Water Quality in Ireland 2010 - 2012

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 co-ordinating 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.

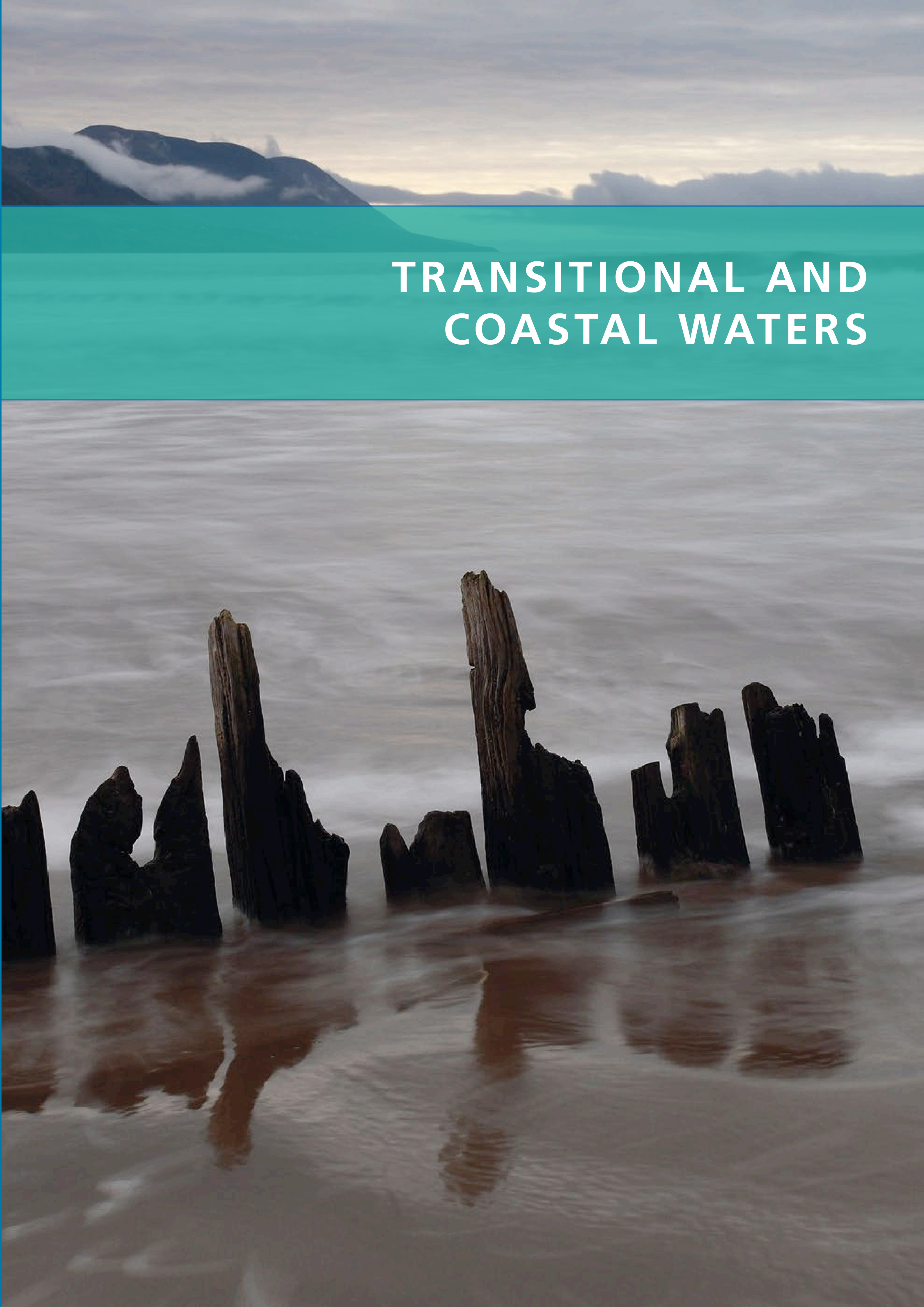
Management and structure of the EPA

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 Climate, Licensing and Resource Use
- Office of Environmental Enforcement
- Office of Environmental Assessment
- Office of Radiological Protection
- 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.

TRANSITIONAL AND COASTAL WATERS



5. TRANSITIONAL AND COASTAL WATERS

Authors: Shane O'Boyle, Robert Wilkes, Georgina McDermott and Sorcha Ní Longphuirt

- 36.3% of transitional waters were at high or good ecological status, accounting for 44.7% of the total area assessed (approximately 377 km^2). A number of water bodies, mainly in the south-east and south of the country, continue to display symptoms of nutrient enrichment, and have been classed as eutrophic.
- 67.4% of coastal waters were at high or good ecological status, accounting for 93% of the total area assessed (approximately 12,471 km^2). Downward trends in nutrient loads to the marine environment are now evident, with significant reductions in riverine nutrient inputs. This downward trend is apparent in the reduction in nutrient sources, particularly from the agriculture sector, which has seen an 18.7% and 37.7% reduction in nitrogen and phosphorus sources respectively.
- Nearly two-thirds (65.1%) of the designated shellfish areas monitored over the four-year period were compliant with the guide value for *Escherichia coli.* Of the non-compliant areas, the worst performing were Bannow Bay, Bantry, Dunmanus Inner, Kinsale, Tralee Bay, and Wexford Harbour Inner, where more than 50% of the samples exceeded the guide value. It is likely that additional measures may be required to achieve the quality objectives for shellfish waters in these areas.
- The majority of transitional and coastal waters were at good chemical status. There were a few exceedances of biota standards for mercury in mussel samples. However, mercury has been identified as a ubiquitous persistent, bioaccumulative and toxic substance (uPBT) under Directive 2013/39/EU. uPBTs occur widely in the environment on a global scale, due principally to atmospheric deposition.
- Radioactive substances from the nuclear reprocessing plant at Sellafield in England continue to be discharged to the Irish Sea, though exposure to these substances is not considered to pose a significant health risk to the Irish public.

Introduction

In Ireland, transitional and coastal waters represent a spatial area of over 14,000 km^2 (transitional; 844 km^2, coastal; 13,325 km^2) and represent a wide variety of types, such as lagoons, estuaries, large coastal bays and exposed coastal stretches. These waters are positioned at the interface between land and sea and, as such, are exposed to a wide range of human pressures. These pressures can include discharges from industrial and municipal wastewater treatment plants, inputs from diffuse agricultural sources, morphological alterations associated with harbour and port activities, and accidental or, in some cases, intentional discharges from marine vessels. In this chapter, the authors present the surface water status of these waters based on the analysis of chemical and biological data collected mainly between 2010 and 2012. This analysis will provide the basis for the identification of new environmental objectives and an assessment of whether existing environmental objectives are being met. In addition to status assessment, this chapter will provide information on trends in nutrient inputs, which together with the status assessment, provides further insight into the effectiveness of existing measures. The chapter also provides information on the condition of water-related protected areas (i.e. bathing waters, shellfish waters and nutrient sensitive areas) and on other issues, such as radioactivity in the marine environment and oil pollution events, which have the potential to impact on the environmental quality of these waters.

In Ireland, the picture for transitional waters assessed during the first river basin cycle 2007-2009 was comparable to that in Europe, with 66% of Irish transitional waters at moderate or worse ecological status. For coastal waters, the situation was considerably better, with only one-third (33%) of these waters classified as moderate or worse (McGarrigle *et al*, 2010). The key environmental objectives for Irish transitional and coastal waters are to restore those waters which are at less than good ecological status and to protect those waters which are at high or good ecological status. The achievement of these objectives will depend on the successful implementation of measures targeted at mitigating the environmental pressures which are threatening or have already impacted the current status of these waters.

Surface water status

In assessing the status of individual water bodies (the basic management unit under the WFD), the Directive requires Member States to assess both ecological and chemical status. Chemical status is assessed by compliance with environmental standards for chemicals that are listed in the WFD (Annex X) and the Environmental Quality Standards (EQS) Directive (2008/105/EC). These priority substances include metals, pesticides, and various industrial chemicals. The ecological status of surface waters is based on the assessment of specified biological quality elements, as well as supporting hydromorphological, chemical (specific pollutants), and physico-chemical elements.

The assessment of surface water status is based on the analysis of data collected in the national WFD monitoring programme for transitional and coastal waters. 40% of transitional and coastal water bodies (85 transitional and 43 coastal) were selected as being representative of status for these surface water categories. These were subsequently monitored and extrapolated to provide a comprehensive national overview of status within each of Ireland's seven river basin districts, which in total comprise 305 individual transitional and coastal water bodies.

Ecological status

Ecological status is assessed using a number of specified biological quality elements, such as phytoplankton, benthic invertebrates, macroalgae, angiosperms (seagrass and saltmarsh), and fish (in transitional waters only). These elements are responsive to a variety of environmental pressures, including nutrient and organic enrichment, hydromorphological alteration, and chemical pollution. A number of physico-chemical parameters, such as dissolved oxygen, inorganic nitrogen, phosphorus, and a number of specific pollutants, are also used in the assessment. Ecological status is classified into five categories based on the degree of deviation away from the reference condition for each of these individual elements. The five categories are high, good, moderate, poor and bad, which corresponds to a minor, slight, moderate, major and severe deviation from undisturbed conditions. The details of the WFD ecological status assessment methodology is available online[29].

Ecological status is assessed on a 'one-out-all-out' basis, with the status of a water body being based on the biological quality element or physico-chemical standard with the lowest status. For example, if all the elements in a water body are at or near reference conditions, then the status of the water body is considered to be high. However, if any single biological quality element or chemical parameter is of lesser status, then classification is based on that element.

29 http://www.epa.ie/pubs/reports/water/waterqua/Final_Status_Report_20110621.pdf

Monitoring opportunistic macroalgae in Dublin Bay

In this assessment, 294 individual water bodies, including 193 transitional and 101 coastal, were assessed based on information collected by the EPA, Marine Institute and Inland Fisheries Ireland between 2010 and 2012. Some of the biological assessments were based on data that extended back to 2007, to include those elements which require six years of the WFD cycle for their assessment. Of the transitional waters assessed, over one-third (36%) were found to be at good or high ecological status, with just under a half (48%) at moderate or worse ecological status. By area, the picture is better, with 45% of the area of transitional waters being classified as being of good or high ecological status. The remaining water bodies (16%) were unassigned due to insufficient information. This unassigned category contains a large number of very small water bodies, mostly lagoons, which only represent a surface area of 0.7 km^2, or 0.1% of the total area assessed. A number of water bodies (15) were classed as poor, and two water bodies were classed as bad, indicating, respectively, a severe and major deviation away from undisturbed conditions. The picture for coastal waters is considerably different, with 67% of waters at good or high ecological status and 22% at moderate status. Rincarna Pools, a small coastal lagoon, was the only coastal water body to be classed at poor ecological status. In terms of surface area, 93.6% or 12, 470 km^2 of coastal waters, are at high or good ecological status.

The breakdown for each water category is shown in **Figure 5-1** and the breakdown of water bodies in each of the classification categories for each river basin district is given in Appendices 4 and 5. **Table 5.1** lists the poor and bad status transitional water bodies, together with the element resulting in this status. Of the 17 water bodies assessed as poor or bad status, 11 are lagoons. The assessment of lagoons is still considered with low confidence, as the assessment tools for lagoons are still new and require further refinement. Nevertheless, the status of these lagoons is likely to be less than good. Further information on the physico-chemical or biological element resulting in less than good status is given in the sections below.

The location of all the transitional and coastal water bodies, together with their ecological classification, is shown in **Figure 5-2**, and can be accessed electronically via the EPA Geoportal site[30]. In addition to the 294 water bodies mentioned above, eleven areas, mainly ports (e.g. Foynes Harbour, Rosslare Harbour, and Cork Harbour) have been designated as heavily-modified

30 http://gis.epa.ie/

water bodies (HMWBs). Seven of these areas were classed at moderate ecological potential (MEP), and four at good ecological potential (GEP), during the first river basin management cycle, based on a mitigation measures and status based classification scheme. The issue of HMWB designation will need to be revisited in the next set of river basin management plans. The approach to designation should be reviewed in light of the greater availability of biological monitoring data, and existing GEP classifications will also need to be reviewed to confirm the situation with regard to mitigation measures and the status of biological elements most sensitive to hydromorphological pressures.

In the following sections, further detail is provided on the physico-chemical and biological elements that were used in the classification of ecological status reported in this chapter.

It was not possible to make a direct comparison between this current assessment of ecological status and the previous assessment undertaken in 2007-2009, as the monitoring of these waters during the earlier period was not fully implemented at that time.

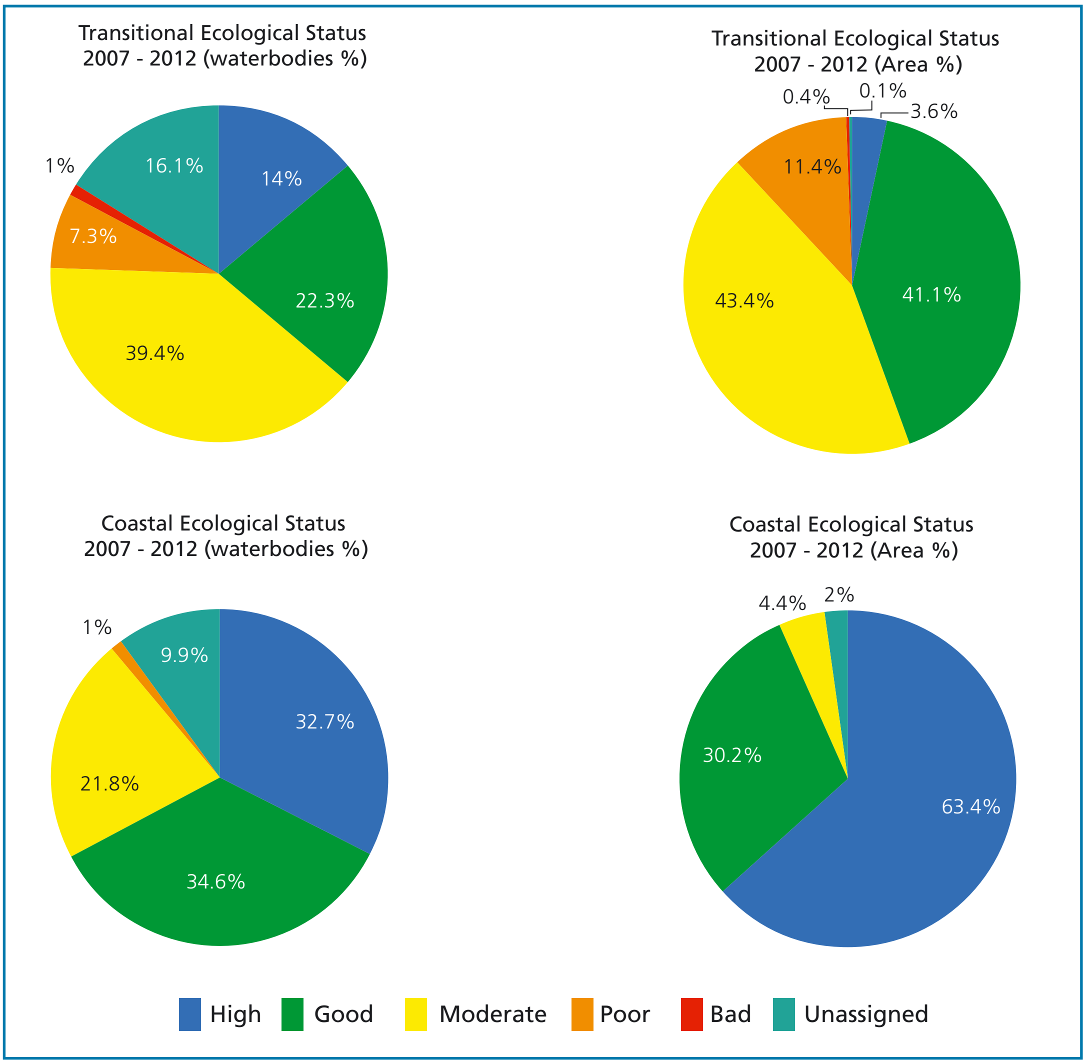


Figure 5-1. Ecological status of transitional and coastal (TraC) waters 2007-2012 (Percentage of water bodies and surface area in each status class).

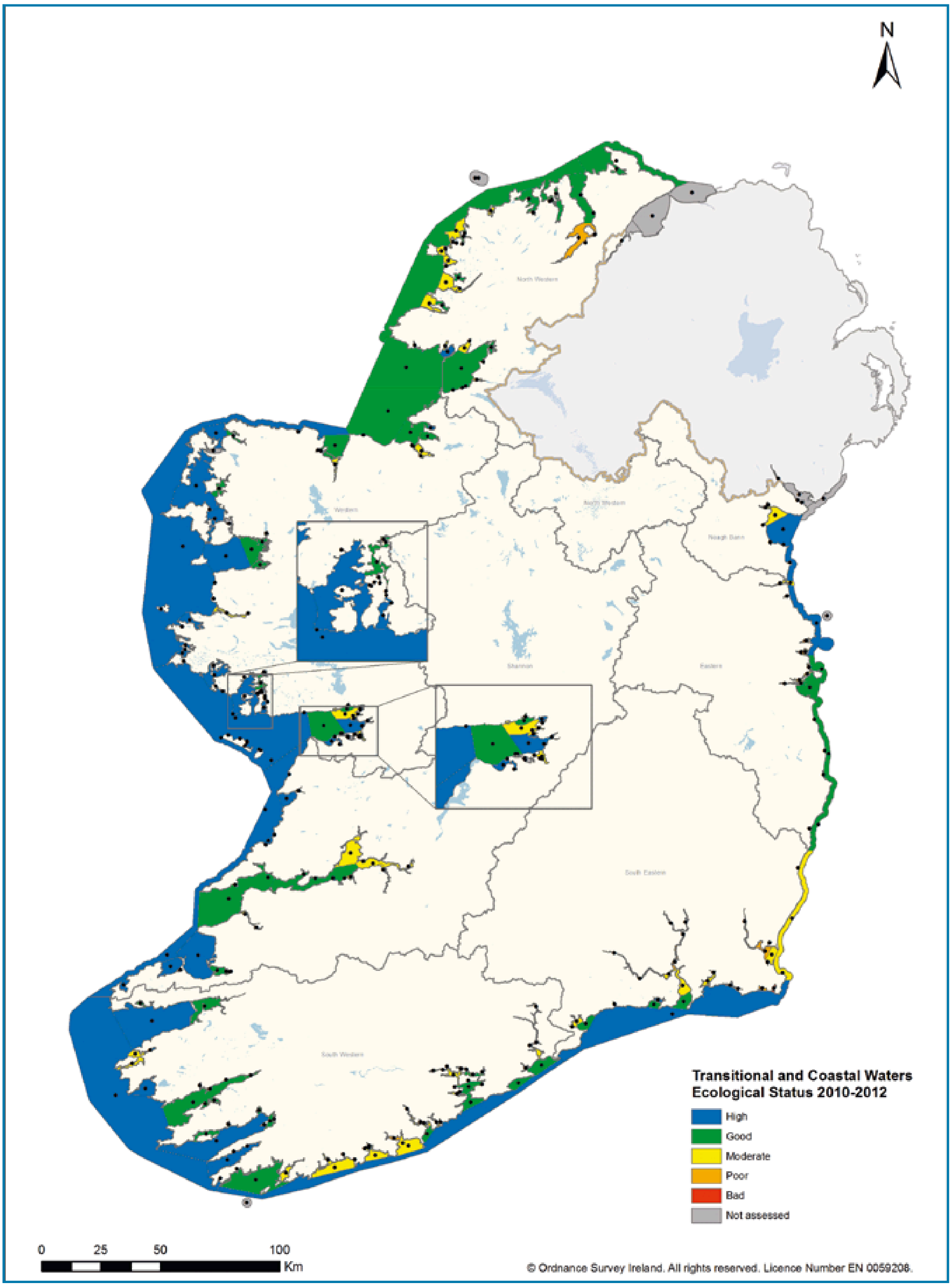


Figure 5-2. Ecological status of transitional and coastal waters around Ireland.

Quality elements determining ecological status

In transitional waters, fish, phytoplankton and marine plants are the elements most often responsible for a moderate or worse classification, whereas elements such as nutrients (MRP), dissolved oxygen (DO,) and biochemical oxygen demand (BOD) are less significant. In coastal waters, benthic invertebrates and dissolved oxygen are responsible for the greatest number of moderate or worse classifications. A breakdown for each individual water body is provided online and the element determining the status of less than good water bodies is shown in **Figure 5-3**, while further detail on the elements causing poor or bad status is shown in **Table 5-1**.

Water body	RBD	Ecological Status	Biological Element Responsible
Rogerstown Estuary	Eastern	Poor	Opportunistic macroalgae, angiosperms
Broadmeadow Water	Eastern	Poor	Marine plants, phytoplankton bloom frequency and biomass
Durnesh Lough	North-Western	Poor	Fish
Swilly Estuary	North-Western	Poor	Phytoplankton bloom frequency and biomass
Inch Lough	North-Western	Poor	Fish and phytoplankton biomass
North Slob Channels	South-Eastern	Poor	Phytoplankton bloom frequency and biomass
Lower Slaney Estuary	South-Eastern	Poor	Phytoplankton bloom frequency and biomass
Lady's Island Lake	South-Eastern	Bad	Marine plants, fish, phytoplankton biomass
Tacumshin Lake	South-Eastern	Poor	Fish and phytoplankton biomass
New Ross Port	South-Eastern	Poor	Benthos
Shannon Airport Lagoon	Shannon	Poor	Phytoplankton biomass
Lough Donnell	Shannon	Poor	Phytoplankton biomass
Glashaboy Estuary	South-Western	Poor	Fish
Argideen Estuary	South-Western	Poor	Opportunistic macroalgae
Kilkeran Lake	South-Western	Poor	Marine plants, fish, phytoplankton biomass
Kinvarra Bay Lagoons	Western	Bad	Marine plants, fish, phytoplankton biomass
Rincarna Pools	Western	Poor	Marine plants, fish, phytoplankton biomass

Table 5-1. Water bodies at poor and bad ecological status, together with the biological elements determining status.

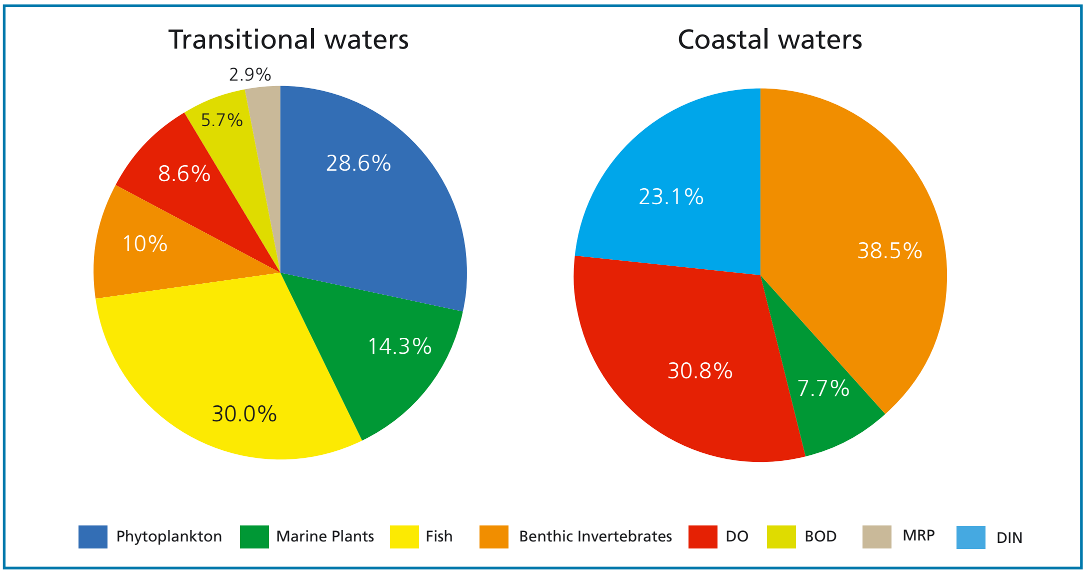


Figure 5-3. Percentage contribution of each element resulting in moderate or worse classification.

Physico-chemical elements

A number of general parameters are assessed to determine if the physico-chemical environment is capable of supporting the biological quality elements. Compliance of individual physico-chemical elements is assessed against the Environmental Quality Standards (EQSs) specified in the Surface Water Regulations (SI 272 of 2009). These include EQSs for inorganic nitrogen and phosphorus, dissolved oxygen, and biochemical oxygen demand (BOD).

Nitrogen and phosphorus in transitional and coastal waters

While phosphorus generally limits plant growth in freshwater and estuarine systems, nitrogen is considered to be the limiting nutrient in open coastal waters (Howarth and Marino, 2006). The concentration of both nitrogen, as dissolved inorganic nitrogen (DIN), and phosphorus, as molybdate reactive phosphorus (MRP), is monitored in winter when levels are expected to be at their seasonal maximum due to the absence of any significant plant or algal growth. Nutrient levels are also monitored in summer to capture the potential effect of seasonal changes in river flow and volume, which, in turn, can result in higher nutrient concentrations, particularly of phosphate, in some estuaries in summer.

The potential of phosphorus and nitrogen to limit phytoplankton growth in estuaries and coastal waters respectively, was the basis of the decision to establish an EQS for MRP in transitional waters and an EQS for DIN in coastal waters (S.I. 272 of 2009).

The highest DIN concentrations were found in the estuaries of the South-Eastern and South-Western River Basin Districts. High median winter DIN concentrations ranging between 3.8–6.2 mg/l N were observed in the Glashaboy (Glanmire) Estuary, the upper Slaney Estuary, the upper Barrow Nore Estuary, upper Barrow Estuary, and the upper Lee (Cork) and upper Blackwater estuaries. The lowest median winter DIN values, below 0.17 mg/l, were found in the high salinity coastal waters, including Kinsale Harbour, Kimackilloge Harbour, Outer Kenmare River, Sligo Bay and Kilkieran Bay.

It is also necessary to take into account the diluting capacity of seawater when reporting nutrient concentrations, and this is achieved by examining the percentage exceedance of concentrations against salinity-related thresholds. The highest exceedances were observed in the Glashaboy Estuary, lower Lee Cork Estuary, upper and lower Slaney Estuary, the Argideen Estuary, Barrow Nore Estuary upper and Clonakilty Harbour. Four coastal areas (Wexford Harbour, Courtmacsherry Bay, Valentia Harbour (Portmagee Channel) and Killybegs Harbour) failed to comply with the DIN environmental quality standard.

In relation to MRP concentrations, the majority (80%) of estuaries and coastal waters had MRP median winter and summer values less than 0.030 mg/l P, with half of these having levels less than 0.020 mg/l P. The highest winter median MRP concentrations were mostly found in the estuaries of the Shannon River Basin District, such as the Deel, Maigue, and Fergus. In some estuaries, concentrations of MRP were higher in summer than in winter, indicating that in these water bodies, point sources may be more important than diffuse sources. These include the Maigue, upper and lower Liffey, Tolka and lower Bandon Estuaries. Three transitional areas (Tralee, Deel and Maigue Estuaries) failed to comply with the MRP environmental quality standard in winter, and four areas (Broadmeadow Water, Rogerstown, Tolka and Maigue Estuaries) failed to comply with the standard in summer.

Dissolved oxygen and biochemical oxygen demand

In recent years, concern has grown about the spread of hypoxia (major oxygen deficiency) in the world's coastal seas as a result of coastal pollution. When oxygen levels decline as a result of pollution, they can have adverse effects on aquatic organisms, including slower growth rates, impaired immune response and, in severe cases, mortality. When oxygen concentrations become very low, they are described as either hypoxic, when levels fall below 2 mg/l, or anoxic, when there is 'no-oxygen' present.

The assessment of dissolved oxygen levels in 95 Irish transitional and coastal water bodies between 2010-2012 shows that the vast majority of waters (90.4% of the surface area assessed; 3,984 km^2) had satisfactory oxygen conditions capable of supporting nearly all forms of aquatic life. Furthermore, no hypoxia or anoxia was observed in any of the water bodies surveyed (Table 5-2). These findings are in good agreement with previous assessments, and confirm the more than satisfactory nature of oxygen conditions in Irish estuaries and nearshore waters (O'Boyle *et al*., 2009). Oxygen deficiency (values below 6.0 mg/l) was observed in 12 water bodies. Just two water bodies, the upper Lee Estuary in Cork City and McSwyne's Bay in Co. Donegal, had levels close to or below the threshold, which is likely to cause adverse effects in some sensitive marine organisms (i.e. ≤ 4.6 mg/l (Vaquer-Sunyer and Duarte, 2008). The low DO levels in the upper Lee Estuary in Cork City are probably due to historically enriched sediments from untreated sewage, while the low levels in McSwyne's Bay appear to be linked to elevated biochemical oxygen demand, following the collapse of an exceptional phytoplankton bloom which occurred in the coastal waters of western Ireland in the summer of 2012 (**see Box 1**).

Category value (mg/l)	Anoxic (0 - 0.5)	Hypoxic (0.5 - 2.0)	Deficient (2.0 - 6.0)	Sufficient (6.0-10.0)
Number (n)	0	0	12	83
(%)	0	0	12.6	87.4
Surface Area (km^2)	0	0	384.3	3,599.8
(%)	0	0	9.6	90.4

Table 5-2. Proportion of monitored water bodies in each dissolved oxygen (DO) category by number and surface area (3,690 km^2; total surface area monitored). Based on minimum (5‰) dissolved oxygen levels.

The effect of organic enrichment on oxygen conditions, as indicated by the biochemical oxygen demand (BOD) concentration, is shown in Figure 5-4, which shows that the majority of the 102 waters assessed had acceptable levels of BOD (i.e. EQS of 95 percentile less than 4 mg/l O_2). Some notable improvements were noted in the Middle Suir Estuary, where BOD levels have decreased since the last assessment (down from 6.1 to 2.5 mg/l BOD), and this may reflect the provision of secondary wastewater treatment for Waterford City which was commissioned in 2010.

In 13 water bodies or 13% of those assessed, the level of oxygen demand observed indicated the presence of substantial organic enrichment, with eight of these estuaries - Nore, Rogerstown, Glashaboy, Lee Estuary upper, Barrow Nore, Broadmeadow Water, Argideen, Owenacurra and Lower Bandon, having BOD 95 percentile values ranging from 5.0-7.8 mg/l O_2.

Overall, levels of BOD appear to have reduced, with the current and previous assessment indicating a considerable improvement on the 2002-2006 assessment, when nearly 32% of water bodies were in breach of the EQS.

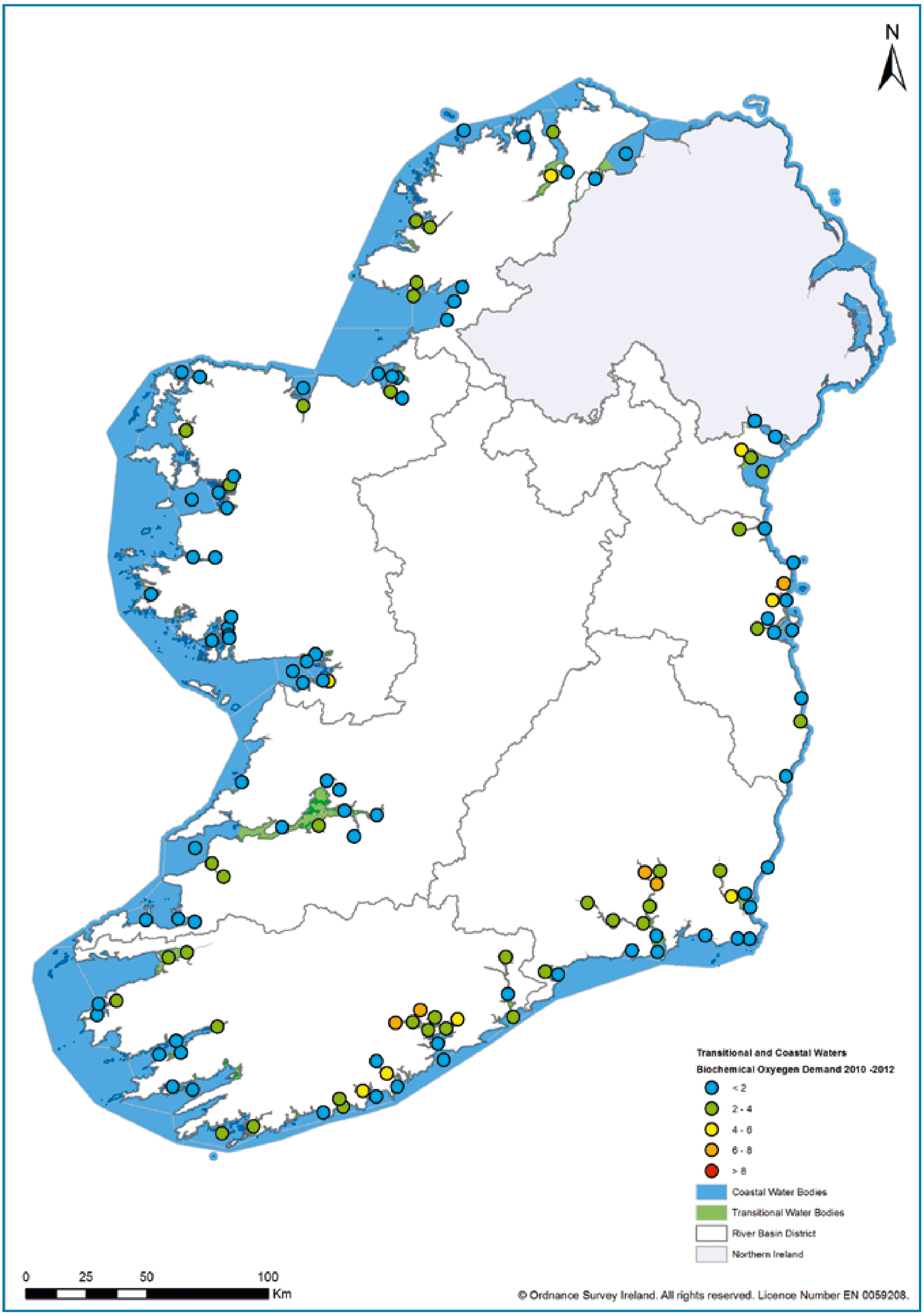
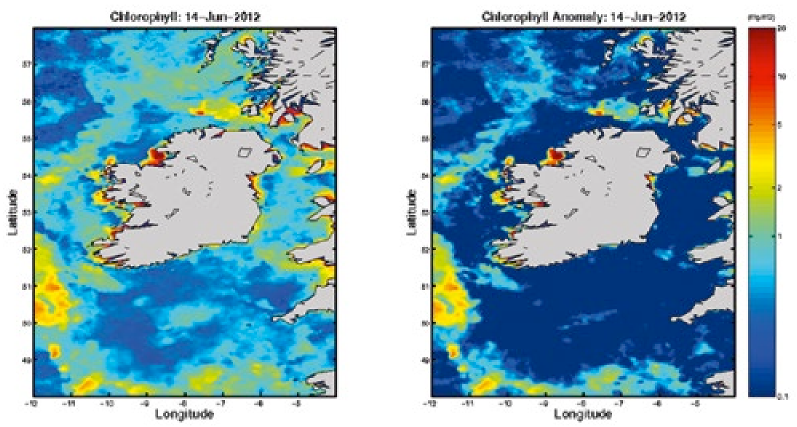


Figure 5-4. Summer (95%ile) biochemical oxygen demand concentration (mg/l) in transitional and coastal waters around Ireland 2010-2012.

Box 1. *Karenia mikimotoi* Bloom 2012

In the summer of 2012, there was an exceptional bloom of the dinoflagellate *Karenia mikimotoi* off Ireland's western seaboard. The formation of the bloom was associated with a period of calm settled weather. The bloom began in early June off the Donegal coast and persisted along the north-west coast until mid-July. A second bloom off Mayo began in mid-June and dissipated at the end of July. Maximum cell numbers of 4.5 million cells L^{-1} were reached at the beginning of July when the bloom peaked in Gweebarra Bay, Co. Donegal. Reddish-brown water was also reported in some coastal bays. The extent of the bloom was also apparent from satellite images, with the chlorophyll distribution and chlorophyll anomaly maps below showing the presence of the bloom in the surface waters of Donegal Bay on the 14th of June (Source: Marine Institute). While this phytoplankton species is non-toxic to humans, it does produce a toxin which can be an irritant to the gills of fish, shellfish and invertebrates, resulting in mortalities. There were considerable mortalities of vertebrates and invertebrates, including lugworms, cockles, Baltic Tellins, and sand eels. Dead fish were also found washed up onto the shore. The bloom also had a severe impact on oyster farms in Donegal Bay, where losses of between 20-80% occurred in some sites. Local sea anglers and prawn and lobster fishermen also reported low fish catches along the west and north-west during this time, which was probably due to fish avoiding the affected areas. Impacts on water quality were noticeable through changes in dissolved oxygen conditions in the water column. Supersaturation, excessively elevated dissolved oxygen levels, is associated with the bloom especially during the initial stages when the cells are growing and photosynthesing. This was very noticeable in late May in McSwyne's Bay and Gweebarra Bay, where a subsurface chlorophyll peak was associated with high dissolved oxygen levels. Another related impact is the depletion of oxygen in the water following the collapse of the bloom, which can affect organisms as well as water quality. This can be a problem, especially in areas where there is little water circulation. Dissolved oxygen levels in these areas were closely monitored by the EPA, and while some very low DO levels were found in the inner parts of some bays in Donegal during the 2nd week of July, these had nearly all returned to expected seasonal values by the end of August. In other more coastal waters, the bottom DO levels had returned to expected values by early 2013, probably due to winter mixing of the water column.



Biological quality elements

A number of biological elements have been used to provide an ecological assessment of transitional and coastal water status. In transitional waters, the biological element which displayed the greatest deviation from reference condition was the marine plants, with 40% of areas assessed using this element having moderate or worse ecological status. Marine plants include intertidal opportunistic macroalgae, rocky shore macroalgae and marine angiosperms. Of these three, opportunistic macroalgae is the element responsible for all the moderate or worse ecological status classifications. This element is responsible for the poor ecological status of the Argideen and Rogerstown estuaries in west Cork and County Dublin, where extensive mats of algae cover the intertidal area and impact negatively on the ecology of both estuaries. In the Rogerstown estuary, mats of opportunistic algae are found overgrowing the intertidal seagrass beds and this, in turn, is impacting on the status of both biological quality elements.

Opportunistic macroalgal accumulations in the Clonakilty Harbour, Co. Cork, August 2011.

The biological elements with the next highest percentage of moderate or worse classifications are the benthic invertebrates at 28%, followed by fish at 22%, and phytoplankton at 20%.

In coastal waters, and not surprisingly, given the much better status of these waters, the assessment of the biological elements indicates either high or good ecological status, with the exception of five water bodies where benthic invertebrates have shown a moderate deviation away from reference condition, and a single water body (Malahide Bay), where the element green opportunistic macroalgae was also at moderate status.

Overall, the status and response of the biological elements indicate that the main pressures impacting on biological status are nutrient and organic enrichment, and these impacts are mostly restricted to transitional waters. Furthermore, the strong correlation between phytoplankton biomass and biochemical oxygen demand (BOD) in these areas indicates that most of the organic enrichment is generated internally (endogenous) from phytoplankton blooms enriched by elevated nutrients, and not delivered externally (exogenous) from rivers or from discharges from wastewater treatment plants (O'Boyle et al., 2013). This implies that measures to control nutrient enrichment may be the most effective way of improving the ecological status of these waters. The absence of exogenous nutrient enrichment may be an indirect indicator of the improvements that have been achieved by reducing external loadings of organic matter to estuaries, primarily through the provision of improved levels of wastewater treatment.

Specific pollutants

Annual average concentrations for all WFD water bodies sampled in 2012 for copper, arsenic and zinc complied with national standards set in SI 272 of 2009. Total chromium is measured in water, and further speciation is required if concentrations are above the Environmental Quality Standard for chromium VI. This was not the case, so chromium is deemed compliant.

In the year 2012, the pesticides linuron and glyphosate were also tested for in TraC water bodies but not detected in any samples.

Similarly, volatile organic carbons (VOCs) (xylenes and toluene) were not detected in any samples, with the exception of one single measurable concentration in a sample from Kilkieran, albeit at a level far below the EQS.

Hydromorphological pressures

Hydromorphological pressures may also be relevant, particularly in relation to potential impacts on benthic invertebrates and fish populations, but the link between these pressures and ecological status in Irish tidal waters needs further investigation. As an initial step in assessing these pressures, a Geographical Information System (GIS) based tool called the Transitional and Coastal Waters Morphological Impact Assessment System (TraC-MImAS), developed by the UK Technical Advisory Group (UKTAG), has been adopted and applied in Ireland. The tool was designed to provide an assessment of the potential impact of physical structures and morphological alterations upon the overall hydromorphological condition of transitional and coastal waters. The principle is based on assessing the relative size of the footprint of different structural and morphological changes to water bodies. Footprints above specified size thresholds are considered to represent risk to the ecological status of the water body.

TraC-MImAS was first used in Ireland in 2007 to inform the morphological condition classification of TraC water bodies for the purposes of WFD assessment and reporting. The tool was reviewed and further developed in 2012 to provide a more accurate assessment of the current degree of alterations.

A recent assessment of 68 transitional and coastal waters in Ireland using TraC-MImAS indicated that, in 50 (73%) water bodies, the overall level of hydromorphological alteration was not likely to be causing an effect on ecological status. Of the remaining water bodies, nine water bodies (13%) were determined as being of moderate morphological condition, and 10 (14%) were determined to be of poor or bad morphological condition, indicating that 27% of water bodies assessed may be at risk of not being capable of supporting the biological elements due to the degree of structural modification. Work is ongoing to further investigate whether the levels of physical disturbance are actually impacting on biological communities.

Chemical status

Chemical status is assessed by compliance with environmental standards for priority substances and priority hazardous substances that are listed in the WFD (Annex X) and the Environmental Quality Standards (EQS) Directive (2008/105/EC). These priority substances and priority hazardous substances include metals, pesticides, and various industrial chemicals. The first round of the national monitoring programme for these substances commenced in late 2011, and was completed at the end of 2014. The monitoring was undertaken by the Marine Institute on behalf of the EPA. In the 2010-2012 assessment period, 14 areas were assessed for compliance against water-based EQSs, and 32 areas were assessed for compliance against biota-based EQSs.

Water sampling was undertaken monthly in 2012 between Lough Swilly in Co. Donegal and Kinvara Bay in Co. Galway (the remaining areas were sampled in 2013 and 2014). Biota sampling of the common mussel (*Mytilus edulis*) was undertaken in late 2011 from around the Irish coast. The compliance of water results for each water body is assessed against Annual Average (AA) EQSs and Maximum Allowable Concentration (MAC) EQSs. At present, biota EQSs are limited to three substances; mercury, haxachlorobenzene and hexachlorobutadiene. The results of these assessments are given in Appendices 6 and 7.

With the exception of mercury in water, which exceeded the MAC EQS in Broadhaven Bay and Mulroy Bay, there were no EQS exceedances in any of the other 12 areas where water-based EQSs were assessed. The exceedance in Mulroy and Broadhaven only occurred in one of 12 samples collected, so the overall confidence in this result is low. It cannot be ruled out that these anomalous measurements were artefacts of testing or sampling. Indeed, a thirteenth sample collected in Mulroy Bay in 2012, near to the WFD sampling site, was less than the analytical LOD of 0.01 µg $L^{-1.}$

Monitoring using the common mussel in 32 areas showed no exceedances in the biota-based EQS for mercury, hexachlorobenzene and hexachlorobutadiene, with the exception of four areas (Cork Harbour, Cromane, Lee (Tralee) Estuary and Rogerstown Estuary) which exceeded the EQS for mercury. The mercury EQS has been set at 20 µg Kg^{-1} wet weight to protect piscivorous wildlife against secondary poisoning. It should be noted that the concentrations were well below standards for fishery products[31] and therefore, do not pose a risk to human health. The EQS is at the analytical Limit of Quantification (LoQ) for the method of analysis for mercury in shellfish and, moreover, close to the concentration of mercury routinely detected in shellfish from Irish waters. Directive 2008/105/EC indicates that Member States can take account of background concentrations for metals if they prevent compliance with an EQS. OSPAR (Oslo Paris Convention) use a Background Assessment Concentration (BAC) of 90 µg kg^{-1} dry weight (~18 µg kg^{-1} wet weight). If this approach was taken, all the results from the 32 areas sampled would be within or close to the EQS+BAC. There is little guidance on how to apply the biota EQS (e.g. MAC vs. Average), or how to account for natural variability and interspecific and intraspecific biological factors that influence concentrations. It is clear that the mercury biota EQS would be consistently exceeded in marine and freshwater fish tissue, as concentrations in fish are higher than in mussels (McGovern et al., 2011; Vignati et al., 2013). Mercury has been identified as a ubiquitous PBT under Directive 2013/39/EU. These are persistent, bioaccumulative and toxic substances (PBTs), and other substances that behave like PBTs. They can be found for decades in the aquatic environment at levels posing a significant risk, even if extensive measures to reduce or eliminate emissions of such substances have already been taken. Some are also capable of long-range transport and are largely ubiquitous in the environment. Therefore, non-compliant results do not infer specific issues local to a water body or indeed river basin district.

There were very few detections for polyaromatic hydrocarbons (PAHs) measured in water [priority harzardous substances: –anthracene, benzo(a)pyrene, benzo(b+k) fluoranthene and benzo(ghi)perylene + indeno (1,2,30cd)-pyrene; and priority substances: fluoranthene, naphthalene]. Monitoring results all complied with AA-EQS and, where available, MAC-EQS, with the exception of sum of benzo(ghi)perylene + indeno (1,2,3 cd)-pyrene. In this case, no assessment could be carried out, as the reported LOQ exceeded the very low AA-EQS three-fold, although for each parameter, all reported results were below the Limit of Quantification.

Volatile Organic Compounds in water [benzene, trichlorobenzenes, dichloroethane, dichloromethane (all priority substances)] were generally below LOQs (only two detections from 168 samples for dichloromethane), and are all reported as compliant with AA-EQS and MAC-EQS (benzene only).

31 European Commission Regulation (EC) No.1881/2006 as amended by Regulation 629/2008 sets maximum levels for certain contaminants, such as mercury, cadmium and lead, in fishery products

Alkylphenols [four nonylphenol (priority hazardous substances) and four octylphenol (priority substances)] were not detected in water at any of the WFD stations sampled in 2012. However the phthalate, DEHP, was detected in approximately 11% of samples, with an individual maximum of 1.76 µg L^{-1} found in Kinvarra Bay. While the two highest measurements were from Kinvarra (August and September, 2012), both exceeding the AA-EQS of 1.3 µg L^{-1}, all other values were <0.03 µg L^{-1} at this location, and the overall annual average for Kinvarra and all other water bodies sampled in 2012 complies with the AA-EQS.

The pesticides diuron, atrazine and simazine were not detected in any of the water samples and, as the detection capabilities for the methods are well below the AA-EQS, these are reported as compliant for all WFD water bodies sampled.

In biota, hexachlorobenzene (HCB) and hexachlorobutadiene (HCBD) were determined in mussel samples that were obtained from 32 of the 46 WFD target water bodies. Hexachlorobenzene was detected at low concentrations in all samples (range 0.01 – 0.06 µg Kg^{-1} wet weight) and this was well below the WFD EQS of 10 µg Kg^{-1} wet weight set for biota. Hexachlorobutadiene was not detected in any sample, indicating HCBD concentrations were below 0.002 µg Kg^{-1} wet weight in all samples, which is well below the WFD EQS of 55 µg Kg^{-1} wet weight.

In addition to monitoring these three substances in biota, the presence of tributyl tin (TBT) in the common mussel is also assessed. This information is not used for WFD chemical status assessment because there is no recognised biota-based EQS for this substance. However, this information, together with regular surveys of 'imposex' in the Common Dogwhelk (see **Box 2**), provides useful information on the presence and distribution of this contaminant in the marine environment.

As the WFD monitoring programme continues, further information on these contaminants in water will be provided, to ensure as complete a picture as possible of chemical status of transitional and coastal waters can be provided. Based on this initial analysis, however, it is expected that the chemical status of transitional and coastal waters is mostly good.

Box 2. TBT-specific effects in Dogwhelks (*Nucella lapillus*) around the Irish coast

The common dogwhelk is a useful biological indicator of tributyl tin (TBT) pollution effects. Female dogwhelks are particularly sensitive to TBT contamination and can develop male sex characteristics, including the development of male genetalia – a term referred to as 'imposex' .

In 2010 and 2011, the degree of imposex in female dogwhelks was assessed at 63 sites around the Irish coast from Carlingford Lough (Co. Louth) to Mulroy Bay (Donegal Bay) (Wilson et al., 2014). Trends in imposex since 1987 were also examined. Over 75% of the sites examined met the OSPAR Ecological Quality Objective, but a number of sterile females (EcoQO not met) were found at 14 of the 63 sites, including Killybegs, Castletownbere, Cork Harbour and Waterford Harbour (Dunmore East).

Comparison with previous surveys revealed little change up to 2005, but a substantial and significant improvement thereafter. At 10 locations, levels were shown to significantly decrease between middle (1996-2004) and early (1987-1995) surveys, with a more significant decrease evident between recent (2005-2011) and earlier surveys, indicating ongoing improvement.

Protected area status

The purpose of the WFD is to provide a general level of protection for all groundwater and surface waters (rivers, lakes, transitional and coastal waters) aiming to restore and maintain waters at good status or better. In addition, water-related protected areas may have other environmental objectives which must also be achieved under specific legislation. As the objectives and standards set by different directives may differ (as the function or attribute they protect may differ), it is possible for a water body to be at good or high status, while the protected areas within these water bodies may be failing to meet the requirements of the protected area legislation (e.g. microbiological standard in shellfish flesh). In many cases, the general objectives of the Water Framework Directive are compatible with the objectives of other directives. For example, in the case of the freshwater pearl mussel, the WFD objectives are compatible with the conservation objectives for this species (SI 296 of 2009). There are some other cases, however, where existing conditions may be favouring a protected species or habitat, but the status of the water body under the WFD is less than good. This may be due to the presence of a hydromorphological alteration (e.g. impoundment) or nutrient enrichment, which may be favouring a protected species or habitat, but which may be impacting on the general environmental conditions of the water body. In such circumstances, the general objectives of the WFD prevail (EC, 2011), as these seek to protect the entire ecosystem and not specific species or habitats. However, there are cases where the species or habitat should receive priority, if that particular water body or site is important to the conservation of that attribute on a national or regional biogeographic scale. These are just some of the considerations that need to be taken into account in the river basin management process, to ensure the correct balance is struck between water quality objectives, nature protection, and the sustainable use of these natural resources.

In the following sections, the authors provide an assessment of whether or not the water-related environmental objectives of protected areas, which occur in transitional and coastal waters, are being met.

Urban Wastewater Treatment Directive (UWWTD) designated sensitive waters

In Ireland, 19 estuaries have been designated as sensitive waters (S.I. 254 of 2001, S.I. 440 of 2004, S.I. 48 of 2010) under the Urban Wastewater Treatment Directive. The estuaries designated as sensitive (**Table 5-3**) were deemed to be displaying symptoms of eutrophication or potential eutrophication, as defined in both the Nitrates Directive and Urban Wastewater Treatment Directive. These symptoms include nutrient enrichment by compounds of nitrogen and phosphorus, accelerated growth of algae and higher forms of plant life, and the undesirable disturbance to the balance of organisms present and to the quality of the water concerned. The definitions used in both directives recognise the complexity of the linkages between the cause and response of water bodies to nutrient enrichment, and to be categorised as eutrophic, water bodies must display each of the symptoms listed above. This approach is different to the 'one-out-all-out' approach of the WFD, which means that moderate status under the WFD may not always correspond to eutrophic status under the Nitrates and UWWT Directives. The weight of evidence approach recognises that moderate deviations from reference conditions under the WFD may not necessarily result in an undesirable ecological disturbance. This may well be the case in a nutrient-enriched estuary, where factors, such as poor light availability in the water column and short residence times, inhibit the "accelerated growth of algae and higher forms of plant life", with the result that no undesirable ecological disturbance (e.g. algal bloom) arises (O'Boyle *et al.*, 2015). Conversely, a moderate deviation in any one of the elements included under the WFD may be indicative of an emerging environmental issue, and it might be more sensible to take action before this deviation results in a negative impact on the environment.

Area	
Broadmeadow Estuary (Inner)	Cashen / Feale Estuary
Liffey and Tolka Estuaries	Killybegs Harbour
Slaney Estuary (Upper)	Castletown Estuary
Slaney Estuary (Lower)	Blackwater Estuary Upper
Barrow Estuary	Blackwater Estuary Lower
Suir Estuary (Upper)	Lee Estuary/Lough Mahon
Bandon Estuary Upper	Owennacurra Estuary/North Channel
Bandon Estuary Lower	Clonakilty Harbour
Lee Estuary Upper (Tralee)	Boyne Estuary
Feale Estuary Upper	

Table 5-3. Estuaries designated as sensitive waters under the Urban Wastewater Treatment Directive.

Trophic status of Irish waters

In Ireland, the presence of eutrophication is assessed using the Trophic Status Assessment Scheme (Toner et al., 2005). The scheme compares the compliance of individual parameters against a set of criteria indicative of trophic state. These criteria fall into three different categories which broadly capture the cause-effect relationship of the eutrophication process, namely nutrient enrichment, accelerated plant growth, and disturbance to the level of dissolved oxygen normally present. The occurrence of these symptoms of eutrophication is used to classify the trophic status of tidal waters as follows:

Eutrophic water bodies are those in which criteria in each of the categories are breached, i.e. where elevated nutrient concentrations, accelerated growth of plants, and undesirable water quality disturbance occur simultaneously;

Potentially Eutrophic water bodies are those in which criteria in two of the categories are breached and the third falls within 15% of the relevant threshold value;

Intermediate status water bodies are those which breach one or two of the criteria;

Unpolluted water bodies are those which do not breach any of the criteria in any category.

The assessment of estuarine and coastal waters for the period 2010-2012 is shown in **Figure 5-5.** Of the 102 water bodies included in the assessment, seven (6.9%) were classed as eutrophic, nine (8.8%) as potentially eutrophic, 28 (27.5%) as intermediate and 58 (56.9 %) were unpolluted (**Figure 5-5(a)**). In terms of surface area, only 78.5 km^2 or 1.7% of the total area assessed (4,314 km^2) is classed as either eutrophic or potentially eutrophic (**Figure 5-5(b)**).

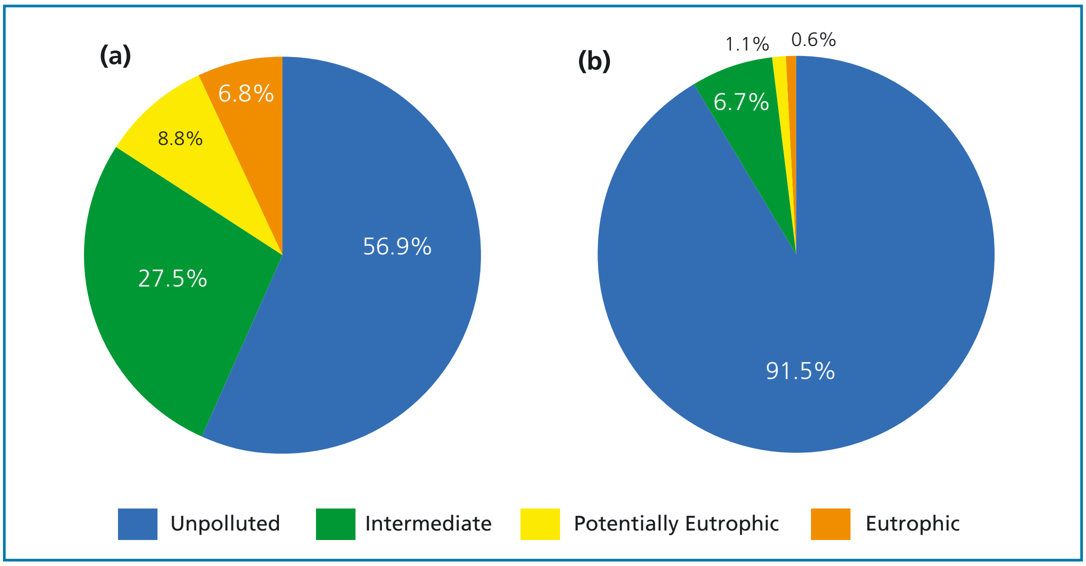


Figure 5-5. Percentage of water bodies in each of the trophic status categories by a) number (n = 102) and b) surface area (4,314 km^2).

The trophic status of nearly all water bodies nationally was based on monitoring results from a selection of representative water bodies. This national overview is shown in **Figure 5-6.** The national picture is similar to that from monitored water bodies, with 63% of water bodies classified as unpolluted, 20% as intermediate, 8% as potentially eutrophic, and 5% as eutrophic. In 4% of water bodies, there was insufficient information to extrapolate trophic status.

The results of this assessment appears to confirm an overall improvement in water quality which was evident in the last report (McGarrigle et al., 2010). Five fewer water bodies have been classed as eutrophic (or potentially eutrophic) when compared to the previous assessment (2007-2009). These are inner Dundalk Bay, Malahide Bay, North Channel Great Island, upper Barrow Estuary and the Colligan Estuary, with inner Dundalk Bay showing the most improvement, having improved from being eutrophic to unpolluted. The lower Blackwater Estuary has also improved in status and has, for the first time since assessments began, been classed as unpolluted. The reasons for this improvement in trophic status are elaborated upon in **Box 3**, which also includes a series of maps showing the temporal improvement in trophic status.

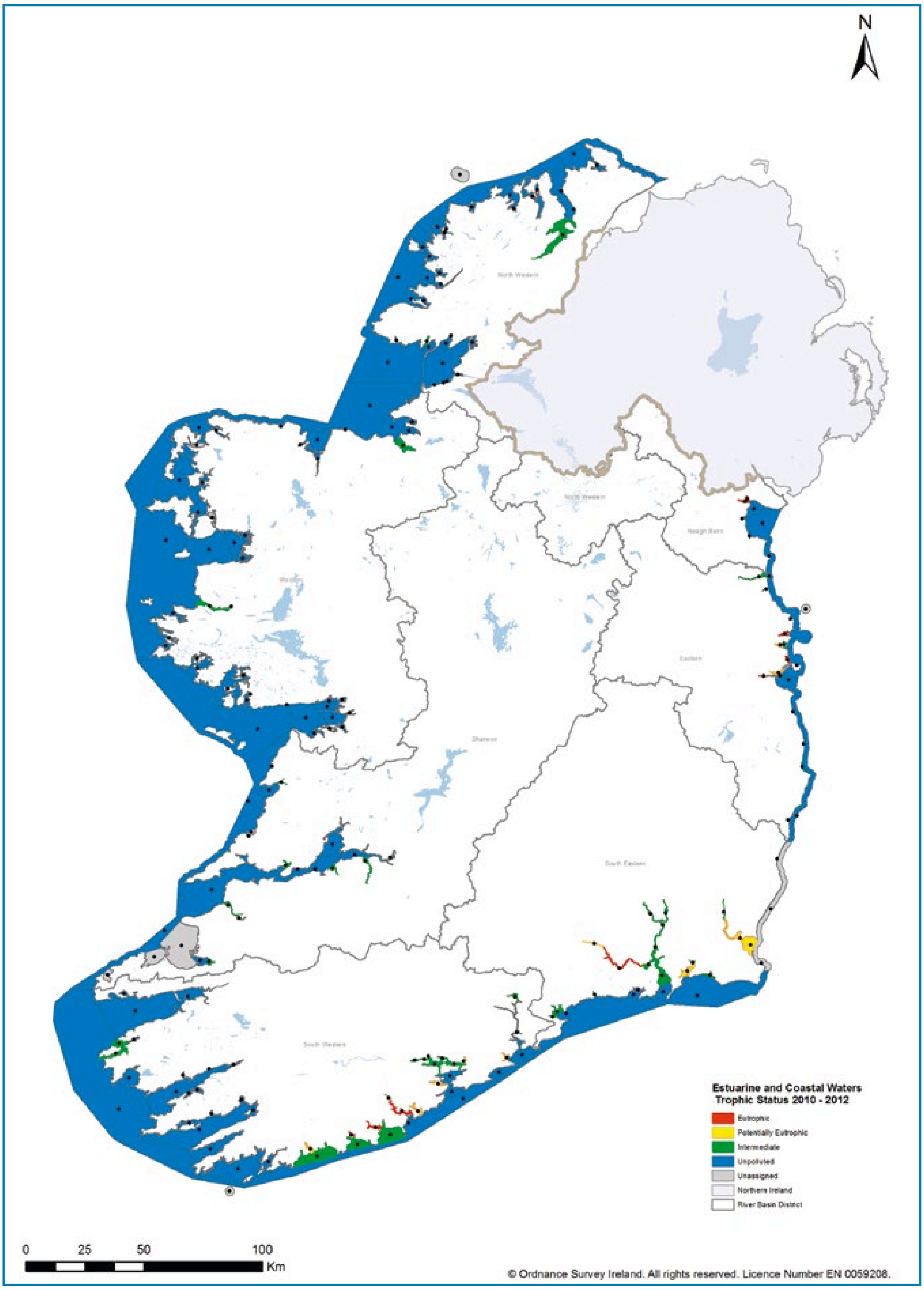


Figure 5-6. Trophic status of estuarine and coastal waters around Ireland 2010-2012.

There have also been some disimprovements. Rogerstown Estuary and the upper Liffey Estuary have deteriorated in status and are now categorised as eutrophic, while Wexford Harbour, Owenacurra Estuary and the Glasaboy Estuary have been classed as potentially eutrophic. These areas had previously been classed as intermediate. Clonakilty Harbour, which was not assessed previously, was also found to be eutrophic, mainly due to the presence of excessive amounts of green opportunistic macroalgae.

A comparison of trophic status assessments going back to the mid-1990s is shown in **Table 5-4**. While the number of areas included in this assessment has increased in recent years due to the implementation of the Water Framework Directive, the proportion of water bodies in each status category is likely to be broadly representative of trophic conditions in Irish estuarine and coastal waters as a whole (see **Figure 5-6**).

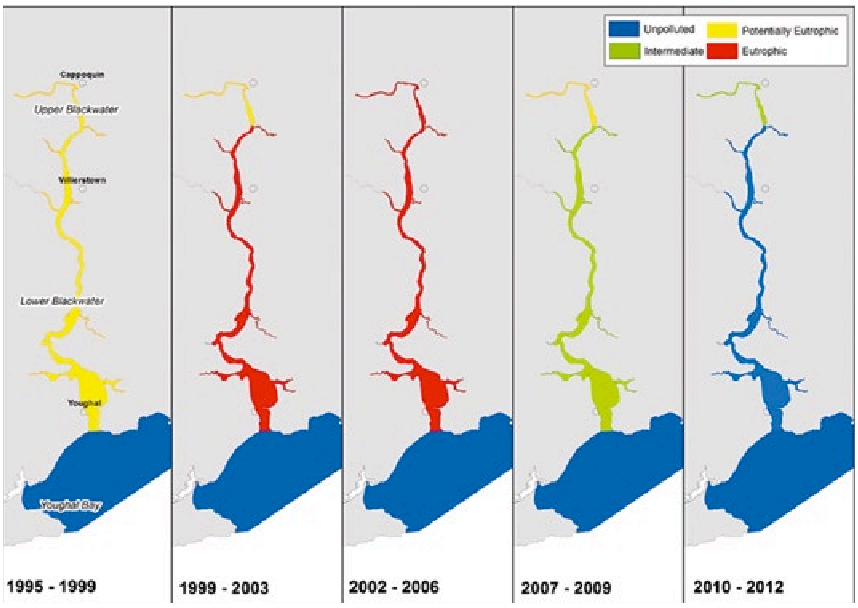
Water Bodies	Trophic Class	1995-1999	1999-2003	2002-2006	2007-2009	2010-2012
Numbers	Eutrophic	15	12	13	9	7
	Potentially Eutrophic	3	3	2	5	9
	Intermediate	18	28	27	31	28
	Unpolluted	24	26	27	44	58
	Total	**60**	**69**	**69**	**89**	**102**
Percentage	Eutrophic	25.0	17.4	18.9	10.1	6.9
	Potentially Eutrophic	5.0	4.3	2.9	5.6	8.8
	Intermediate	30.0	40.6	39.1	34.8	27.5
	Unpolluted	40.0	37.7	39.1	49.5	56.9
	Total	**100**	**100**	**100**	**100**	**100**

Table 5-4. Summary of Trophic Status Assessment Scheme analysis from 1995 to 2012.

Box 3. Improvements in the trophic status of the Blackwater Estuary

The Blackwater Estuary, which previously had been classed as eutrophic, has shown a marked improvement in water quality and is no longer considered to be eutrophic. The series of maps below show the improvement in trophic status, from eutrophic and potentially eutrophic in the mid-1990s and 2000s, to unpolluted in the period 2010-2012. An assessment of the main nutrient inputs to the catchment has shown, from 2000 to 2011, a decrease in nitrogen (N) and phosphorus (P) loads of 17% and 20% respectively. Over the same time period, inorganic fertiliser application rates in the catchment have declined, resulting in a 34% and 53% reduction in N and P loadings respectively. This reflects a drop in national fertiliser usage rates over the last decade (Lalor *et al*., 2010). Sheep numbers in the catchment have also decreased by 70%, from 270,000 to 80,000, in the last 20 years. Wastewater treatment plants (WWTPs) and one-off housing, while representing a small fraction of the total load (1.3% of N and 7% of P), have increased slightly over the last 20 years. This increase is due to a rise in population of 21% which has offset, at least in mass balance terms, the improvement in the level of wastewater treatment. Long-term monitoring of river nutrient inputs reflect the reductions in calculated loadings over the last decade, with decreases in nitrogen and phosphorus to the estuarine system observed between 2000 to 2010 (Ní Longphuirt *et al*., 2015).

Within the estuary, phosphate concentrations have shown significant reductions from 1997 to 2012, indicating a response to reduced loadings from the river catchment. Dissolved oxygen saturation has also improved throughout the estuary, with increases being most evident in the upper estuary, while chlorophyll a, a proxy for phytoplankton biomass, decreased significantly in the lower estuary. No decrease in nitrogen concentrations was observed, which suggests a de-coupling between nitrogen loading and estuarine responses, in that the phosphorus-driven decline in water column primary production may have resulted in a reduction in the biological uptake of available nitrogen. However, the potential impact of increased nitrogen transport downstream to N-limited coastal waters, as the nitrogen-filtering capacity of the upper estuary weakens, will require further investigation.



Urban wastewater treatment

The main environmental objective of the Urban Wastewater Treatment Directive, and the national regulations implementing the Directive, is to provide specified levels of treatment based on the size of the agglomeration and the type of water body to which the wastewater is discharged (freshwater, estuarine or coastal, sensitive or non-sensitive). The Directive also specifies mandatory effluent quality standards for discharges from larger agglomerations. In Ireland, there were 170 such larger agglomerations in 2012. The Directive requires 'appropriate treatment' at all other agglomerations, i.e. those below the threshold size of the larger agglomerations.

In 2012, 93.9% of the wastewater load generated at urban areas subject to the wastewater discharge licensing programme received at least secondary treatment, with the remaining 6.1% receiving primary treatment, preliminary treatment or no treatment (EPA, 2014). These figures illustrate the continued increase in the provision of secondary treatment. In 2001, for example, only 29% of the wastewater load received at least secondary treatment, with the remaining 71% receiving only primary treatment or no treatment.

Nevertheless, at the end of 2012, seven large urban areas which discharge to estuaries or coastal waters did not meet the UWWTD requirement to have secondary treatment in place (Arklow, Clifden, Cobh, Killybegs, Passage West/Monktown, Ringaskiddy and Youghal). In the case of Arklow, Killybegs and Ringaskiddy, the provision of treatment was due by the end of 2000. Furthermore, in 2012, nine agglomerations, with a population equivalent greater than 10,000, five of which discharge to estuaries and coastal waters, did not meet the requirement to provide infrastructure to reduce nutrients and did not meet nutrient quality standards for discharges to nutrient-sensitive areas. The five areas discharging to estuaries and coastal waters are: Killybegs, Dundalk, Cork City, Carrigtohill and Dublin City.

The directive sets mandatory limits on the concentration of biochemical oxygen demand (BOD), chemical oxygen demand (COD) and, in the case of certain discharges to sensitive areas, total phosphorus and total nitrogen in waste-water discharges from larger agglomerations. While almost 94% of urban wastewater received at least secondary treatment, 44 of the larger urban areas did not achieve the mandatory effluent quality and sampling standards set in the Directive in 2012.

Shellfish waters

The Shellfish Waters Directive (2006/113/EC) establishes mandatory values for a range of environmental parameters which must be complied with, as well as guide values which Member States must aim to achieve. The directive is implemented in Ireland by the Quality of Shellfish Waters regulation (S.I. No. 268 of 2006) which sets the guide and mandatory values for trace metals, organohalogens and microbiological pollutants in shellfish waters and shellfish flesh.

In Ireland, 64 areas have been designated as shellfish waters (S.I. No. 268 of 2006, S.I. No. 55 of 2009, S.I. No. 464 of 2009). In the sections below, the level of compliance against both mandatory and guide values for each of the parameters listed in the national regulations implementing the Directive is summarised.

Trace metals, organohalogens and physico-chemical parameters

In 2011, water samples for the assessment of metal concentrations were collected from 44 shellfish areas. In all samples, dissolved metal concentrations (arsenic, cadmium, chromium, copper, lead, nickel, silver and zinc) were compliant with the mandatory values. Furthermore, these water concentrations were also less than the WFD EQS established in the Surface Water

Regulations (S.I. No. 272 of 2009). An analysis of physico-chemical parameters (i.e. salinity, temperature, dissolved oxygen, pH and suspended solids) did not indicate any significant disturbance to the physico-chemical environment and its ability to support shellfish populations.

Contaminant levels in shellfish flesh from different species (common mussel, native oyster, Pacific oyster and cockle) were sampled from 26 areas, to assess the compliance of these areas against guide values for metals and organohalogens in shellfish flesh. All areas, with the exception of a single sample of cockle, which exceeded the guide value for nickel, were in compliance with the guide values. This likely reflects the fact that different species of mollusc regulate trace metals differently and the relatively high concentration of nickel in cockles is typical of this species.

Microbiological quality

A guide value for faecal coliforms (Parameter 10) of ≤ 300 faecal coliforms in 100ml of shellfish flesh and intravalvular liquid is set out in the Annex to the Directive. The Directive stipulates that three-quarters (75%) of samples should conform to this guide value and that monitoring should be based on a programme of quarterly sampling.

In order to make use of existing monitoring and testing programmes using established and accredited analytical test procedures, levels of *E. coli,* rather than faecal coliforms, have been monitored to assess compliance with the guide value. Within shellfish, *E. coli* levels have been quoted as usually making up between 75 to 95% of the overall levels of faecal coliform present but may make up as little as 1% in some areas of low level faecal pollution. The value of 75% has been taken by many workers as a conservative average for an equivalence figure. Previously, this figure was used as the value for determining equivalence between *E. coli* and faecal coliforms in the shellfish hygiene directive. Therefore for assessment purposes, a value of ≤ 230 *E. coli* Most Probable Number (MPN) 100g-1 was considered equivalent to the directive guide value of ≤ 300 faecal coliforms MPN 100g-1.

This value is used by the Marine Institute to assess the microbiological quality of designated shellfish growing areas monitored between February 2009 and November 2012 (Marine Institute, 2013). Nearly two-thirds (65.1%) of the designated areas monitored over the four-year period were compliant with the guide value of ≤ 230 *E. coli* MPN 100g-1 on 75% or more of sampling occasions (Marine Institute, 2013). Of the non-compliant areas, the worst performing were Bannow Bay, Bantry, Dunmanus Inner, Kinsale, Tralee Bay, and Wexford Harbour Inner, where more than 50% of the samples exceeded the guide value. The compliance results for individual shellfish areas for this period are available from the Marine Institute (www.marine.ie).

Shellfish production areas

In order to ensure the quality of shellfish for human consumption, controls are placed on the waters used for shellfish cultivation and harvesting. Since January 2006, the controls are driven by the EC Hygiene Regulations (Nos. 852/853/854 of 2004) which lay down specific rules for food of animal origin. The Sea Fisheries Protection Authority (SFPA), established in January 2007, is the competent authority in Ireland for classifying shellfish production areas.

A shellfish sanitation monitoring programme, based on a number of parameters including microbiological criteria and levels of E. coli, for classifying shellfish growing waters has been in operation in Ireland since 1985. The scheme of classification has three categories, in addition to a prohibited one, and the criteria for the classification of shellfish harvesting areas are shown in **Table 5-5**.

Classification	E. coli per 100g of live bivalve mollusc flesh and intravalvular fluid[1]	Treatment Required
Class A	<230	None
Class B	<4,600	Purification, relaying in Class A or cooking by an approved method
Class C	<46,000	Relaying for a long period (2 months) to meet Class A or B requirements or may be heat treated
Prohibited	>46,000	Harvesting not permitted

1 Five-tube, three dilution Most Probable Number (MPN) test

Table 5-5. Classification scheme for shellfish production areas.

In 2008, a new code of practice on microbiological monitoring was implemented in which three years' data were used, prior to which classifications were determined every six months based on the previous year's data. The 2012 classification of shellfish production areas in Ireland classified 138 production beds in 61 production areas: 39 (28.3%) were classified as class A, 19 (13.8%) classified as 'seasonal' class A and 69 (50.0%) as class B, while a single production bed in each of Waterford Harbour and Wexford Harbour were classed as C. A small number of areas were given a preliminary classification and this occurs when an area is being classified for the first time or after a period of suspension in production. The term may also be used where results are incomplete. The results for each area can be viewed on the SFPA website (www.sfpa.ie).

Trends in pressures impacting on TraC waters

The EPA has been involved in two major programmes over many years to assess changes in pressures which potentially impact on the status of transitional and coastal waters. Both of these programmes have been instigated by the Oslo Paris Convention for the Protection of the marine environment of the North-East Atlantic – OSPAR. The OSPAR Riverine Inputs and Direct Discharges programme has been in operation since 1990, and assesses the annual river and direct input of nutrients and other substances to the marine environment. The OSPAR PARCOM Source Apportionment programme undertakes a periodic assessment of nutrient loadings from different sources.

Trends in river inputs

Analysis of trends in nutrient loads in 20 major Irish rivers between 1990 and 2010 (**Table 5-6**) indicate a statistically downward trend in total phosphorus and total ammonia in the majority of rivers, and a downward trend in total nitrogen in half the rivers. The Corrib river appears to show a slight upward trend in total ammonia, however this is due to a change in laboratory procedures and is unlikely to reflect a real increase in loadings from the Corrib catchment.

River	Total Phosphorus		Total Nitrogen		Total Ammonia	
	Trend	(Tonnes Yr-1)	Trend	(Tonnes Yr-1)	Trend	(Tonnes Yr-1)
Avoca	Downward**	-0.97	Downward***	-189.08	Downward***	-94.18
Bandon	No change	-0.91	Downward**	-46.92	No change	-1.12
Barrow	Downward***	-6.38	No change	-64.33	Downward***	-3.44
Blackwater	Downward***	-19.29	Downward*	-170.66	Downward**	-12.96
Boyne	Downward***	-4.28	Downward*	-74.85	Downward**	-3.02
Corrib	No change	-0.62	No change	-49.40	Upward*	2.24
Deel	Downward***	-3.54	No change	-23.89	Downward**	-2.07
Dodder	Downward***	-0.49	No change	-3.80	Downward*	-0.18
Erne	No change	-0.01	Downward*	-48.17	No change	0.47
Fergus	No change	-0.91	No change	-10.99	Downward*	-0.66
Lee	No change	-0.64	Downward**	-73.93	Downward*	-2.17
Liffey	Downward***	-3.88	Downward***	-35.62	Downward***	-3.36
Maigue	Downward***	-7.09	Downward**	-60.36	Downward**	-3.57
Moy	No change	-0.93	No change	-20.34	No change	-0.48
Nore	Downward***	-7.35	No change	-55.28	Downward***	-3.67
Shannon old channel	Downward***	-5.68	No change	-54.21	Downward**	-4.03
Shannon Tail race	Downward*	-5.75	Downward*	-114.87	No change	0.12
Slaney	Downward***	-7.30	No change	-38.32	Downward***	-4.13
Suir	Downward***	-10.59	No change	-7.16	Downward***	-9.46
Tolka	Downward***	-0.62	Downward***	-9.64	No change	-0.22

Table 5-6. Trends in river loadings of nutrients to the marine environment between 1990-2012. The degree of significance is indicated by a significance code: not significant (NS), *; p<0.05, **; p<0.01, ***; p<0.001. Asterisks indicate degree of significance.

Comparing nutrient loadings for the most recent three-year period (2010-2012) to the first three-year period (1990-1992) indicates how substantial the reduction has been in the loadings of these nutrients to the tidal waters environment. This is particularly evident for loadings of total ammonia and total phosphorus, which has shown a percentage decrease of 80.5% and 56.2% or 4,506 and 1,457 tonnes respectively. For total nitrogen, the corresponding percentage reduction is 35.5% or 33,759 tonnes. The figures for total nitrogen and total ammonia are skewed somewhat by inclusion of the figures for the Avoca river, which has seen a remarkable 93.7% and 99.2% reduction in total nitrogen and total ammonia respectively, following the introduction of a licensing regime in a large fertiliser production plant on the Avoca river in the late 1990s and its closure in 2002. If these reductions are removed from the national figures, the percentage reduction in national loadings of total phosphorus, total nitrogen and total ammonia would be 56.2% (unchanged), 25.2% and 36.1% respectively.

In the next section, the results of the OSPAR PARCOM Source apportionment work gives some initial indications of what might be responsible for the observed decreases in nutrient loadings to the marine environment.

Trends in nutrient sources

The PARCOM Source Apportionment (PSA) programme uses a set of published guidelines (Harmonised Quantification and Reporting Procedures for Nutrients) to estimate the potential loading from various sources, such as agriculture, urban wastewater treatment, industry, unsewered populations, and forestry. The estimated percentage contributions of nitrogen and phosphorus from each source are shown in **Figure 5-7.** For nitrogen, the largest source is agriculture (87.5%), followed by urban wastewater treatment (4.9%), and forestry (1.7%), with unsewered industry, and unsewered populations and other sources representing less than 6% of the total nitrogen loading. For phosphorus, the largest source is agriculture (49.2%), followed by urban wastewater treatment (28.7%), with peatlands, background losses, unsewered populations, and forestry each accounting for about 5% of the total phosphorus loading. These figures show that nitrogen sources are primarily coming from diffuse sources, while phosphorus sources are coming from a mixture of point and diffuse sources.

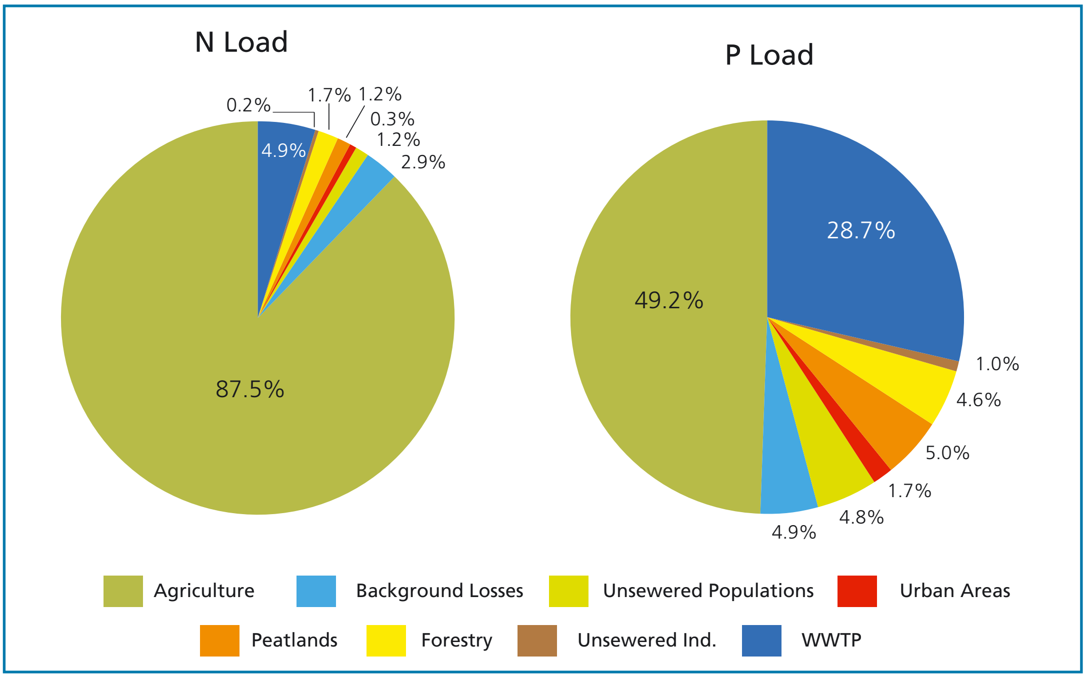


Figure 5-7. Relative contribution of sources of discharges and losses of nitrogen and phosphorus to the marine environment (Based on estimates from 2012).

A comparison of the relative change in nutrient sources between the present assessment and an earlier assessment carried out in 1995 is shown in **Table 5-7**. Before interpreting the values given in this table, it is important to point out that these values represent the potential amount of nutrient at source, and do not take into account the processes (e.g. retention and attenuation) which might occur between the source of the nutrient and its eventual input to the marine environment (i.e. the pathway). Nevertheless, this exercise provides a valuable assessment of the relative change in individual nutrient sources, which in turn provides valuable information on what is driving change in these sources. When all sources combined for the present period are compared to the earlier period, there has been an estimated 27.1% and 17.0% reduction in sources of phosphorus and nitrogen respectively. Sources of phosphorus from forestry, peatlands, urban areas and unsewered populations have increased, while sources from urban wastewater, unsewered industries, background losses and agriculture have decreased. Sources of nitrogen from urban wastewater, forestry, peatlands and urban areas have increased, while sources from unsewered industries, unsewered populations, background losses and agriculture have decreased.

The biggest reduction, in absolute terms, was seen in the agriculture sector, with a 37.7% reduction (equating to just under 2,000 tonnes) in phosphorus loadings. This is mostly accounted for by the reduction in the use of inorganic phosphorus fertiliser following the introduction of improved farming practices and, in particular, the management of inorganic fertiliser application. The amount of in organic phosphorus fertiliser usage in 2008, for example, is less than half of what it was in 1995 (Lalor *et al.*, 2010). The next most obvious reduction in both nitrogen and phosphorus is from unsewered industry, which is down by 74.8% and 86.6% respectively. While there is some uncertainty in relation to these figures, this reduction may reflect the connection of unsewered industries to municipal sewage treatment networks. This, in turn, may explain the increase in nitrogen loadings from municipal wastewater treatment plants, which might have been expected to have seen a reduction in nutrient loadings given the general improvement in the level of treatment seen in recent years (see earlier section on urban wastewater treatment). It would appear that improved levels of treatment and retention of nutrients has been offset somewhat by the increase in the loadings from newly-connected industries and previously unsewered populations, which has also seen a significant fall. Overall, improved wastewater treatment and capacity has reduced the nutrient loading that would otherwise be emitted to the water environment from these sectors.

2012	N Load Kg yr^{-1}	% Difference from 1995	P Load Kg yr^{-1}	% Difference from 1995
WWTP	8,451,652	6.1	1,863,268	-12.1
Unsewered Industries	305,761	-74.8	63,647	-86.6
Forestry	3,014,509	44.4	300,500	84.6
Peatlands	2,131,174	10.5	327,343	10.0
Urban Areas	592,467	94.3	112,545	90.7
Unsewered Populations	2,023,145	-32.7	312,526	9.2
Background Losses	5,041,712	-12.5	319,956	-16.1
Agriculture	151,413,194	-18.7	3,196,976	-37.7
Total	**172,973,615**	**-17.0**	**6,496,761**	**-27.1**

Table 5-7. PARCOM - National Source Apportionment Assessment 2012 and comparison with 1995 Source Apportionment Exercise.

If the authors compare the relative percentage reduction figures obtained from the PARCOM source apportionment work and that based on river inputs, they see that both approaches indicate a reduction in both nitrogen and phosphorus loads (**Table 5-8**). The reduction in nitrogen loads estimated from the two approaches are broadly similar, but the estimated reduction in phosphorus loading, based on river inputs, is more than double what it is from the source apportionment approach (56.2% versus 27.1%). Previous comparisons of both approaches had indicated good agreement for both nitrogen and phosphorus, so the reason why the agreement is less good on this occasion is unclear. One possible explanation which requires further research, is that as sources of phosphorus have decreased, the river catchment is becoming a much better filter for any available phosphorus. Another explanation could be the effect of measures which have been put in place in recent years to reduce the loss of nutrients from both diffuse and point sources.

	N Load (% Diff)	P Load (% Diff)
Source apportionment	-17.0	-27.1
River inputs	-25.2	-56.2

Table 5-8. Comparison of nutrient reductions derived from the PARCOM Source Apportionment Exercises undertaken in 1995 and 2012 and nutrient reductions in river loadings between 1990-1992 and 2010-2012.

Other issues relevant to the marine environment

Radioactivity in the marine environment

Radioactivity monitoring in the Irish marine environment is carried out by the EPA Office of Radiological Protection. The primary focus of its marine monitoring programme is to assess the radiation doses to the Irish population arising from discharges from the Sellafield reprocessing plant and to assess the geographical and temporal distribution of artificial radionuclides in the marine environment.

The exposure of the Irish population to radioactivity in the marine environment is assessed by measuring concentrations of radioactivity in samples of a wide range of fish and shellfish collected from commercial landings at major Irish fishing ports and aquaculture areas. Seawater and seaweed are analysed from coastal sites and sediment samples are taken at offshore sites in the western Irish Sea. Caesium-137 is measured in sediments to assess levels of radionuclides from historic discharges, as remobilisation from sediments is now the predominant source of marine activity in the Irish Sea. The most recent report on marine monitoring covers the years 2010 and 2011 (McGinnity et al., 2012).

Analysis of seawater and seaweed samples showed that caesium-137 and technetium-99 trends were the same as in previous reports. Concentrations of caesium-137 have remained relatively constant since the mid-1990s, while technetium-99 has shown a reduction in activity since 2004. This corresponds to a reduction of discharges of this radionuclide. Both nuclides showed the same geographical distribution where the highest concentrations were found on the north-east coast. The monitoring of technetium 99 in seawater ceased at the end of 2010 due to the recent reductions in its concentrations. In seaweed, caesium-137 has remained relatively constant since the mid-1990s, while technetium-99 activity concentrations showed a similar pattern observed in seawater, where levels peaked in late 1997 and early 1998 and have reduced significantly over the last few years.

Caesium-137 concentrations in fish and shellfish were also similar to those detected in previous years. Most technetium-99, plutonium-238 and plutonium-239,240 activity concentrations in the samples were below detection limits.

In general, the levels of radioactive contamination present in the marine environment do not warrant any modification of the habits of people in Ireland, either in their consumption of seafood or in any other use of the amenities of the marine environment (McGinnity et al., 2012)[32].

A survey for tritium in Irish seawater began in 2008 (Currivan et al., 2013). Tritium is of importance as it is included in the list of radioactive substances of interest to the OSPAR Convention. Up to now, the low radio-toxicity of tritium means it has not been included as a radionuclide of interest in the ORP's routine environmental programme. Over the three-year period, 85 seawater samples were collected and the majority were found to have tritium concentrations below the minimum detectable activity of 1 Bq/L. Twelve (14%) samples analysed contained measureable amounts of tritium at concentrations 0.9-2.4 Bq/L. Overall, the concentration of tritium in seawater samples around the Irish coastline are low when compared to tritium concentrations measured in seawater in the eastern Irish Sea. The EPA is continuing to monitor tritium in seawater, as the operational discharges of tritium from Sellafield are expected to increase due to decommissioning activities for the period 2011-2015.

32 www.epa.ie/radiation

Oil pollution incidents

One of the responsibilities of the Irish Coast Guard is to develop and co-ordinate an effective regime in relation to preparedness and response to spills of oil and hazardous and noxious substances from ships and offshore platforms within the Irish Exclusive Economic Zone. The Coast Guard's responsibilities also include the establishment and the maintenance of a National Contingency Plan for marine pollution, preparedness and response.

The major maritime incidents causing, or with potential to cause, oil pollution that occurred between 2010 and 2012 are summarised in **Tables 5-9** and **5-10**.

The Irish Coast Guard investigated 46 incidents in 2010, 41 in 2011, and 47 in 2012. Mineral oils accounted for 63%, 39% and 51% respectively of the polluting material observed annually between 2010 and 2012, and of these, diesel and gas oils were most frequently identified. The majority of spills in 2011 and 2012 were less than one tonne. However, in 2011 the grounding of one fishing vessel resulted in a reported 35 tonnes of diesel fuel lost, and in 2012 an estimated spill of five tonnes of heavy oil took place in Dublin Port. There were 17 reported oil pollution events in 2012 where the estimated volume of discharges is not known. The number of reported oil pollution events that beached on the shoreline was respectively two, three and one in 2010, 2011 and 2012. However, because light oils disperse relatively quickly, a true picture of spills and the extent of spills is not known.

The overall geographical pattern indicates that the majority of oil discharges occurred in the smaller harbours and their surrounding areas. In 2010, 37% of incidents were reported in the open sea, with 12% in 2011, and 51% in 2012. The number of incidents reported for the open sea should be treated cautiously, as the Coast Guard has no dedicated aerial surveillance capability and depends on reports from shipping and commercial traffic. The number of reported incidents concerning offshore oil or gas installations remained similar to previous years (two in 2010, one in 2011 and five in 2012) (**Table 5-11**). Details of pollution incidents reported to the Irish Coastguard over the current assessment period are shown in Table **5-12**.

	Mineral Oil	Garbage	Sewage	Chemicals	Other Substances	Other*	Threats**	Total
2010	29	-	-	2	13			46
2011	16	-	-	-	6	19		41
2012	24	-	-	3	4		16	47

* Reported incidents including ship casualty, where pollution reports were investigated but reports could not be verified.

** Threats are incidents generating Coast Guard Pollution reports, such as a grounding, vessels not under command, tows, etc., but with no actual pollution.

Table 5-9. The total number of incidents reported by category of pollution in the Irish Exclusive Economic Zone from 2010 to 2012.

	Open Sea	Tidal River/ Estuary	Bay/near shore waters	Beach/ Shore	Port/ Harbour	Other*	Total
2010	17	4	9	10	6		46
2011	5	4	3	4	6	19	41
2012	24	2	5	4	12		47

* Reported incidents including ship casualty, where pollution reports were investigated but reports could not be verified.

Table 5-10. The distribution of received reports of pollution in 2010, 2011 and 2012 by marine environmental zone within the Exclusive Economic Zone.

	Shore	Unknown	Fishing Vessel	Oil Tanker	Cargo Vessel	Offshore Oil/Gas Installation	Pleasure Craft	Wreck	Dredger
2010	5	13	17	1	3	2	4	1	-
2011	3	8	5	-	2	1	2	1	-
2012	3	18	10	-	10	5	1	-	-

Table 5-11. The breakdown of pollution sources in 2010, 2011 and 2012.

Location	Year	Vessel	Incident	Outcome
Dublin Port	2012		An estimated spill of 5t of heavy oil.	Spill was contained within the port and Pollution and Water Services attended on behalf of the Port.
Irish Exclusive Economic Zone	2012	MSC Flaminia	Vessel caught fire in mid-Atlantic, with a number of containers lost overboard during an associated explosion.	At end of August, a number of containers from the casualty were reported adrift in the Irish Exclusive Economic Zone, some with residues of Hazardous and Noxious substances. Monitoring took place and assistance was given to salvage operators to locate and recover some of these.
Dingle Bay	2011	FV LeStiff	Vessel hit charted rock. Weather was favourable for dispersion.	Vessel not permitted to enter Dingle by harbour master due to pollution and no repair facilities. Vessel proceeded to Cork for dry dock. Lost 9t diesel from forward tanks and continued to lose up to 25t from mid-tank.
South-East of Helvick Head	2010	MV BG Dublin	7 containers lost overboard, one of which contained approx. 11t of a hazardous material.	Containers all sunk and contents started to come ashore. The hazardous material was Sodium Bromate which is soluble in water and the packaging was cardboard. There was no trace of this coming ashore. Extensive area of coastline showed signs of the other cargo (plastic containers, firelogs and surgical nappies) coming ashore, and local authorities were responsible for the clean-up.
Drogheda Harbour	2010	FV Ros Aine	Sunk	Booms were deployed to contain spill. The vessel was raised on the 12th and 450lts of diesel removed.

Table 5-12. Specific details of pollution incidents reported to the Irish coast guard between 2010-2012.

Conclusions

This chapter has provided one of the most comprehensive assessments of the environmental status of transitional and coastal waters ever undertaken. The analysis has shown that the vast majority of coastal waters (by surface area) are at good or high ecological status, indicating that these waters have the capacity to support ecologically healthy and diverse marine communities. The proportion of transitional waters at good and high status is considerably less, at 36% by number of water bodies and 45% by surface area, indicating the greater influence of human activity on this water category.

In terms of chemical status, the results to date indicate that the majority of transitional and coastal waters will be at good chemical status.

While nearly two-thirds (65.1%) of the designated shellfish areas monitored over the four-year period were compliant with the guide value for *Escherichia coli,* there were a number of non-compliant areas where more than 50% of the samples exceeded the guide value. The worst performing were Bannow Bay, Bantry, Dunmanus Inner, Kinsale, Tralee Bay, and Wexford Harbour Inner. It is likely that additional measures may be required to achieve the quality objectives for shellfish waters in these areas.

Radioactive substances from the nuclear reprocessing plant at Sellafield in England continue to be discharged to the Irish Sea, though exposure to these substances is not considered to pose a significant health risk to the Irish public.

Downward trends in nutrient loads to the marine environment are now apparent, with significant reductions in riverine nutrient inputs. This downward trend is also apparent in the reduction in nutrient sources, particularly from the agriculture sector, which has seen an 18.7% and 37.7% reduction in nitrogen and phosphorus sources respectively. The reduction in nutrient inputs is contributing towards an improvement in the trophic status of estuarine waters, as evidenced by the improvements seen in the Blackwater Estuary in recent years. A number of estuaries, however, mainly in the south-east and south of the country continue to display symptoms of nutrient enrichment and have been classed as eutrophic. The hydrological complexity and related sensitivity of these estuarine waters means that a thorough case-by-case characterisation of these estuaries will be required, to ensure that the most effective measures are put in place to improve their status.

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 Aeráide, Ceadúnaithe agus Úsáide Acmhainní
- An Oifig Forfheidhmithe i leith cúrsaí Comhshaoil
- An Oifig um Measúnú Comhshaoil
- An Oifig um Cosaint Raideolaíoch
- 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.

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Headquarters
PO Box 3000,
Johnstown Castle Estate
County Wexford, Ireland

T: +353 53 916 0600
F: +353 53 916 0699
E: info@epa.ie
W: www.epa.ie
LoCall: 1890 33 55 99

Regional Inspectorate
McCumiskey House,
Richview, Clonskeagh Road,
Dublin 14, Ireland

T: +353 1 268 0100
F: +353 1 268 0199

Regional Inspectorate
Inniscarra, County Cork,
Ireland

T: +353 21 487 5540
F: +353 21 487 5545

Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny, Ireland

T +353 56 779 6700
F +353 56 779 6798

Regional Inspectorate
John Moore Road, Castlebar
County Mayo, Ireland

T +353 94 904 8400
F +353 94 902 1934

Regional Inspectorate
The Glen, Monaghan, Ireland

T +353 47 77600
F +353 47 84987

Regional Offices
The Civic Centre
Church St., Athlone
Co. Westmeath, Ireland
T +353 906 475722

Room 3, Raheen Conference Centre,
Pearse House, Pearse Road
Raheen Business Park, Limerick,
Ireland
T +353 61 224764

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