# WATER QUALITY IN 2016

## An Indicators Report

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

# ENVIRONMENTAL PROTECTION AGENCY

The Environmental Protection Agency (EPA) is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. We are committed to protecting people and the environment from the harmful effects of radiation and pollution.

## The work of the EPA can be divided into three main areas:

Regulation: *We implement effective regulation and environmental compliance systems to deliver good environmental outcomes and target those who don't comply.*

Knowledge: *We provide high quality, targeted and timely environmental data, information and assessment to inform decision making at all levels.*

Advocacy: *We work with others to advocate for a clean, productive and well protected environment and for sustainable environmental behaviour.*

## Our Responsibilities

### Licensing

We regulate the following activities so that they do not endanger human health or harm the environment:

- waste facilities (*e.g. landfills, incinerators, waste transfer stations*);
- large scale industrial activities (*e.g. pharmaceutical, cement manufacturing, power plants*);
- intensive agriculture (*e.g. pigs, poultry*);
- the contained use and controlled release of Genetically Modified Organisms (*GMOs*);
- sources of ionising radiation (*e.g. x-ray and radiotherapy equipment, industrial sources*);
- large petrol storage facilities;
- waste water discharges;
- dumping at sea activities.

### National Environmental Enforcement

- Conducting an annual programme of audits and inspections of EPA licensed facilities.
- Overseeing local authorities' environmental protection responsibilities.
- Supervising the supply of drinking water by public water suppliers.
- Working with local authorities and other agencies to tackle environmental crime by coordinating a national enforcement network, targeting offenders and overseeing remediation.
- Enforcing Regulations such as Waste Electrical and Electronic Equipment (WEEE), Restriction of Hazardous Substances (RoHS) and substances that deplete the ozone layer.
- Prosecuting those who flout environmental law and damage the environment.

### Water Management

- Monitoring and reporting on the quality of rivers, lakes, transitional and coastal waters of Ireland and groundwaters; measuring water levels and river flows.
- National coordination and oversight of the Water Framework Directive.
- Monitoring and reporting on Bathing Water Quality.

### Monitoring, Analysing and Reporting on the Environment

- Monitoring air quality and implementing the EU Clean Air for Europe (CAFÉ) Directive.
- Independent reporting to inform decision making by national and local government (*e.g. periodic reporting on the State of Ireland's Environment and Indicator Reports*).

### Regulating Ireland's Greenhouse Gas Emissions

- Preparing Ireland's greenhouse gas inventories and projections.
- Implementing the Emissions Trading Directive, for over 100 of the largest producers of carbon dioxide in Ireland.

### Environmental Research and Development

- Funding environmental research to identify pressures, inform policy and provide solutions in the areas of climate, water and sustainability.

### Strategic Environmental Assessment

- Assessing the impact of proposed plans and programmes on the Irish environment (*e.g. major development plans*).

### Radiological Protection

- Monitoring radiation levels, assessing exposure of people in Ireland to ionising radiation.
- Assisting in developing national plans for emergencies arising from nuclear accidents.
- Monitoring developments abroad relating to nuclear installations and radiological safety.
- Providing, or overseeing the provision of, specialist radiation protection services.

### Guidance, Accessible Information and Education

- Providing advice and guidance to industry and the public on environmental and radiological protection topics.
- Providing timely and easily accessible environmental information to encourage public participation in environmental decision-making (*e.g. My Local Environment, Radon Maps*).
- Advising Government on matters relating to radiological safety and emergency response.
- Developing a National Hazardous Waste Management Plan to prevent and manage hazardous waste.

### Awareness Raising and Behavioural Change

- Generating greater environmental awareness and influencing positive behavioural change by supporting businesses, communities and householders to become more resource efficient.
- Promoting radon testing in homes and workplaces and encouraging remediation where necessary.

### Management and Structure of the EPA

The EPA is managed by a full time Board, consisting of a Director General and five Directors. The work is carried out across five Offices:

- Office of Environmental Sustainability
- Office of Environmental Enforcement
- Office of Evidence and Assessment
- Office of Radiological Protection and Environmental Monitoring
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet regularly to discuss issues of concern and provide advice to the Board.

# Water Quality in 2016: An Indicators Report

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Main cover photo: Ballinagee River in County Wicklow
(Source: Deirdre Tierney, EPA)

# Table of Contents

LIST OF MAPS



LIST OF FIGURES

# 1. INTRODUCTION

Environmental indicators represent or summarise a significant aspect of the state of the environment and related human activities. They focus on trends in environmental changes, the stresses causing them, how the environment and its components respond to these changes, and societal response to prevent, reduce or ameliorate these stresses. Indicators generally **simplify** complex phenomena in a **quantifiable way**, so that information can be **communicated** to the appropriate decision makers and progress to reaching established goals can be **measured**.

The intention of the report is to provide timely, scientifically sound information on water quality to inform decision makers as well as the public using a series of water quality indicators. This is the first water indicators report published by the Environmental Protection Agency for nearly a decade, and it is intended that this report will be published annually. In total, there are 16 indicators in the report. Each indicator summarises a particular water quality parameter or issue. Taken together, these indicators tell the story of the state of Ireland's aquatic environment, from the remote upland areas that spawn many of our rivers to our wide, meandering river systems and abundant lakes and groundwaters, to the estuaries that spill out into our coastal areas and seas, and the beaches we treasure for their cleanliness and beauty. The indicators present the current situation, an indication of recent change and, where possible, longer term trends. The inclusion of these trends is to provide information on the improvement or deterioration in that aspect of water quality and to inform measures for the protection and improvement of water quality. The indicators have been set out in a 'stand alone' fashion so that a concise assessment is available for each.

This information will help to track progress with the National River Basin Management Plan. It is hoped that this report and future ones will provide timely information to adjust implementation activities in order to address the continually changing physical and ecological context during the implementation phase of the plan. Some amendments to the indicators reported may take place in 2018/2019 to further align reports with the work planned to implement the River Basin Management Plan and to further inform all interested parties on the effectiveness of the Programme of Measures.

# 2. THE INDICATORS

The indicators were selected based on their analytical soundness, measurability and relevance to policy implementation, both nationally and internationally. The set of indicators was selected in the context of the EPA's existing core set of environmental indicators and following a review of other relevant water quality indicator sets maintained by the European Environment Agency, as well as the indicators being developed to track progress in the implementation of the United Nations Sustainable Development Goals.

Nutrient pollution (caused by too much nitrogen and phosphorus in our waters) is the key environmental issue impacting on the state of surface waters in Ireland, hence the focus in the report on nutrient-based indicators. Indicators looking at nutrients in each of the main water categories (groundwater, rivers, lakes, estuaries and coastal waters) are presented. The annual input of nutrients to the sea is also included. The indicators also look at specific aspects of water quality in rivers, lakes, canals, estuaries and coastal waters. One indicator focuses on high-quality river sites and their deterioration in recent years, together with indicators on fish kills and faecal coliforms in groundwater. A bathing water quality indicator has also been included.

Where possible, indicators include trend analysis, so any change in the state of the aquatic environment can be identified. The level of insight that can be provided in the analysis will depend on the indicator, but at the very least a direction of travel in terms of improvements or deterioration is presented where possible.

The 16 indicators are:

Indicator 1: River Quality

Indicator 2: High Quality River Sites

Indicator 3: Nitrate in Rivers

Indicator 4: Phosphate in Rivers

Indicator 5: Canal Quality

Indicator 6: Lake Biological Quality

Indicator 7: Total Phosphorus in Lakes

Indicator 8: Fish Kills

Indicator 9: Trophic Status of Transitional and Coastal Waters

Indicator 10: Nitrogen in Transitional and Coastal Waters

Indicator 11: Phosphorus in Transitional and Coastal Waters

Indicator 12: Nutrient Inputs to the Marine Environment

Indicator 13: Nitrate in Groundwater

Indicator 14: Phosphate in Groundwater

Indicator 15: Bacteria in Groundwater

Indicator 16: Bathing Water Quality

# 3. KEY INSIGHTS

While the aquatic environment is complex, a number of key insights can be taken from the indicators presented in this report. Some of these insights are positive, such as the decline in nutrient pollution and reduction in serious pollution events that result in fish kills. Others are negative and indicate that nutrient pollution is still an issue in some areas, while the loss of our highest quality and pristine river sites indicates a substantial deterioration in the quality of these previously unimpacted sites.

We can see from the nutrient-based indicators that loadings of nutrients to the sea have substantially decreased over the past 25 years. Loads of phosphorus and nitrogen entering the sea from rivers have decreased (**Indicator 12**), and this reduction is also reflected in the concentration of nutrients in our rivers, which has been stable or declining (**Indicators 3 & 4**).

We still have issues with water quality and a substantial number of our rivers, lakes and estuaries are not as healthy as they should be (**Indicators 1, 6 & 9**). A significant proportion of sites still have too much nutrients. A quarter of rivers and lakes and just under a third of estuaries and coastal waters are failing their environmental quality standard or assessment criteria (**Indicators 3, 4, 7 & 10**). High levels of phosphorus in the north-east of the country are impacting on lake water quality (**Indicator 7**), while high nitrogen concentrations in the south and south-east are impacting on the quality of many of our estuaries (Indicator 9).

The reduction in the number of seriously polluted river sites (the worst of the worst) and decline in the number of fish kills also indicates that significant progress has been made in dealing with serious pollution events (**Indicators 1 & 8**). Despite this good news, we have seen a very significant decline in the number of high quality river sites (the best of the best). The proportion of high quality sites has almost halved since the late 1980s (**Indicator 1**). Even more worrying is the dramatic reduction in pristine river sites, which have fallen from 584 to only 23 sites over the same period (**Indicator 2**). Substantial efforts will be required to ensure that further loss of these sites can be halted and where possible reversed.

There has also been a serious and continuing deterioration in river water quality in the north-west of the country (**Indicator 1**). Several rivers here have seen significant losses of river insects, which are typically indicators of good water quality. The level of deterioration indicates serious pollution events. Further investigations in these rivers will be required to find the cause of this deterioration and to identify the actions required to address it.

A small proportion of groundwater sites were in breach of their respective threshold values for nitrate (3.0%) and phosphate (7.7%) with two sites exceeding the drinking water nitrate standard of 50 mg/l (**Indicators 13 & 14**). These figures indicate that Ireland's chemical groundwater quality is generally good. However, in terms of microbiological quality a high proportion of groundwater sites (42%) are contaminated with the bacterium *E. coli*, indicating the presence of faecal contamination (**Indicator 15**). This highlights the need for groundwater source protection and associated management and the need for regular testing of drinking water supplies from groundwater.

The quality of Ireland's bathing waters remains good, with 9 in 10 bathing waters meeting the minimum required standard of sufficient quality and 8 in 10 being at either good or excellent quality. Seven bathing waters out of a total of 142 had poor quality, meaning that management measures will need to be identified and implemented for these areas (**Indicator 16**).

# 4. MAIN FINDINGS

Each of the indicators provides valuable information on the water environment. The main findings arising from them are:

- The number of pristine (Q5) sites increased from 21 to 23 between 2013-2015 and 2014–2016. This is against a backdrop of massive loss in these sites from 13.4% (584 sites) in 1987–1990 to 0.8% (23 sites) in 2014–2016.
- There was a decline in the number of river water bodies in high/good quality and a corresponding increase in water bodies in moderate and poor quality in 2014–2016 compared to 2013–2015 (23 water bodies or 1%).
- Five river water bodies were classified as bad quality in 2014–2016 the same as in 2013–2015. This is a significant reduction in bad quality waters from 91 water bodies in 1987–1990.
- 26% of river sites had average phosphate concentrations greater than 0.035 mg/l P. Concentrations of phosphate consistently greater than 0.035 mg/l P in rivers are likely to lead to nutrient pollution.
- 72% of canal water bodies were classified as being at good or maximum biological quality in 2014–2016 and in 2013–2015.
- Lake biological quality in 2014–2016 showed an improvement in good or better quality lakes (50%) compared to 2013–2015 (48%).
- The percentage of monitored lakes with total phosphorus >0.025 mg/l P increased by 2% in 2014–2016 compared to 2013–2015. Concentrations of phosphate consistently greater than 0.025 mg/l P in lakes are likely to lead to nutrient pollution.
- 31 fish kills were reported in 2016 compared with 23 in 2015. Over a longer time scale, there is a reducing trend in the number of fish kills.
- For 2014 to 2016 the proportion of groundwater sites with concentrations greater than 25 mg/l $NO_3$ was greater than for the preceding five years (2009–2013).
- There was a 5 percentage point drop in monitored groundwater sites with average concentrations of <0.015 mg/l P in 2016 compared to 2015. In 2016, 7.7% of groundwater monitoring sites had mean phosphorus concentrations greater than the groundwater Water Framework Directive (WFD) threshold value of 0.035 mg/l P. This threshold value is considered when assessing the contribution of phosphorus in groundwater to rivers.
- Faecal bacteria were detected at 42% of WFD groundwater monitoring sites in 2016, highlighting the necessity for testing of drinking water supplies from groundwater for microbial contamination and for the provision of adequate treatment.
- 132 (93%) out of the 142 bathing waters assessed met the minimum required standard of sufficient quality in 2017.
- 18 of the 102 transitional and coastal water bodies assessed for trophic status in 2014–2016 were eutrophic or potentially eutrophic. This is similar to previous assessments.
- 31% of transitional (estuaries) and coastal water bodies (29 of 93 water bodies) exceeded the winter dissolved inorganic nitrogen (DIN) threshold for 2014–2016. Two water bodies showed significant decreasing concentration trends, Lough Mahon and Outer Cork Harbour.

## Indicator 1: River Quality

Macroinvertebrates (tiny animals without backbones) have been used extensively to assess water quality and the general health of river ecosystems since the 1970s. The general health of macroinvertebrate communities in Irish rivers is assessed using the Quality rating system (Q-value), which categorises the biological quality of a river into 5 classes based on the diversity and abundance of the macroinvertebrate community (high, good, moderate, poor and bad). Where there is more than one site in a water body, the quality is reported as the lowest class recorded in the water body. The national monitoring programme revisits each site once every three years.

Based on the last three years of data, 1,342 (58%) of the river water bodies were in good or better biological quality (Figure 1, Map 1). The remaining 963 (42%) river water bodies were of moderate or worse quality. There was a small decline in the number of river water bodies in good quality and a small increase in water bodies in moderate and poor quality compared to 2013–2015. This change is similar to changes first observed in 2013–2015 compared to 2010–2012. The number of river water bodies in bad quality has fallen dramatically from 91 in 1987–1990 to five water bodies in this assessment.

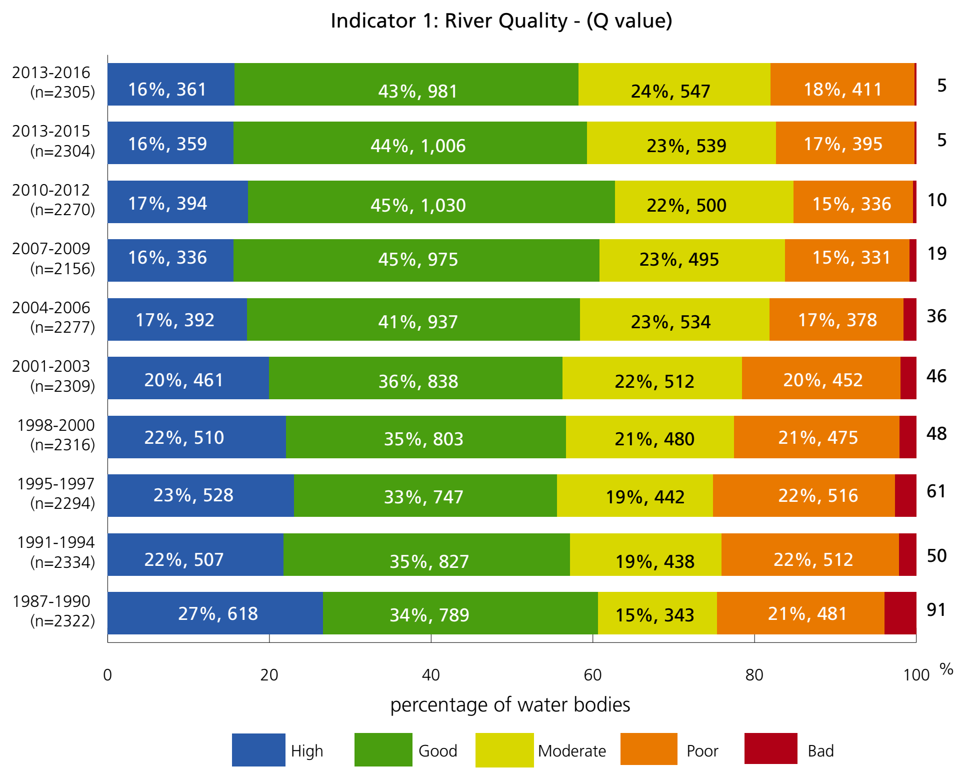
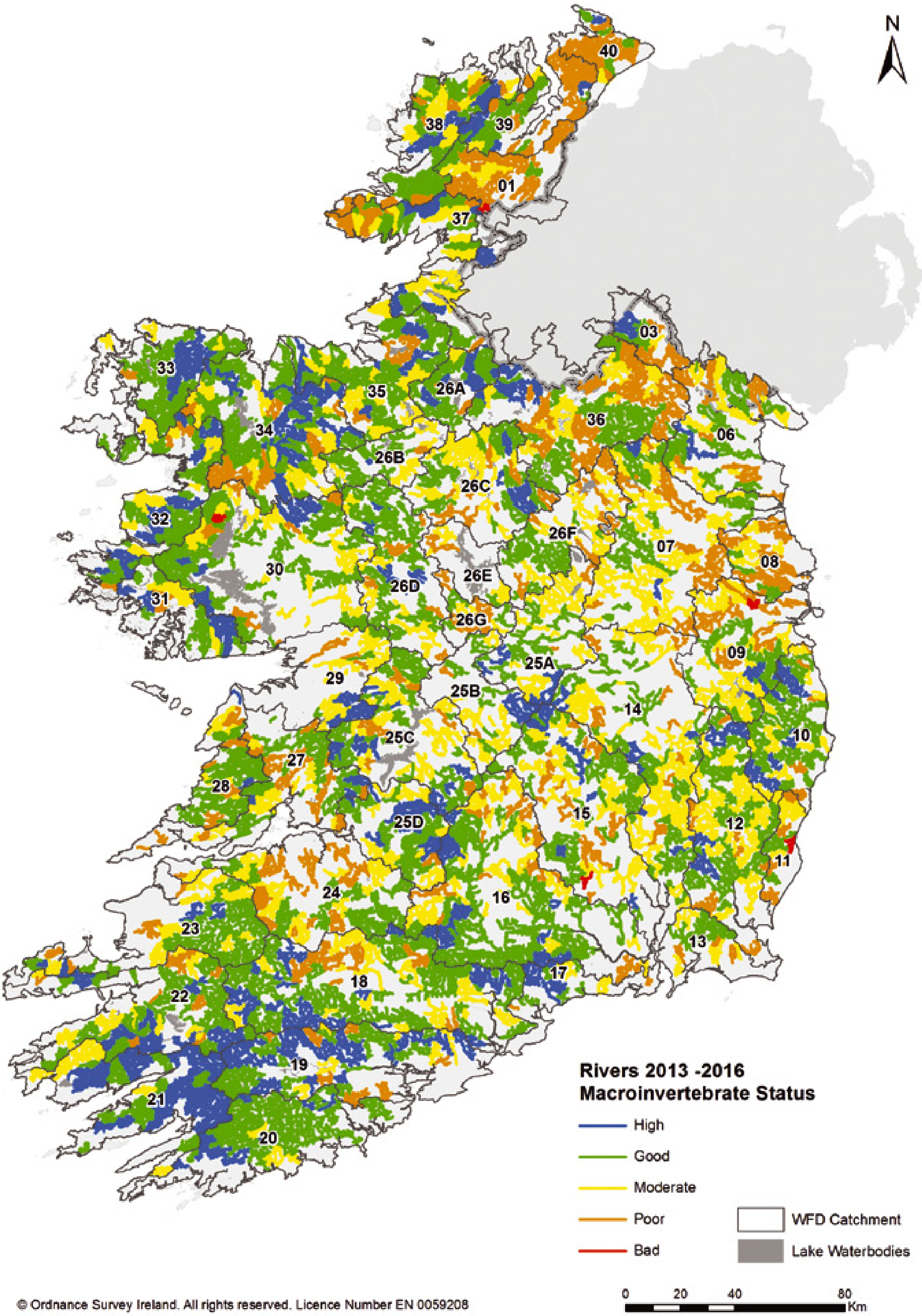



**Figure 1:** National trend in macroinvertebrate quality of water bodies using the Q-value quality rating system between 1987 and 2016.

Of the 10 catchments with survey updates in 2016, the Slaney and Colligan–Mahon catchments had an overall improvement. The overall number of river water bodies at satisfactory (high or good) quality declined in eight catchments (Foyle, Lough Swilly, Donagh–Moville, Liffey & Dublin Bay, Nore, Laune–Maine–Dingle Bay, Shannon Estuary North and Moy & Killala Bay). There was a continuing deterioration in river invertebrate quality in the north-west. There is an increase in the number of river water bodies classified as poor quality in these catchments, with significant losses in both macroinvertebrate diversity and abundance.

**Source:** C. Bradley, G. Free, B. Kennedy, R. Little, P. McCreesh, W. Trodd, M. McGarrigle & J. Lucey.

**Map 1:** 2013–2016 invertebrate assessment for monitored river water bodies ($n$ = 2,305).





**Source:** EPA (C. Bradley), Cartography: EPA (C. Byrne).

## Indicator 2: High Quality River Sites

High quality at river sites is an indicator of largely undisturbed natural conditions. These sites are important for supporting aquatic species sensitive to pollution such as the protected, but declining, freshwater pearl mussel and juvenile salmon. The presence of high quality sites can contribute significantly to species diversity and these sites are a source for species re-colonisation of river stretches that are recovering from pollution. This indicator is based on a subset of the Quality rating system (Q-value) covering the highest quality sites (Q5 sites) and other high quality sites (Q4-5 sites).

In each survey period the decline in high quality sites (Q5 + Q4-5 sites) has continued, from 31.6% (1,374 sites of 4,614 sites sampled) in the 1987–1990 period to 17.5% (490 sites of 2,802 sites sampled) in 2013–2016 (Figure 2). What is more striking is the decrease in reference condition sites (Q5 – our most pristine sites) from 13.4% (584 sites) to 0.8% (23 sites) in the current period. There was a small increase of two sites from the 21 sites reported in the Water Quality in Ireland Report 2013–2015 based on the three years 2014, 2015 and 2016.

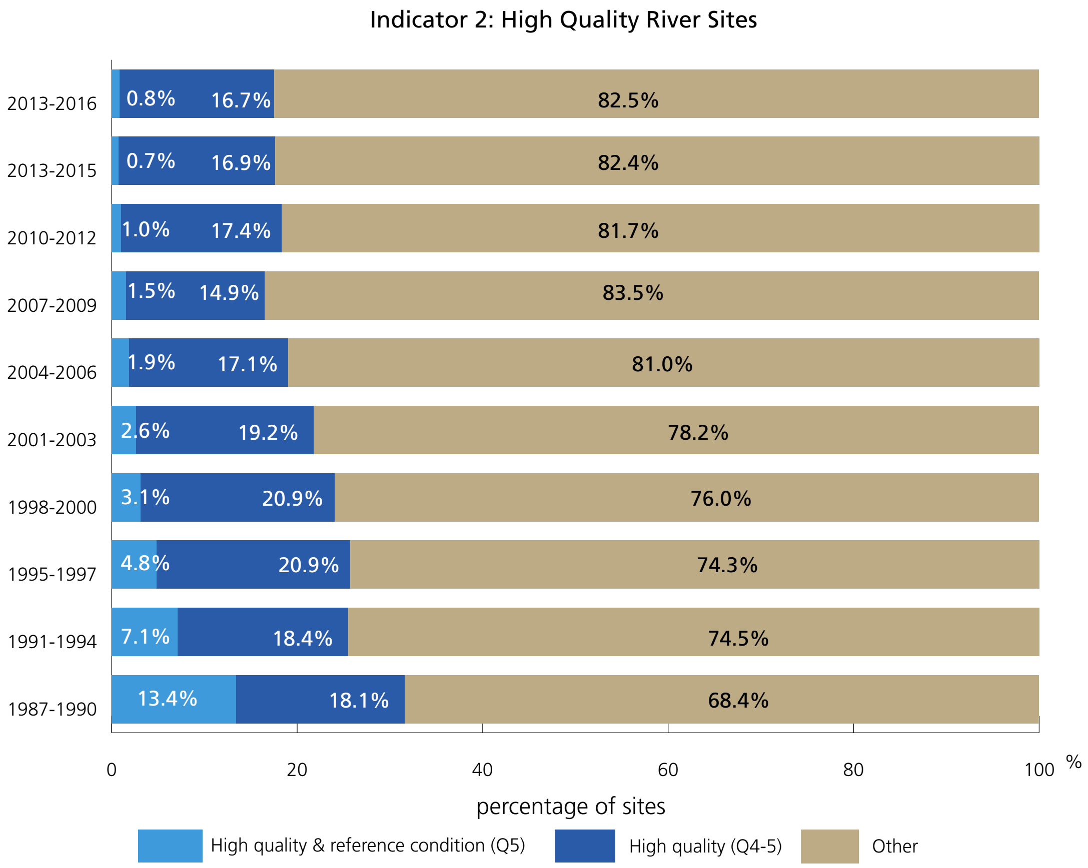



**Figure 2:** Trend in the percentage of high quality river sites (Q5, Q4–5) since 1987

The largest number of high quality sites continues to be in the less densely populated, less developed, and less intensively farmed regions in the west and south-west of the country. These sites represent the best quality rivers across Ireland, and therefore their continuing loss is a very significant concern. Substantial effort is required to protect the few remaining high quality river sites and, where feasible, return impacted ones to their earlier high quality.

**Source:** C. Bradley, G. Free, B. Kennedy, R. Little, P. McCreesh, W. Trodd, M. McGarrigle & J. Lucey.

## Indicator 3: Nitrate in Rivers

The concentration of nitrate[1] in rivers is an indicator of the level of nutrient enrichment and a potential human health indicator in water abstracted for drinking water purposes. The indicator is based on categorising the three-year average nitrate concentration from 1,732 individual river sites located in 712 rivers[2] into six quality classes. While there are no environmental quality standards for nitrate, average nitrate concentration values < 4 mg/l as $NO_3$ (0.9 mg/l N) and < 8 mg/l as $NO_3$ (1.8 mg/l N) are considered by the EPA to be indicative of high and good quality, respectively.

**Table 1:** Number and percentage of river sites and rivers in each category for the period 2014–2016.

| 3-year average | Categories of nitrate concentrations (mg/l $NO_3$) in rivers | | | | | | |
|---|---|---|---|---|---|---|---|
| mg/l as $NO_3$ | <4 | 4–8 | 8–12 | 12–25 | 25–37.5 | 37.5 –50 | Total |
| No. of sites | 690 | 384 | 353 | 284 | 19 | 2 | 1,732 |
| % sites | 39.8% | 22.2% | 20.4% | 16.4% | 1.1% | 0.1% | 100% |
| No. of rivers | 320 | 143 | 141 | 96 | 10 | 2 | 712 |
| % of rivers | 44.9% | 20.1% | 19.8% | 13.5% | 1.4% | 0.3% | 100% |

62% of monitored river sites (65% of rivers) have average nitrate concentrations less than 8 mg/l as $NO_3$ (Table 1). The remaining 38% of monitored river sites and 35% of rivers have average nitrate concentrations greater than 8 mg/l as $NO_3$. Twelve rivers had nitrate concentrations > 25 mg/l $NO_3$. These rivers with notably higher concentrations of nitrate are in the south and south-east of the country (Map 2).

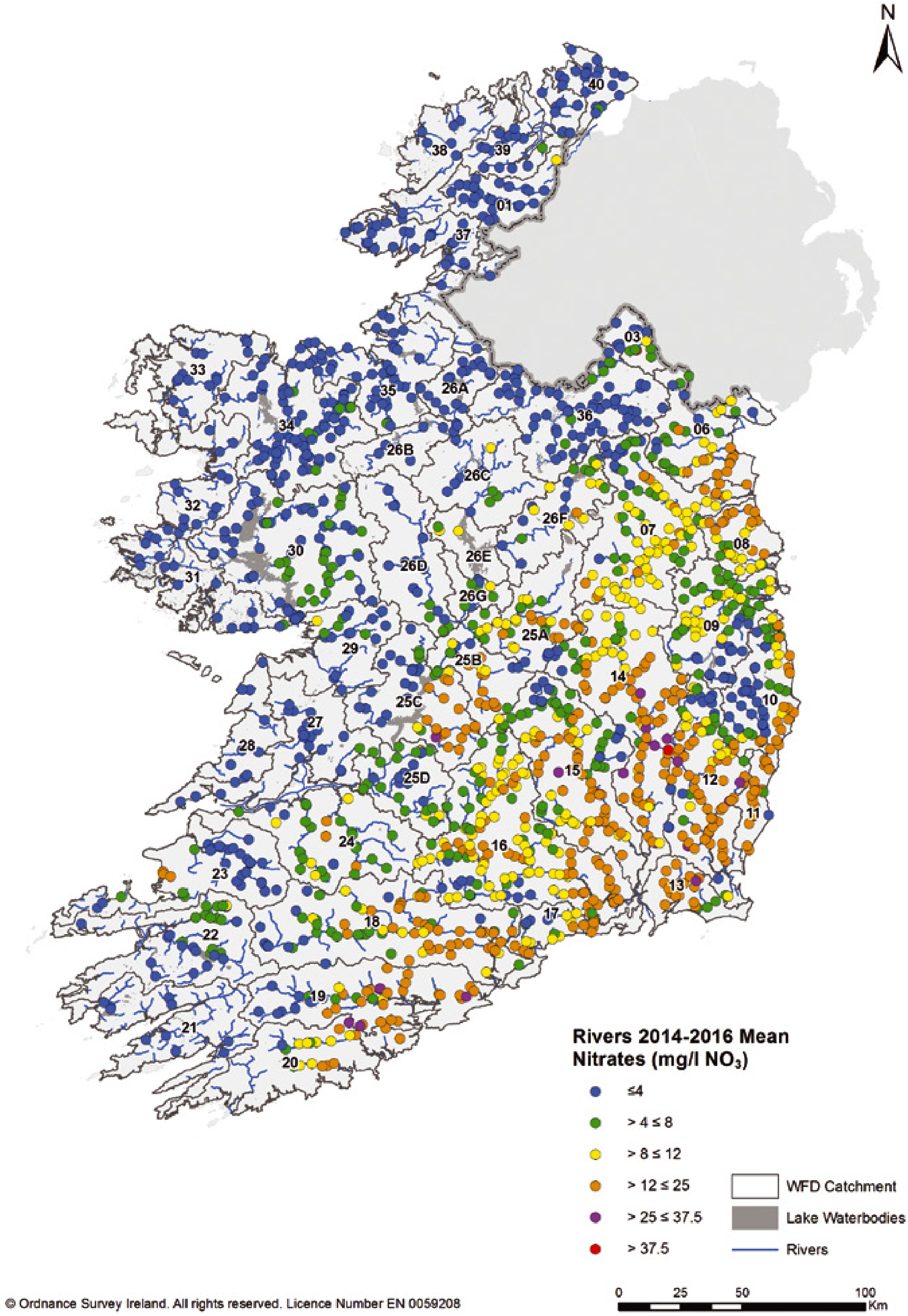
**Table 2:** Nitrate trends in river sites (numbers, percentage) categorised by direction and rate of change.

| Classification | Rate of change (mg/l nitrogen/yr) | No. of sites | Percentage |
|---|---|---|---|
| Strong improving | Reducing by more than 0.2 | 32 | 1.9 |
| Weak Improving | Reducing by between 0.05 and 0.2 | 812 | 48.1 |
| Stable | Varying by less than ± 0.05 | 832 | 49.3 |
| Weak deterioration | Increasing by between 0.05 and 0.2 | 11 | 0.7 |
| Strong deterioration | Increasing by more than 0.2 | 2 | 0.1 |

A statistical analysis[3] of the annual rate of change since 2007 was undertaken for 1,688 river sites in 699 rivers. Trends indicate that almost all river sites show either a decrease (50.0%) or no change (49.3%) in nitrate concentration (Table 2). Of the 32 stations showing strongly improving trends, almost half are in the south-east and in north county Cork (Map 3). While this is welcome, it appears that these reductions in concentration have not been sufficient to lead to a discernible improvement in the biological quality of the associated water ecosystem.

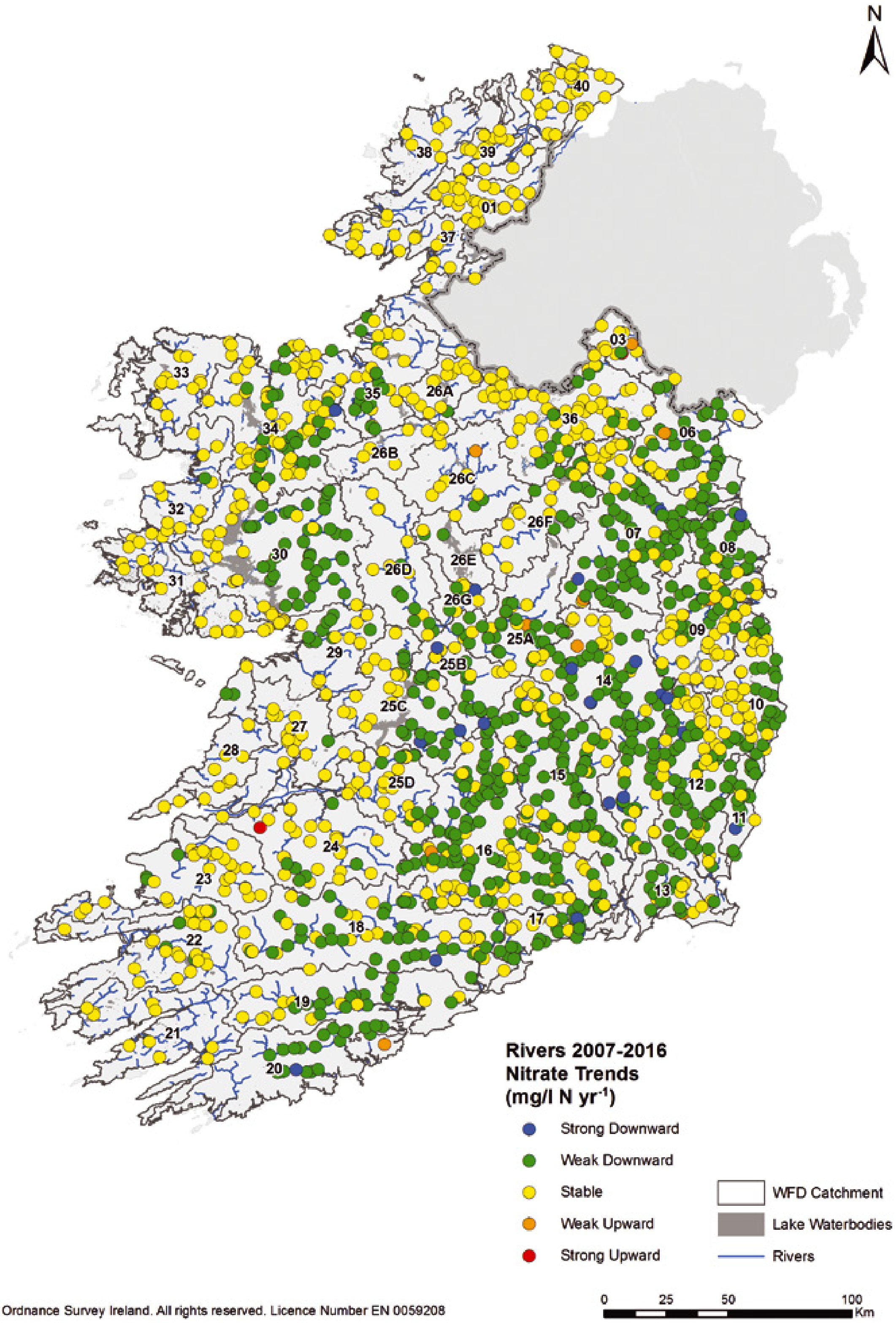
1 Measured as total oxidised nitrogen (nitrite + nitrate).
2 'River' in this instance is the geographical river and comprises all sites within the same river code.
3 Mann–Kendall and Sen's slope statistical methodology applied to sites with at least eight years' data between 2007 and 2016.

**Map 2:** Mean nitrate concentration at river sites for 2014–2016.




**Source:** EPA (P. Webster), Cartography: EPA (C. Byrne).

**Map 3:** Trends in mean nitrate concentration at river sites between 2007 and 2016 inclusive.




**Source:** EPA (P. Webster), Cartography: EPA (C. Byrne).

## Indicator 4: Phosphate in Rivers

Phosphate is essential for plant growth but if present in excessive amounts it can lead to significant impacts on the ecological health of rivers. Phosphate can be introduced into waters from a variety of sources, primarily from industrial and sewage discharges and from losses from application of animal manure and inorganic fertilisers to agricultural lands. The concentration of phosphate in rivers is a key driver of eutrophication (nutrient pollution) in freshwaters.

This indicator is based on categorising the three-year average phosphate[4] concentration from 1,732 individual river sites located in 708 rivers into six quality classes. Mean phosphate concentrations of ≤0.025 mg/l P and ≤0.035 mg/l P have been established in Ireland as legally binding environmental quality standards to support the achievement of high and good ecological status as required by the WFD. Concentrations of phosphate consistently greater than 0.035 mg/l P are likely to lead to nutrient pollution.

**Table 3:** Number and percentage of river sites and rivers in each phosphate concentration category for the period 2014–2016.

| 3-year average | Categories of phosphate concentration (mg/l P) in rivers | | | | | | |
|---|---|---|---|---|---|---|---|
| mg/l P | < 0.025 | 0.025–0.035 | 0.035–0.05 | 0.05–0.1 | 0.1–0.25 | >0.25 | Total |
| No. of sites | 1004 | 267 | 214 | 198 | 43 | 6 | 1732 |
| % of sites | 58.0% | 15.4% | 12.4% | 11.4% | 2.5% | 0.3% | 100% |
| No. of rivers | 425 | 91 | 90 | 74 | 24 | 4 | 708 |
| % of rivers | 60.0% | 12.9% | 12.7% | 10.5% | 3.4% | 0.5% | 100% |

The indicator shows that 73% of river sites (73% of rivers) have average phosphate concentrations < 0.035 mg/l P. Over a quarter of sites (26%) have average phosphate concentrations > 0.035 mg/l P, which is not sufficient to support the achievement of the ecological objectives of the WFD (Table 3). Of the 1,732 river sites examined, six exhibited excessive phosphate concentrations (>0.25 mg/l P). These were the Aghalona in Co. Carlow, Cahore Canal and Assally in Co. Wexford, Borrisoleigh stream downstream of the wastewater treatment plant in Co. Tipperary, Ahavarraga Stream in Co. Limerick, and Charleville Stream in Co. Cork (Map 4).

A statistical analysis[5] of the annual rate of change since 2007 was undertaken for 1,679 river sites in 686 rivers (Table 4). Trends indicate that almost all river sites show either no change (74.4%) or a decrease (22.1%) in phosphate concentration. The percentage of sites showing a decrease in concentration (22.1%) is greater than the percentage of sites showing an increase in concentration (3.4%). While this is welcome, it appears that these improvements in phosphate concentration have not been sufficient to lead to a discernible improvement in the biological quality of the associated water ecosystem.

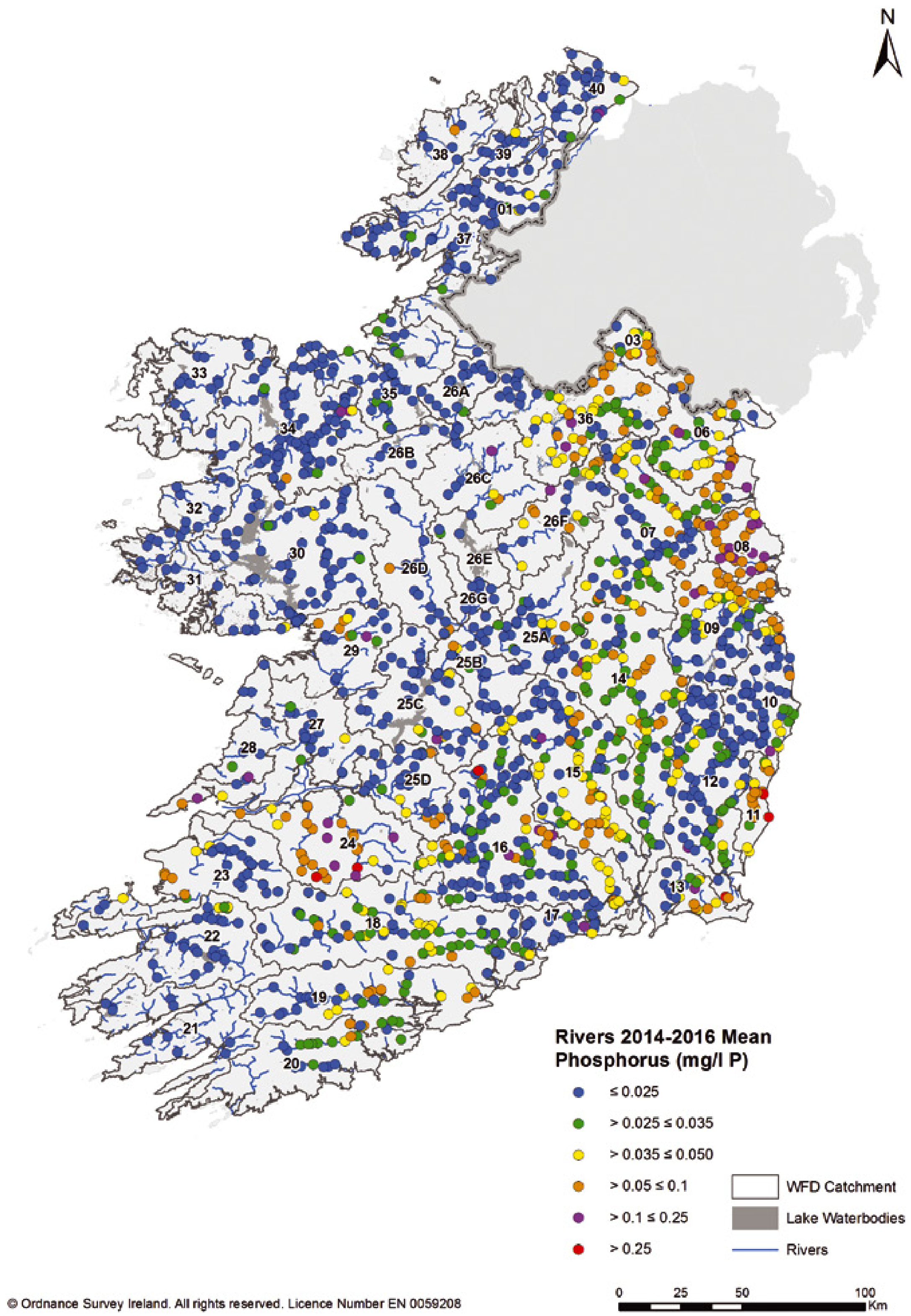
The Boyne and Nanny–Devlin catchments (Co. Meath, Westmeath) show the greatest improvements in trend, followed by the Barrow and Suir catchments (Co. Carlow, Kilkenny, Tipperary, Map 5). In the west of Ireland, where some of the lowest phosphate concentrations are to be found, there is very limited change.

4 Measured as molybdate reactive phosphate (MRP).
5 Mann–Kendall and Sen's slope statistical methodology applied to sites with at least eight years' data between 2007 and 2016.

**Table 4:** Phosphate trends in river sites (numbers, percentage) categorised by direction.

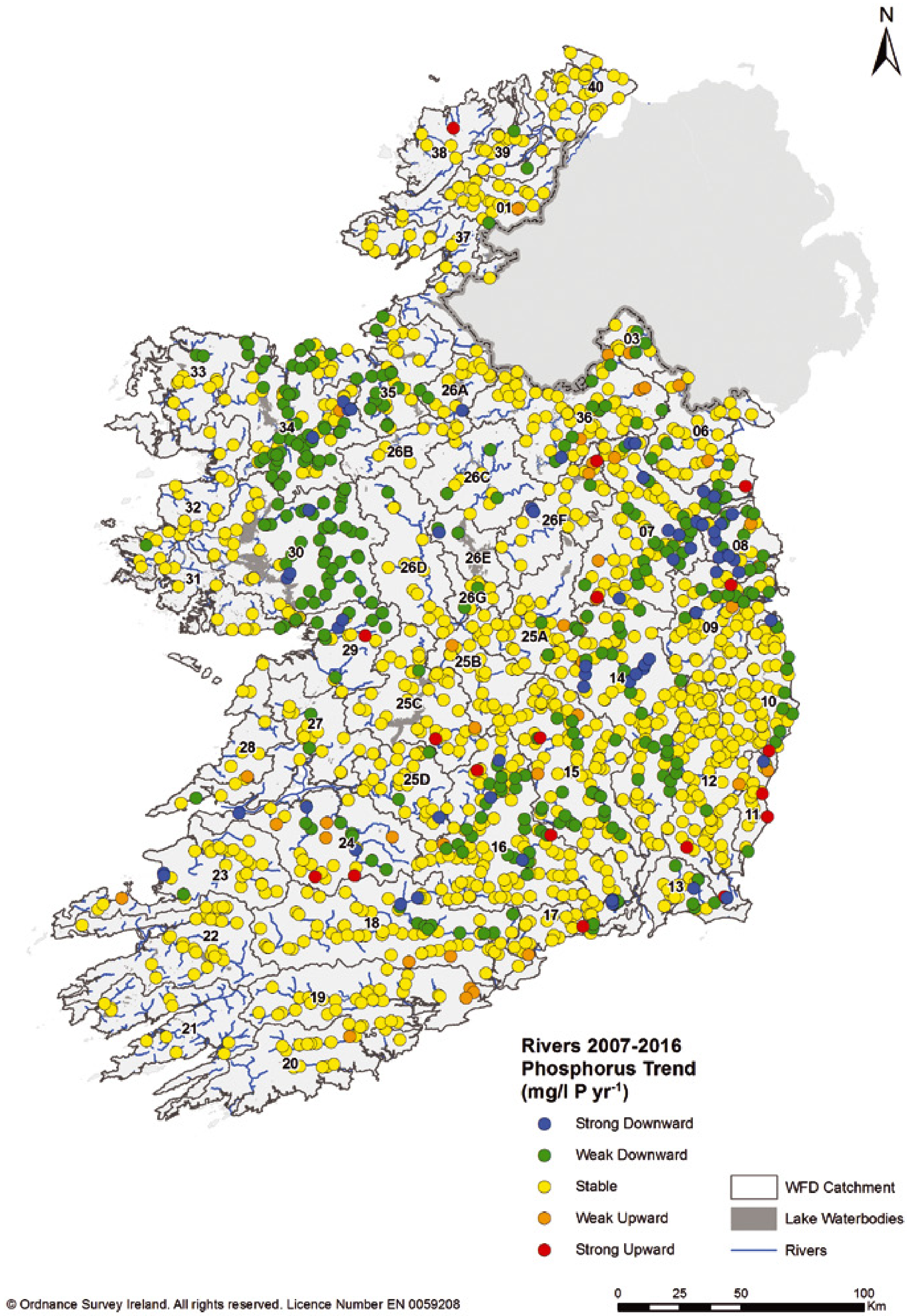
| Classification | Rate of change (mg/l P/yr) | No. | Percentage |
|---|---|---|---|
| Strong improving | Reducing by more than 0.005 | 68 | 4.0 |
| Weak improving | Reducing by between 0.002 and 0.005 | 304 | 18.1 |
| Stable | Varying by less than ±0.002 | 1250 | 74.4 |
| Weak deterioration | Increasing by between 0.002 and 0.005 | 39 | 2.3 |
| Strong deterioration | Increasing by more than 0.005 | 18 | 1.1 |

**Map 4:** Mean phosphate concentrations at river sites for the period 2014–2016.




**Source:** EPA (P. Webster), Cartography: EPA (C. Byrne).

**Map 5:** Trends in phosphate concentrations at river sites for the period 2007–2016.




**Source:** EPA (P. Webster), Cartography: EPA (C. Byrne).

## Indicator 5: Canal Quality

The main canal systems, the Royal and Grand Canals and sections of the Shannon–Erne Waterway, have been designated as artificial water bodies under the WFD and comprise 15 water bodies. A number of water quality elements are assessed under the WFD to classify each canal water body according to its ecological potential. One of the key elements of that assessment, biological quality, is presented in this indicator as five categories (maximum, good, moderate, poor and bad).

Biological quality is assessed in the canals by surveying the aquatic plants and invertebrates (tiny animals without backbones). 72% of canal water bodies were classified as being at good or maximum biological quality in the 2014–2016 period (Figure 3, Map 6). Trends for biological quality indicate an overall improvement in the maximum quality class when compared to the 2010–2012 data (Figure 3), indicating that biological quality was generally satisfactory overall.

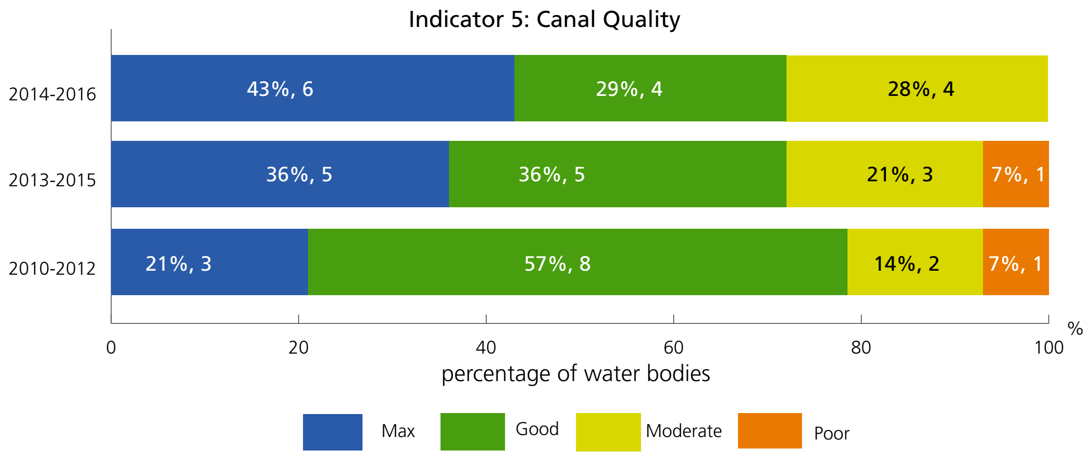
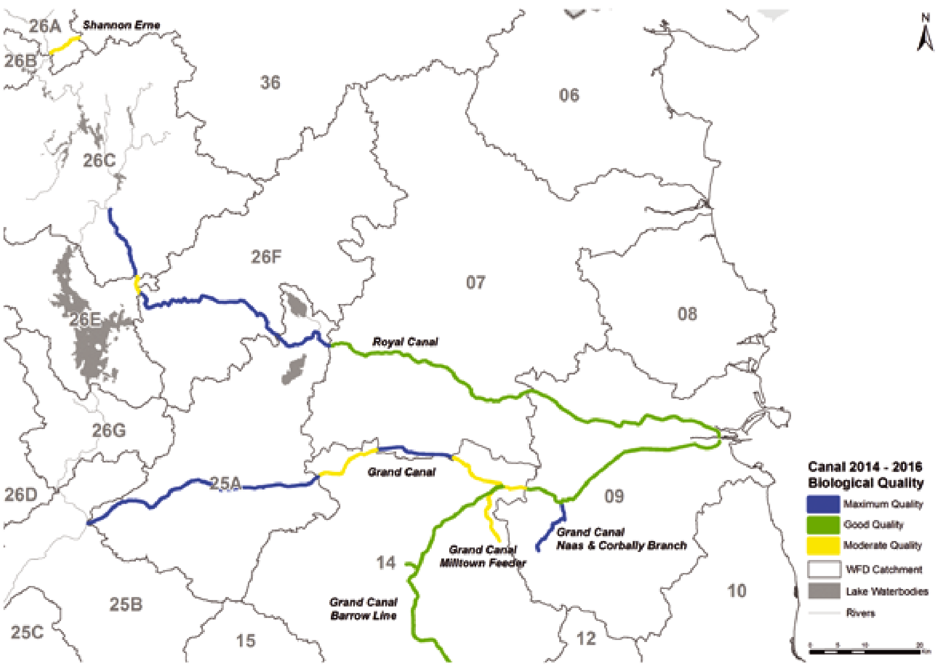



**Figure 3:** Biological quality of canals (percentage and number of water bodies) from 2010 to 2016.

**Map 6:** Biological quality of canals for 2014–2016.




**Source:** Waterways Ireland (Paula Treacy and Sabine Browne) Cartography: EPA (Claire Byrne)

## Indicator 6: Lake Biological Quality

The indicator is based on the biological assessment of macrophytes (aquatic plants), phytoplankton (free-floating microscopic algae), phytobenthos (small algae that grow on rocks and other substrates) and fish from 225 monitored lakes for the period 2014–2016. The indicator is reported using five quality classes (high, good, moderate, poor and bad). The purpose of this indicator is to identify annual changes in the biological quality of lakes and provide an indication of the likely change in lake ecological status, which is fully assessed every three years.

113 lakes or 50.2% were in good or better quality, while the remaining 112 lakes or 49.8% were less than good quality (Figure 4, Map 7). This indicates a 1.8% improvement in good or better quality compared to the previous three-year assessment. Overall lake water quality deteriorated by 3% compared to the baseline period of 2007–2009.

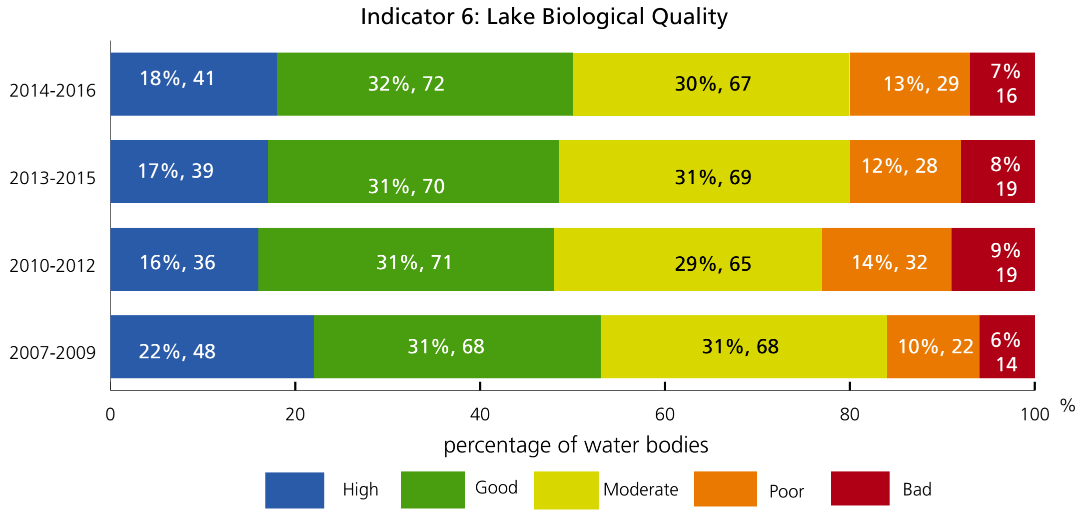
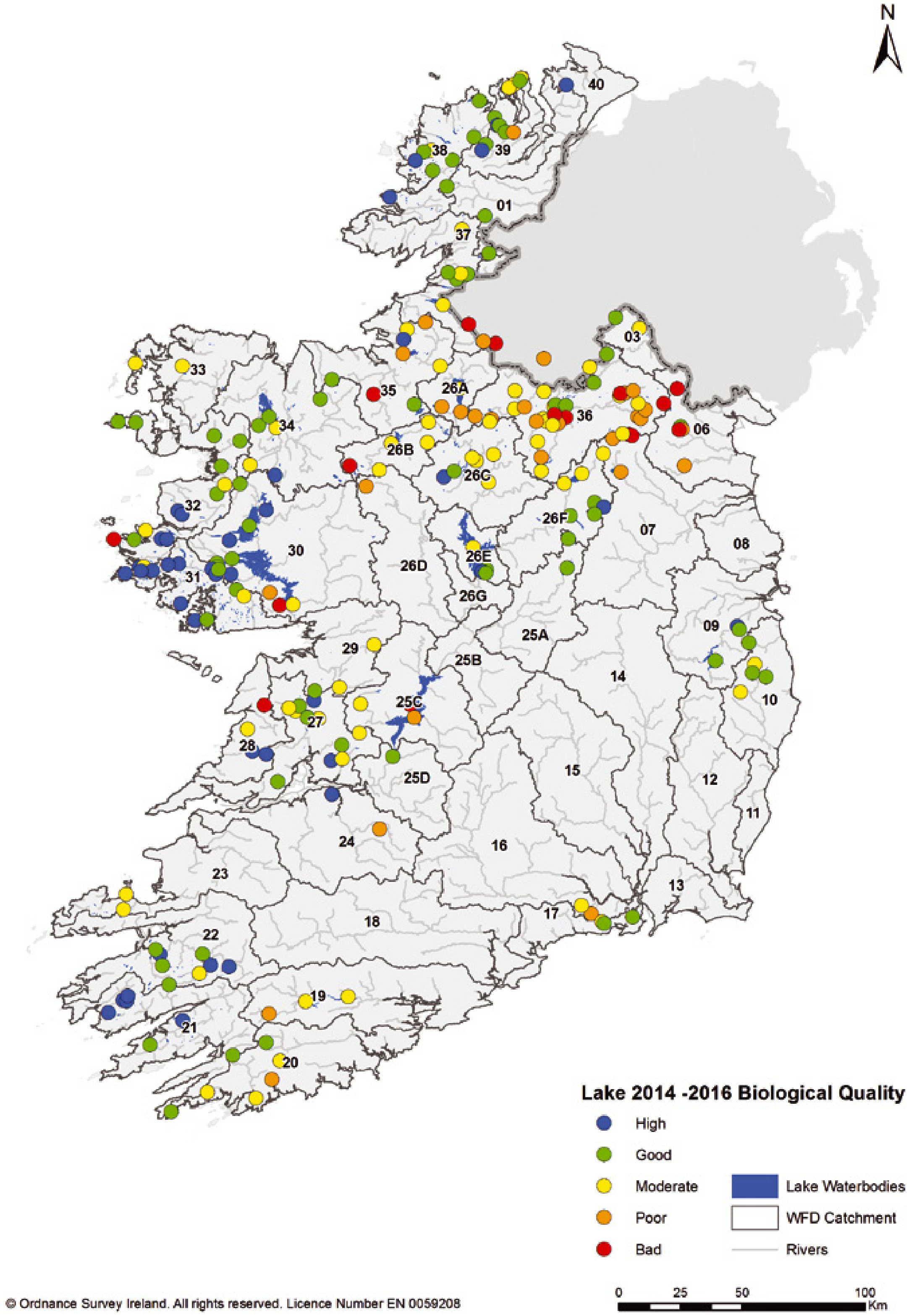



**Figure 4:** The biological quality of monitored lakes for 2014–2016, with number of lakes and percentage provided for each category.

Twenty-two lakes improved in quality, while 11 lakes deteriorated between 2013–2015 and 2014–2016. Of the lakes that deteriorated, eight were due to a change in macrophytes. Four of these lakes were previously of good quality (Beaghcauneen Lough, Co. Galway; Lough Seecon, Co. Galway; Rowan, Co. Leitrim; and Mushlin, Co. Cavan) and four were at less than good quality but have deteriorated further (Muckno, Co. Monaghan; Ballyquirke, Co. Galway; Lough Scur, Co. Leitrim; and Lough Macnean Upper, Co. Cavan). The quality of these eight lakes will be unchanged until the next time macrophytes are surveyed which is once every 3 years.

**Source:** EPA (D. Tierney, G. Free, B. Kennedy, R. Little, C. Plant, W. Trodd, H. Feeley and C. Wynne).

**Map 7:** Biological quality of lakes for 2014–2016.




**Source:** EPA (D. Tierney), Cartography: EPA (C. Byrne).

## Indicator 7: Total Phosphorus in Lakes

The concentration of total phosphorus in lakes is a key quality indicator because of its impact on biological water quality in freshwater lakes. Nutrients such as phosphorus are essential for plant growth, but if present in excess amounts, can lead to a significant decrease in water quality due to the proliferation of plants and algal blooms.

This indicator is based on categorising the average three-year total phosphorus concentration in 224 monitored lakes into five quality classes (high, good, moderate, poor and bad). While there is no national environmental quality standard for phosphorus in lakes, average concentration values < 0.010 mg/l as P and < 0.025 mg/l as P are considered to indicate high and good quality, respectively.

Three-quarters of lakes sampled (74% or 165 lakes) had an average concentration value < 0.025 mg/l as P, while the remainder (26% or 59 lakes) had an average concentration value greater than 0.025 mg/l as P (Figure 5). There was a 2 percentage point reduction in the number of lakes with an average concentration value < 0.025 mg/l as P compared to 2013–2015. Of note is a 5 percentage point reduction in the proportion of lakes in high quality (≤0.01 mg/l P). This may indicate a potential reversal in the improving trend in the proportion of lakes in high quality since 2007. The percentage of monitored lakes in the moderate category (>0.025 mg/l P) has increased by 2 percentage points compared to 2013–2015. Fifteen lakes had increases in total phosphorus and five lakes had reduced levels of total phosphorus compared to 2013–2015. The most phosphate-enriched lakes were Farnham Lough, Co. Cavan; Lough Egish, Co. Monaghan; Lough Rinn, Co. Leitrim; Inner Lough, Co. Monaghan; and Belhavel Lough, Co. Leitrim (Map 8).

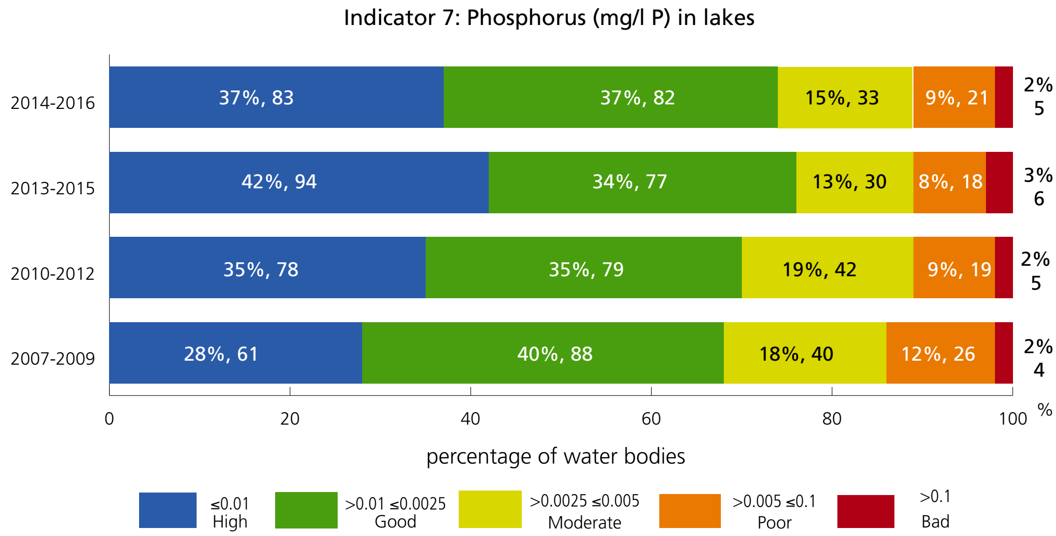
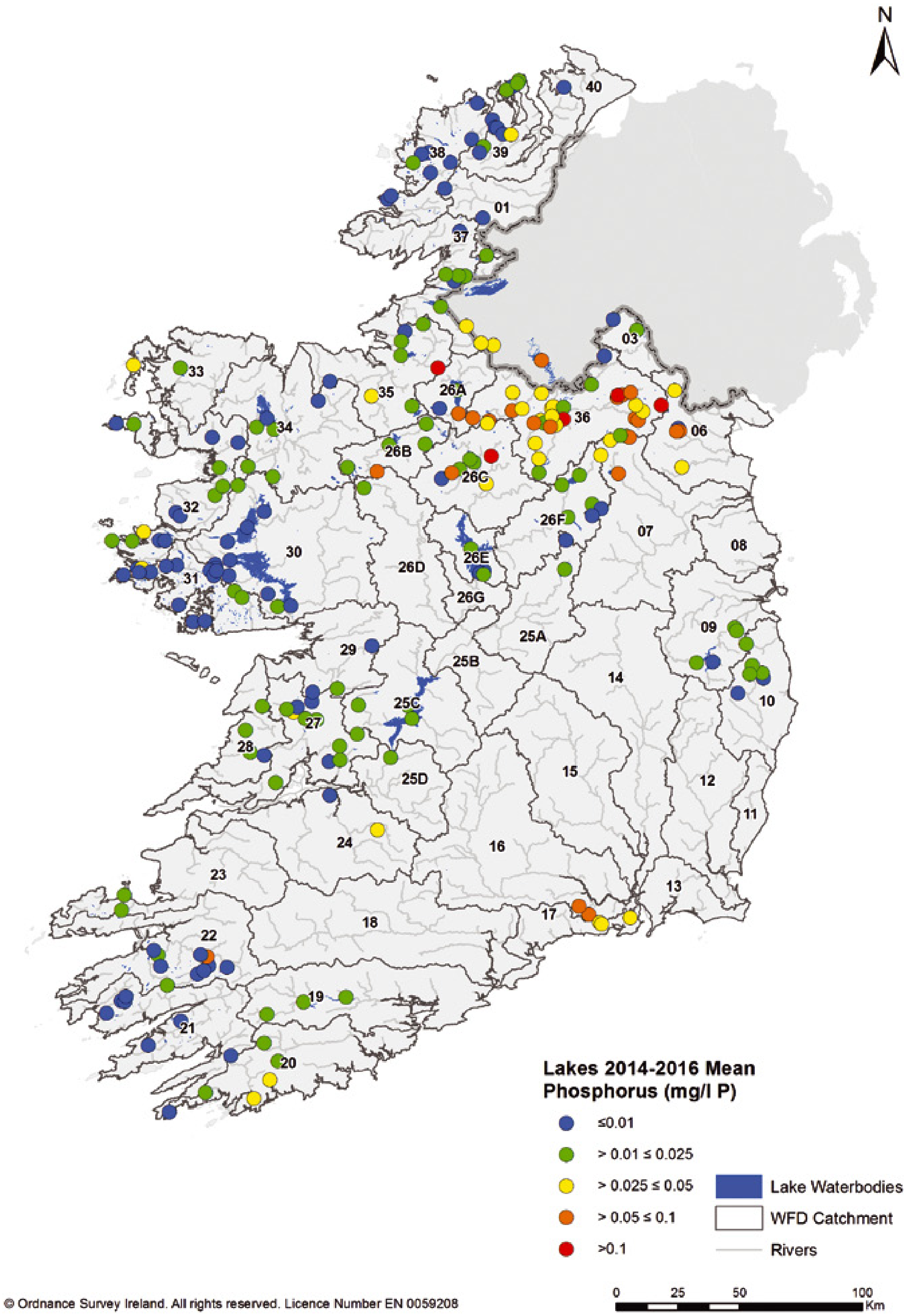



**Figure 5:** The three-year averages of total phosphorus concentrations at monitored lakes 2007–2016 categorised by quality classes.

**Source:** G. O'Donnell, A. Stephens, G. Free & D. Tierney.

**Map 8:** Mean total phosphorus concentrations at all lakes for 2014–2016.




**Source:** EPA (G. O'Donnell), Cartography: EPA (C. Byrne).

## Indicator 8: Fish Kills

The presence of healthy fish stocks, particularly salmon and trout, in rivers, lakes and estuaries is an indicator of good water quality. A fish kill is a sign of a catastrophic ecosystem disruption. Fish kills can occur within a localised stretch or over a large distance in a water body. There are many possible causes (e.g. release of hazardous chemicals, changes in temperature, algal blooms, siltation) but oxygen depletion in water is the principal cause of fish kills. These conditions can be brought about by anthropogenic inputs of organic matter to water or may result from excessive plant growth. Data on fish kills in Ireland are compiled annually by Inland Fisheries Ireland (IFI). Fish kills for 2016 are low compared with long-term trends (Figure 6). The worst years were 1987 and 1989, with more than 100 fish kills. While the situation seemed to be improving from 2010 to 2012, the more recent increasing trend in 2014, 2015 and 2016 (22, 23 and 31 fish kills respectively) is a cause for concern.

Indicator 8: Fish Kills

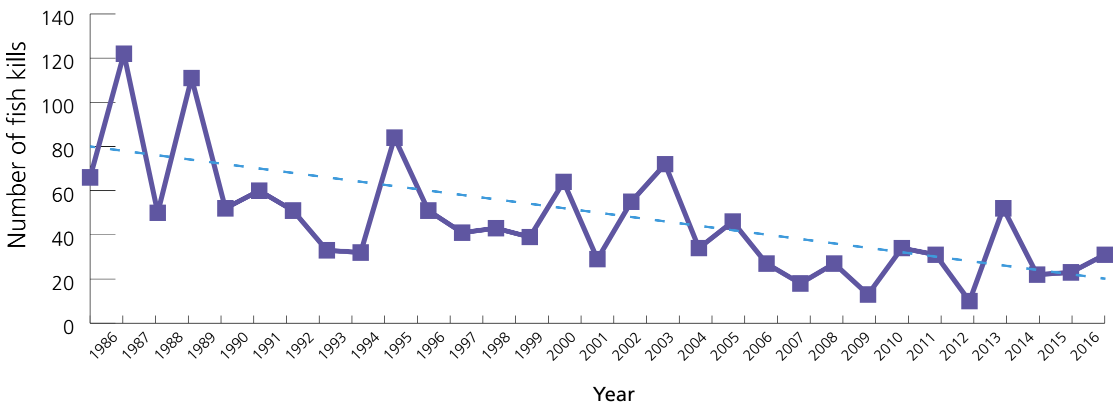



**Figure 6:** Number of reported fish kills per year from 1986 to 2016.

The known causes of fish kills between 2010 and 2016 are varied but, where determined based on investigations carried out by IFI environmental staff, are primarily due to agricultural practice (Table 5). The number of recorded fish kills per IFI region is shown on Map 9. IFI Limerick reported the highest number of fish kills caused by agricultural and municipal sources, while IFI Dublin reported the highest number caused by industrial sources but also for undetermined sources (Table 5).

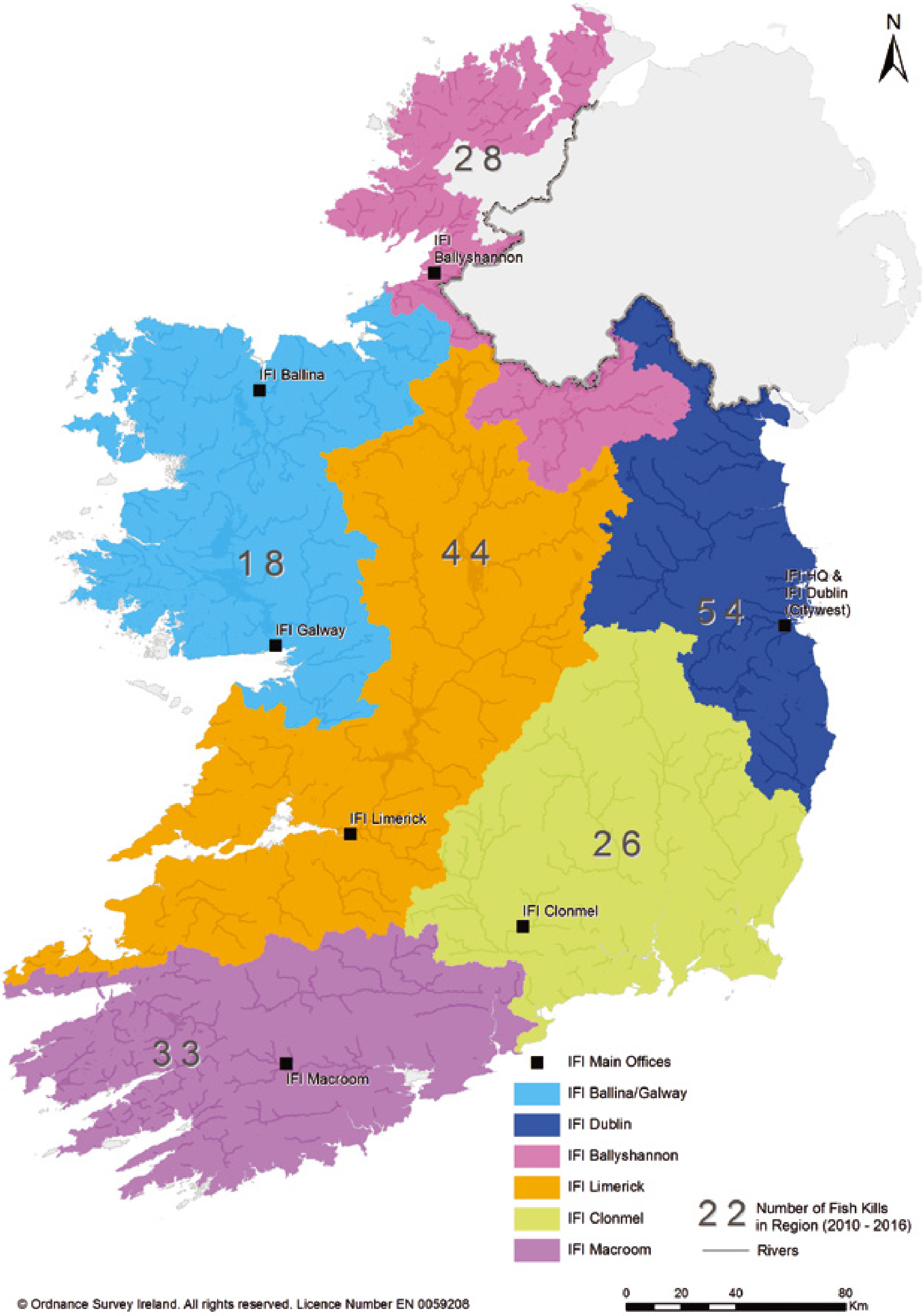
**Table 5:** Causes attributed to reported fish kills by IFI between 2010–2016.

| IFI Office | Cause of Reported Fish Kill | | | | Total |
|---|---|---|---|---|---|
| | Agriculture | Industrial Operations | Municipal Works | *Other | |
| **Dublin** | 4 | 10 | 2 | 38 | **54** |
| **Clonmel** | 9 | 0 | 1 | 16 | **26** |
| **Macroom** | 7 | 9 | 2 | 15 | **33** |
| **Limerick** | 18 | 1 | 5 | 20 | **44** |
| **Ballina/Galway** | 4 | 0 | 3 | 11 | **18** |
| **Ballyshannon** | 5 | 1 | 6 | 16 | **28** |
| **Total** | **48** | **21** | **19** | **115** | **203** |

* Other: Cause not determined. In some incidents, high temperatures and low water levels are suspected, but the cause could also be eutrophication or disease.

In July 2017, a fish kill on the River Tolka in Dublin caused the death of over 500 fish. It's reported that a sewer became blocked by a car tyre, which led to a manhole overflowing and sewage being discharged into the river. This is at least the seventh reported fish kill on this river since 2010, with three in 2013 alone. This number of fish kills is unacceptable for this small river, which is struggling to recover from previous fish kills. Some of the causes of fish kills on the River Tolka are unknown, but they are mainly attributed to industrial sources.

**Map 9:** Number of fish kills in each IFI office region for 2010–2016.




**Source:** IFI (F. Kelly), Cartography: EPA (C. Byrne).

## Indicator 9: Trophic Status of Transitional and Coastal Waters

The assessment of trophic status is used to identify waters that may be sensitive to nutrient enrichment and the occurrence of eutrophication. Trophic status is a measure of the amount of biomass in a water body at a certain time. Too much nutrient leads to too much biomass, which can severely impact the normal functioning of saline ecosystems and can cause changes to the biological communities and undesirable disturbance to the overall ecology. Eutrophication in estuaries and coastal waters can be caused by nitrogen and/or phosphorus. Phosphorus is generally considered the primary limiting nutrient in river-dominated estuaries while nitrogen is considered the primary limiting nutrient in coastal ecosystems. This indicator categorises the trophic status of these waters into four classes: eutrophic, potentially eutrophic, intermediate or unpolluted.

Of the 102 water bodies assessed by this indicator, nine (9%) were eutrophic, nine (9%) were potentially eutrophic, 27 (26%) were intermediate and 57 (56%) were unpolluted (Figure 7). Fifteen water bodies deteriorated and nine water bodies improved in trophic status compared to 2010–2012. The eutrophic or potentially eutrophic areas are predominantly located on the east and south coasts, with most of the unpolluted water bodies located on the south-west, west and north-west coasts (Map 10).

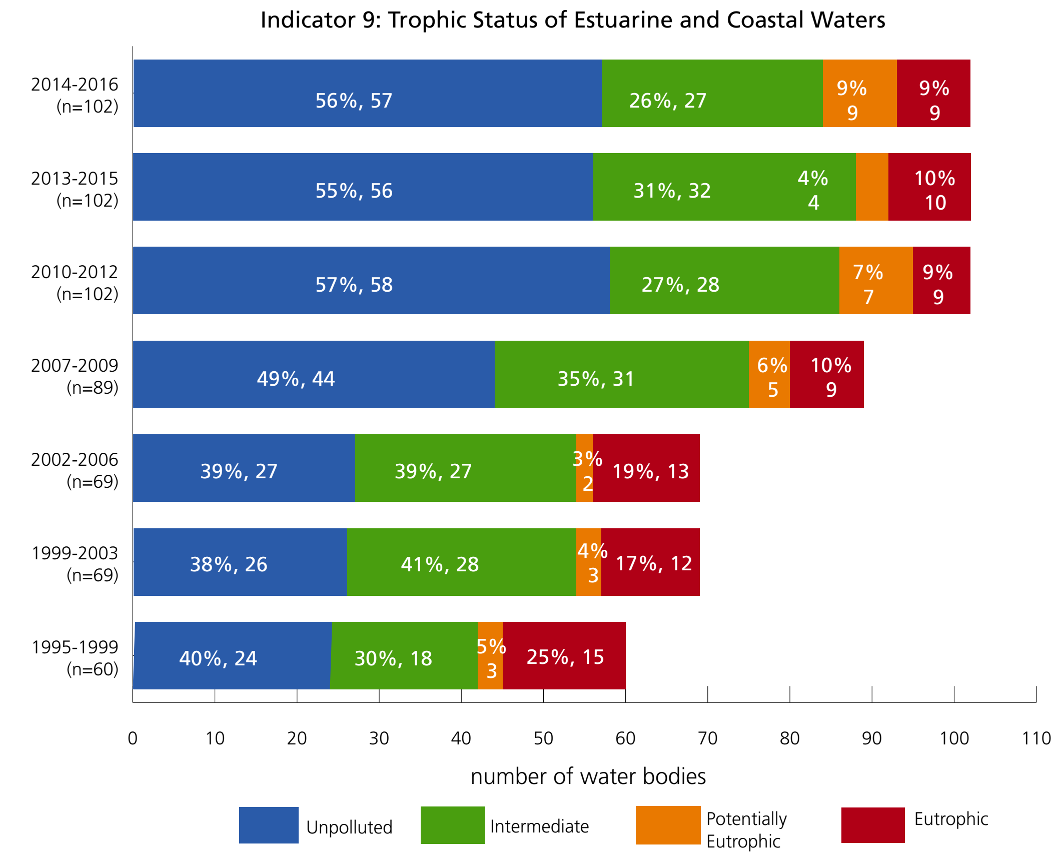
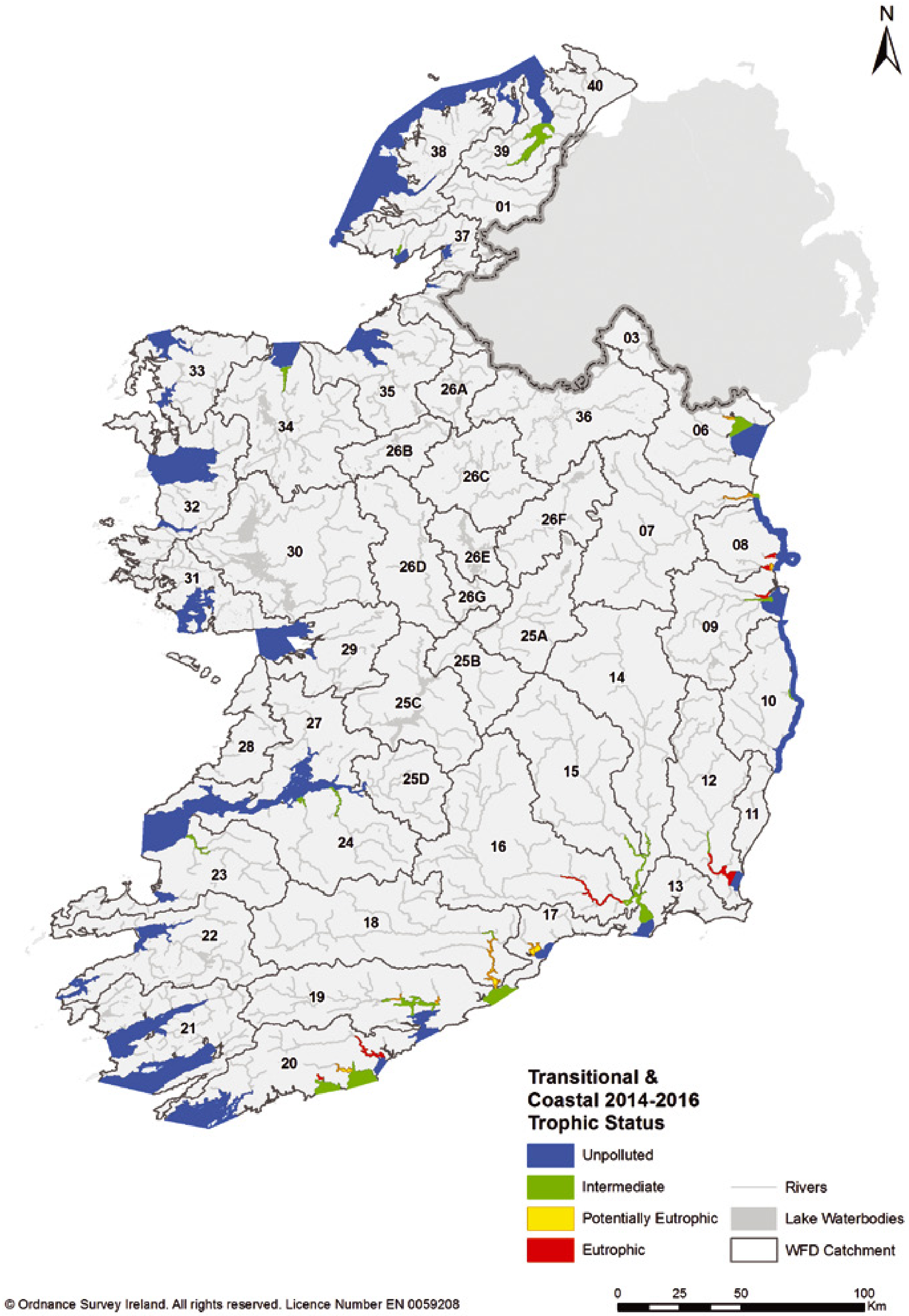



**Figure 7:** Trophic status assessment of transitional and coastal waterbodies since 1995.

The number of eutrophic water bodies has declined since 1995–1999, but the combined number of eutrophic and potentially eutrophic water bodies has remained unchanged. Since the 2007–2009 assessment, eight estuaries have been consistently classified as either eutrophic or potentially eutrophic: the Argideen, Co. Cork; Broadmeadow, Co. Dublin; Castletown, Co. Louth; Bandon, Co. Cork (upper and lower); lower Slaney, Co. Wexford; upper Suir; and Rogerstown, Co. Dublin.

**Map 10:** The 2014–2016 trophic status of transitional and coastal waters.






**Source:** EPA (R. Wilkes, G. McDermott, S. Ní Longphuirt, J. Keogh), Cartography: EPA (C. Byrne).

## Indicator 10: Nitrogen in Transitional and Coastal Waters

Nitrogen is generally considered the primary limiting nutrient in coastal ecosystems, meaning that the concentration of this nutrient can limit the growth of algae and aquatic plants. Increases in nitrogen can lead to elevated growth of phytoplankton (free-floating microscopic algae) and/or opportunistic macroalgae (large algae such as sea lettuce). In winter the concentration of nitrogen as dissolved inorganic nitrogen (DIN)[6] is expected to be at its highest due to the absence of any significant plant or algal growth. Salinity-dependent thresholds have been defined for DIN in transitional and coastal waters, and there is an environmental quality standard for coastal waters. These assessment thresholds range from ≤2.6 mg N/l at a salinity of 0 to ≤0.25 mg N/l at a salinity of 34.5 and are used to assess water quality of transitional and coastal waters around Ireland. Dissolved inorganic nitrogen concentrations above the assessment threshold indicate the presence of elevated nitrogen levels from anthropogenic sources. The indicator uses the median winter DIN concentration for the period 2014–2016 to assess exceedance against the assessment threshold.

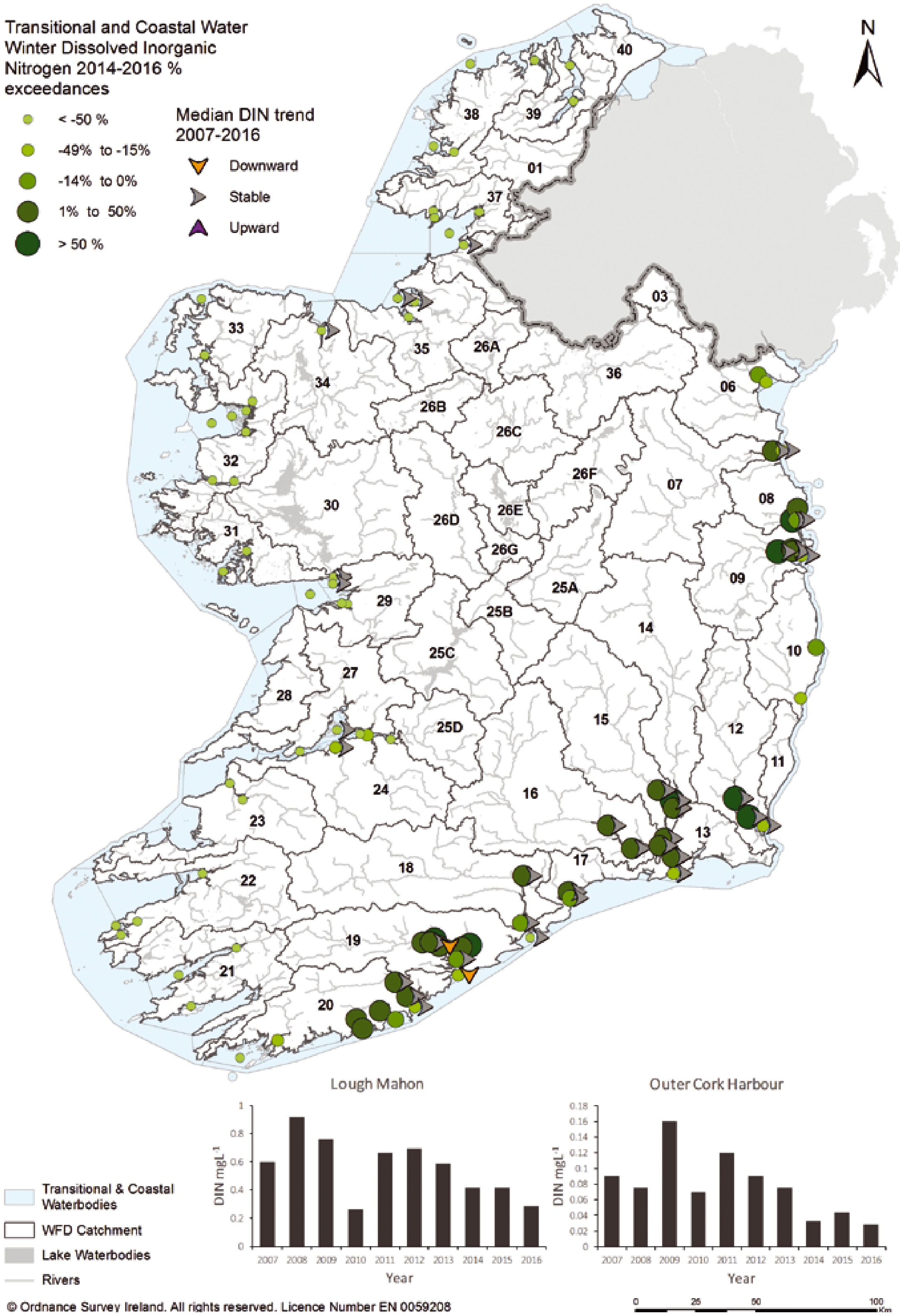
Of the 93 water bodies assessed, 29 (31%) exceeded the threshold (Map 11). The largest exceedances were in the Glashaboy estuary, Co. Cork; Broadmeadow Water, Co. Dublin; Upper Barrow estuary, Co. Kilkenny; the lower and upper Slaney estuary, Co. Wexford; and the Owenacurra estuary, Co. Cork (greater than 50% above the threshold). Clonakilty Bay was the only coastal water body to exceed the threshold and to breach the corresponding environmental quality standard for coastal waters, although the coastal waters of Malahide Bay, Co. Dublin and Dungarvan Harbour, Co. Waterford were close to the threshold. A similar number of water bodies (26) exceeded the threshold in the 2010–2012 assessment period.

The highest absolute winter dissolved inorganic nitrogen concentrations were found in the Glashaboy estuary, Co. Cork (4.9 mg N/l), the Upper Barrow estuary, Co. Kilkenny (4.4 mg N/l), the Owenacurra estuary, Co. Cork (4.1 mg N/l), upper Slaney estuary, Co. Wexford (3.9 mg N/l) and Barrow Nore Estuary Upper, Co. Wexford (3.6 mg N/L).

Trend analysis of winter median concentrations in transitional and coastal water bodies in 19 catchments was undertaken from 2007 to 2016. Since 2007, no significant increases in DIN have been observed in transitional and coastal waters. The results show a significant improvement in dissolved inorganic nitrogen in two water bodies, Lough Mahon and Outer Cork Harbour, Co. Cork (Map 11).

6 DIN = nitrite + nitrogen + ammonia. Note that here nitrate is expressed as N rather than $NO_3$ as is the case for the other indicators in the report, and the numerical expression using NO3 is four times greater than when N is used.

**Map 11:** Winter dissolved inorganic nitrogen levels in transitional and coastal waters 2014–2016 showing percentage exceedances, above and below assessment level and trend analysis in 19 catchments.




**Source:** EPA (R. Wilkes, G. McDermott, S. Ní Longphuirt, J. Keogh), Cartography: EPA (C. Byrne)

## Indicator 11: Phosphorus in Transitional and Coastal Waters

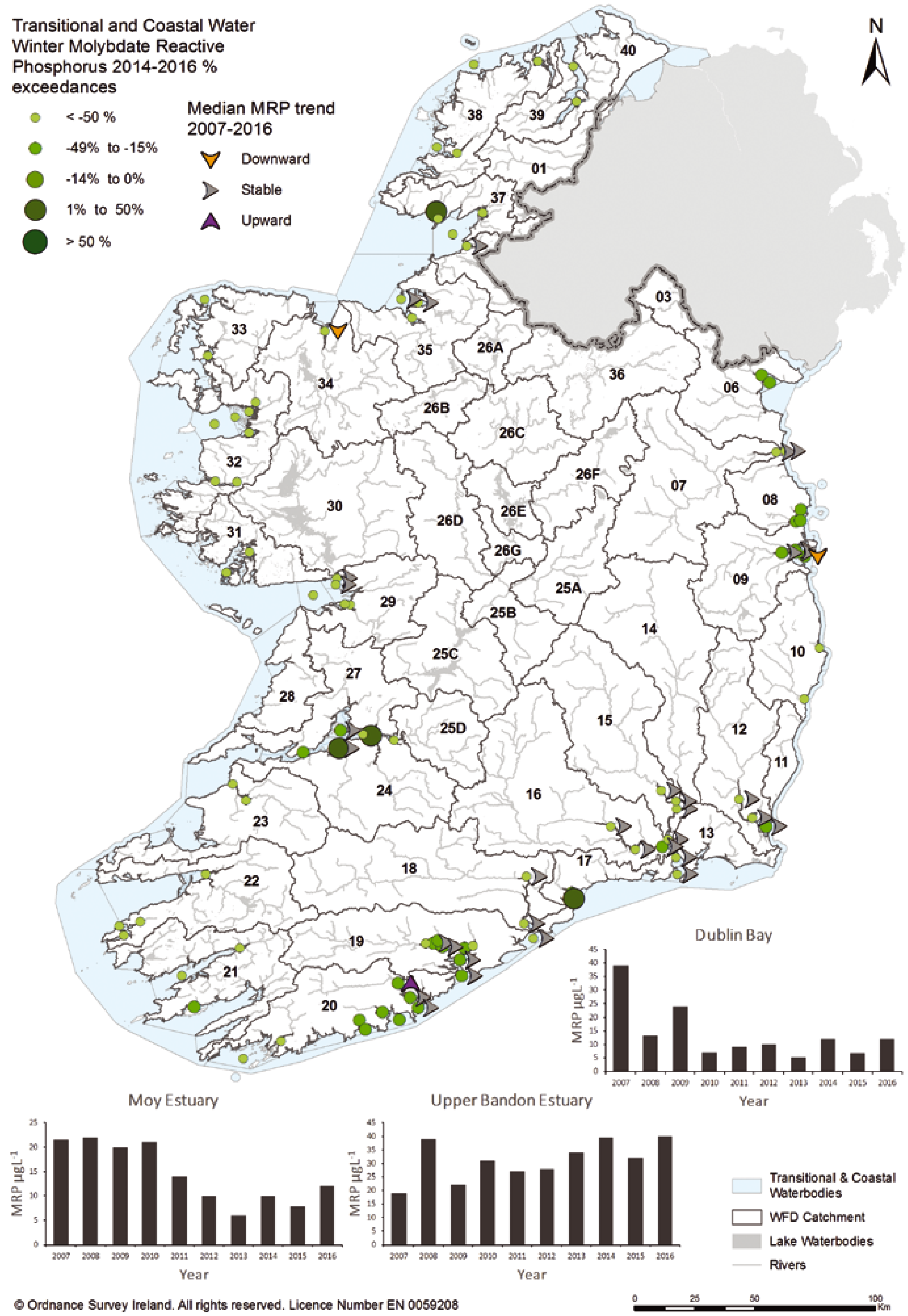
Phosphorus is important in transitional systems because it is limiting in lower salinity waters. Salinity-dependent thresholds have been defined for phosphorus[7] in transitional and coastal waters and there is an environmental quality standard for transitional waters (S.I. 272, 2009). The assessment threshold is 0.060 mg P/l for fresh to intermediate salinity waters and ranges from 0.059–0.040 mg P/l for intermediate to full salinity waters. Phosphorus concentrations above these thresholds can indicate excess phosphorus being transported to surface waters due to anthropogenic activity. Winter (January–March) phosphorus exceedances give an indication of available nutrients without the influence of biological activity, which mainly occurs during the summer growth period.

Of the 93 water bodies assessed, four (4.3%) exceeded the relevant salinity winter phosphorus threshold: two coastal water bodies (Dungarvan Harbour, Co. Waterford and Killybegs Harbour, Co. Donegal), and two transitional water bodies (Maigue and Deel estuaries, Co. Limerick) (Map 12[8]). In terms of absolute concentration, the majority (91%) of estuaries and coastal waters had winter median phosphorus values < 0.040 mg/l P, with half of these having levels < 0.020 mg/l P. The highest winter phosphorus concentrations were found in the Maigue estuary (0.075 mg/l P), Deel estuary (0.070 mg/l P), Dungarvan Harbour (0.054 mg P/l) and Killybegs Harbour (0.049 mg/l P). In summer the highest concentrations were found in the Castletown estuary, Co. Louth (0.076 mg/l P) and Tolka estuary, Co. Dublin (0.057 mg/l P).

Trend analysis of winter median phosphorus concentrations in transitional and coastal waters in 19 catchments was undertaken between 2007 and 2016. The results show that concentrations in Dublin Bay and the Moy estuary, Co. Mayo, decreased significantly, while there is a clear upward trend in concentrations over the 10-year period in the upper Bandon estuary.

7 Measured as MRP.
8 Trends are only reported where they have been calculated for a catchment.

**Map 12:** Winter phosphate levels in transitional and coastal waters 2014–2016 showing percentage exceedances, above and below assessment level and trend analysis.




**Source:** EPA (R. Wilkes, G. McDermott, S. Ní Longphuirt, J. Keogh), Cartography: EPA (C. Byrne).

## Indicator 12: Nutrient Inputs to the Marine Environment

Overabundance of nutrients in transitional and coastal zones can cause excessive growth of seaweed and phytoplankton, with knock-on effects throughout the ecosystem. To assess the amount of nutrients entering Irish coastal zones, monitoring of the inputs of total phosphorus and total nitrogen into the marine environment from 19 major rivers has been ongoing since 1990[9]. The inputs are calculated based on nutrient concentrations, which are measured 12 times a year, and river flow, which is measured continuously.

Nutrient inputs from Irish rivers have varied over the 27 years since monitoring began. Total phosphorus loads increased until the late 1990s in all sea areas and then began to decrease (Map 13). However, there have been significant reductions in normalised[10] nutrient loads from rivers into the three main sea areas: Irish Sea, Celtic Sea and the Atlantic coasts. On a national basis, the loading of total phosphorus and total nitrogen has decreased by 4,099 tonnes (53%) and 76,271 tonnes (28%) respectively when comparing loads from 1990–1992 to 2014–2016. The largest reductions in total phosphorus and total nitrogen loads were seen in rivers discharging to the Irish and Celtic Seas.

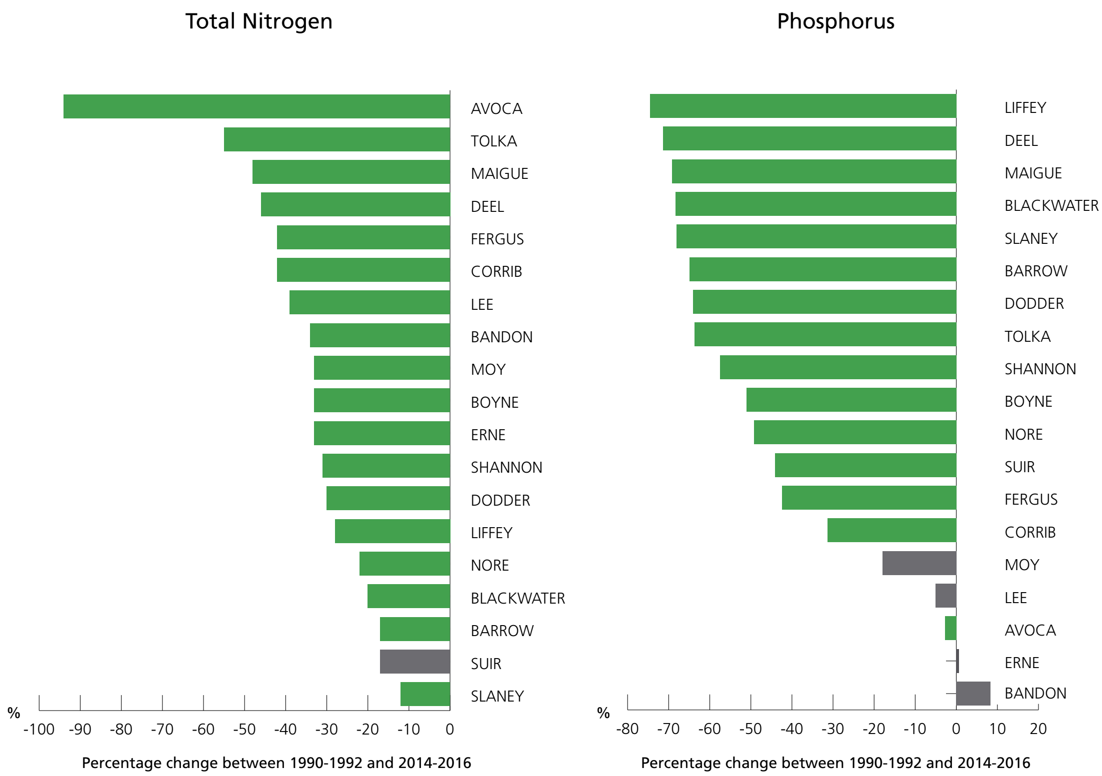



**Figure 8:** Change in loadings of total phosphorus and total nitrogen since 1990 from 19 rivers. Green indicates statistically significant change and grey indicates the change is not statistically significant.

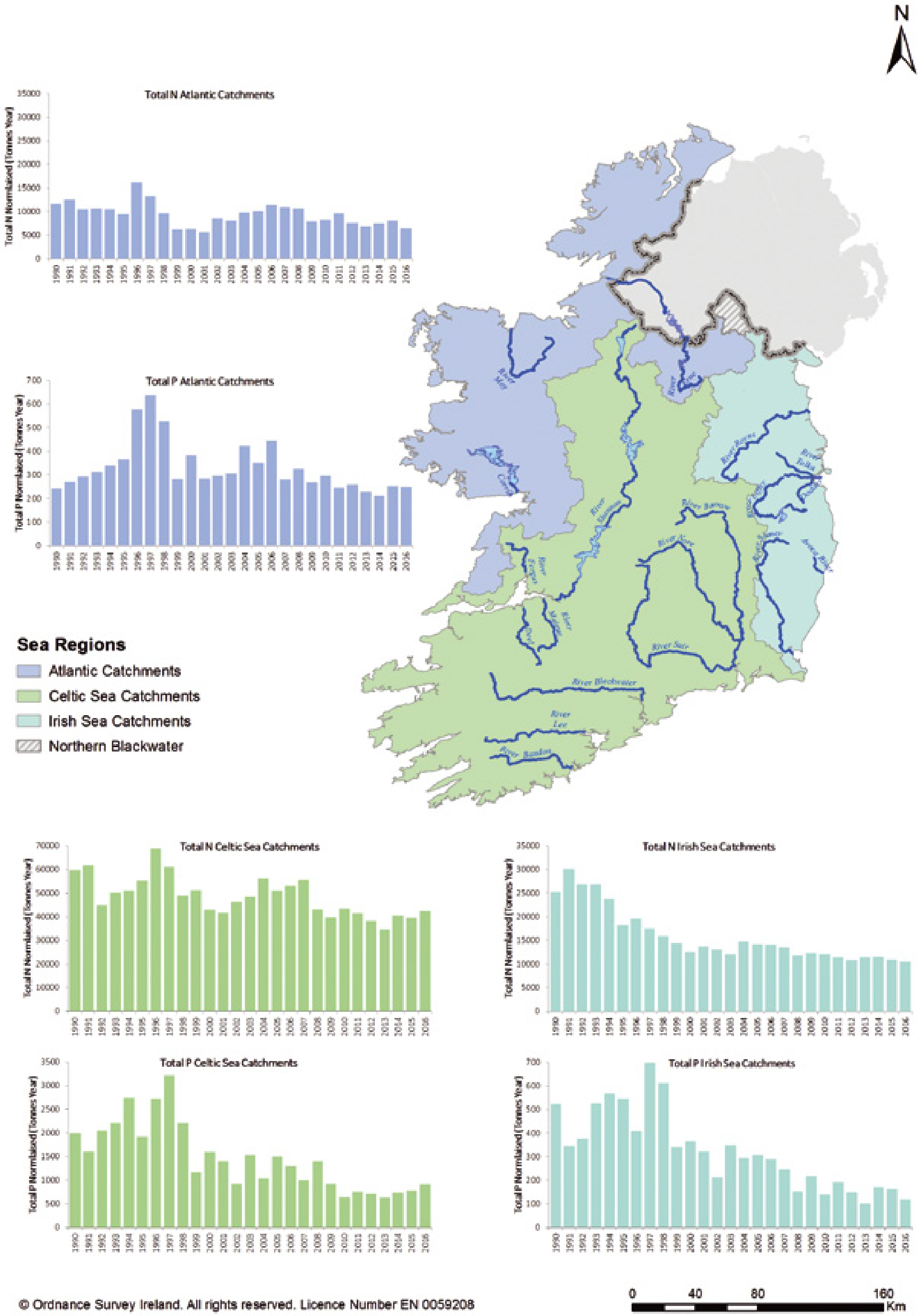
Trend analysis of total phosphorus loads undertaken between 1990 and 2016 (Figure 8) show significant reductions in all rivers, except the Lee and Bandon rivers (Celtic Sea) and the Erne and Moy rivers (Atlantic Sea). Significant reductions in total nitrogen loads were seen in all rivers except for the Suir (Celtic Sea). Very substantial total nitrogen load reductions were seen in the Avoca River, related to the cessation of industrial activity in the catchment in the early 1990s. Overall the reductions are a

9 As part of the Oslo-Paris Convention for the Protection of the North East Atlantic strategy to combat eutrophication in the marine environment.

10 To remove the influence of inter-annual changes in river flow, the inputs are normalised by a factor which represents the long-term average flow rate for each river.

result of national measures to reduce the loss of nutrients from terrestrial sources to surface waters[11]. In recent years, the reduction in nutrient inputs appears to have slowed. Trend analysis undertaken between 2007 and 2016 showed no significant reductions except for one river for total phosphorus (Barrow) and four rivers for total nitrogen (Corrib, Fergus, Moy and Slaney).

**Map 13:** Normalised loads of total nitrogen and total phosphorus between 1990 and 2016 in each sea area. Note the change in axis scaling between the Celtic Sea and the Atlantic and Irish Sea.




**Source:** EPA (R. Wilkes, G. McDermott, S. Ní Longphuirt, J. Keogh), Cartography: EPA (C. Byrne).

11 These include improvements in urban waste water treatment, changes in agricultural practices and the licensing of industrial activity.

# Indicator 13: Nitrate in Groundwater

Low concentrations of nitrate ($NO_3$) are found naturally in groundwater, and concentrations higher than 10 mg/l of $NO_3$ are usually indicative of inputs relating to human activities. Groundwater is widely abstracted for drinking water in Ireland and the drinking water standard of 50 mg/l $NO_3$ relates to potential for harm to human health. Groundwater is also an important pathway for the movement of nitrate from diffuse and small point sources to water ecosystems. Nitrate is often the limiting nutrient in marine ecosystems, and nitrate concentrations impact on the ecology at lower levels than the drinking water standard.

This indicator is based on the annual mean nitrate concentration for 195 groundwater monitoring sites that are monitored three times per year.

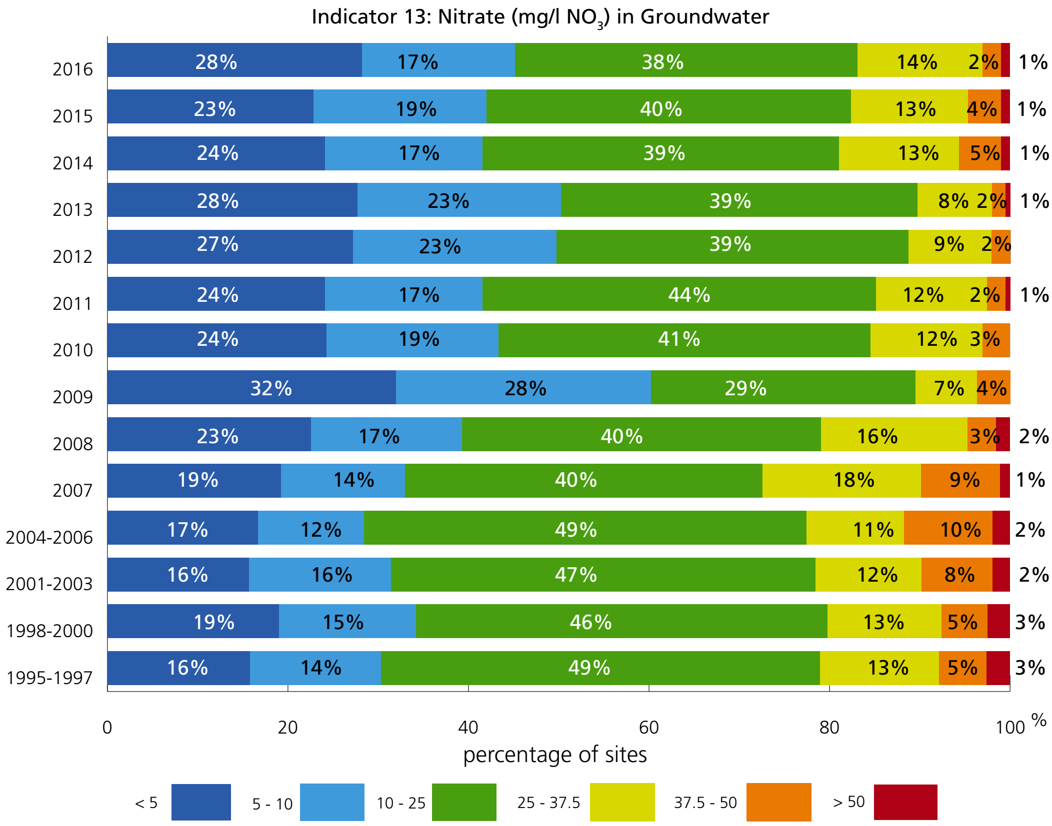



**Figure 9:** Mean nitrate concentrations at groundwater quality monitoring sites, 1995 to 2016.

Nationally, mean nitrate concentrations in groundwater have seen a modest reduction since 1995 (Figure 9). However, the proportion of sites with concentrations greater than 25 mg/l NO3 from 2014 to 2016 was greater than for the preceding five years (2009 to 2013). In 2016 the mean nitrate concentration exceeded the Irish groundwater WFD threshold value concentration of 37.5 mg/l $NO_3$ at six monitoring sites, with two sites having mean concentrations greater than the Drinking Water Standard. Generally, the south and south-east of the country continue to have the greatest proportion of monitoring stations with higher nitrate concentrations (Map 14).

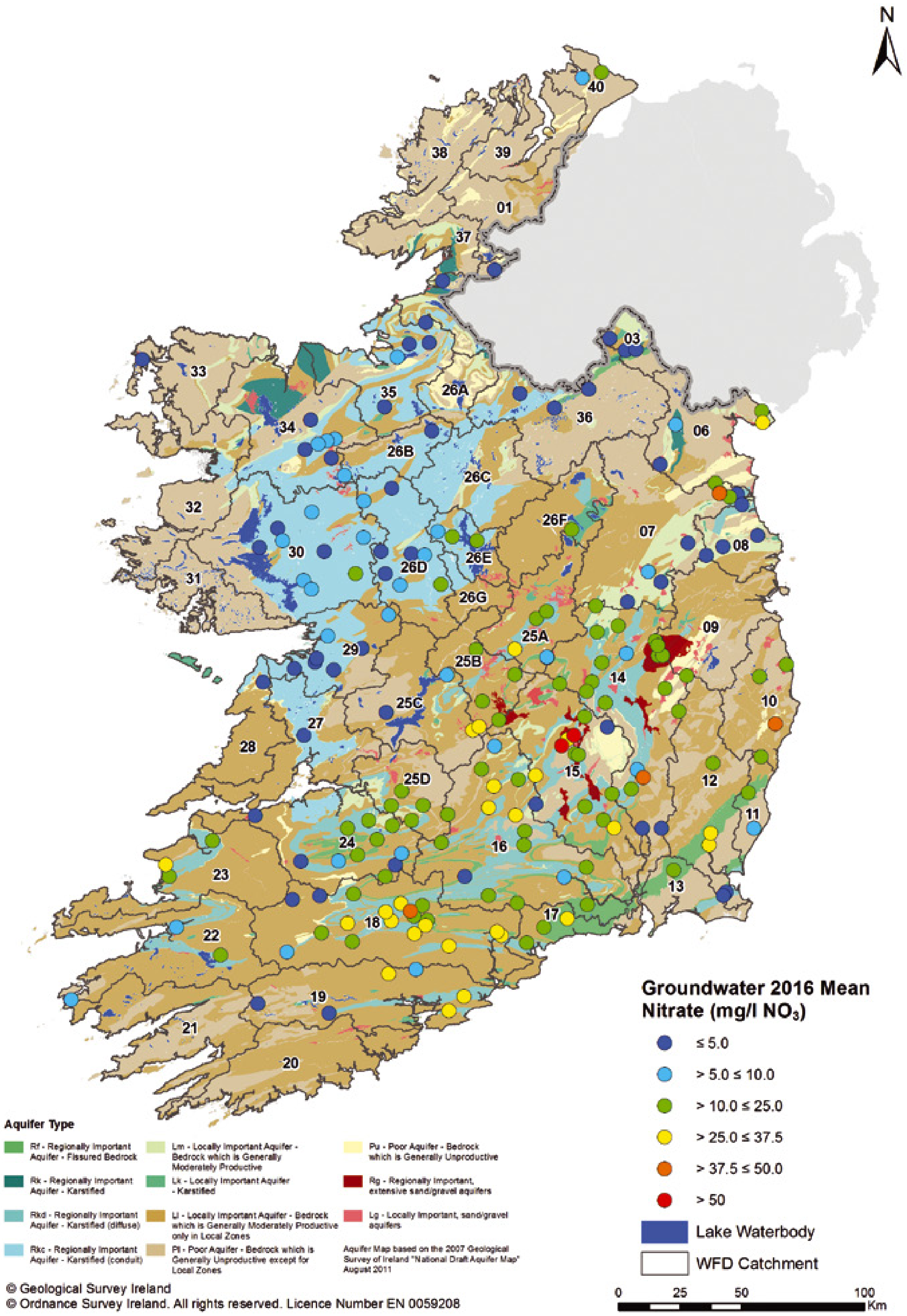
An assessment was carried out using annual average data for the 10-year period 2007 to 2016[12]. Statistically significant trends were determined for 18% of sites (Table 6). This indicated that 22 sites are improving (decreasing nitrate concentrations) and four sites are deteriorating (increasing nitrate concentrations). In terms of long-term change, none of the 35 sites with a statistically significant trend were projected to have concentrations greater than 37.5 mg/l $NO_3$ in 2027.

**Table 6:** Summary of the groundwater nitrate trend assessment for 2007 to 2016.

| Statistically significant trend | Rate of change predicted (mg/l $NO_3$ per year) | Number of sites | Percentage of total sites assessed (n = 195) |
|---|---|---|---|
| Strong Decreasing | Decreasing by more than 1 | 6 | 3 |
| Weak Decreasing | Decreasing by between 0.25 and 1 | 16 | 8 |
| No Statistical Trend | Trend not detected | 160 | 82 |
| Stable | Varying by less than ±0.25 | 9 | 5 |
| Weak Increasing | Increasing by between 0.25 and 1 | 4 | 2 |
| Strong Increasing | Increasing by more than 1 | 0 | 0 |

12 Mann–Kendall trend test to determine statistically significant trends (to 90% confidence) and Sen's trend test to determine the annual rate of change

**Map 14:** Mean nitrate concentrations in 2016 at EPA groundwater monitoring sites.




**Source:** EPA (A. Mannix), Cartography: EPA (C. Byrne).

## Indicator 14: Phosphate in Groundwater

Groundwater is an important pathway for the movement of phosphorus[13] from diffuse and small point sources to water ecosystems, particularly in catchments with thin soils or where bedrock outcrops at the surface. The Irish groundwater WFD threshold value of 0.035 mg/l P is considered when assessing the contribution of phosphorus in groundwater to surface waters. This indicator is based on the annual mean phosphorus concentrations for 195 groundwater monitoring sites.

Of the 195 groundwater sites monitored, 180 sites (92.3%) had mean phosphorus concentrations < 0.035 mg/l P in 2016. The remaining proportion (7.7%) is comparable to recent years (Figure 10), but is higher than in 2008 (5.2%) and 2009 (4.2%). In 2016, there was a 5 percentage point drop in the percentage of monitoring sites with mean concentrations <0.015 mg/l P. Five monitoring sites (2.6%) had mean concentrations > 0.050 mg/l P in 2016. The monitoring sites with phosphorus concentrations above the WFD groundwater threshold value of 0.035 mg/l P are dispersed geographically (Map 15).

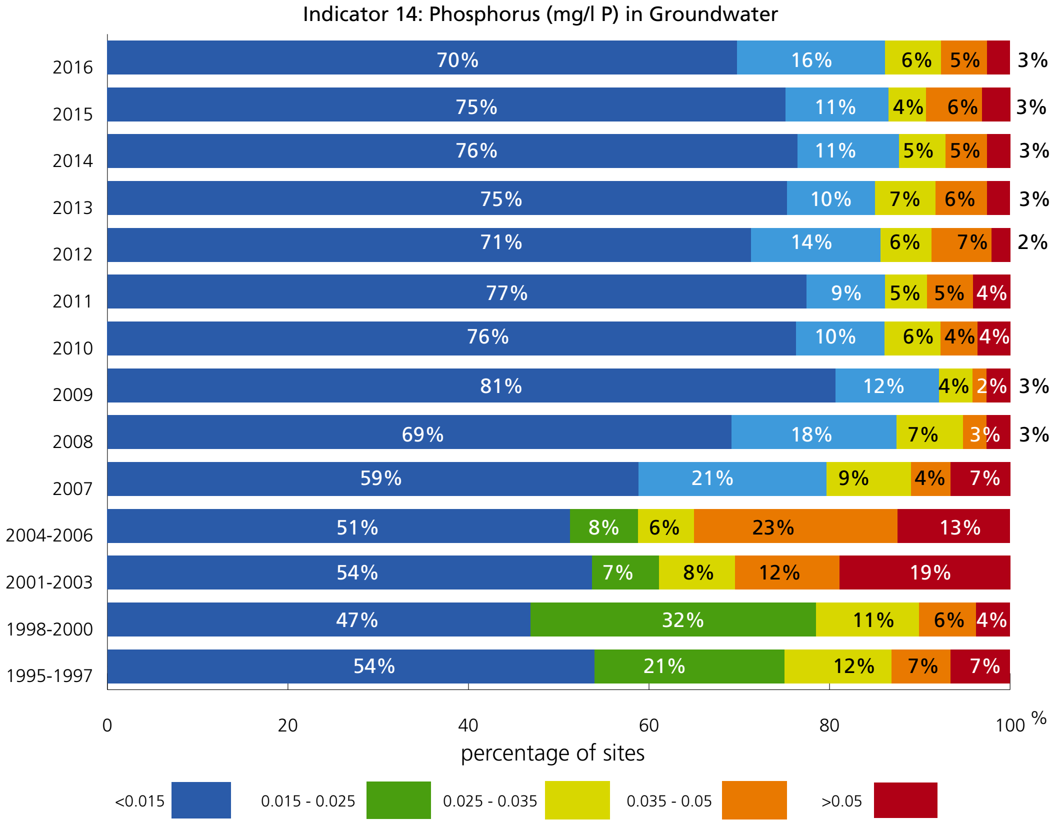



**Figure 10: Mean phosphorus concentrations at groundwater quality monitoring sites, 1995 to 2016.**

There has been a modest reduction in groundwater phosphorus concentrations since 2008, which has resulted in fewer groundwater bodies being classified as being at poor groundwater status (Figure 10). During the second WFD cycle status assessment (2009 to 2015), <1% of the area of the country was classified as being at poor groundwater status due to the contribution of phosphorus from groundwater to less than good status surface water bodies (9 groundwater bodies).

13 measured as MRP.

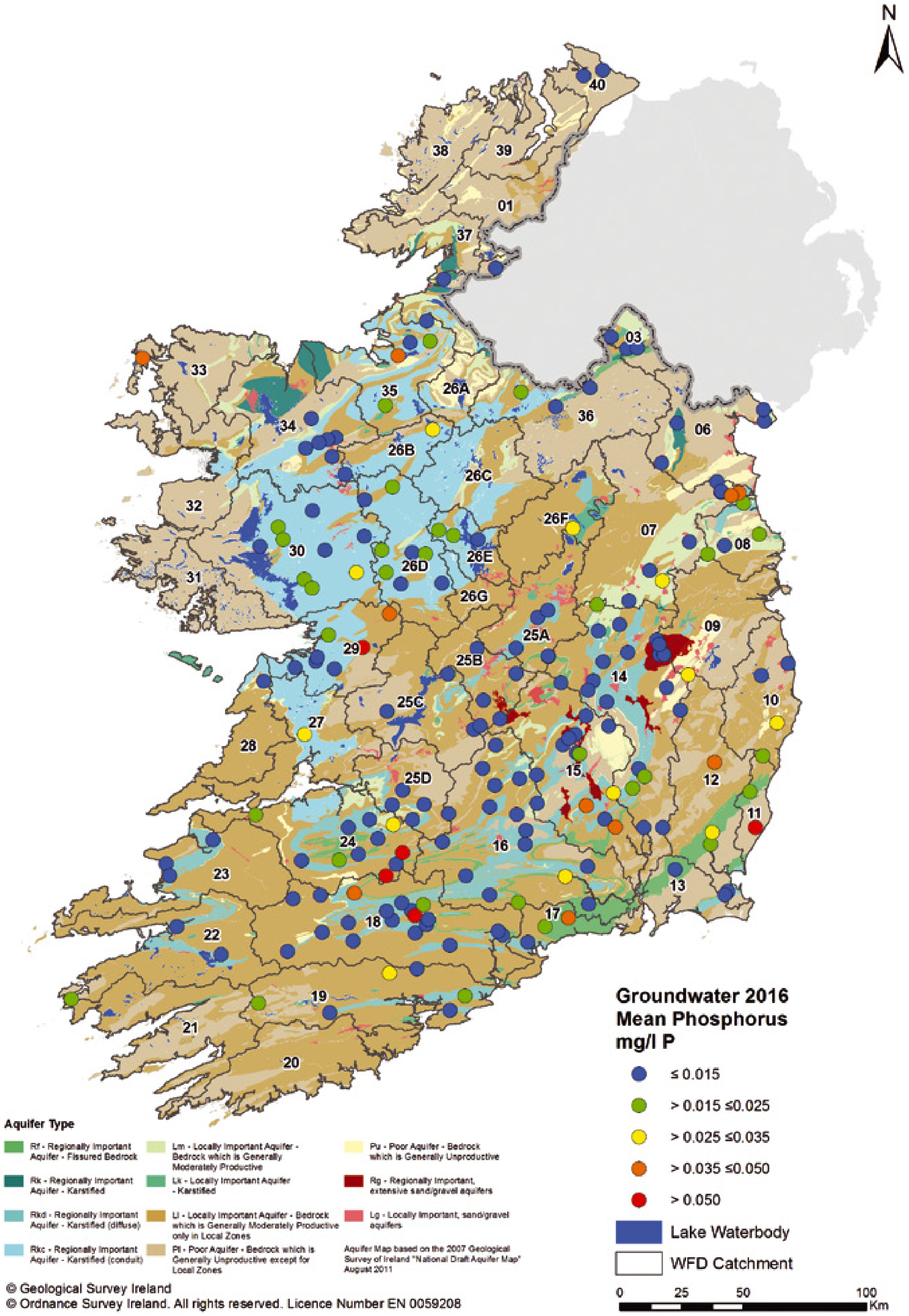
A trend assessment of 195 sites (Table 7) was carried out using annual average data for the 10-year period from 2007 to 2016[14]. No trend (77% of sites) or a stable trend (22%) was detected at the majority of sites (99%). Ten of the 45 sites with statistically significant trends were projected to have concentrations greater than 0.035 mg/l P in 2027, indicating a risk of failure to meet the requirements of the WFD.

**Table 7:** Summary of the groundwater phosphorus trend assessment for 2007 to 2016.

| Statistically significant trend | Rate of change predicted (mg/l P per year) | Number of sites | Percentage of total sites assessed (n = 195) |
|---|---|---|---|
| Strong Decreasing | Decreasing by more than 0.005 | 0 | 0% |
| Weak Decreasing | Decreasing by between 0.002 and 0.005 | 1 | 0.5% |
| No Statistical Trend | Trend not detected | 150 | 77% |
| Stable | Varying by less than ± 0.002 | 43 | 22% |
| Weak Increasing | Increasing by between 0.002 and 0.005 | 1 | 0.5% |
| Strong Increasing | Increasing by more than 0.005 | 0 | 0% |

14 Mann–Kendall trend test to determine statistically significant trends (to 90% confidence) and Sen's trend test to determine the annual rate of change.

**Map 15:** Mean phosphorus concentrations in 2016 at EPA groundwater monitoring sites.




**Source:** EPA (A. Mannix), Cartography: EPA (C. Byrne).

## Indicator 15: Bacteria in Groundwater

Escherichia coli (E. coli) is a bacterium that is often used as an indicator of faecal contamination of water. It is specific to faecal material from humans and other warm-blooded animals. Its detection is an indication of contamination of groundwater by faecal matter and that pathogens (disease-causing organisms) may be present. This contamination is generally from agriculture or septic tanks. Many private water supplies abstract from groundwater and may have limited or no treatment[15] and in these situations, the most important water supply consideration is the absence of pathogens. The drinking water regulations[16] specify a value of zero number/100 ml E. coli.

This indicator summarises the results of monitoring of the 195 national groundwater monitoring network sites for E. coli and categorises the results into five bands based on the level of contamination. Results for 2016 and previous years are given in Figure 11 for comparison purposes[17].

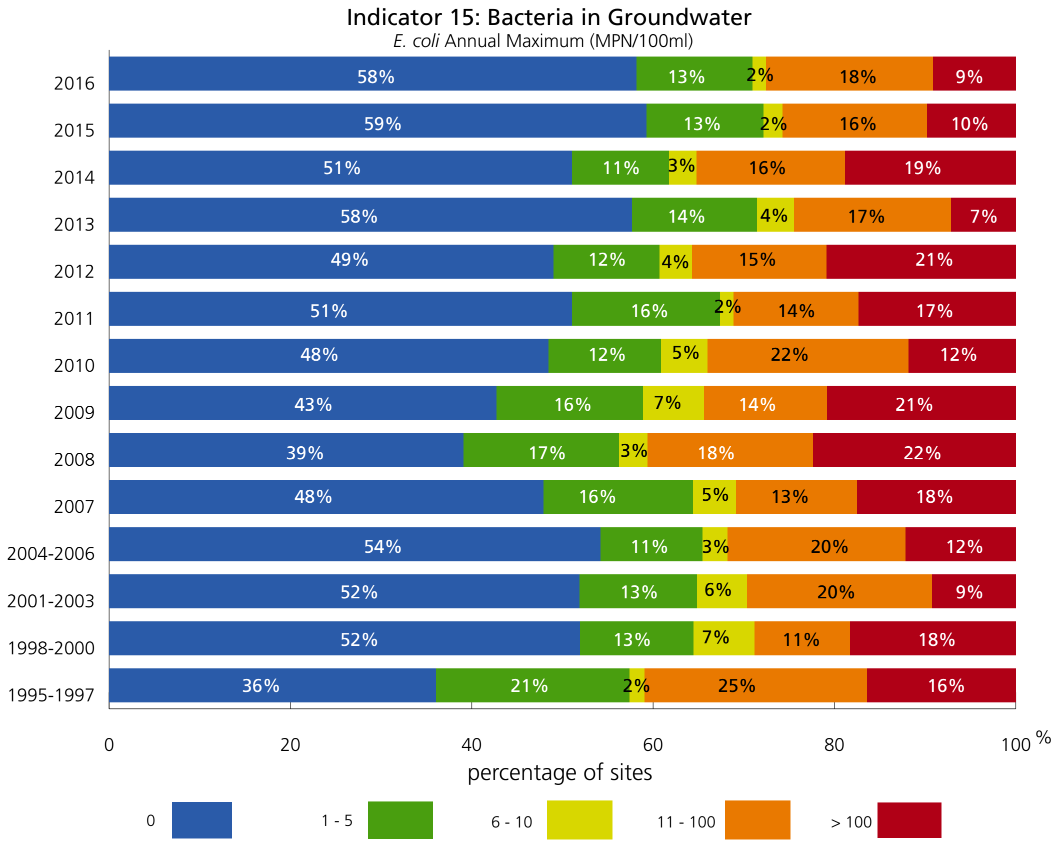



**Figure 11:** Annual maximum *E. coli* at groundwater quality monitoring sites, 1995 to 2016.

42% of the 195 groundwater monitoring sites had a sample containing one or more *E. coli* in 2016. A total of 592 samples were taken at these monitoring sites in 2016 and 188 (31.8%) of these contained one or more E. coli. The high proportion of monitoring sites with E. coli detections reflects both the presence of pressures and the vulnerable nature of groundwater in some parts of the country, e.g. areas such as the karst limestone aquifers in the west of Ireland (Map 16). These factors highlight the necessity for testing of drinking water supplies from groundwater for microbial contamination and for the provision of adequate treatment. This is particularly relevant

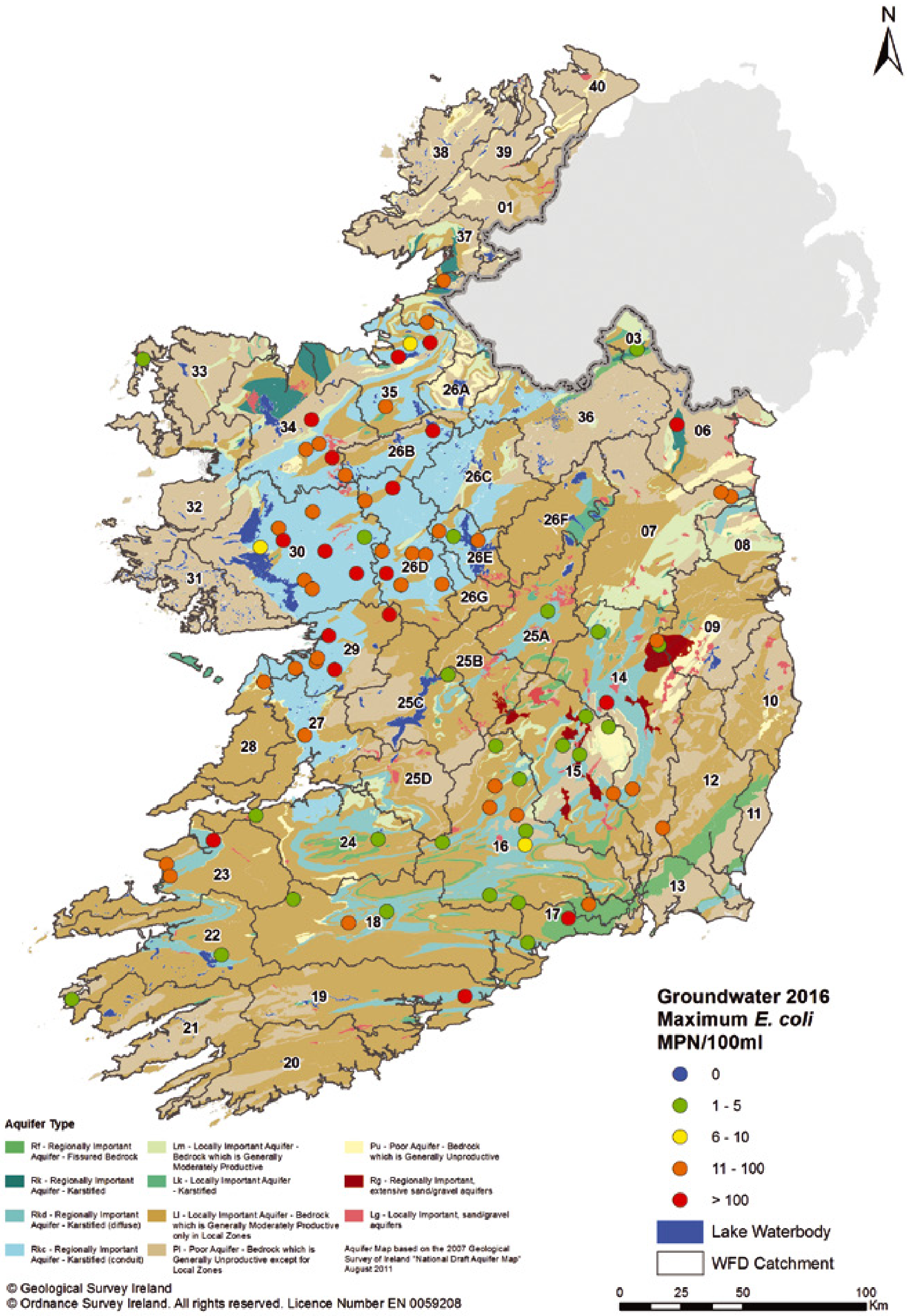
15 EPA, 2017. Focus on Private Water Supplies. *http://www.epa.ie/pubs/reports/water/drinking/Focus%20on%20Private%20SuppliesV6.pdf*

16 S.I. No. 122 of 2014 EU (Drinking Water) Regulations 2014

17 The assessment only includes monitoring sites with at least one sample in 2016. Some sample results historically have been reported as 'faecal coliforms' and these have been included as E. coli for this assessment.

for households and other private supplies which may not have treatment in place for microbial contaminants. The EPA recommends that all drinking water supplies are monitored at least once a year for E. coli, with greater frequencies required depending on the supply type.

**Map 16:** Maximum annual *E. coli* in 2016 at EPA groundwater monitoring sites.




**Source:** EPA (A. Mannix), Cartography: EPA (C. Byrne).

## Indicator 16: Bathing Water Quality

Beaches are important recreational areas that attract both residents and tourists. They are also important habitats and home to many different species. In the 1970s the European Union introduced the Bathing Water Directive, which contained rules and monitoring requirements to ensure that beaches are a safe place to bathe. A revised version of the Directive was introduced in 2006 and subsequently transposed into Irish legislation which came fully into effect in December 2014.

The Directive seeks to reduce the risk to bathers from bacterial pollution and to improve health protection by introducing stricter standards for bathing water quality and a new approach to assessment. The assessment of bathing water quality now uses the compliance monitoring data for the current and three previous bathing seasons (on a rolling basis) rather than focusing solely on the most recent bathing season. In 2017, 142 bathing waters were assessed and categorised into four categories (excellent, good, sufficient and poor) based on the level of compliance with two bacteriological standards, E. coli and intestinal Enterococci. As a minimum, all bathing waters are required to meet the 'sufficient' standard.

In 2017, the majority of bathing waters, 132 out of the 142 assessed, met the minimum required standard of sufficient quality. 120 bathing waters were classed as being either excellent or good quality, with most of these (102) being in the excellent category. Seven locations were assessed to be in poor quality (Merrion Strand, Sandymount Strand, Loughshinny, Rush South, Portrane Ballyloughane and Clifden). The public can still access and use these beaches but restrictions or prohibitions on bathing may be in place, so beach users are advised to check current restrictions and water quality, via the *Beaches.ie* website, on bathing water notice boards at the beach, or from the relevant local authority.

**93%** of bathing waters had sufficient quality

**84.5%** of bathing waters had excellent or good quality

**7** bathing waters had poor quality

Overall, bathing water quality has remained static since the new Regulations came into effect, with little change in the number of areas in excellent quality.

Further details about bathing water quality can be found in the Annual Bathing Water Report on the EPA website at : *http://www.epa.ie/pubs/reports/water/bathing/Bathing%20Water%20Quality%20in%20Ireland%20-%202017.pdf*

**Source:** Bathing Water in Ireland Report 2017. ISBN: 078-1-84095-775-4, Web only.

# AN GHNÍOMHAIREACHT UM CHAOMHNÚ COMHSHAOIL

Tá an Ghníomhaireacht um Chaomhnú Comhshaoil (GCC) freagrach as an gcomhshaol a chaomhnú agus a fheabhsú mar shócmhainn luachmhar do mhuintir na hÉireann. Táimid tiomanta do dhaoine agus don chomhshaol a chosaint ó éifeachtaí díobhálacha na radaíochta agus an truaillithe.

## Is féidir obair na Gníomhaireachta a roinnt ina trí phríomhréimse:

Rialú: *Déanaimid córais éifeachtacha rialaithe agus comhlíonta comhshaoil a chur i bhfeidhm chun torthaí maithe comhshaoil a sholáthar agus chun díriú orthu siúd nach gcloíonn leis na córais sin.*

Eolas: *Soláthraímid sonraí, faisnéis agus measúnú comhshaoil atá ar ardchaighdeán, spriocdhírithe agus tráthúil chun bonn eolais a chur faoin gcinnteoireacht ar gach leibhéal.*

*Tacaíocht: Bímid ag saothrú i gcomhar le grúpaí eile chun tacú le comhshaol atá glan, táirgiúil agus cosanta go maith, agus le hiompar a chuirfidh le comhshaol inbhuanaithe.*

## Ár bhFreagrachtaí

### Ceadúnú

- Déanaimid na gníomhaíochtaí seo a leanas a rialú ionas nach ndéanann siad dochar do shláinte an phobail ná don chomhshaol:
- saoráidí dramhaíola (*m.sh. láithreáin líonta talún, loisceoirí, stáisiúin aistrithe dramhaíola*);
- gníomhaíochtaí tionsclaíocha ar scála mór (*m.sh. déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta*);
- an diantalmhaíocht (*m.sh. muca, éanlaith*);
- úsáid shrianta agus scaoileadh rialaithe Orgánach Géinmhodhnaithe (*OGM*);
- foinsí radaíochta ianúcháin (*m.sh. trealamh x-gha agus radaiteiripe, foinsí tionsclaíocha*);
- áiseanna móra stórála peitril;
- scardadh dramhuisce;
- gníomhaíochtaí dumpála ar farraige.

### Forfheidhmiú Náisiúnta i leith Cúrsaí Comhshaoil

- Clár náisiúnta iniúchtaí agus cigireachtaí a dhéanamh gach bliain ar shaoráidí a bhfuil ceadúnas ón nGníomhaireacht acu.
- Maoirseacht a dhéanamh ar fhreagrachtaí cosanta comhshaoil na n-údarás áitiúil.
- Caighdeán an uisce óil, arna sholáthar ag soláthraithe uisce phoiblí, a mhaoirsiú.
- Obair le húdaráis áitiúla agus le gníomhaireachtaí eile chun dul i ngleic le coireanna comhshaoil trí chomhordú a dhéanamh ar líonra forfheidhmiúcháin náisiúnta, trí dhíriú ar chiontóirí, agus trí mhaoirsiú a dhéanamh ar leasúchán.
- Cur i bhfeidhm rialachán ar nós na Rialachán um Dhramhthrealamh Leictreach agus Leictreonach (DTLL), um Shrian ar Shubstaintí Guaiseacha agus na Rialachán um rialú ar shubstaintí a ídíonn an ciseal ózóin.
- An dlí a chur orthu siúd a bhriseann dlí an chomhshaoil agus a dhéanann dochar don chomhshaol.

### Bainistíocht Uisce

- Monatóireacht agus tuairisciú a dhéanamh ar cháilíocht aibhneacha, lochanna, uiscí idirchriosacha agus cósta na hÉireann, agus screamhuiscí; leibhéil uisce agus sruthanna aibhneacha a thomhas.
- Comhordú náisiúnta agus maoirsiú a dhéanamh ar an gCreat-Treoir Uisce.
- Monatóireacht agus tuairisciú a dhéanamh ar Cháilíocht an Uisce Snámha.

### Monatóireacht, Anailís agus Tuairisciú ar an gComhshaol

- Monatóireacht a dhéanamh ar cháilíocht an aeir agus Treoir an AE maidir le hAer Glan don Eoraip (CAFÉ) a chur chun feidhme.
- Tuairisciú neamhspleách le cabhrú le cinnteoireacht an rialtais náisiúnta agus na n-údarás áitiúil (*m.sh. tuairisciú tréimhsiúil ar staid Chomhshaol na hÉireann agus Tuarascálacha ar Tháscairí*).

### Rialú Astaíochtaí na nGás Ceaptha Teasa in Éirinn

- Fardail agus réamh-mheastacháin na hÉireann maidir le gáis cheaptha teasa a ullmhú.
- An Treoir maidir le Trádáil Astaíochtaí a chur chun feidhme i gcomhair breis agus 100 de na táirgeoirí dé-ocsaíde carbóin is mó in Éirinn

### Taighde agus Forbairt Comhshaoil

- Taighde comhshaoil a chistiú chun brúnna a shainaithint, bonn eolais a chur faoi bheartais, agus réitigh a sholáthar i réimsí na haeráide, an uisce agus na hinbhuanaitheachta.

### Measúnacht Straitéiseach Timpeallachta

- Measúnacht a dhéanamh ar thionchar pleananna agus clár beartaithe ar an gcomhshaol in Éirinn (*m.sh. mórphleananna forbartha*).

### Cosaint Raideolaíoch

- Monatóireacht a dhéanamh ar leibhéil radaíochta, measúnacht a dhéanamh ar nochtadh mhuintir na hÉireann don radaíocht ianúcháin.
- Cabhrú le pleananna náisiúnta a fhorbairt le haghaidh éigeandálaí ag eascairt as taismí núicléacha.
- Monatóireacht a dhéanamh ar fhorbairtí thar lear a bhaineann le saoráidí núicléacha agus leis an tsábháilteacht raideolaíochta.
- Sainseirbhísí cosanta ar an radaíocht a sholáthar, nó maoirsiú a dhéanamh ar sholáthar na seirbhísí sin.

### Treoir, Faisnéis Inrochtana agus Oideachas

- Comhairle agus treoir a chur ar fáil d'earnáil na tionsclaíochta agus don phobal maidir le hábhair a bhaineann le caomhnú an chomhshaoil agus leis an gcosaint raideolaíoch.
- Faisnéis thráthúil ar an gcomhshaol ar a bhfuil fáil éasca a chur ar fáil chun rannpháirtíocht an phobail a spreagadh sa chinnteoireacht i ndáil leis an gcomhshaol (*m.sh. Timpeall an Tí, léarscáileanna radóin*).
- Comhairle a chur ar fáil don Rialtas maidir le hábhair a bhaineann leis an tsábháilteacht raideolaíoch agus le cúrsaí práinnfhreagartha.
- Plean Náisiúnta Bainistíochta Dramhaíola Guaisí a fhorbairt chun dramhaíl ghuaiseach a chosc agus a bhainistiú.

### Múscailt Feasachta agus Athrú Iompraíochta

- Feasacht chomhshaoil níos fearr a ghiniúint agus dul i bhfeidhm ar athrú iompraíochta dearfach trí thacú le gnóthais, le pobail agus le teaghlaigh a bheith níos éifeachtúla ar acmhainní.
- Tástáil le haghaidh radóin a chur chun cinn i dtithe agus in ionaid oibre, agus gníomhartha leasúcháin a spreagadh nuair is gá.

### Bainistíocht agus struchtúr na Gníomhaireachta um Chaomhnú Comhshaoil

Tá an ghníomhaíocht á bainistiú ag Bord lánaimseartha, ar a bhfuil Ard-Stiúrthóir agus cúigear Stiúrthóirí. Déantar an obair ar fud cúig cinn d'Oifigí:

- An Oifig um Inmharthanacht Comhshaoil
- An Oifig Forfheidhmithe i leith cúrsaí Comhshaoil
- An Oifig um Fianaise is Measúnú
- Oifig um Chosaint Radaíochta agus Monatóireachta Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáideacha

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag comhaltaí air agus tagann siad le chéile go rialta le plé a dhéanamh ar ábhair imní agus le comhairle a chur ar an mBord.

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An Ghníomhaireacht um Chaomhnú Comhshaoil

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