

# Chapter 8: Water





# Water

## 1. Introduction

Water is essential to life. Our rivers, lakes, estuaries, coastal waters and groundwaters sustain our livelihoods, food production and industries, support our tourism and recreational activities, and are an integral part of our culture and heritage. As well as being critically important to humans, water is just as essential for the many species that call Ireland's waters home. From the tiniest river insects to kingfishers and otters, these creatures rely on clean water and healthy aquatic habitats for their survival.

This precious resource is under threat from a range of human activities that cause pollution and damage to our waters and its habitats, and from climate change. The freshwater pearl mussel, Ireland's longest living animal, which depends on clean water, is facing extinction. By safeguarding our waters, we can also protect the delicate ecosystems that rely on them, allowing them to build resilience and adapt to the effects of climate change.

The European Union (EU) Water Framework Directive (WFD; 2000/60/EC) and our national water policy aim to protect clean waters and restore degraded waters. However, despite these efforts, Ireland's water quality is not as good as it should be.

The Environmental Protection Agency's latest water quality reports (EPA, 2022, 2023a, 2024a) show that water quality is not as good as it should be and that any improvements made in recent years are being offset by declines elsewhere. Overall, the proportion of waters in satisfactory condition has decreased since assessments under the WFD began in 2007.

We must protect and maintain the health of our waters. Without clean and healthy waters, we cannot hope to sustain a vibrant society or a thriving aquatic environment with diverse species and habitats.

This chapter sets out the current state of our groundwaters, rivers, lakes, estuaries, lagoons and nearshore coastal waters. It looks at the pressures affecting water quality and quantity. It examines the responses that are in place and planned to address water pollution. Issues that affect the marine environment are reviewed in Chapter 9. Habitat quality and species diversity in surface waters are discussed in Chapter 7, and some key water and health issues (drinking water, bathing water, shellfish waters, waste waters, algal blooms and hazardous chemical substances) are considered in Chapter 14.

## 2. Current situation

Ireland has an extensive water quality monitoring programme, undertaken by the EPA, local authorities, Inland Fisheries Ireland, Waterways Ireland and the Marine Institute. The EPA classifies and reports on the quality of surface waters (rivers, lakes, estuaries and coastal waters) and groundwaters every 3 years under the approach set out in the WFD (Figure 8.1). Surface waters are classified as being in high, good, moderate, poor or bad ecological status. Groundwaters are classed as good or poor.

The overall aim for water quality, as required by the WFD, is to achieve good or high ecological status and good chemical status in all water bodies. Waters in high and good ecological status show only minor or slight changes from natural conditions and represent healthy and diverse ecosystems. We are required to protect these from deterioration.

Waters in less than good status (moderate, poor or bad) range from moderately to severely damaged by pollution or habitat degradation. We need to restore these.

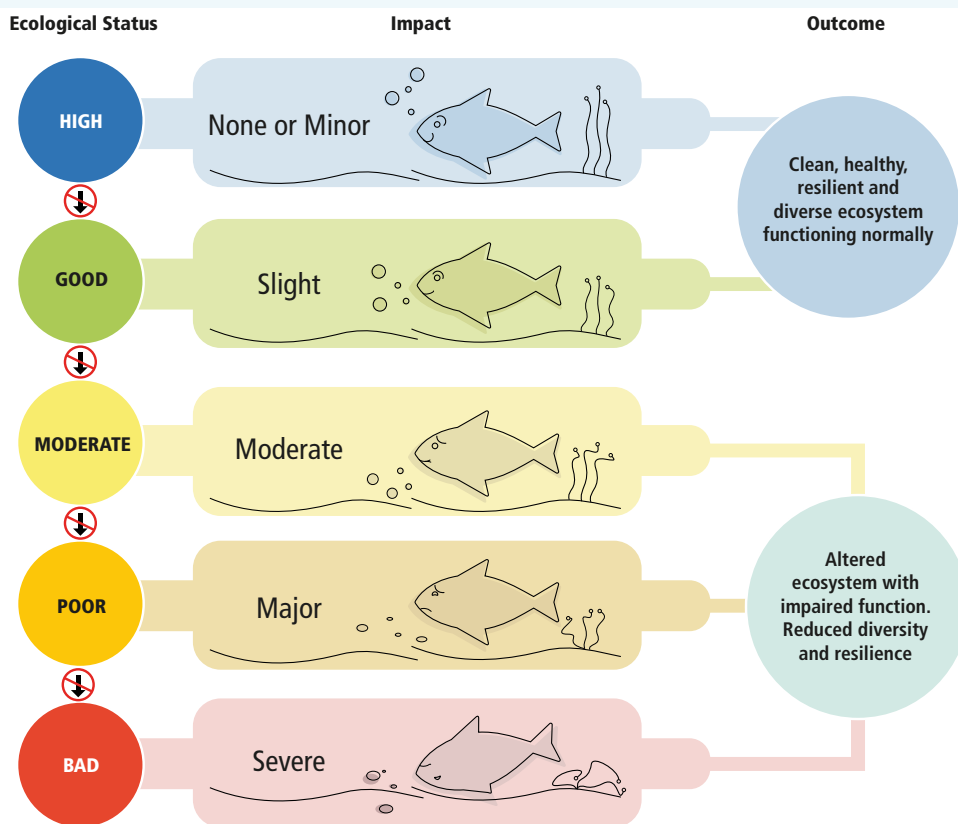


Finny River, Co. Mayo





Figure 8.1 The five ecological status classes of surface waters and the associated environmental impacts



Source: EPA, 2022

### Surface waters

Nearly half (46%) (EPA, 2022) of our surface waters are not ecologically healthy, and this is primarily due to human activities. Agriculture, damage to hydromorphology (see Topic Box 8.1), commercial conifer forestry plantations and poorly treated sewage are the most significant pressures on Ireland’s aquatic environment.

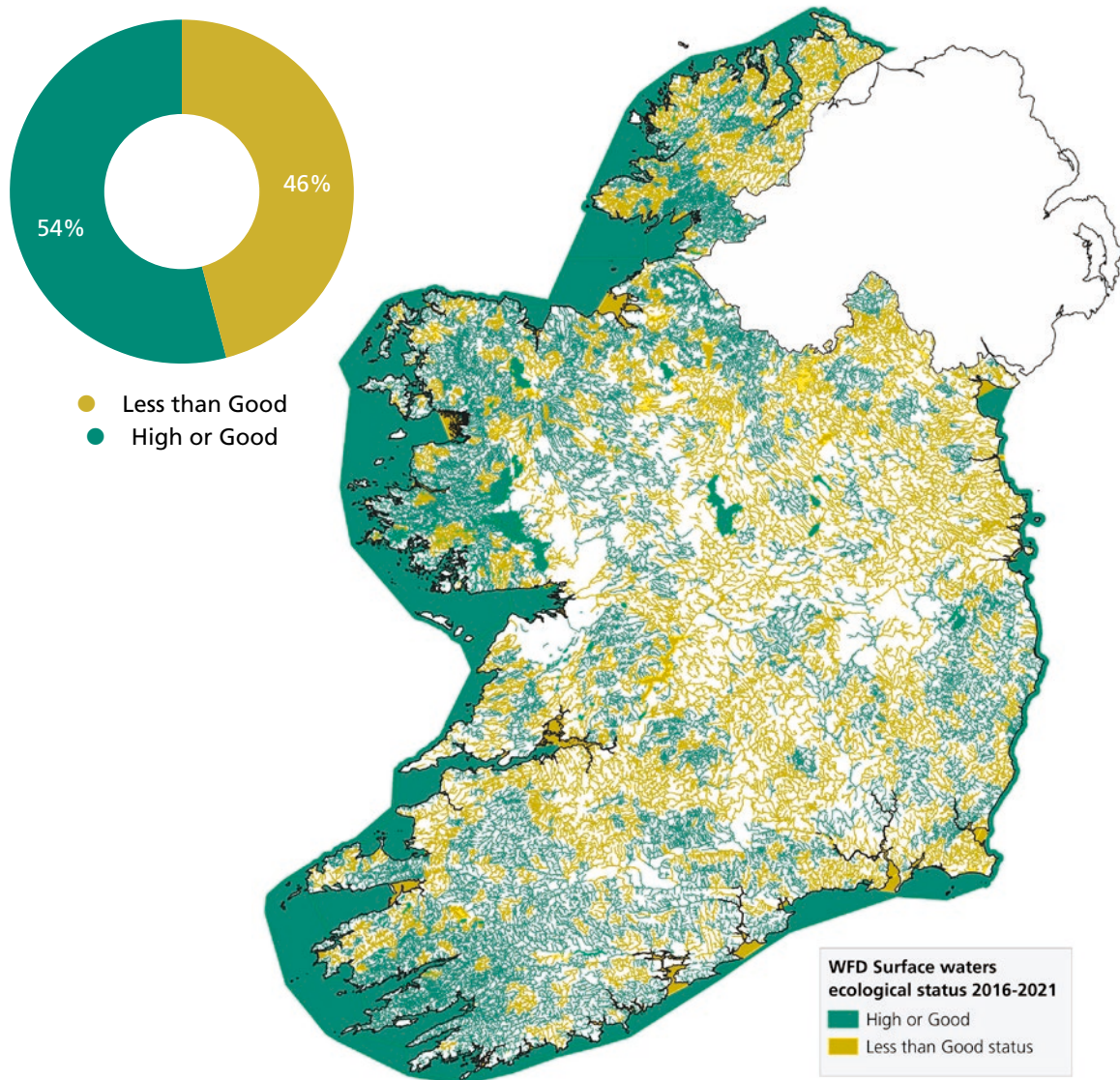
The EPA undertakes a full assessment of the overall quality and ecological status of Ireland’s waters every 3 years and reports on the indicators of water quality in the intervening years.

The data and evidence in this report are based on the most recent full assessment of the status of Ireland’s surface waters (EPA, 2022) (Figure 8.2) and updated indicators data from 2022 (EPA, 2023a) and 2023 (EPA, 2024a).





**Figure 8.2** Surface water ecological status, 2016–2021



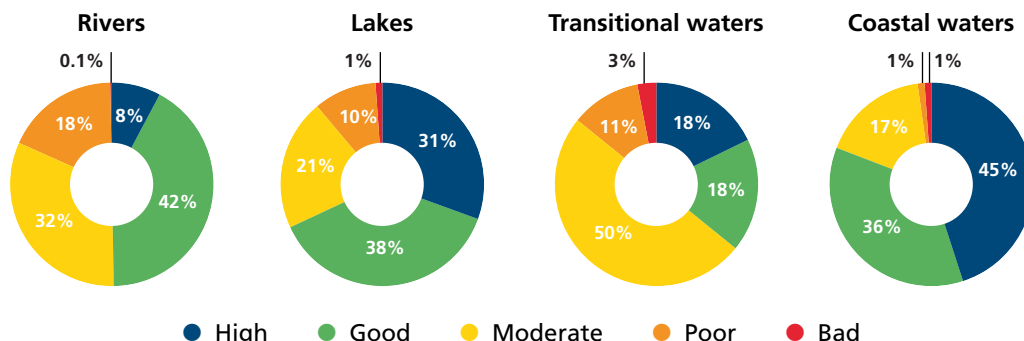
Source: EPA, 2022

Coastal waters have the highest percentage of waters in high or good ecological status (81%) followed by lakes (69%), rivers (50%) and transitional waters (estuaries and lagoons) (36%), which have the poorest water quality (Figure 8.3).

Half of the surface waters monitored in the period 2016–2021 failed to achieve good chemical status due to the exceedance of environment quality thresholds for at least one hazardous chemical substance (Figure 8.4). However, when ubiquitous substances (chemicals widespread in the aquatic environment, such as mercury) are excluded from the assessment, 88% of water bodies are in good chemical status.

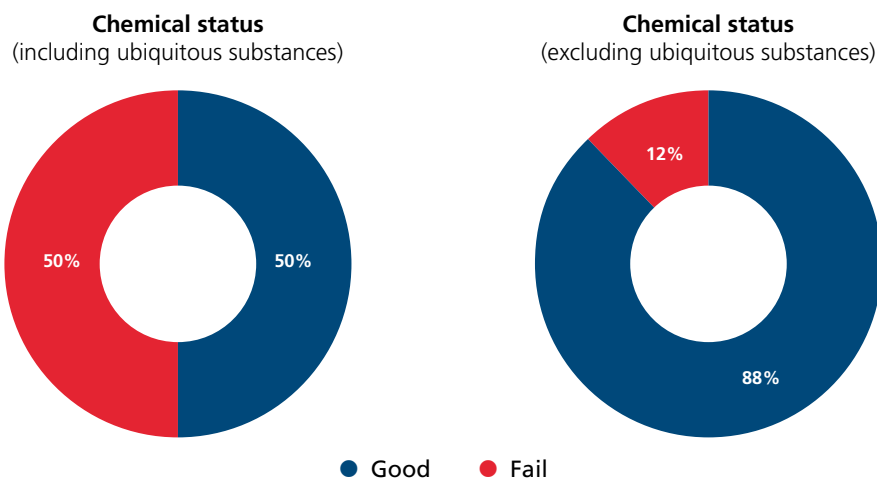


Figure 8.3 Percentage of waters in each ecological status by surface water body category, 2016–2021



Source: EPA, 2022

Figure 8.4 Proportion of monitored surface water bodies achieving or failing to achieve good chemical status, 2016–2021



Source: EPA, 2022

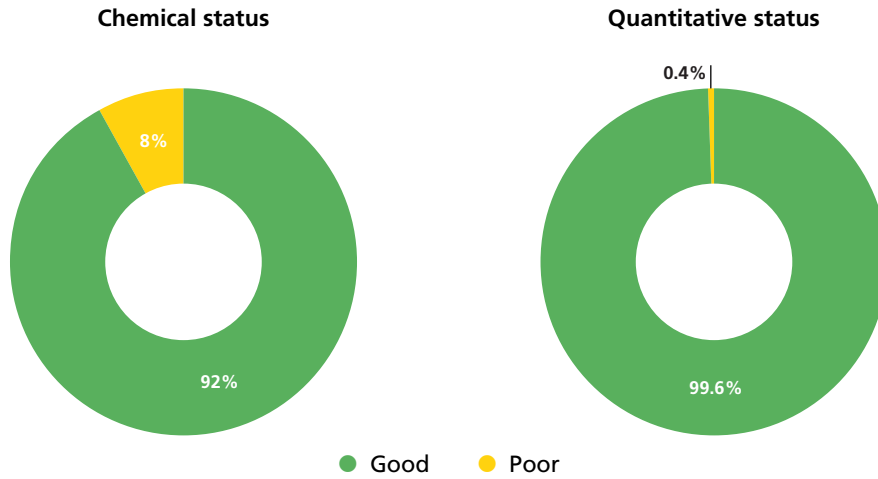
**High status objective water bodies.** Waters that are in high status are our cleanest and healthiest waters. They are significant biodiversity reservoirs and increase the resilience of our ecosystems to environmental damage. In some areas, we depend on these highest quality waters to increase the aquatic biodiversity in the more degraded areas downstream when water quality has improved. The protection and restoration of high status objective water bodies is therefore an important water quality objective.

In Ireland, 334 rivers, 41 lakes and 27 transitional and coastal water bodies have a high status objective, commonly known as Blue Dot waters. Of these 402 high status objective water bodies, only 175 are currently in high status. This represents a failure to protect our most pristine water bodies over the last 20 years. These water bodies need to be protected and, where necessary, restored.

**Groundwaters.** With a few localised exceptions, the quality and quantity of groundwater in Ireland is generally good (Figure 8.5): 92% of groundwater bodies are in good chemical status and over 99% are in good quantitative status. Overall, 91% of bodies met both objectives, accounting for 97% of the country by area (69,519 km<sup>2</sup>).



**Figure 8.5** Chemical and quantitative status of groundwaters, 2016-2021



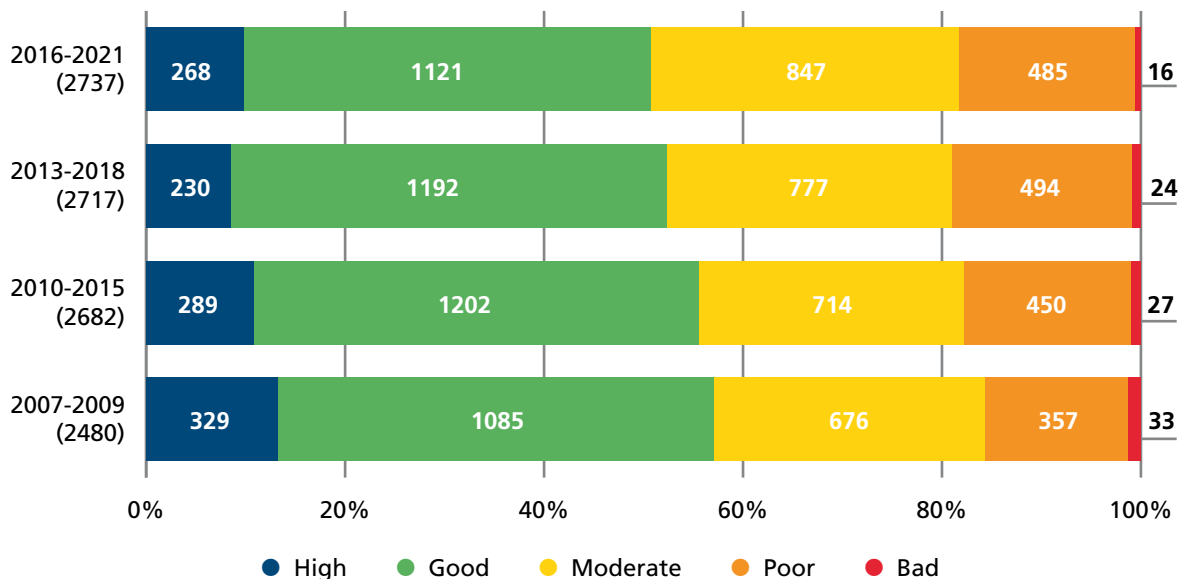
Source: EPA, 2022

### Changes and trends in water quality

Water quality has been monitored in Ireland since the 1970s. The WFD came into effect in 2001 and the baseline year for assessment is the 2007–2009 monitoring period. Despite two cycles of river basin management planning, successive EPA reports show that, while progress has been made in reducing the number of the worst-polluted ‘bad’ sites, the percentage of sites in

satisfactory condition (good or high status) has declined since then. The most recent full EPA assessment (EPA, 2022) reported further declines in all water categories, most significantly in the quality of our estuaries (15.7%) and coastal waters (9.5%). The declines were associated with increased nitrogen losses to the marine environment, particularly in the south and south-east of the country (Figure 8.6).

**Figure 8.6** Ecological status of monitored surface water bodies (including rivers, lakes, estuaries and coastal waters) in each of the main assessment periods, from the first assessment in 2007–2009 to the most recent assessment period (2016–2021)



Source: EPA, 2022





Point source discharge

### 3. What is the problem? Significant pressures and issues

A range of human activities put pressure on water quality. The EPA assesses what the particular issue is and identifies what and where the pressures are that are affecting water quality.<sup>1</sup> Water bodies that are in danger of not meeting their environmental objectives, based on the water monitoring data, are categorised as 'at risk'. In total, 1649 water bodies (34%) are at risk of not meeting their environmental objectives by 2027. The top four significant pressures impacting at-risk water bodies are as follows.

1. **Agriculture** (impacting 1023 water bodies). The main issue associated with agriculture is the loss of excess nutrients (primarily nitrogen and phosphorus) from farming activities, both in the yard and across the farm. This is often accompanied by the loss of fine sediment, which is another important issue. Hazardous chemicals such as those found in pesticides and animal health products can also have an impact on water quality.
2. **Activities that damage hydromorphology** (impacting 448 water bodies). Changes to flow and physical habitat can damage the ecology and change the natural function and processes of water bodies. Hydromorphological alterations are associated with land and stream drainage (largely for agriculture or forestry), channelisation (largely driven by arterial drainage schemes, flood protection work and navigational dredging) and urban areas. See Topic Box 8.1 for more information.

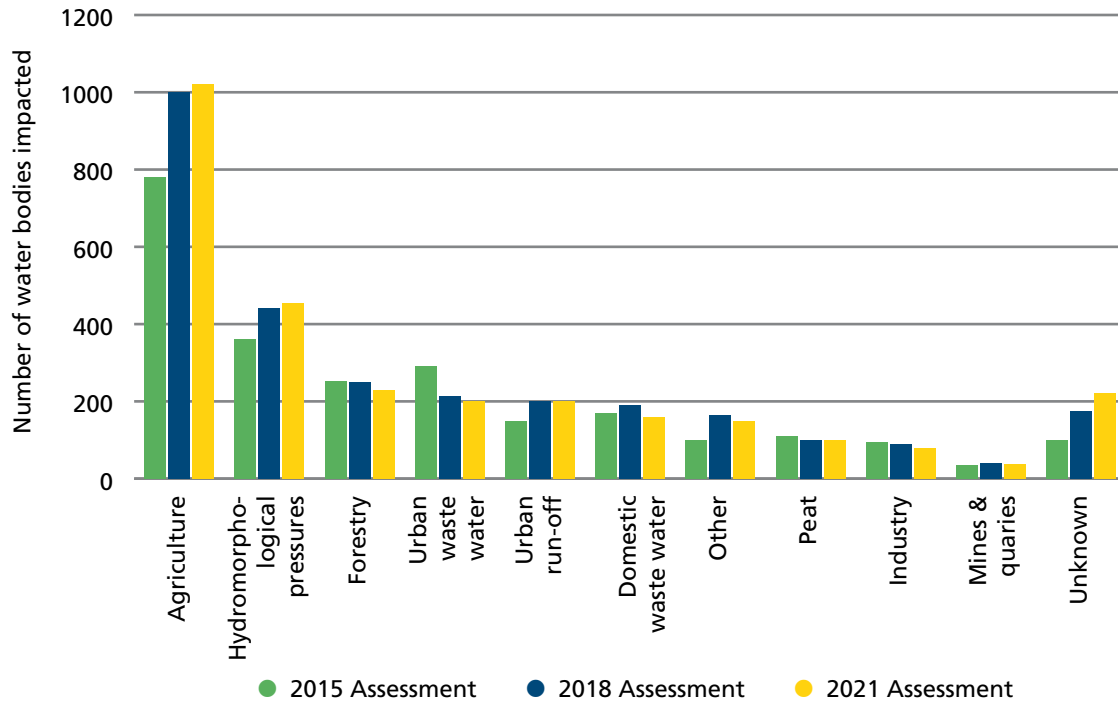
3. **Forestry** (impacting 216 water bodies). Activities such as afforestation, forest road works, thinning, clear-felling and reforestation can cause the release of sediment, nutrients and pesticides to water bodies and can impact habitat conditions. The available evidence shows that water quality decline caused by commercial forestry activities can be substantial, dropping by two or sometimes three status classes. However, water bodies can recover within a few years and can remain in very good condition when the forests are stable between harvesting events. Much of this pressure arises from inappropriate historical afforestation practices, which included the planting of commercial conifers on peat soils, often in sensitive uplands and without water setback distances in place.
4. **Urban waste water** (impacting 197 water bodies). The main issues arising from urban waste water are the release of nutrients (nitrogen and phosphorus), organic pollution and the release of pathogens from poorly or untreated sewage that pose a risk to human health.

Figure 8.7 shows the changes in the numbers of water bodies impacted by each pressure based on the three most recent assessments. The biggest change has been in the number of water bodies impacted by agriculture – an increase of over 200. The number of water bodies impacted by waste water is decreasing as investment increases and upgrading treatment plants progresses.

<sup>1</sup> [www.epa.ie/publications/monitoring--assessment/freshwater--marine/update-on-pressures-impacting-on-water-quality.php](http://www.epa.ie/publications/monitoring--assessment/freshwater--marine/update-on-pressures-impacting-on-water-quality.php) (accessed 21 June 2024).



**Figure 8.7** Number of at-risk water bodies impacted by pressures affecting their ecological status in 2015, 2018 and 2021



Source: EPA, 2022

**Topic Box 8.1** Examples of damage to river hydromorphology



**Dredging** damages the riverbed and vegetation growing in the channel and on the bankside and can be detrimental to wildlife, such as fish, living in the water.

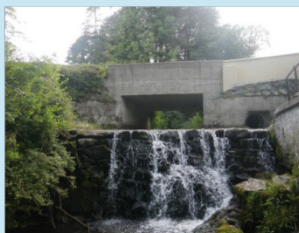


**Poaching** by livestock can cause damage to riverbanks and release sediment that can clog up fish spawning beds.





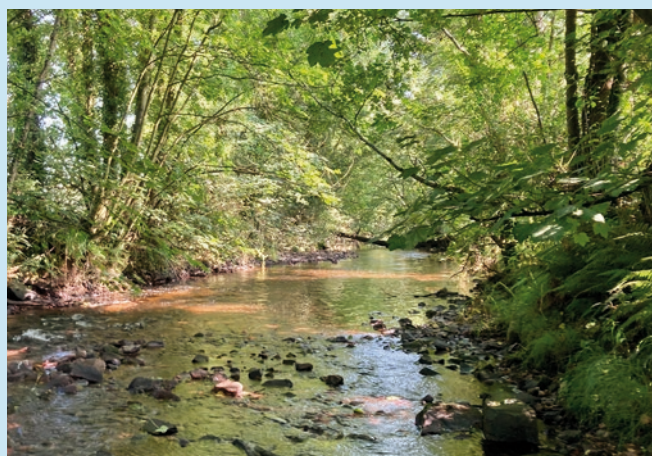
**Topic Box 8.1** Examples of damage to river hydromorphology (continued)



**Barriers** impede the movement of water, sediment and fish, such as salmon, and alter the natural flow of a river.



**Hard engineering works** on rivers permanently damage the habitat, reduce shade, and can give invasive species an advantage.



**Healthy riverine hydromorphology** means rich and mature riparian zones, no barriers, a clean riverbed with a natural flow, and a healthy ecology.

## Nutrient pollution

The most significant issue affecting water bodies at risk of not meeting their environmental objective is nutrient pollution. When phosphorus or nitrogen<sup>2</sup> enter waterways they can cause excessive growth of plants and algae. This overgrowth can clog up those waterways and lead to oxygen loss from the water, which harms the ecology. Monitoring data show that recovery can occur relatively quickly when the nutrient sources are removed and when there are good water quality areas upstream for restoring the aquatic wildlife.

Nitrogen pollution is caused mainly by agricultural activities. Phosphorous pollution comes from both agricultural losses and urban waste water. While increased concentrations of both phosphorus and nitrogen can lead to eutrophication, the presence of excess phosphorus is of particular concern for the ecological health of our rivers and lakes. Elevated levels of nitrogen are more of a concern for our estuaries. High nitrate concentrations in some drinking water supplies can pose a risk to human health.

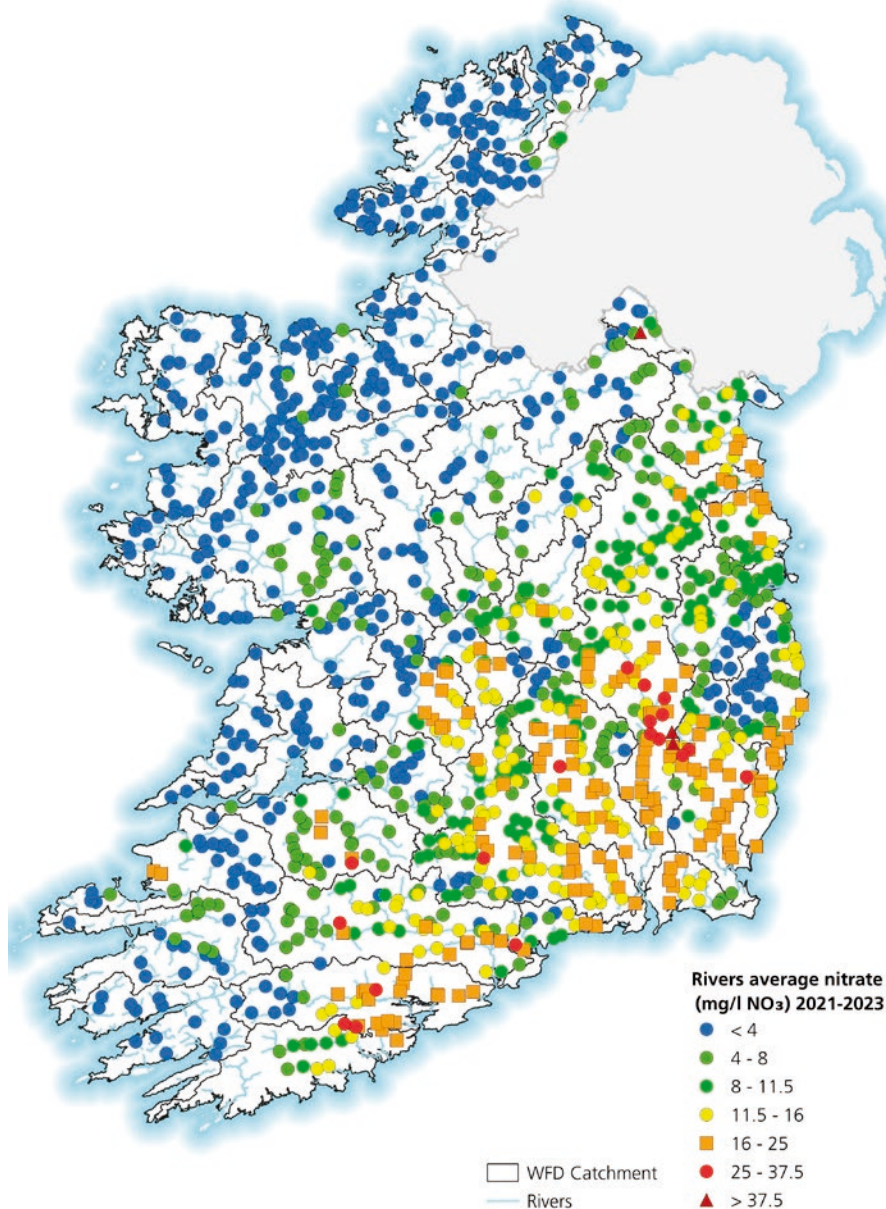
2 Different terms, such as phosphate and nitrate, can be used for phosphorus and nitrogen depending on analysis and reporting requirements.



As well as through direct discharges, nutrients can find different pathways into our waters depending on the landscape and soil type. Nitrogen tends to move down through freely draining soils until it meets the water table. From there, it makes its way horizontally underground in groundwater until it reaches a watercourse and eventually the downstream estuary. Phosphorus tends to move overland, carried by run-off on wet and heavy soils.

**Nitrogen.** Nitrate concentrations are too high in 42% of river sites and 17% of estuarine and coastal water bodies (EPA, 2024a). This excess nitrate is damaging the ecological health of many of our estuaries and nearshore coastal waters. In particular, nitrate concentrations are too high in the south-east and southern region of Ireland (Figure 8.8). Annual average nitrate concentrations generally increased in these areas from about 2013 and peaked in 2018/2019, following a combination of excess nitrogen use and a drought year. There have been year-on-year fluctuations since 2020 but no real improvement overall. Concentrations remain too high, especially in the east, south-east and south.

**Figure 8.8** Average river nitrate concentrations, 2021–2023



Source: EPA, 2024a

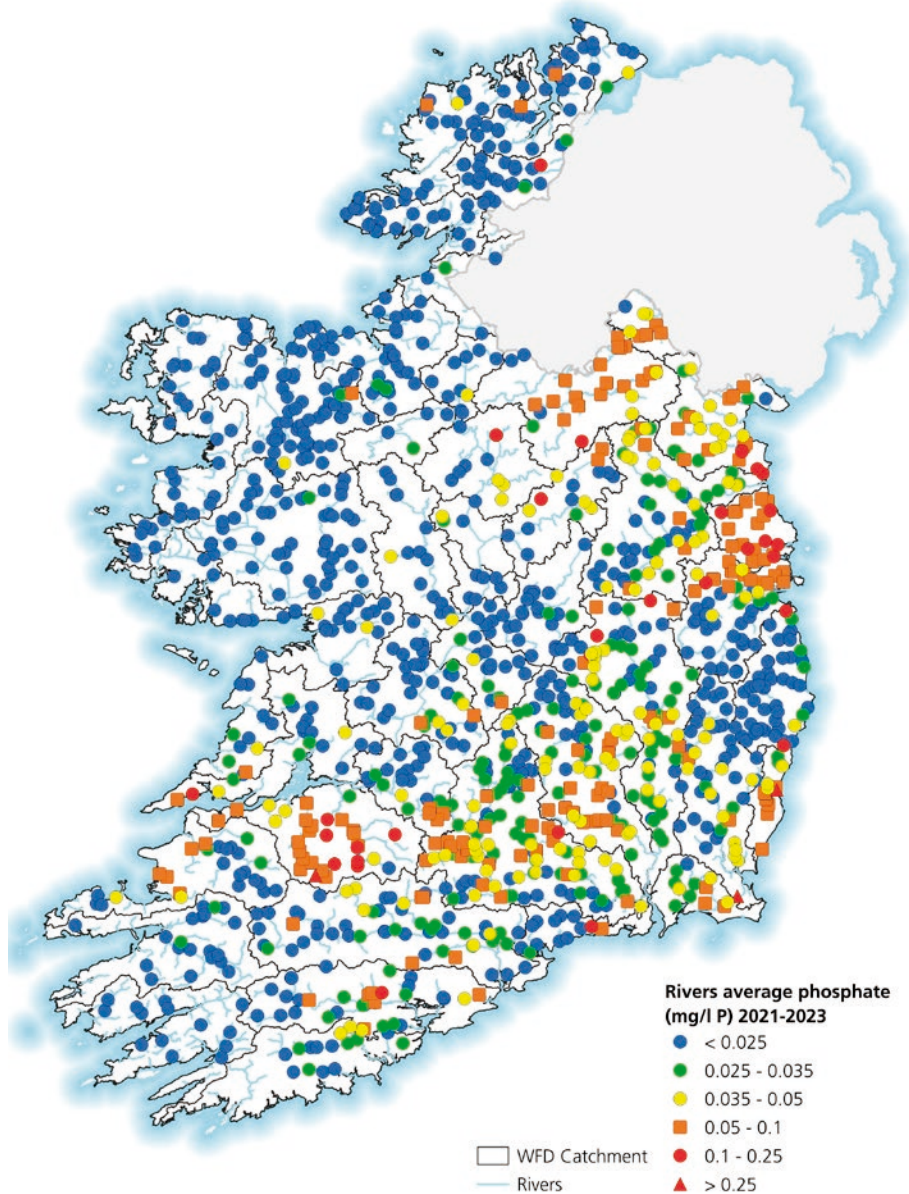




**Phosphorus.** Phosphorous concentrations are too high in 27% of rivers and 35% of lakes (EPA, 2024a), and this is having an impact on their ecology. Elevated phosphorous concentrations are associated with areas of poorly draining soil, for example in Limerick, Monaghan and Meath (Figure 8.9). Lakes in Cavan and Monaghan have the highest total phosphorous concentrations. Phosphate levels in rivers and lakes fluctuate from year to year but have generally been stable in recent years.

**Nutrient loadings to the marine environment.** Loads of nitrogen and phosphorus discharged to the marine environment from our rivers have increased since the 2012–2014 period (EPA, 2024a), placing continued pressure on the ecology of our marine water bodies. The EPA reported notable declines in the ecological status of estuaries and coastal waters in 2022 (EPA, 2022), particularly along the southern seaboard. These declines are attributed to increasing nutrient concentrations as a result of agricultural losses.

Figure 8.9 Average river phosphate concentrations, 2021-2023



Source: EPA, 2024a





## Hydromorphology

Damage to the hydromorphology of our waters is the second most prevalent of the significant issues affecting water quality in Ireland. A significant proportion of our water bodies is being damaged by activities that impact their physical condition, flow and habitat. These changes, referred to as alterations to the hydromorphology, are most common in our rivers and estuaries.

The most common types of activities causing hydromorphological damage in Ireland include:

- channelisation (straightening river channels), drainage and dredging of the waterway
- land drainage works associated with farming and forestry
- hard engineering works on the banks and beds of rivers, lakes and marine waters
- barriers, impoundments and weirs
- abstraction of water for drinking water, farming and industry
- overgrazing, poaching by livestock and removal of riparian vegetation.

The changes to hydromorphology can impact the entire ecosystem by removing suitable habitat and clogging the spawning beds of fish. Removal of riparian vegetation such as trees can create pathways for pollutants to make their way over land and into watercourses, and reduce shade and food sources for aquatic wildlife. Over-widening of channels can lead to shallower water levels and may result in the overheating of streams and rivers, a risk that is increasing with climate change.

Barriers, impoundments and weirs affect the free passage of water and sediment, and can prevent migratory species, such as salmon, lamprey and eel, from accessing their natural spawning grounds and successfully completing their life cycles.

Significant water abstraction and land drainage can alter natural flow conditions and lake levels. A reduced flow of water and increased sedimentation can negatively impact species, such as the mayfly and freshwater pearl mussel, that need clean, flowing, oxygen-rich water.

## Hazardous chemical substances

Certain hazardous chemicals that are widespread in the aquatic environment can cause harm to aquatic organisms and pose a risk to drinking water supplies (see also Chapter 14). These substances are monitored and assessed against environmental quality standards, which have been set at levels to protect the most sensitive aquatic organisms and public health.

Of the 349 rivers, lakes and estuaries monitored by the EPA between 2016 and 2021, half had concentrations of one or more chemical substances higher than the relevant environmental quality standard (EPA 2022). Three substances, mercury, polycyclic aromatic hydrocarbons (PAHs) and polybrominated diphenyl ethers (PBDEs), accounted for 83% of the exceedances. Mercury is naturally occurring and is emitted globally from volcanoes and the burning of coal. PAHs are produced from the burning of fossil fuels. Both mercury and PAHs find their way into water bodies via atmospheric deposition (rainfall). PBDEs are a group of substances used as flame retardants in the manufacture of household goods and clothing. PBDEs enter water bodies via industrial and municipal waste waters. All three of these substances are bioaccumulative (they can build up in animals or fish), persistent (stable for a long time) and toxic to aquatic and human health.

In recent years, other substances of emerging concern have been detected in Irish waters. Per- and polyfluoroalkyl substances (PFASs) are widely used in the manufacture of stain-resistant clothes and household products and in industrial processes and firefighting foams. They enter water bodies via waste waters and leakage from contaminated sites. PFASs have been detected in rivers and estuaries (EPA, 2022), and PFAS contamination has been identified at sites associated with the use of firefighting foams.<sup>3</sup>

Pesticides found in our aquatic environment are suspected of having toxic impacts. Concentrations of the agricultural insecticide cypermethrin (a component of sheep dip) were found to exceed the relevant environmental quality standard in some Donegal rivers and transitional waters in the south-east (EPA, 2022).

The herbicide MCPA (2-methyl-4-chlorophenoxyacetic acid), used for controlling rushes in grassland areas, is regularly detected in surface waters. In 2023, the pesticide limit was exceeded in 23 public drinking water supplies (EPA, 2024b), mostly because of the presence of MCPA.

3 [www.epa.ie/publications/monitoring--assessment/waste/monitoring-for-per--and-poly-fluoroalkyl-substances-pfas-and-brominated-flame-.php](http://www.epa.ie/publications/monitoring--assessment/waste/monitoring-for-per--and-poly-fluoroalkyl-substances-pfas-and-brominated-flame-.php) (accessed 25 June 2024).



## 4. Responses

The WFD and other associated national and EU environmental, public health and planning legislation set the framework used to protect and restore water quality in Ireland. This legislation is implemented by a range of public bodies and by local authorities. The WFD requires that river basin management plans (RBMPs) establishing programmes of measures to achieve water quality objectives are implemented in 6-year cycles.

### River basin management plans

The first two cycles of RBMPs, covering the period 2009–2021, established comprehensive monitoring and reporting programmes, developed new governance structures, and implemented an integrated catchment

management approach to the protection of waters. Over that time, however, the plans did not achieve the water quality protection and restoration objectives required under the WFD. The Water Action Plan 2024, A River Basin Management Plan for Ireland, which covers the third cycle, was published in September 2024 (DHLGH, 2024). While some of the new measures, such as the Farming for Water European Innovation Partnership (EIP)<sup>4</sup> and National Barriers Programme,<sup>5</sup> have commenced, the delay in finalising and adopting the overall plan delayed progress in improving governance, implementing measures and enacting legislation required to restore and protect water quality. A summary of the key measures is set out in Table 8.1.

**Table 8.1** Summary of measures to deal with the main significant pressures on water quality from the third iteration of the National River Basin Management Plan (Water Action Plan 2024) 2022–2027

Sector/pressure	Measure
<b>All pressures</b>	<ul style="list-style-type: none"> <li>Expansion of the Areas for Action programme, which builds further on the Priority Areas for Action programme managed by the Local Authority Waters Programme</li> </ul>
<b>Agriculture</b>	<ul style="list-style-type: none"> <li>Strengthening of the Nitrates Action Programme and associated Good Agricultural Practice Regulations (S.I. No. 113/2022) to reduce nutrient pollution</li> <li>Strengthening of measures in the CAP Strategic Plan to improve water quality, including conditionality, ecoschemes and the results-based Agri-Climate Rural Environment Scheme</li> <li>Implementation of a national agricultural inspection plan overseen by the EPA and supported by new inspectors in local authorities</li> <li>Commitment of €60 m to a Farming for Water EIP to support the implementation of targeted measures on farms to protect water quality</li> </ul>
<b>Hydro-morphology</b>	<ul style="list-style-type: none"> <li>Introduction of a new legislative regime to manage the impacts of pressures on the physical condition of waters</li> <li>Investment in the National Barriers Programme led by Inland Fisheries Ireland.</li> <li>Improving fish migration in the Lower River Shannon (at the Parteen and Ardnacrusha dams)</li> </ul>
<b>Forestry</b>	<ul style="list-style-type: none"> <li>Introduction of new support measures in the Forestry Programme 2023–2027 to protect water quality</li> <li>Increase in the area of forest with appropriate water setbacks</li> <li>Introduction of incentives to create new native forests to provide water services</li> </ul>
<b>Urban waste water</b>	<ul style="list-style-type: none"> <li>Continued investment by Uisce Éireann in improvements to waste water infrastructure, prioritising waters where urban waste water is a significant pressure</li> <li>Investment in new waste water infrastructure in villages not served by public waste water collection systems</li> </ul>

CAP, Common Agricultural Policy

Source: DHLGH, 2024

<sup>4</sup> [www.gov.ie/en/press-release/468aa-ministers-mcconalogue-hackett-and-noonan-launch-60-million-farming-for-water-eip/](http://www.gov.ie/en/press-release/468aa-ministers-mcconalogue-hackett-and-noonan-launch-60-million-farming-for-water-eip/) (accessed 25 June 2024).

<sup>5</sup> [www.fisheriesireland.ie/what-we-do/research/national-barriers-programme](http://www.fisheriesireland.ie/what-we-do/research/national-barriers-programme) (accessed 25 June 2024).



## Agricultural measures

Agriculture is the most widespread of the pressures that impact water bodies. The number of water bodies impacted by agricultural activities increased between 2015 and 2021, coinciding with a period of significant intensification driven by the removal of the dairy quota and strategies such as FoodVision 2025. The need to address the impact of agriculture on water quality is now receiving significant attention as a result of the risk to the nitrates derogation (See Topic Box 8.2).

Actions to address the impacts of agriculture on water quality consist of both regulatory and voluntary measures. The primary regulatory tool is the Good Agricultural Practice Regulations. Voluntary measures are implemented through the Agricultural Sustainability Support and Advisory Programme (ASSAP), agri-environmental schemes, such as the Agri-Climate Rural

Environment Scheme (ACRES), and other results-based payment schemes under EIP and LIFE projects. Details of the key measures are included in Chapter 10.

The review undertaken to develop the Fifth Nitrates Action Programme highlighted a significant level of non-compliance with the Good Agricultural Practice Regulations. In addition, the Commission's Implementing Decision ((EU) 2022/696) on the nitrates derogation required Ireland to take additional measures to improve compliance. To address this, the EPA was tasked with overseeing and monitoring the implementation of a new national agricultural inspection programme carried out by local authorities. This programme is now in place and additional resources have been assigned to the EPA and local authorities. A key element will be an increase in farm inspections and improved data on the extent and nature of non-compliance and the resolution of issues.

### Topic Box 8.2 Ireland's nitrates derogation

The aim of the Nitrates Directive (91/676/EEC) is to protect water quality from nutrient pollution arising from agricultural sources. Every 4 years, Member States may seek a derogation to increase the level of organic nitrogen loading from 170 kg/N/ha to a maximum of 250 kg/N/ha, provided that the derogation does not impact water quality. Derogation farms are subject to additional, more stringent, measures than other farms and an increased inspection regime.

Ireland was initially granted a nitrates derogation in 2007 and is currently one of three remaining EU countries that hold one. The Netherlands' derogation is being phased out by 2025, and Denmark will not seek another after July 2024, when its derogation expires, so it is likely that Ireland will be the only country negotiating a further derogation for 2026 onwards.

A condition of Ireland's current derogation required an interim assessment of water quality to be carried out in 2023 in accordance with specific criteria set by the European Commission (2022/696/EU). The outcome of the assessment was a reduction in the maximum permitted organic nitrogen load from 250 kg/N/ha to 220 kg/N/ha on derogation farms over much of the country.

The derogation reduction has generated considerable public interest in water quality and the actions that need to be taken on farm to reduce nutrient pollution. Actions to prevent phosphorous losses to water are relatively straightforward and involve breaking the pathway between the source and the water body at the farm level. Actions to reduce nitrogen losses can be more challenging, as it is the cumulative amount of nitrate lost from the catchment area to waters that counts, so all farms have a role to play. The level of nitrogen loss varies depending on farm practices, soil type and weather, but the key action needed is reducing the source load in areas where the risk of loss is highest.

Three types of action need to be progressed to reduce the impacts from agriculture and improve water quality.

1. Ensure that all farms comply with the Good Agricultural Practice Regulations. Significant new resources have recently been committed to local authorities to increase inspections and to the EPA to develop a national agricultural inspections programme and oversee its implementation.
2. Continue to improve nitrogen use efficiency on farm, so that as much as possible of the nitrogen used is taken out in food or crops and not leached into the environment. The average nitrogen use efficiency on Irish farms is 24% (Teagasc, 2023), but Teagasc aims to increase that to 35% on grassland farms through a range of measures, including improving soil fertility and nutrient management planning.
3. Step up efforts to reduce cumulative nitrogen loading in catchments where required. In some catchments, improving compliance and efficiency may be enough to achieve the required reductions in nitrate leaching.

Actions to protect and improve water quality are needed across all farming types, not just derogation farms. It remains to be seen whether the current increased focus on the need to improve water quality and additional measures, such as the enhanced agricultural inspection programme and Farming for Water EIP, will be delivered at the scale and pace needed.





A challenge for agriculture is that many of the measures to address water quality are voluntary schemes. In addition, incentives are not always sufficient to get measures where they are needed, or measures are not sufficiently targeted to address the specific issues in the locations where they are needed. While ASSAP has a high farmer engagement rate, a review of the programme identified the lack of funding for voluntary measures as a barrier to progress.<sup>6</sup> A key response to this is a new Farming for Water EIP, which was launched in March 2024. This will provide funding to farmers for implementing specific, targeted measures to protect and restore water quality.

### Hydromorphological measures

Impacts on hydromorphology arising from multiple sectors are the second most prevalent pressure on our waters, affecting 448 water bodies. Current measures to address hydromorphology include control of agricultural land drainage (via the Environmental Impact Assessment Regulations (S.I. No. 296/2018)), best practice guidelines for drainage works<sup>7</sup> and a barriers assessment programme;<sup>8</sup> however, it is acknowledged in the Water Action Plan 2024 that controls on pressures that impact the physical condition of waters need to be strengthened.

One such control is the introduction of a regulatory regime to address the impact of abstractions on water quality. The Abstractions (and Associated Impoundments) Act (No. 48 of 2022) was published in 2022 and regulations to give effect to the Act were published in August 2024.

Another key measure in the Water Action Plan is the introduction of a regulatory regime to control activities that involve works on, or in, water bodies that may impact their hydromorphology. The control of such activities is a requirement of the WFD, and Ireland's failure to have adequate controls in place is the subject of a European Commission infringement case.

Irish rivers are heavily fragmented by barriers such as weirs, culverts and bridges, which block the movement of fish and impact the overall habitat and biodiversity of rivers. The new National Barriers Programme, established by Inland Fisheries Ireland, will develop the evidence base to identify, risk assess and develop suitable restoration programmes to mitigate the impacts of barriers. This work will support the objectives of the EU Nature Restoration Law (Regulation (EU) 2024/1991) to deliver free-flowing rivers.

The implementation of measures to address and regulate activities that impact hydromorphology has received little attention, limiting the state's ability to manage this pressure. The actions set out in the Water Action Plan need to be prioritised and resourced to make progress in this area.

### Forestry measures

Forestry is the third most significant pressure impacting water quality, and there has been little change in the relative scale of its impacts between the assessment periods. Water quality declines caused by forestry operations, such as afforestation, harvesting and thinning, can often be substantial; however, there is evidence that water bodies can recover following these events and remain in good condition when the forests are stable. Forest creation can also be used as a mitigation measure for other pressures; for example, to intercept overland loss of phosphorus or sediment from agricultural activities from entering water.

In 2023, the Shared National Vision for Trees, Woods and Forests in Ireland by 2050<sup>9</sup> was published, calling for:

**The right trees in the right places for the right reasons with the right management – supporting a sustainable and thriving economy and society and a healthy environment.**

6 [www.teagasc.ie/media/website/crops/ASSAP-Expert-Review-Final-Report---pdf--22-Nov-2021.pdf](http://www.teagasc.ie/media/website/crops/ASSAP-Expert-Review-Final-Report---pdf--22-Nov-2021.pdf) (accessed 24 June 2024).

7 [www.floodinfo.ie/frs/media/filer\\_public/b0/5a/b05a1126-7de1-4921-bdb2-1c2579470171/environmental\\_guidance\\_-\\_drainage\\_maintenance\\_and\\_construction\\_2019\\_web\\_part-1.pdf](http://www.floodinfo.ie/frs/media/filer_public/b0/5a/b05a1126-7de1-4921-bdb2-1c2579470171/environmental_guidance_-_drainage_maintenance_and_construction_2019_web_part-1.pdf) (accessed 24 June 2024).

8 [www.fisheriesireland.ie/what-we-do/research/national-barriers-programme](http://www.fisheriesireland.ie/what-we-do/research/national-barriers-programme) (accessed 24 June 2024).

9 [www.gov.ie/en/publication/forestry-policy-and-strategy/#shared-national-vision-for-trees-and-forests](http://www.gov.ie/en/publication/forestry-policy-and-strategy/#shared-national-vision-for-trees-and-forests) (accessed 24 June 2024).



This vision informed Ireland’s Forestry Strategy 2022–2030,<sup>10</sup> with the associated Forestry Programme 2023–2027. The Forestry Programme includes a number of measures relating to the protection of water during all forestry activities, including the Forests for Water scheme; grant aid for conversion to continuous cover forestry or native woodlands; a forestry environmental enhancement scheme to establish setbacks in legacy forests; and grant aid for various works to reduce forestry activity or mitigate its effects.

The main risk to water quality occurs when forestry activities are occurring, so the implementation of mitigation measures and their effective oversight is essential. Forestry measures and impacts are further discussed in chapters 5 and 10.

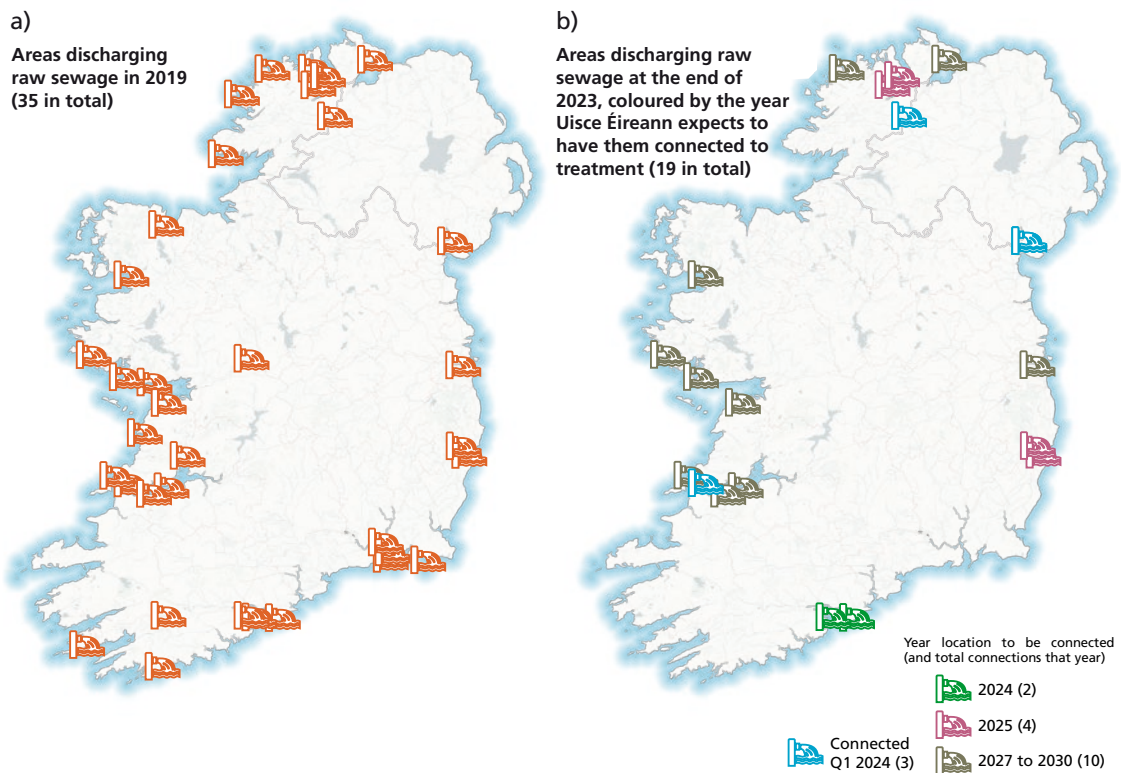
### Urban waste water measures

Urban waste water discharges, from treatment plants and overflows, are the fourth most significant pressure impacting our waters; almost 200 water bodies are affected by discharges, either alone or in combination with other pressures.

The EPA has identified priority areas where Uisce Éireann should direct resources to protect the environment from the harmful effects of waste water discharges. There were 80 priority areas at the end of 2023, down from 148 in 2017. However, Uisce Éireann has still not clearly identified the interventions needed at one-third of the priority areas where waste water is adversely impacting inland and coastal waters (EPA, 2023b).

At the end of 2023, 19 towns and villages were still discharging raw sewage every day. Uisce Éireann is implementing plans to provide treatment for nine of these areas by the end of 2025, and the remaining areas are expected to receive treatment between 2027 and 2030 (Figure 8.10).

**Figure 8.10** Towns and villages still discharging raw sewage in a) 2019 and b) 2023



10 [www.gov.ie/en/publication/forestry-policy-and-strategy/#irelands-forest-strategy-2023-2030](http://www.gov.ie/en/publication/forestry-policy-and-strategy/#irelands-forest-strategy-2023-2030) (accessed 24 June 2024).



Ireland's waste water collecting systems include an estimated 2447 storm water overflow outlets; however, Uisce Éireann does not have sufficient information on discharges from these storm water overflows (EPA, 2023b). To address this information gap, Uisce Éireann is assessing all storm water overflows against national standards and is installing equipment to monitor overflow events. The information gathered from this work will provide greater clarity on storm water overflows and their impact and support prioritisation of action to mitigate their discharge risk.

At the end of the period 2020–2024, Uisce Éireann will have invested €5.35 billion in improving the water services infrastructure, with 42% of this spending on collection and treatment of waste water.<sup>11</sup> The number of water bodies impacted by urban waste water is reducing and the investment is delivering improvements in water quality; however, treatment in many areas is still not as good as it needs to be. It will take multi-billion euro investment and at least two decades to bring all waste water collection and treatment systems up to standard (EPA, 2023b).

### Measures to address other pressures

A range of other pressures impact water quality, including domestic waste water treatment systems, urban run-off and industry. All of them need to be addressed in order to achieve our water quality objectives. Further information on all the measures to address these pressures is set out in the Water Action Plan.

### Management of hazardous substances

A wide range of legislation is in place to reduce the effects of chemicals on the environment and human health. Measures to improve the management of the life cycle of chemicals will reduce the effects of chemicals in use now and will seek to ensure that chemicals produced in the future do not have negative effects on human health or the environment (see Chapter 14).

Phasing out the burning of fossil fuels and developing safer manufacturing processes will halt emissions of mercury, PAHs and PDBEs over time. In Ireland, tighter controls on the use of cypermethrin and MCPA, replacement of hazardous PFASs and the remediation of PFAS-contaminated sites will reduce the risks from these substances. Remedial measures have been successful in preventing the exceedance of MCPA thresholds in water supplies by bringing relevant stakeholders and local catchment groups together to promote responsible pesticide use and resolve the issues at source.

Increased monitoring of these substances by the EPA in recent years has improved our knowledge of the sources and prevalence of hazardous chemicals in the aquatic environment. Continued vigilance, regular risk assessments and appropriate mitigation measures will be required to protect Irish waters from hazardous chemical substances.

### Improved governance

A three-tiered structure was created during the second cycle of the RBMP to improve governance and implementation. While the structure has significantly improved collaboration between stakeholders and implementing bodies, particularly at the local and regional levels, there were still issues with overall ownership of the plan, the accountability of implementing bodies, and the tracking of the progress of measures and of the overall plan.

The management of water quality is by its nature the responsibility of a range of different agencies and bodies. Good governance arrangements are essential to deliver on the commitments made in the Water Action Plan and to ensure accountability for delivering water quality objectives. EPA-funded research by the Institute of Public Administration, *Water Governance in Ireland: Towards the Third-Cycle River Basin Management Plan, 2022–2027* (IPA, 2021), included recommendations for building on and improving the governance arrangements in areas such as the functioning of the three tiers, clarity of institutional roles and capacity building. The research also highlighted the need for improved data gathering on measures being implemented so that their effectiveness and overall progress in delivering water quality objectives can be assessed. It is essential that these recommendations are implemented and, in particular, that tracking the progress of the overall plan and the implementation of measures is improved and the information is made publicly available.

<sup>11</sup> [www.water.ie/sites/default/files/projects/strategic-plans/capital-investment-plan/Capital-Investment-Plan-2020-2024-Explanatory-Booklet.pdf](http://www.water.ie/sites/default/files/projects/strategic-plans/capital-investment-plan/Capital-Investment-Plan-2020-2024-Explanatory-Booklet.pdf) (accessed 3 July 2024).





A measure in the Water Action Plan will be the establishment of a programme delivery office in the Department of Housing, Local Government and Heritage to oversee and coordinate governance and implementation. This has the potential to significantly improve oversight.

### Infringement cases

Of the 14 active environmental infringement cases against Ireland, five relate to water.<sup>12</sup>

These are a failure to correctly transpose the WFD (open since 2007); a breach of the Urban Waste Water Treatment Directive (91/271/EEC) (two cases dating from 2013 and 2023); a failure to address trihalomethanes in drinking water (open since 2017); and a failure to finalise plans for the management of river basins.

The number of infringement cases, failure to fully resolve them in a timely manner and the significant delays in publishing both the second and third cycles of the RBMP point to a lack of priority given to water policy and management by consecutive governments over decades.

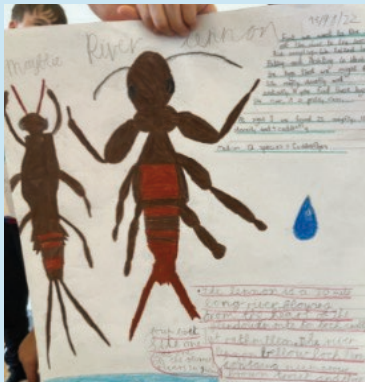
The recast Drinking Water Directive ((EU) 2020/2184) and revised Urban Waste Water Treatment Directive<sup>13</sup> are bringing new and more stringent requirements for water services. It is essential that these directives are fully implemented within the time frames required to protect water quality and health, and that all the outstanding requirements of the WFD are implemented.

### Community and stakeholder engagement

There has been a strong emphasis in recent years on improving public participation and community involvement in the protection of waterways. The water community officers at the Local Authority Waters Programme (LAWPRO) have established themselves as contact points for local communities across the country. A growing number of groups are getting involved in caring for their local water environment, ranging from angling and sports clubs and Tidy Towns and community development associations to local catchment groups and river trusts (Topic Box 8.3).

#### Topic Box 8.3 Community projects

Examples of community projects include the Blue Dot Explorer project and (overleaf) the East Corrib Alliance project.



12 [ec.europa.eu/atwork/applying-eu-law/infringements-proceedings/infringement\\_decisions/](https://ec.europa.eu/atwork/applying-eu-law/infringements-proceedings/infringement_decisions/) (accessed 24 June 2024).

13 [www.consilium.europa.eu/en/press/press-releases/2024/01/29/urban-wastewater-council-and-parliament-reach-a-deal-on-new-rules-for-more-efficient-treatment-and-monitoring/](https://www.consilium.europa.eu/en/press/press-releases/2024/01/29/urban-wastewater-council-and-parliament-reach-a-deal-on-new-rules-for-more-efficient-treatment-and-monitoring/) (accessed 3 July 2024).



### Topic Box 8.3 Community projects (continued)

**Blue Dot Explorer.** This project engages with schools in northern Donegal on the value of high-status rivers. It is led by the An Taisce Donegal Local Association in conjunction with Nature Northwest and LAWPRO.



**East Corrib Alliance.** The group was formed by angling clubs associated with Lough Corrib and the rivers and streams on the eastern side of the lough. It delivers projects on restoration and maintenance of spawning habitat, conservation and protection of wild brown trout and salmon, and monitoring of water quality throughout the area. The funding supports the provision of fencing (below left), animal drinking troughs (including solar-powered troughs; below right) and tree planting.



The Community Water Development Fund<sup>14</sup> has provided funding for these groups in amounts ranging from hundreds of euros to a maximum of €25,000. Since 2018, €2.7 million has been invested in supporting 886 local community groups to carry out a range of activities aimed at protecting water quality and increasing local awareness. A further €500,000 under the new LAWPRO Catchment Support Fund will help non-governmental organisations working on water quality to develop and strengthen the skills, processes and resources they need to grow.

The establishment of An Fóram Uisce<sup>15</sup> as a statutory stakeholder group was another key measure to improve stakeholder participation in protecting water quality. The forum has 26 members representing 13 sectors with an interest in water quality. It provides a national platform for drawing on members' various perspectives and expertise to seek consensus and develop policy advice on the preparation and implementation of RBMPs.

The development of local catchment management plans and sectoral action plans, which will be delivered during the third cycle of the RBMP, will be a further step in improving public information and increasing public participation in protecting water quality.

<sup>14</sup> [lawaters.ie/funding](http://lawaters.ie/funding) (accessed 24 June 2024).

<sup>15</sup> [thewaterforum.ie](http://thewaterforum.ie) (accessed 24 June 2024).



## Climate adaptation and water resilience

The effects of climate change on Ireland's water resources will be wide-ranging and will create both acute and chronic challenges. The coastal waters around Ireland are projected to continue warming, and ocean acidity is expected to increase. Increased water temperatures will lead to additional in-channel vegetation growth, reduced oxygen availability, reduced aquatic habitat diversity and thermal stress to aquatic species.

Changes in precipitation are expected to contribute to an increase in the frequency of flooding and drought events. This will affect water availability, as well as increasing run-off of pollutants from land and surface and sewer flooding, leading to pollution.

The effects of climate change are already being felt in Ireland. Monitoring records show increases in intense precipitation events, average river flows and sea level rise, highlighting the need to plan for and adapt to climate change. Achieving our water quality objectives is a key measure to ensure the resilience of our water bodies and protect them against climate change impacts.

The Water Quality and Water Services Infrastructure Sectoral Adaptation Plan (Water SAP) (DHPLG, 2019) is the primary adaptation tool for the water sector. A separate SAP was published for flood risk management. The Water SAP outlines the risks to the water sector and the potential adaptive measures needed to address these risks. A key measure highlighted in the Water SAP is the integrated catchment management approach that has been adopted in Ireland to manage water resources and address water quality issues. Progress on the implementation of adaptation policy and increasing resilience under the Water SAP was given an overall rating of 'moderate' by the Climate Change Advisory Council (CCAC, 2023). Its report found limited evidence of mainstreaming adaptation across departments, local authorities and agencies.

Uisce Éireann has developed a National Water Resources Plan,<sup>16</sup> which is a strategic approach aimed at future-proofing public water supply over the next 25 years to address climate change impacts and other challenges, such as population growth and emerging contaminants.

A second iteration of the Water SAP is due to be completed in 2025, and it is essential that a more effective assessment of the risks and adaptation measures needed is undertaken and implemented and that national plans such as the Ireland's Water Action Plan and Uisce Éireann's National Water Resources Plan are fully aligned with the Water SAP.

Further detail on climate change risks and on national mitigation and adaptation approaches is available in Chapter 4.

## Water research and innovation

Since the launch of its 10-year research framework (EPA, 2021), the EPA has committed over €4.3 million to projects under the research hub 'Protecting and Restoring our Natural Environment' (EPA, 2023c).

Examples of ongoing projects funded by EPA Research to address these thematic areas include:

- HymoGuide – developing guidance for regulatory standards for hydromorphology
- HydroGen – integrating DNA-based assessment tools into water quality and biodiversity monitoring
- GRADS & SMARTS – sustainable management of groundwater resources
- AquaCop – using remote sensing products for monitoring transitional and coastal waters
- WFDFutureS – supporting a long-term project to research future climate and demographic scenarios and management tools for the WFD.

Several project teams co-funded by the Irish government and the EU are working with local stakeholders to improve water quality in their catchments, including on a number of EU co-funded EIP projects.

<sup>16</sup> [www.water.ie/projects/strategic-plans/national-water-resources/#](http://www.water.ie/projects/strategic-plans/national-water-resources/#) (accessed 24 June 2024).



The Waters of LIFE is an EU LIFE integrated project with a €20 million budget that aims to help reverse the deterioration of Ireland’s most pristine waters<sup>17</sup> (see also Chapter 7). Waters of LIFE will support the implementation of measures to protect and enhance high status objective water bodies and thus will support the work of the Blue Dot Catchments Programme run by LAWPRO, which has the same objective.

### 5. Outlook

The EPA conducted an assessment of the measures contained in the Water Action Plan 2024 with a view to forecasting their efficacy in achieving Ireland’s water quality objectives (EPA, 2024c). The analysis focused on the 1649 (34%) water bodies currently at risk of not meeting their 2027 environmental objectives. It assessed whether there were specific targeted measures in place to address the pressures on them and, if so, the likelihood of their being effective. The assessment shows that there will be a significant shortfall in reaching our 2027 targets even if all the measures are fully implemented (Figure 8.11).

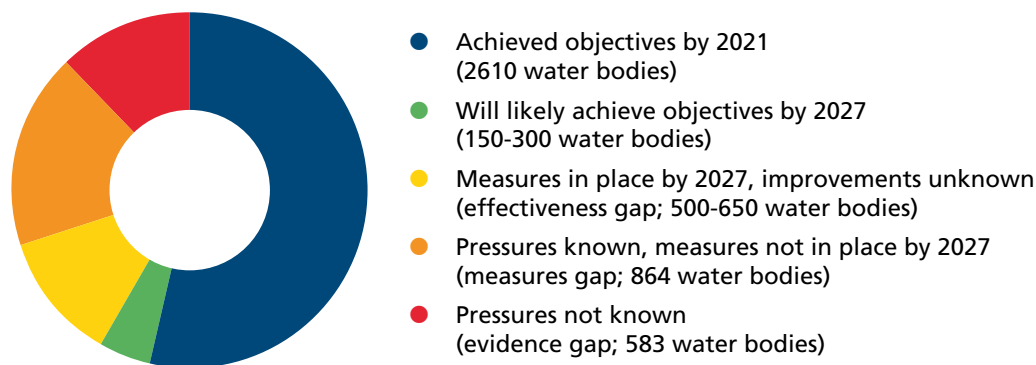
Specifically, the analysis found that:

- Between 150 and 300 of the water bodies assessed are forecast to meet their water quality targets by 2027.
- A further 500–650 at-risk water bodies may see some water quality improvements, even if not to the level required to meet the status objectives.
- Approximately 864 of the 1649 water bodies do not have specific, targeted measures planned and are therefore unlikely to achieve their status objectives by 2027.

These forecasts do not take account of any future deteriorations in water quality, which, based on the evidence to date, are essentially offsetting any improvements being made.

There remains therefore a significant challenge ahead to meet our water quality objectives, ensure we have safe and resilient water services and meet the new, more stringent requirements of the recast Drinking Water Directive and Urban Waste Water Treatment Directive.

Figure 8.11 Likelihood of water bodies achieving Water Framework Directive objectives by 2027



Source: EPA, 2024c

17 [www.watersoflife.ie/about/#:~:text=The%20Waters%20of%20LIFE%20is%20an%20EU%20LIFE,protracted%20and%20persistent%20water%20quality%20trend%20in%20Ireland](http://www.watersoflife.ie/about/#:~:text=The%20Waters%20of%20LIFE%20is%20an%20EU%20LIFE,protracted%20and%20persistent%20water%20quality%20trend%20in%20Ireland) (accessed 24 June 2024).





## 6. Conclusions

Almost half of our surface waters, rivers, lakes, estuaries and coastal waters and their associated ecosystems are degraded and are not achieving their water quality objectives.

While significant investment and additional resources have been committed to address water quality issues in recent years, based on current and planned measures we will not achieve our legally binding water quality objectives by 2027.

There are a number of key gaps that need to be addressed to prevent further decline and to start to see a significant scale of improvement in water quality. In addition, climate change is impacting, and will continue to impact, water resources and water quality management.

### **The main factor impacting water quality is excessive concentrations of nitrogen and phosphorus.**

Nitrate concentrations are too high in 40% of river sites and in 20% of estuarine and coastal water bodies nationally. The agricultural sector is responsible for more than 85% of the total nitrogen losses to water in certain catchments in the south and south-east. Phosphate concentrations are too high in 28% of rivers and 36% of lakes.

Water quality is a local issue. Unless measures are targeted to the specific problem and area where the measure is needed they will not deliver improvements. This is a key gap, particularly among agricultural measures, which are often at the national scale, voluntary or delivered through specific projects and not sustained.

### **We will not achieve our water quality outcomes without effective implementation of and compliance with environmental legislation.**

With the exception of hydromorphology, there is a wide range of legislative instruments in place to mitigate the impacts of various pressures on water quality. However, there is a significant gap in implementation in terms of achieving compliance. Agricultural inspections are identifying significant levels of non-compliance with the Good Agricultural Practice Regulations, and the EPA has highlighted the need for improvements in local authority performance with respect to agricultural inspections.

Measures to address hydromorphology are limited. The abstraction regime is not yet in place and there is no effective control of activities that can impact hydromorphology, including from land drainage works at the farm level to large arterial drainage and flood mitigation schemes.



A range of other pressures, such as septic tanks, regulated discharges to water and impacts from forestry and illegal peat extraction and drainage, could be addressed through effective implementation and enforcement of existing legislation.

### **There is an urgent need to improve the overall governance and accountability of water management in Ireland.**

A new three-tier structure to significantly improve the governance of water management in Ireland was introduced in the second cycle of the RBMP. While this resulted in some improvements, particularly in engagement and coordination among key stakeholders and implementing bodies, the tiers themselves were not operating as they should, and there were gaps in overall accountability and the tracking and reporting of measures and progress. The Water Action Plan was published in September 2024. While some of the high-level measures in the plan have already commenced, the delay in finalising and adopting the overall plan created a national water policy vacuum that limited progress to date in the restoration and protection of water quality.

### **Climate change is impacting, and will continue to impact, water quality and water services.**

The effects of climate change are already being felt in Ireland. The management of water resources, historically not a major issue in Ireland, will become increasingly important to meet our population growth, industry and food production needs. Ensuring good water quality is a key measure to ensure resilience in conditions of low flow and higher temperatures. Climate change adaptation to protect water quality and water services is not as well progressed and integrated as it needs to be.



## Key chapter messages

- 1.** There needs to be immediate, substantial and sustained reductions in nitrogen pollution, especially in catchments of concern in the south and south-east, to prevent any further deterioration in the quality of our estuaries and coastal waters. Targeted measures to reduce phosphate run-off could deliver significant improvements in inland waters and offer multiple benefits for climate and biodiversity.
- 2.** We need to see full implementation of existing environmental legislation and high compliance rates across all regulated activities. A regulatory regime to address activities that impact hydromorphology is also required. All measures must be sufficiently targeted to the water quality issue and location to ensure that they deliver improvements.
- 3.** Water governance structures need to be reviewed to ensure that they operate effectively. Detailed tracking and reporting of measures in Ireland's Water Action Plan 2024 is required to improve accountability among implementing bodies, public access to information and, ultimately, Ireland's water quality.
- 4.** It is essential to build climate resilience into water quality management and into water services. Plans - such as the Water Action Plan, the Water Quality and Water Services Climate Adaptation Plan, and Uisce Éireann's National Water Resources Plan - are key to identifying risks and adaptation measures.





## References

- CCAC, 2023. *Third Climate Change Adaptation Score Card Final Report*. Climate Change Advisory Council. [www.climatecouncil.ie/councilpublications/otherpublications/Final%20CCAC%20Scorecard%20Assessment%20Report%202023%20web.pdf](http://www.climatecouncil.ie/councilpublications/otherpublications/Final%20CCAC%20Scorecard%20Assessment%20Report%202023%20web.pdf) (accessed 20 June 2024).
- DHPLG, 2019. *Water Quality and Water Services Infrastructure – Climate Change Sectoral Adaptation Plan*. Department of Housing, Planning and Local Government. [www.gov.ie/en/publication/f5710-water-quality-and-water-services-infrastructure-climate-change-sectoral-adaptation-plan/](http://www.gov.ie/en/publication/f5710-water-quality-and-water-services-infrastructure-climate-change-sectoral-adaptation-plan/) (accessed 20 June 2024).
- DHLGH, 2024. *Water Action Plan 2024: A River Basin Management Plan for Ireland*. Department of Housing, Local Government and Heritage. [www.gov.ie/RBMP/](http://www.gov.ie/RBMP/) (accessed 13 September 2024).
- EPA, 2021. *EPA Research 2030: A Framework for EPA Research 2021–2030*. Environmental Protection Agency. [www.epa.ie/publications/research/epa-research-2030/epa-research-2030-framework.php](http://www.epa.ie/publications/research/epa-research-2030/epa-research-2030-framework.php) (accessed 4 December 2023).
- EPA, 2022. *Water Quality in Ireland 2016–2021*. Environmental Protection Agency. [www.epa.ie/publications/monitoring--assessment/freshwater--marine/water-quality-in-ireland-2016--2021-.php](http://www.epa.ie/publications/monitoring--assessment/freshwater--marine/water-quality-in-ireland-2016--2021-.php) (accessed 13 September 2024).
- EPA, 2023a. *Water Quality in 2022: An Indicators Report*. Environmental Protection Agency. [www.epa.ie/publications/monitoring--assessment/freshwater--marine/water-quality-in-2022-indicator-report.php](http://www.epa.ie/publications/monitoring--assessment/freshwater--marine/water-quality-in-2022-indicator-report.php) (accessed 4 December 2023).
- EPA, 2023b. *Urban Waste Water Treatment in 2022*. Environmental Protection Agency. [www.epa.ie/publications/monitoring--assessment/waste-water/uww-report-2022.php](http://www.epa.ie/publications/monitoring--assessment/waste-water/uww-report-2022.php) (accessed 4 December 2023).
- EPA, 2023c. *EPA Research 2030*. Environmental Protection Agency. [www.epa.ie/our-services/research/epa-research-2030/](http://www.epa.ie/our-services/research/epa-research-2030/) (accessed 4 December 2023).
- EPA, 2024a. *Water Quality in 2023: An Indicators Report*. Environmental Protection Agency. [www.epa.ie/publications/monitoring--assessment/freshwater--marine/EPA-Water-Quality-Indicator-Report-2023-web-11June2024.pdf](http://www.epa.ie/publications/monitoring--assessment/freshwater--marine/EPA-Water-Quality-Indicator-Report-2023-web-11June2024.pdf) (accessed 17 June 2024).
- EPA, 2024b. *Drinking Water Quality in Public Supplies 2023*. Environmental Protection Agency. [Drinking Water Quality in Public Supplies 2023 | Environmental Protection Agency \(epa.ie\)](http://www.epa.ie/publications/monitoring--assessment/freshwater--marine/Drinking-Water-Quality-in-Public-Supplies-2023) (accessed 9 July 2024).
- EPA, 2024c. *An Analysis of the Gap to Achieving Water Framework Directive Environmental Objectives*. Environmental Protection Agency (forthcoming).
- IPA, 2021. *Water Governance in Ireland: Towards the Third-Cycle River Basin Management Plan, 2022–2027*. Institute of Public Administration. [www.ipa.ie/\\_fileUpload/Documents/EPA\\_WATERGOVERNANCE\\_FINAL.pdf](http://www.ipa.ie/_fileUpload/Documents/EPA_WATERGOVERNANCE_FINAL.pdf) (accessed 20 June 2024).
- Teagasc, 2023. *Teagasc National Farm Survey Sustainability Report 2022*. Agricultural Economics and Farm Surveys Department. [www.teagasc.ie/publications/2023/national-farm-survey---2022-sustainability-report.php](http://www.teagasc.ie/publications/2023/national-farm-survey---2022-sustainability-report.php) (accessed 20 June 2024).