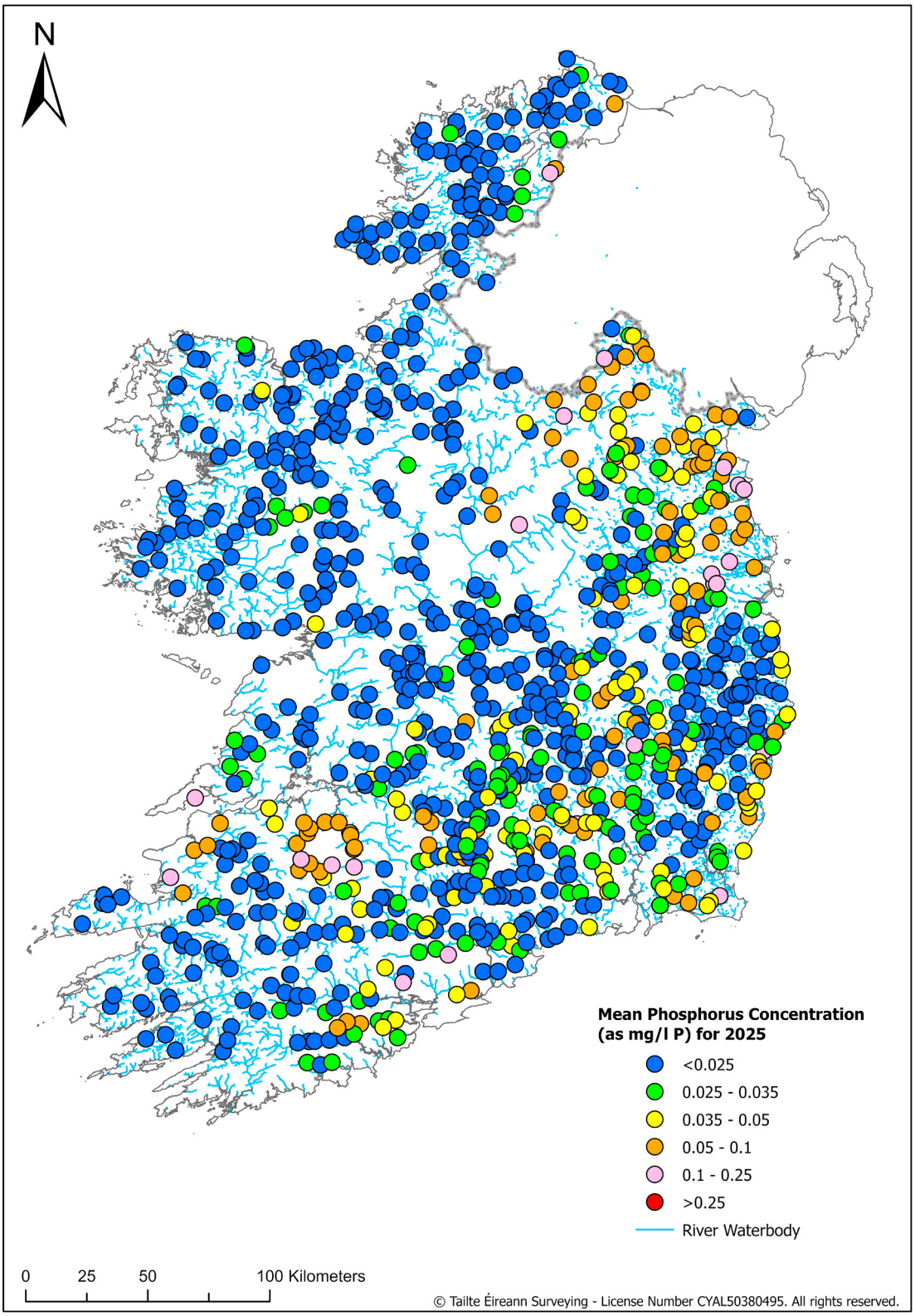


Figure 6: Mean phosphorus concentrations at river monitoring sites in 2025



Map 4: Mean phosphorus concentrations in rivers during 2025

Lakes

Nitrate in Lakes

Figure 7 summarises the mean nitrate concentrations from the national lake monitoring programme for 2025. Data were available for a total of 223 lakes. In summary, Figure 7 and Map 5 show that mean nitrate concentrations in Irish lakes remain low.

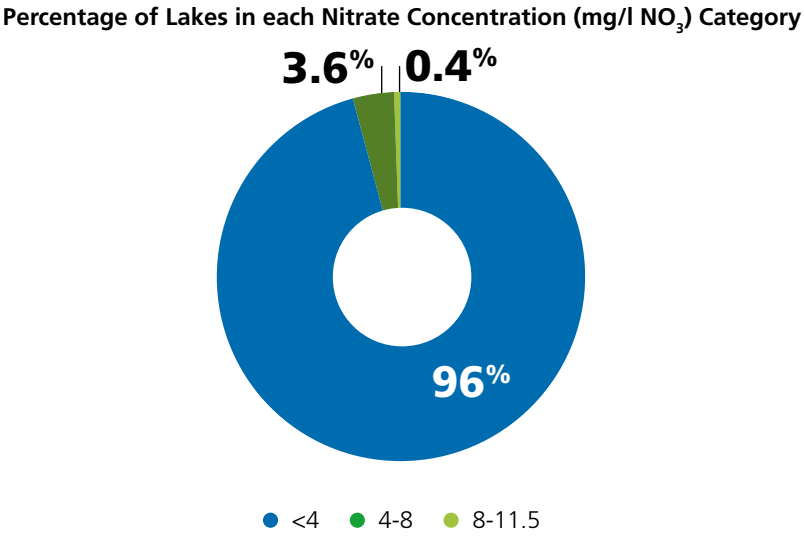
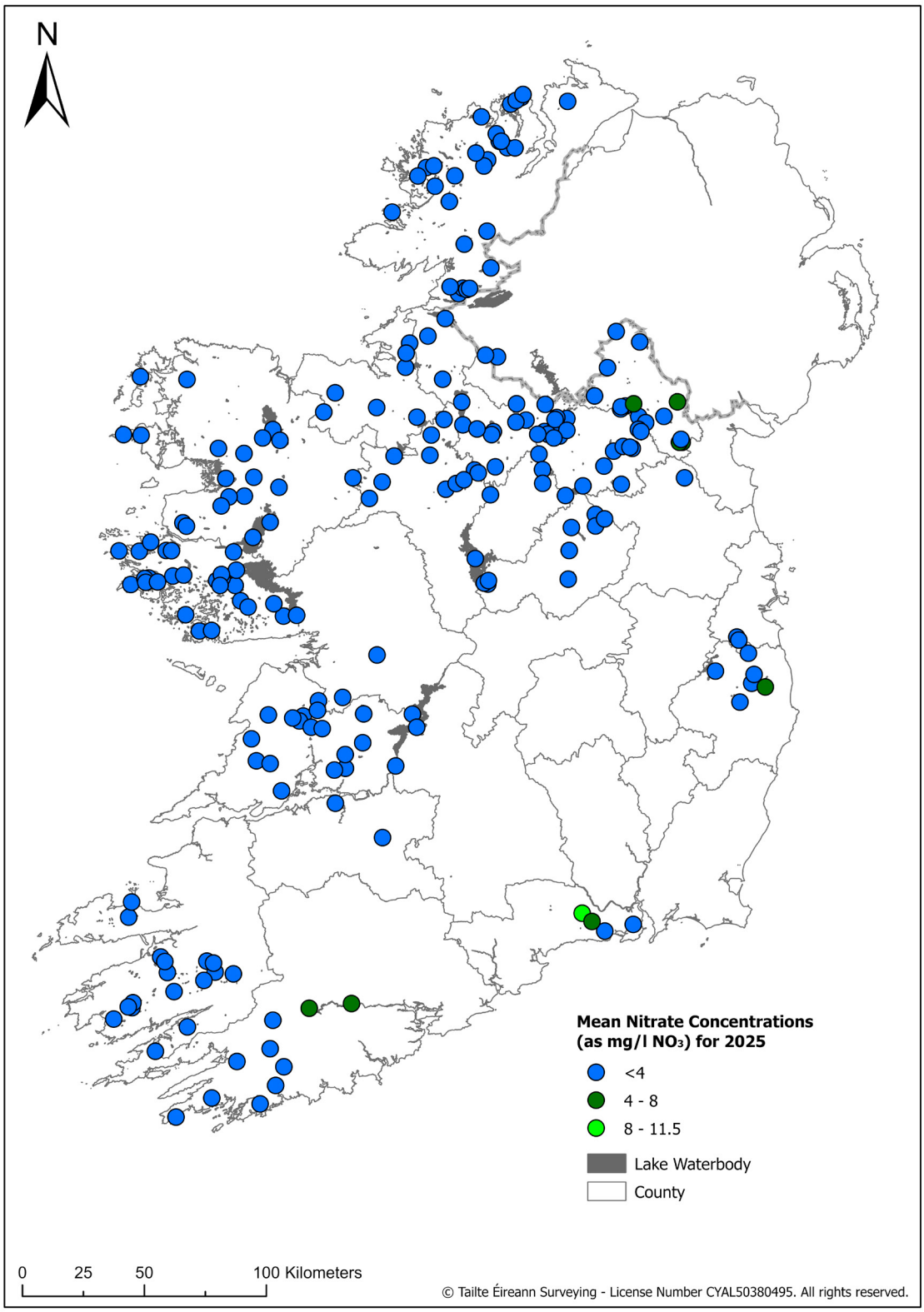


Figure 7: Mean nitrate concentrations in lakes during 2025



Map 5: Mean nitrate concentrations in lakes during 2025

Estuarine and Coastal Waters

Nitrogen in Estuarine and Coastal Waters

Figure 8 summarises the relative percentage deviation from the median winter nitrogen threshold[2] from the national transitional and coastal monitoring programme between 2023 and 2025. 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 (20%) estuarine and coastal water bodies assessed were in unsatisfactory condition for DIN, which is the same number of water bodies in unsatisfactory condition as in the previous assessment.

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.

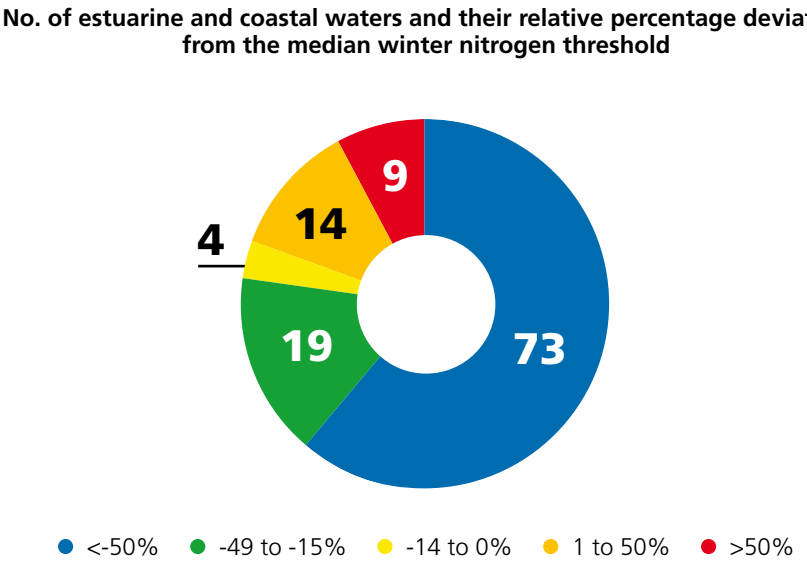
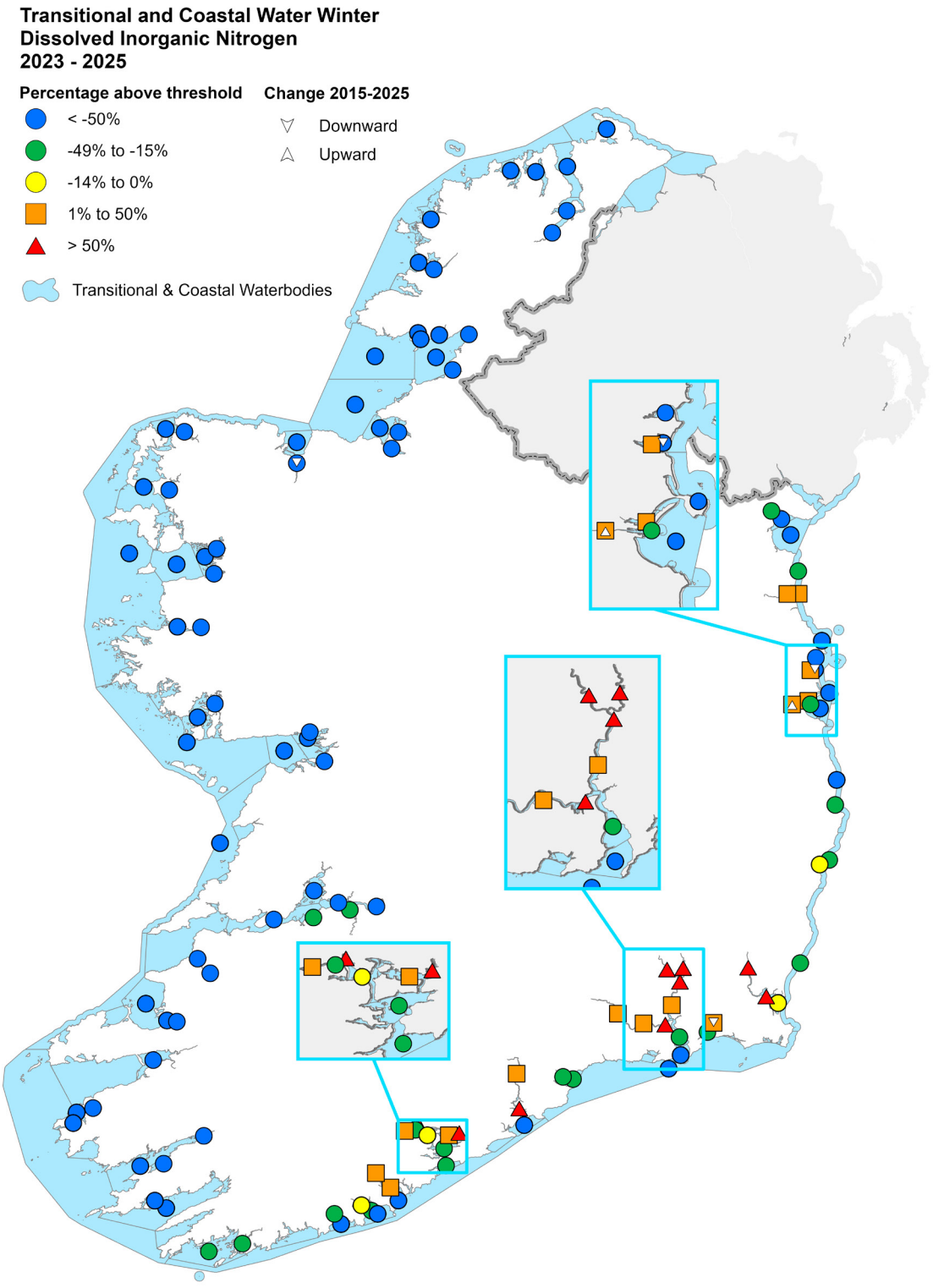


Figure 8: Number of estuarine and coastal waters and their relative percentage deviation from the median winter nitrogen threshold during 2025-2025

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.



Map 6: Relative percentage deviation from the median winter nitrogen threshold in marine waters during 2023-2025

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 2023 to 2025. In winter the concentration of phosphate is expected to be at its highest due to the absence of any significant plant or algal growth.

The majority (97.5%) of estuaries and coastal waters assessed were in satisfactory condition for phosphate. Three waterbodies were in unsatisfactory condition, having exceeded the relevant threshold[3].

Map 7 shows that the Cashen, Deel and Maigue estuaries (Shannon) remain in an unsatisfactory condition due to median winter phosphorus exceedances, representing no change from the previous assessment.

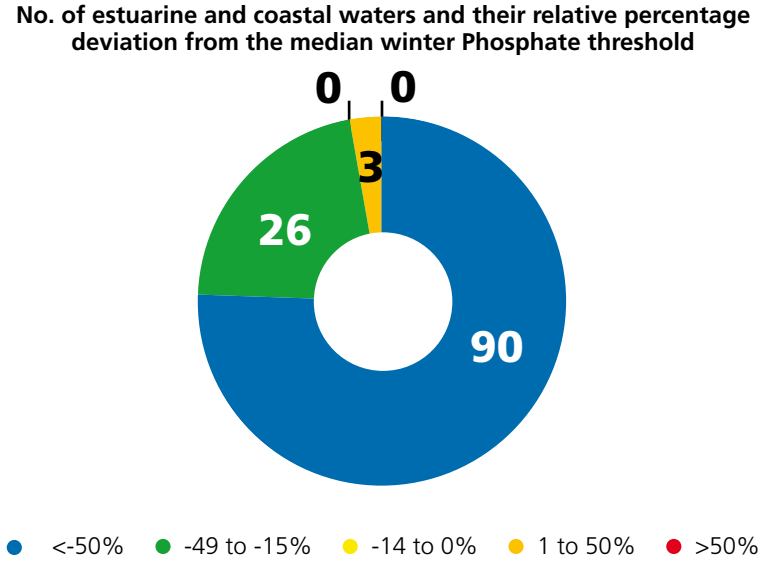
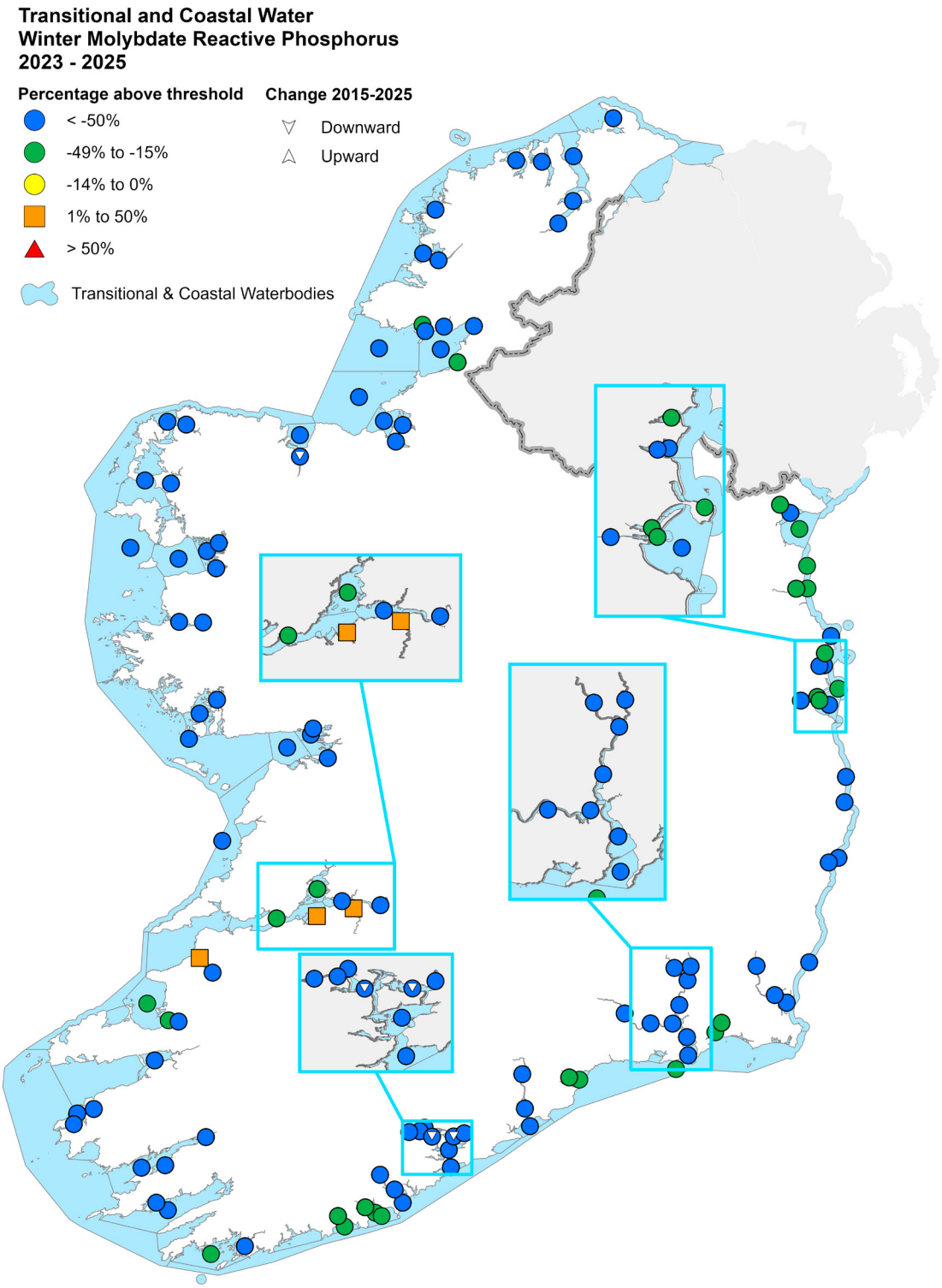


Figure 9: Number of estuarine and coastal waters and their relative percentage deviation from the median winter phosphorus threshold during 2023-2025

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.



Map 7: Relative percentage deviation from the median winter phosphorus threshold in marine waters during 2023-2025

Summary

Nutrient losses from agriculture remain one of the principal pressures preventing water bodies from achieving their environmental objectives under the Water Framework Directive (WFD).

The most recent ecological status assessment (2019-2024) found that just over half of Ireland's rivers and lakes, and only 30% of estuaries, were in satisfactory ecological condition. Overall, water quality has declined since the previous ecological status assessment.

The findings of this report indicate that water quality improvements have not yet been achieved. Most notably, mean river nitrate concentrations increased by 10% nationally between 2024 and 2025, with concentration increases recorded in all regions. This cancels out the improvements in river water quality observed in 2024. In contrast, nitrate concentrations in groundwater, lakes, estuarine waters and coastal waters remained broadly stable during the past year.

Despite this overall stability in other water categories, nitrate concentrations remain unacceptably high in many parts of the country. In 2025, 42% of river monitoring stations recorded mean nitrate concentrations greater than 8 mg/l NO_3, a level associated with adverse impacts on the ecological health of rivers. In addition, 20% of estuarine and coastal waters exceeded the median winter nitrogen threshold required to achieve good ecological status in marine waters.

Groundwater nitrate concentrations also remain a concern. In 2025, 21% of groundwater monitoring sites recorded mean nitrate concentrations above 25 mg/l NO_3. Concentrations at this level represent a significant departure from natural background conditions and indicate an increased risk of approaching thresholds at which drinking water quality may be compromised.

Phosphorus concentrations in rivers remained relatively stable but continue to contribute to ecological impacts. In 2025, 22% of river monitoring stations exceeded the good status EQS of 0.035 mg/l P, representing a 1% increase in the number of rivers exceeding the standard compared with 2024. Elevated phosphorus concentrations continue to adversely affect river ecological health and may also contribute to nutrient enrichment in downstream estuarine waters.

The increase in riverine nitrogen concentrations observed during 2025 is particularly concerning. The reversal of the improvements recorded in 2024 suggests that current measures have not yet achieved the sustained reductions in nutrient losses required to improve water quality. There is often a time lag between changes in river nutrient concentrations and ecological responses in estuarine and coastal waters, and during 2025 there was an increased nutrient load to estuarine and coastal waters (EPA, 2026b). Therefore, it is likely that the increase in nutrient concentrations in rivers during 2025 and the overall increase in nutrient load to estuarine and coastal waters will contribute to further deterioration in the ecological condition of estuarine and coastal waters, particularly in the south east and along the southern seaboard, over the coming years.

Agriculture remains the dominant source of nitrogen in Irish rivers, principally through losses of nitrogen from chemical fertilisers and organic manures. River nitrogen concentrations are influenced by a combination of factors, including nutrient inputs, agricultural management practices, soil and catchment characteristics, and weather conditions.

The Nitrates Action Programme must continue to deliver measurable reductions in nutrient losses to waters. Achieving this will require the agricultural sector to maintain and accelerate the implementation of effective nutrient management measures across all regions.

Targeted interventions will be particularly important. Measures to reduce nutrient losses should be focused on critical source areas within catchments, where the risk of nutrient transfer to water is greatest. The locations of critical source areas for nitrogen and phosphorus often differ because the pathways by which these nutrients reach water are controlled by different hydrological and soil characteristics. Measures to reduce phosphorus losses should focus on interrupting pathways for overland flow and soil transport, while measures to reduce nitrogen losses should focus on reducing nitrogen surpluses through improved nutrient management and more efficient use of fertilisers and manures.

The EPA's Pollution Impact Potential (PIP) maps are available to download and these maps identify these high-risk areas and can be used to help target action.

Sustained implementation of targeted, evidence-based measures will be necessary if Ireland is to reverse current trends, achieve improvements in water quality, and meet its environmental objectives under the Water Framework Directive.

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