Integrated Water Quality Report 2012

MONAGHAN & LOUTH

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Environmental Protection Agency

The Environmental Protection Agency (EPA) is a statutory body responsible for protecting the environment in Ireland. We regulate and police activities that might otherwise cause pollution. We ensure there is solid information on environmental trends so that necessary actions are taken. Our priorities are protecting the Irish environment and ensuring that development is sustainable.

The EPA is an independent public body established in July 1993 under the Environmental Protection Agency Act, 1992. Its sponsor in Government is the Department of the Environment, Community and Local Government.

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- Office of Climate, Licensing, Research and Resource Use
- Office of Environmental Enforcement
- Office of Environmental Assessment
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet several times a year to discuss issues of concern and offer advice to the Board.

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Cover Photo – River Glyde at Castlebellingham, County Louth (Patricia Mallen, EPA)

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Contents

EXECUTIVE SUMMARY

Scope

This report presents a review of water quality in counties Monaghan and Louth in 2012. These counties lie within three River Basin Districts (RBDs):

- Neagh-Bann IRBD
- North-Western IRBD
- Eastern RBD

It is a step further along the road of transforming these reports into integrated water quality reports with greater emphasis placed on the reporting requirements of the Water Framework Directive and those of the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272 of 2009). This report therefore also aims to present an assessment of progress towards meeting the objectives of the WFD as set out in the respective River Basin Management Plans.

Physico-chemical data for several key parameters – Ammonia, Nitrate, ortho-Phosphate and Biochemical Oxygen Demand have been presented in map format whereby the annual mean values for each parameter have been presented as coloured dots on maps, with each dot representing a sampling station on a river.

As well as a section on river water quality, there are also sections on lakes, groundwater and transitional & coastal waters, which incorporate biological assessment as well as the physico-chemical assessments. Including these sections is recognition of the importance of these water types in the water cycle and the desire to produce a more integrated WFD-style report. Raw river, lake and groundwater monitoring data are presented on CD at the end of this report.

The report is based on the biological and physico-chemical sampling and analysis of:

- 109 river stations on 35 rivers
- 16 lakes (in County Monaghan)
- 13 groundwater monitoring points
- 16 transitional (estuarine) and coastal waters (in County Louth)
- 4 designated bathing water sites (in County Louth)

Details of the ecological status of Irish waters for the period 2007-2009 as required under the Water Framework Directive are found on the EPA website[1]. The review of water quality is an on-going process and preparations are underway for the assessment and reporting of data for the second WFD reporting cycle. This report builds on the information collated to date.

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

Pressures

The portions of the three RBDs covered in this report can be sub-divided into 11 water management units (WMU). These are mapped in the Introduction and the key pressures are identified in the River Water Quality chapter. Many of the key pressures are common to all WMUs – large point sources such as waste water treatment plants and industrial effluents, small point source pressures e.g. from domestic waste water treatment systems (DWWTS) and farmyards and diffuse pressures from agriculture. Surface & groundwater abstraction points for drinking water are also common to all areas.

Discharges from waste water treatment plants are one of the main sources of pollution in Monaghan and Louth rivers. While there have been improvements in wastewater treatment in the last 10-20 years which has contributed to a general reduction in nutrient levels in rivers over this period, a number of rivers continued to be impacted by wastewater discharges in 2012. Further investment in infrastructure is required in order to achieve greater improvement in water quality and it is expected that the licensing of wastewater treatment plants by the EPA will further drive the upgrade of these plants.

Diffuse pollution from agricultural sources continues to be a significant pressure on river water quality in the north-east. The likely increases in farm outputs over the coming years, in the context of *Food Harvest 2020* will result in even greater pressures. The Nitrates Directive (SI 610 of 2010) is the main measure for addressing agricultural pollution. The second review of Ireland's Nitrates Action Programme is currently being carried out, and the retention of derogations already received from the commission will be critical to the success of *Food Harvest 2020*. However any derogation received will depend on Ireland's ability to show that water quality will not be adversely affected by any increase in agricultural outputs.

Nutrient loss from Domestic Waste Water Treatment Systems (DWWTS) in the form of phosphorus and nitrogen is of concern in terms of its threat to surface water and groundwater quality. In large catchments, it is likely that the nutrient load from DWWTS to surface water is relatively low compared to other pollution sources such as agriculture and wastewater treatment plants. In small catchments, however where the housing density is relatively high and where percolation conditions are problematical, DWWTS are likely to be significant contributor to pollution of surface water. Where groundwater nutrient levels are elevated, DWWTS are unlikely to be the main source except where there is a relatively high density of DWWTS overlying extremely vulnerable groundwater.

Rivers

The River Monitoring Programme covers the following areas:

- Operational Sites
- Surveillance Sites
- Investigative Sites

Operational and surveillance sites are monitored for a range of parameters and at suitable frequency, as required by the relevant legislation. The frequency of monitoring and the range of parameters are determined on a case by case basis for investigative sites. Priority substance monitoring on surveillance sites is also carried out and is co-ordinated by the EPA laboratory in Dublin.

Long term trend data for two key indicator parameters, namely ortho-phosphate and nitrate, indicates that overall, nutrient levels have fallen in the last 10-20 years. While the rate of decrease has slowed or even levelled off in some rivers in the last few years, there was a general improvement in 2012 in both ortho-phosphate and nitrate levels. The annual average ortho-phosphate in 48% of river sites exceeded the threshold for good status, compared with 65% in 2011 and the annual average nitrate in 28% of river sites exceeded the threshold for good status, compared with 30% in 2011.

Biological monitoring for rivers generally occurs at least once every three years. The number of high quality sites in the country has reduced by almost half in the period 1987 to 2008. Only three sites in Monaghan and Louth were classified as high quality (Q4-5) in the period 2010 to 2012 – a drop from the five sites classified as high quality in the previous 2009-2011 assessment period. In addition, only 40% of river channel length in this area is of high or good status compared with 73% nationally.

A total of 68 river sites in counties Monaghan and Louth have been identified as WFD priority polluted sites for tackling the causes of pollution (see section 2.4). The majority of problems at these sites are caused by diffuse agricultural and point source municipal pollution. Elevated ortho-phosphate and nitrate levels are of particular concern and one of the big challenges will be reducing these nutrient levels to acceptable concentrations in all rivers within the timeframes required by the WFD.

Tackling pollution at these sites will not only improve river quality, it may have knock-on beneficial effects on the lakes and transitional & coastal waters that are fed by these rivers. Targeted local investigations using a variety of methods – for example the Small Stream Risk Score (SSRS) in investigating diffuse pollution – will be the most effective way of identifying and eliminating sources of pollution.

Lakes

Sixteen lakes, all of which are in County Monaghan continued to be monitored under the Water Framework Directive. Of these lakes, only 1 lake (6%), Spring Lough, is of good ecological status with none being classified as high status. This compares very unfavourably with the national picture where 47% of lakes are of high or good ecological status and represents a deterioration compared to the 2008-2010 period when 2 lakes (12%) were of good ecological status. Given the current phosphorus levels in this lake, there is a danger that its status will be downgraded should phosphorus levels increase further. Rising trends for chlorophyll and phosphorus in some lakes are of particular concern. Diffuse pollution from intensive agriculture and small point source discharges from domestic waste water treatment systems (DWWTS) are thought to be the main pressures.

Groundwater

During 2012, 13 groundwater sites were monitored in Monaghan and Louth. Overall, water quality is good, over 95% of groundwater bodies by area are of good status, compared with 85% nationally. Compared to national figures, nitrate and ortho-phosphate levels are relatively low in County Monaghan, but the range of values in County Louth are more comparable to those seen nationally. There has been a general decrease in nitrate and ortho-phosphate levels over the period 2007 to

2012 with a noticeable decrease evident in 2012. Faecal Coliforms were detected in 19% of samples taken in Monaghan and Louth in 2012 and while this represents a slight improvement on the figure for 2011, it still highlights the need to protect groundwater sources so that safe drinking water can be provided without the need for increased levels of treatment. Diffuse agriculture and small point sources such as DWWTS and farmyards remain the main pressures on groundwater quality.

Transitional and Coastal Waters

Over 300 km^2 of transitional and coastal waters in 16 water bodies were monitored in the Monaghan-Louth area in 2012. Of these water bodies, five are assessed for ecological status, as defined under the Water Framework Directive; three are classified as being of high or good status with the remaining two being classified as moderate or worse. The change in trophic status for Castletown estuary from potentially eutrophic to eutrophic represents a deterioration in water quality; the percentage figures for intermediate and unpolluted trophic status are more comparable to national figures. In 2012, 75% of bathing waters monitored in County Louth were found to be of good status compared to the national figure of 67%. This represents a deterioration compared to 2011 and is also comparable to the deterioration seen nationally. Heavy rainfall events in 2012 are likely to have contributed to this deterioration.

Overall Assessment and Conclusions

Overall, water quality in Monaghan and Louth remains generally poor when compared with the rest of the country. While the quality of groundwater is good with 95% of groundwater bodies (by area) currently at good or better status, the situation for coastal & transitional waters, rivers and lakes is less encouraging. Currently, just 60% of coastal & transitional waters, 31% of rivers stations and 6% of lakes meet the target of good or better status as required under the WFD.

A total of 68 river sites in Monaghan and Louth have been identified as WFD priority polluted sites for tackling the causes of pollution. Reducing pollution at these sites should also result in improved conditions in lakes, groundwater, and transitional & coastal waters; – refer to section 2.4 and Appendix 4 which identify the suspected sources of pollution.

The low percentage of lakes in Monaghan currently at good or higher status is a real cause for concern. Unless significant action is taken, very few lakes, if any will reach the WFD target of good ecological status by 2015.

Pressures on water bodies in both counties arise from both point and diffuse source pollution. In particular, waters are affected by high levels of nutrients – especially nitrates and ortho-phosphates. Levels of both nutrients need to be reduced to achieve WFD targets.

Addressing the sources of pollution – especially diffuse pollution from agricultural sources and understanding the interactions between the various water bodies – rivers, lakes, groundwater and transitional & coastal waters is vital in retaining and restoring (where appropriate) good status to all water bodies.

The proposed expansion of the agriculture sector, as detailed in Food Harvest 2020, is an enormous economic opportunity for the country and will bring large increases in farm outputs over the coming years. While the majority of the planned expansion of dairy farming will be focussed in the east and south of the country, planned increases in the poultry sector in particular are likely to increase the threat of additional diffuse environmental pressures in the north east. The challenges of meeting the targets set in the strategy in an environmentally sustainable way are significant, and no reduction in the existing levels of protection provided by the 2010 Good Agricultural Practice regulations, nor in the targets set under WFD, should occur as a consequence of this plan.

The challenges associated with meeting the targets set under the WFD are significant and will require considerable effort from all stakeholders. While good progress has been made in recent years in terms of dealing with the larger point sources of pollution, pressures in relation to small point sources as well as diffuse (nonpoint) sources have proven to be much more difficult to address. It is unlikely that current approaches will be sufficiently effective at dealing with these causes of pollution and that new thinking may be required in this regard. The concept of 'Integrated Catchment Management' has been used effectively in other countries as a means of addressing the issues around small point and diffuse sources of pollution. Integrated Catchment Management places a greater emphasis on the need to integrate all aspects of catchment management in order to achieve greater environmental outcomes. While this concept may need to be developed and adapted in an Irish context, it may provide additional solutions to some of these challenges faced in meeting the requirements of the WFD.

1. INTRODUCTION

This report is an evolution of the annual reports on river water quality produced in previous years for the local authorities in Monaghan and Louth. It is also a sequel to those issued previously by the Environmental Protection Agency (EPA) and reviews the water quality monitoring carried out in accordance with the National Water Framework Directive Monitoring Programme for the period 2007-2012. This programme, which commenced in 2007, covers the principal water body types of rivers, lakes, groundwater and transitional (estuarine) & coastal waters. It was set up to address the requirements of Article 10 (1) of the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003). These regulations are the National Regulations implementing the requirements of the Water Framework Directive 2000/60/EC.

This report is a further step along the road to producing a more integrated water quality report that reflects the requirements of the Water Framework Directive. In this regard and in keeping with the format of last year's report, information on rivers, lakes, groundwater and transitional & coastal waters has been included.

The area covered in this report relates to parts of three RBDs, the Neagh-Bann, the North-Western and the Eastern. Figure 1.1 below shows the boundaries of the relevant RBDs in the Monaghan-Louth area. These two counties cover part of the three RBDs. Each RBD is subdivided into Hydrometric areas and divided again into Water Management Units.

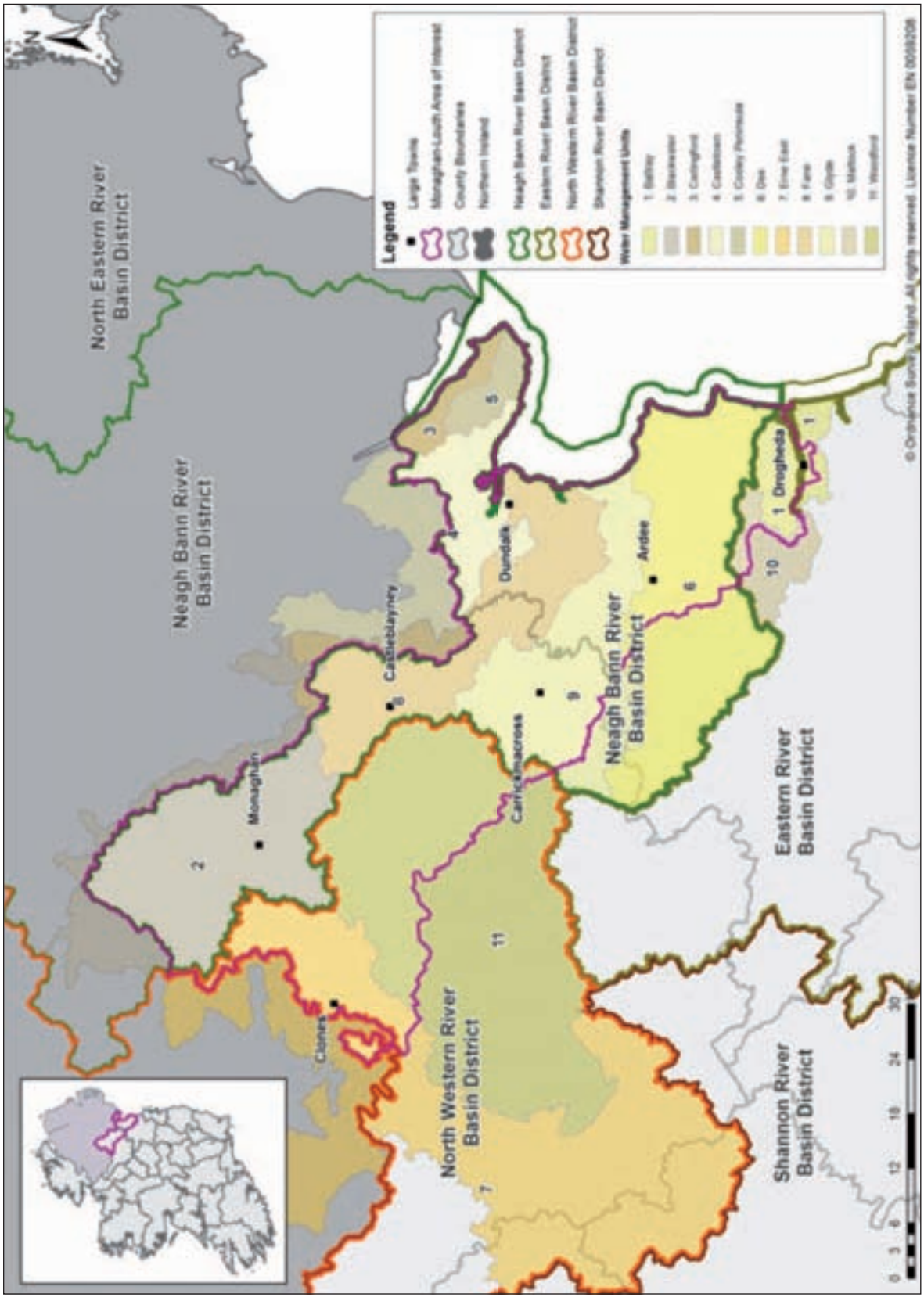
The WFD aims to maintain the high status of surface and groundwater, to prevent the deterioration of existing status of waters and to achieve high or good status for those waters by 2015.

More information on the EU Water Framework Directive can be obtained at *www.wfdireland.ie*. The WFD specifies three types of monitoring – Operational, Surveillance and Investigative. The EPA carries out surveillance monitoring of rivers and lakes, but also provides analytical services to Local Authorities in some areas, in respect of operational monitoring. The operational and surveillance monitoring and assessment of groundwater is undertaken by the EPA. The operational and surveillance monitoring and assessment of transitional and coastal waters is undertaken by the EPA and the Marine Institute, with input from Inland Fisheries Ireland and NPWS. Investigative Monitoring – aimed at identifying possible causes of pollution and steps required to improve conditions is a responsibility of Local Authorities but in some areas may be carried out by the EPA on behalf of the relevant Local Authorities.

The objectives of surveillance monitoring are:

- Supplementing and validating the impact assessment procedure detailed in Annex II of the Directive;
- Assisting the efficient and effective design of future monitoring programmes;
- Assessment of long term changes in natural conditions;
- Assessment of long term changes resulting from widespread anthropogenic activity;
- To provide an overall view of surface water status within the river basin district.

Figure 1.1 *River Basin Districts in the North East of Ireland*



Operational Monitoring aims to:

- Establish the status of those bodies identified as being at risk of failing to meet their environmental objectives;
- Assess any changes in the status of such bodies resulting from the Programme of Measures.

The first full period for the assessment of water quality covers 2009-2014. This report aims to present an assessment of progress towards meeting the objectives of the WFD as set out in the respective River Basin Management Plans. Details of these are available on the WFD Ireland website[2].

Change in Report Format

The format of this report is largely similar to the 2011 Report. The most significant change is the inclusion of long-term trend data in histogram format for two key parameters, namely, ortho-phosphate and nitrate. The following is noted in relation to the trend data:

- The use of rolling three-year means was the preferred approach as it overcame the problem of gaps in the data for certain years for some river stations. It also provides a more normalised display of the trends.
- Where data was available, the time period covered by the histograms is from 1978 to 2012. However, this time period varies due to a lack of data going back in time or unacceptably large time gaps in the data for some river stations.
- Trend data for six river stations for both ortho-phosphate and nitrate are presented in section 2.2 of this report while data for 55 river stations are presented in the Appendices which are available on CD at the end of the report.

2 http://www.wfdireland.ie/docs/1_River%20Basin%20Management%20Plans%202009%20-%202015/

2. RIVER WATER QUALITY

2.1 Sampling Locations

Under the Water Framework Directive, physico-chemical and biological monitoring is being undertaken at 109 stations on 35 rivers in Counties Monaghan and Louth. These sites were selected as representative of clean waters near the source of the river, or spring, and also at regular locations along the river, where sampling is convenient, safe and representative of the river in general. Sites were also selected downstream of discharges that might impact on the general quality of the river.

Table 2.1 *Type of Monitoring carried out on Rivers in the Monaghan and Louth Region*

Monitoring Type	Number of Sites
Physico-Chemical & Biological	56
Biological Only	42
Physico-Chemical Only	11

Further details of the WFD monitoring stations in Monaghan and Louth are given in Appendix 2. The WFD Monitoring Programme is currently being reviewed and the revised programme will form the basis of monitoring requirements for the period 2013-2018.

The frequency of physico-chemical monitoring depends on the legislative requirements. Operational monitoring which is the responsibility of Local Authorities is carried out at least four times annually at each site while surveillance monitoring which is undertaken by the EPA is carried out 12 times annually.

Biological monitoring is generally carried out once every three years at each site.

The number of sites relevant to each monitoring programme in the Monaghan-Louth area is given in table 2.2 below.

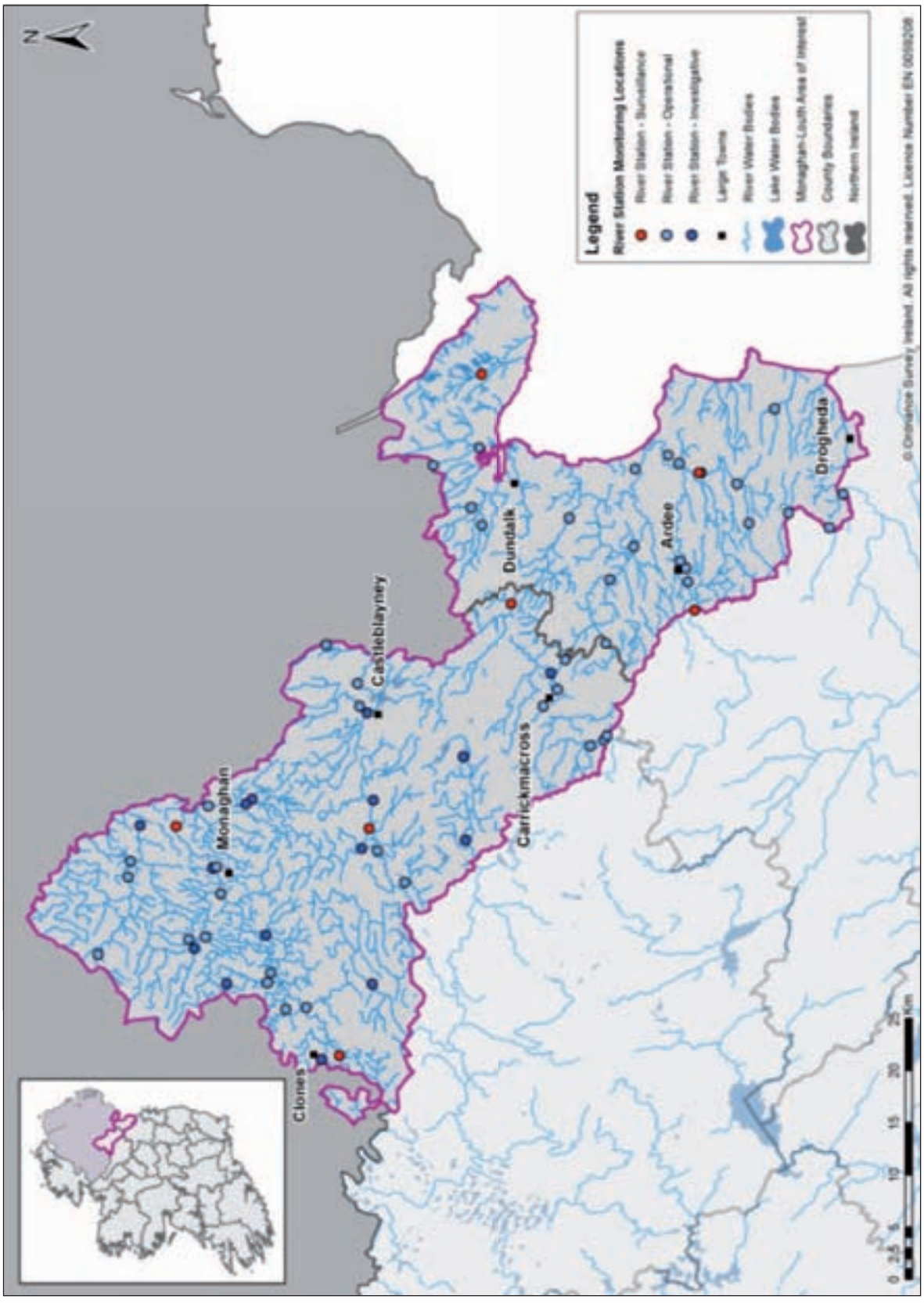
Table 2.2 *Number of Sites Monitored under each Programme in 2012*

WFD Monitoring Programme	Number of Sites
Operational	84
Surveillance	7
Investigative	18

Further information on the design and operation of National Monitoring programmes is available from the EPA website[3].

3 http://www.epa.ie/pubs/reports/water/other/wfd/

Figure 2.1 *Physico-Chemical River Monitoring Points in Monaghan and Louth*



2.2 Physico-Chemical Monitoring of Rivers

The monitoring of rivers in Monaghan and Louth under the WFD is carried out to fulfil the requirements of one of the following programmes:

- Operational Monitoring
- Surveillance Monitoring
- Investigative Monitoring

Operational sites are required to be monitored at least four times per annum and require the following monitoring: temperature, dissolved oxygen, pH, conductivity, hardness, colour, alkalinity, ortho-phosphate, TON, nitrate, nitrite, ammonium, chloride and BOD.

Surveillance sites are required to be monitored 12 times per annum for the general physico-chemical parameters listed above. There is also a requirement to monitor for priority substances (including certain metals and organic compounds) as part of the Surveillance Monitoring Programme.

River monitoring may also be carried out at sites other than those in the current WFD programme. These sites are classified as Investigative Monitoring stations and are monitored by (or on behalf of) Local Authorities for the purposes of assessing the impacts of localised pollution sources. The frequency of monitoring and the parameters monitored varies depending on specific local requirements.

In 2012, physico-chemical monitoring was carried out at a total of 67 stations as detailed in table 2.3 below.

Table 2.3 *Number of Sites Monitored for Physico-Chemical Parameters under each Programme in 2012*

Monitoring Programme	Number of Sites
Operational	49
Surveillance	7
Investigative	11

Figure 2.1 indicates the locations of the river monitoring sites at which physico-chemical monitoring was carried out in counties Monaghan and Louth in 2012. A full list of these stations is also given in Appendix 1.

As in previous reports, water quality in 2012 has been characterised on a broadly defined scale of "Un-polluted", "Slightly Polluted", "Moderately Polluted" and "Seriously Polluted" depending on the concentrations of nutrients such as ortho-phosphate, ammonium and TON, as well as the BOD data. Reference is also made to the latest biological Q-value. This approach is reflected in the individual river assessments given in Appendix 3.

The WFD has introduced a new system of ecological status which incorporates supporting general physico-chemical data and hydromorphological criteria. A separate system for assessing 'chemical status' for a short list of priority substances and priority hazardous substances as per Annex X of the WFD is also now in place. The latter is applied particularly at surface water surveillance monitoring sites. The general physico-chemical and priority substances are now assessed against their compliance with the criteria set out in the "European Communities Environmental Objectives (Surface Water) Regulations 2009" (*S.I. 272 of 2009*[4]).

In determining the ecological status of a river water body, a number of general physico-chemical parameters are assessed against annual mean and 95%ile standards which have been set for each. The assessment is based on a statistical approach whereby the pass/fail criterion requires 50% of these parameters, namely, ortho-phosphate, ammonia, BOD and nitrate to exceed the mean and 95%ile standards at a 99% confidence level. Assessment is typically based on three years of data. Dissolved oxygen is assessed on a one-out all-out basis using a compliance rule requiring 95% of samples to be >80% saturation and 95% of samples to be <120% saturation.

The key parameters are discussed in greater detail in the following sub-sections. It should be noted however that in these sections the maps present the data as face value comparisons against the relevant EQS rather than using the aforementioned statistical approach. This is due to the fact that in order to determine the chemical status using this statistical approach requires a sufficient population of data. In this regard, it is normal to determine chemical status using data over three years. Because this report is based on the assessment of 2012 data only, determination of status was deemed inappropriate.

Information on the main water quality parameters can be found in Appendix 7, and raw river data is provided in Appendix 8 of this report.

2.2.1 Phosphate in River Waters

Significance of Phosphate in River Water: River water quality monitoring has shown increased eutrophication in most Irish rivers since the 1970s. This is caused fundamentally by increased phosphorus run-off from agricultural land and farmyards, as well as from municipal and industrial effluent discharges (McGarrigle *et al.*, 2010).

Eutrophication in surface waters arises from the marked increase in nutrient supply leading to excessive growth of algae or other plants. Phosphorus is usually the limiting nutrient for plant growth in freshwaters. It is an essential element for life and is non-toxic. Plants require phosphorus (along with other nutrients) for growth and a small amount of phosphorus in surface waters is natural.

However, if natural levels of phosphorus are exceeded, there can be excessive plant growth leading to high levels of photosynthesis (and oxygen production) during the day, followed by excessive respiration (and oxygen consumption) during darkness. This diurnal variation leads to a serious drop in oxygen levels at night which can have detrimental effects on water quality of the river. This in turn can disturb the ecological balance of the river leading to shifts in species composition, food-chain effects, increases in toxic algal blooms and collapse of populations of sensitive fish and other species.

4 http://www.environ.ie/en/Legislation/Environment/Water/FileDownLoad,20824,en.pdf

Ortho-phosphate is a very dynamic, biologically active substance and is freely removed from water by aquatic plants and algae, especially during the spring/summer/autumn period. Consequently, increases in eutrophication are not always evident from the analyses of ortho-phosphate in river water samples. In many instances, increased eutrophication is more evident from the biomass of plant and algae and from the effects of plant respiration and photosynthesis on dissolved oxygen and pH.

Much of the phosphorus added to soil in the form of agricultural fertiliser, or animal slurry, tends to accumulate in the top inch of soil. The surface soil layer can easily become saturated with phosphorus. Water can leach significant amounts of phosphorus from surface soil, especially during the early stages of heavy rainfall events. The higher the soil phosphorus content, the higher the potential for loss of phosphorus to waters (Tunney *et al.*, 2000). Rivers also receive direct discharges of wastes that contain various forms of phosphorus – e.g. sewage, animal slurry, industrial effluents, landfill leachate, etc.

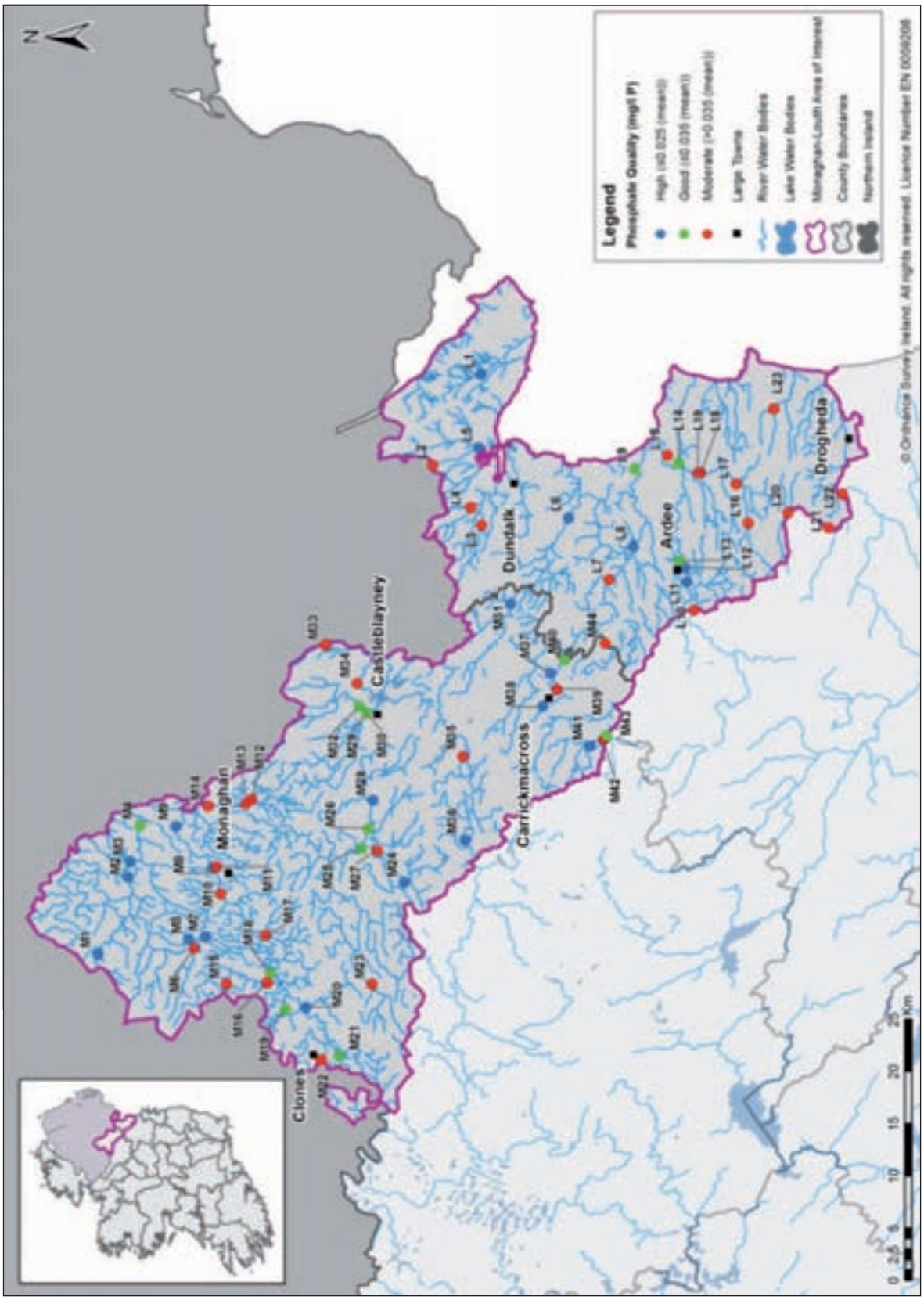
EU Directives and ortho-phosphate Standards for Water: The WFD standards replace the older Phosphorus Regulations and set standards for 'High' and 'Good' Status waters, which must be achieved when licensing discharges. Compliance with these environmental quality standards (EQS) is based on a statistical approach which requires 99% confidence that the EQS has been exceeded. An outline of the procedure used to incorporate general physico-chemical quality elements, including ortho-phosphate, is given in EPA (2011) published in conjunction with Water Quality Status Update 2008-2010.

Table 2.4 *Summary of the Relevant ortho-Phosphate Standards (as mg/l P)*

Water Framework Directive Inland Surface Waters SI 272 of 2009	
Annual Mean	**95%ile**
0.035 good	0.075 good
0.025 high	0.045 high

Figure 2.2 below shows the annual average ortho-phosphate concentration in Monaghan & Louth Rivers in 2012. The map is based on a face value comparison of the annual mean against the EQS for 'High' and 'Good' Status.

Figure 2.2 *Annual Average ortho-Phosphate in Monaghan and Louth Rivers in 2012*



In 2012, the annual average for 48% of the river stations monitored was above the EQS for 'Good' status (i.e. 0.035 mg/l P). This compares favourably to the figure for 2011 (65%), and reinforces the general downward trend for ortho-Phosphate in Monaghan and Louth rivers over the last 10 to 20 years. Despite this, ortho-phosphate levels do remain a cause for concern. The worst affected river stations in 2012 in decreasing annual average ortho-phosphate concentration are presented in table 2.5 below.

Table 2.5 *River Stations with the Highest Average ortho-Phosphate Concentration in 2012*

River Name	River Code/Station Number
Termonfeckin	06T01-0250
White (Louth)	06W01-0400
Dromore	36D02-0100
Proules	06P01-0300
Mattock	07M01-0100

Diffuse agricultural pollution is the main cause in the case of the Termonfeckin, Dromore and Mattock river stations. In addition to diffuse agricultural influences, the White River is also impacted by urbanisation influences from Dunleer village. The Proules is impacted by urbanisation pressures where a combination of waste water treatment plant discharges, unauthorised discharges and hard surface runoff are suspected to be the main issues.

Long-term ortho-Phosphate Trends: Rolling 3 year mean ortho-phosphate concentrations at 55 river stations in Monaghan and Louth are presented in Appendix 5. Long term trends for six of these river stations are presented in Figure 2.3.

In many of the rivers assessed in Monaghan and Louth, ortho-phosphate levels were at their highest in the mid 1990s and have fallen significantly since then as a result of mitigation measures put in place. However, in some cases the rate of decrease has slowed considerably or levelled off. In one or two cases there has been a slight upward trend over the last few years.

Figure 2.3 *Long Term ortho-Phosphate Trends in Monaghan and Louth Rivers*

2.2.2 Nitrate in River Waters

Significance of Nitrate in River Water: Nitrogen ends up in the environment mainly through agricultural processes, input from sewage and industrial discharges. Nitrogen is essential for plant life but elementary nitrogen itself cannot be taken up directly by such plants. Nitrogen must first be bound and converted, for instance to nitrate. This so-called nitrification process is carried out by bacteria, which convert ammonia and ammonium to nitrate and nitrite. Fertilisers applied to crops mainly contain nitrate, but also ammonia, ammonium, urea and amines. After fertilization, crops take up a relatively small part of added nitrogen compounds and because of its solubility in water, nitrate is readily transferred to the water column.

Large amounts of nitrate may cause eutrophication which means an excess of nutrients resulting in oxygen deprivation and fish deaths. Nitrogen does not limit algal growth, because phosphorus is generally a limiting factor in fresh water bodies.

EU Directives and Nitrate Standards for Water: In assessing the ecological status of rivers, nitrate is one of a number of supporting physico-chemical determinands that is assessed in combination with biological quality elements. In this assessment, a set of surrogate standards for nitrate (derived in the same manner as those for the standards for ortho-phosphate, ammonia and BOD in formal SI 272 of 2009) are also used. For high status, a mean of 0.9 and a 95%ile of 1.4 and for good status a mean of 1.8 and a 95%ile of 2.7 mg/l N are used. The pass/fail criterion for ecological status requires 50% of the quality elements – ortho-phosphate, ammonia, BOD and nitrate to exceed the mean and 95%ile standards at a 99% confidence level. The value of 1.8 mg/l N corresponds to the average nitrate value recorded at Irish river sites that are at 'Good' ecological status and similarly 0.9 mg/l N at the 'High' ecological status sites[5].

The EU Directive on the quality of water for human consumption (Council Directive 98/83/EC) specifies a maximum admissible concentration of 11.3 mg/l N for nitrate (= 50 mg/l as NO_3) and also sets out a guide level of 5.65 mg/l N (= 25 mg/l as NO_3) – the lower guide level is not mandatory but, should nonetheless be aimed for as a quality objective.

Normal treatment processes for drinking water do not reduce the nitrate content and consequently, the limits above are also specified in the EU Directive on the quality of surface water intended for the abstraction of drinking water (Council Directive 75/440/EEC).

The EC Directive regarding the protection of waters from pollution caused by nitrate from agricultural sources was introduced in 1991 because of concern for nitrate concentrations in surface and ground waters (Council Directive 91/375/EC). Further regulations introduced in 2006 allow for the control of animal stocking rates, farmyard management and fertilisers and slurry application rates for various crops (S.I. No. 378 of 2006).

5 (See http://www.epa.ie/pubs/reports/water/waterqua/Final_Status_Report_20110621.pdf and https://www.epa.ie/wfdstatus/rivers/RW_Compliance_Rules_RiverChem_20110617.pdf for the details of the statistical method used.)

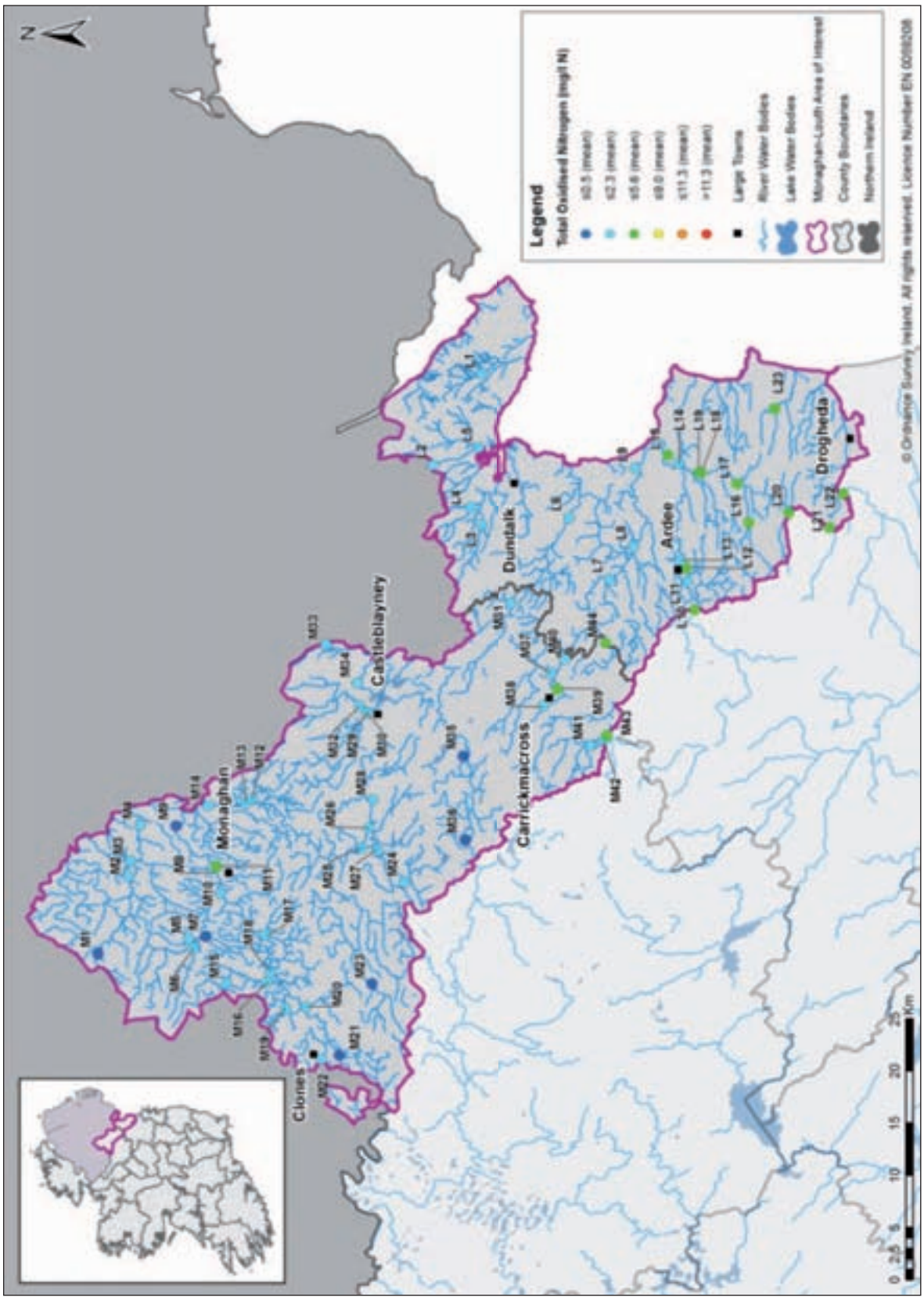
While nitrate levels in rivers in Monaghan and Louth are not as high as they are in some other parts of the country, there are nevertheless a number of rivers in this area that have significant nitrate levels. In 2012, the annual average for 28% of the river stations monitored was above the EQS for 'Good' status (i.e. 1.8 mg/l N). This represents a slight reduction in the figure for 2011 (30%). The worst affected river stations in decreasing annual average nitrate concentration are presented in table 2.6 below.

Table 2.6 *River Stations with the Highest Average Nitrate Concentration in 2012*

River Name	River Code/Station Number
White (Louth)	06W01-0500
Proules	06P01-0300
Termonfeckin	06T01-0250
White (Louth)	06W01-0400
Mattock	07M01-0300

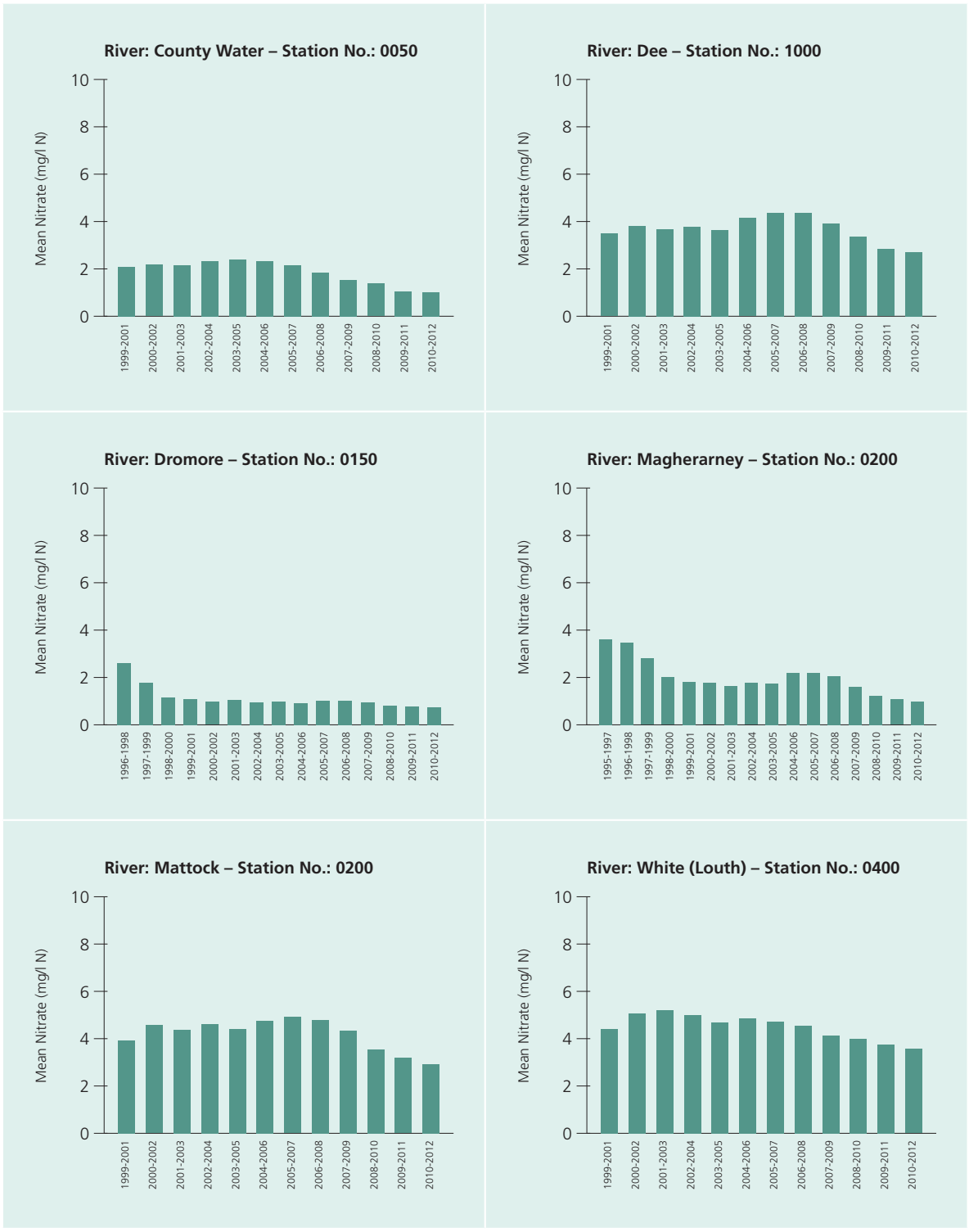
Diffuse agriculture as well as cattle access is the main problem at station 0500 on the White River. Diffuse agricultural pollution is also the main cause in the case of the Termonfeckin and Mattock river stations. In addition to diffuse agricultural influences, station 0400 on the White River is also impacted by urbanisation influences from Dunleer village. The Proules is impacted by urbanisation pressures where a combination of waste water treatment plant discharges, unauthorised discharges and hard surface runoff are suspected to be the main issues.

Figure 2.4 *Annual Average Nitrate in Monaghan and Louth Rivers in 2012*



Long-term Nitrate Trends: Rolling 3 year mean nitrate concentrations at 55 river stations in Monaghan and Louth are presented in Appendix 6. Long-term trends for six of these river stations are presented in Figure 2.5 below. With a few exceptions, the general trend for nitrate levels in Monaghan and Louth rivers is downward and in most cases current levels are at their lowest levels over the period assessed.

Figure 2.5 *Long-term Nitrate Trends in Monaghan and Louth Rivers*



2.2.3 Ammonia in River Waters

Significance of Ammonia in River Water: Ammonia and nitrate are the most common forms of nitrogen in aquatic systems. Ammonia is the preferred nitrogen-containing nutrient for plant growth. It can be converted to nitrite (NO_2) and nitrate (NO_3) by bacteria, and then used by plants.

Ammonia is highly soluble in water and in aqueous solutions an equilibrium exists between un-ionised (NH_3) and ionised (NH_4^+) ammonia. The main factors that influence the equilibrium are pH and to a lesser extent temperature. Increasing the pH and temperature both increase the concentration of the un-ionised form. This is of significance due the high toxicity of un-ionised ammonia to aquatic organisms.

Ammonia commonly enters the environment as a result of municipal, industrial, agricultural and natural processes. The largest non-industrial point sources are sewage treatment plants while agricultural sources including intensive farming are the main diffuse source of ammonia.

EU Directives and Ammonia Standards for Water

Ammonia is one of the parameters used to assess ecological status of rivers as set out in the "European Communities Environmental Objectives (Surface Water) Regulations 2009" (*S.I. 272 of 2009*[6]).

Table 2.7 *Summary of the Relevant Ammonia Standards (as mg/l N)*

Water Framework Directive Inland Surface Waters SI 272 of 2009	
Annual Mean	**95%ile**
0.065 good	0.140 good
0.040 high	0.090 high

The European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. 293 of 1988) specifies a limit for unionised ammonia of 0.02 mg/l NH_3 (0.016 mg/l N). The European Communities (Drinking Water) (No. 2) Regulations 2007 (S.I. 278 of 2007) specifies a parametric value for ammonia of 0.30 mg/l NH_4 (0.23 mg/l N).

Figure 2.6 shows the annual average ammonia concentration in Monaghan and Louth Rivers in 2012. The map is based on a face value comparison of the annual mean against the EQS for 'High' and 'Good' Status.

6 http://www.environ.ie/en/Legislation/Environment/Water/FileDownLoad,20824,en.pdf

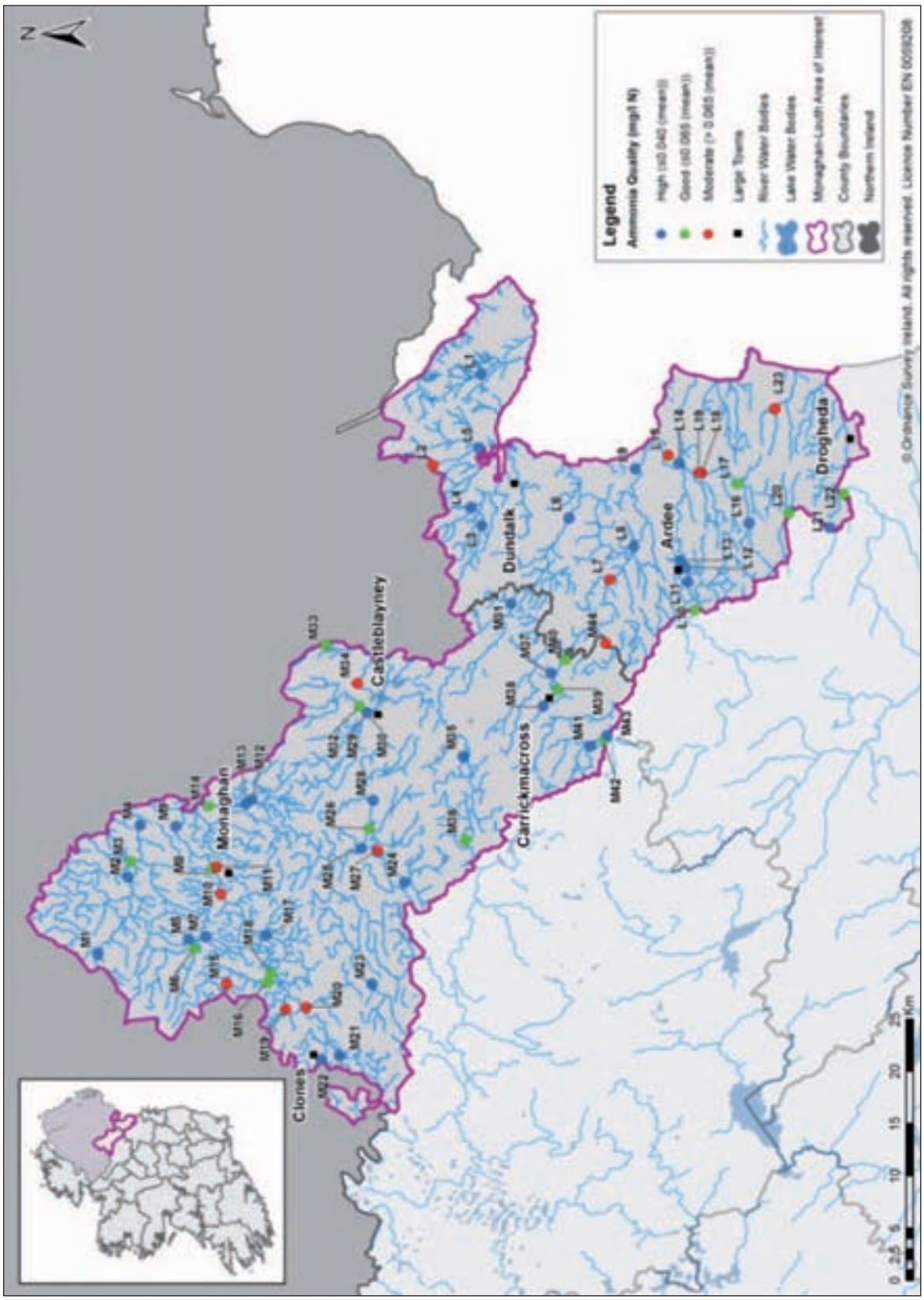
In 2012, the annual average for 21% of the river stations monitored was above the EQS for 'Good' status (i.e. 0.065 mg/l N). This represents an increase on the figure for 2011 (17%) which is a cause for concern. The worst affected river stations in decreasing annual average ammonia concentration are presented in table 2.8 below.

Table 2.8 *River Stations with the Highest Average Ammonia Concentration in 2012*

River Name	River Code/Station Number
Shambles	03S01-0500
White (Louth)	06W01-0400
Glyde	06G02-1230
Termonfeckin	06T01-0250
Dromore	36D02-0100

The Shambles is impacted by urbanisation pressures as well as some mixed rural influences upstream. The low assimilative capacity of this river considering the large urban area is also an issue. Diffuse agricultural pollution is the main cause in the case of the Termonfeckin and Dromore river stations. In addition to diffuse agricultural influences, the White and Glyde Rivers are also impacted by urbanisation influences from Dunleer and Castlebellingham villages respectively.

Figure 2.6 *Annual Average Ammonia in Monaghan and Louth Rivers in 2012*



2.2.4 Biochemical Oxygen Demand of River Waters

Significance of Biochemical Oxygen Demand in River Water: Biochemical Oxygen Demand (BOD) is a measure of how much dissolved oxygen is being consumed as microbes break down organic matter. A high demand, therefore, can indicate that levels of dissolved oxygen are falling, with potentially dangerous implications for a river's biodiversity.

Sources of BOD include leaves and woody debris; dead plants and animals; animal manure; industrial effluent; wastewater treatment plants; DWWTS; and urban stormwater runoff.

When aquatic plants die, aerobic bacteria feed upon them and nutrients, such as nitrates and phosphates are released into the water body, stimulating plant growth. More plant growth eventually leads to more plant decay. Nutrients can be a prime contributor to high BOD in rivers.

In rivers with high BOD levels, aerobic bacteria consume much of the available dissolved oxygen, robbing other aquatic organisms of the oxygen they require to live. Organisms that are more tolerant of lower dissolved oxygen levels may appear and become numerous, such as carp, midge larvae and sewage worms. Organisms that are intolerant of low oxygen levels, such as caddisfly larvae and mayfly and stonefly nymphs, will not survive. As organic pollution increases, the ecologically stable and complex relationship present in waters containing a high diversity of organisms is replaced by a low diversity of pollution-tolerant organisms with increasing populations.

EU Directives and BOD Standards for Water

Biochemical Oxygen Demand is one of the parameters used to assess ecological status of rivers as set out in the "European Communities Environmental Objectives (Surface Water) Regulations 2009" (*S.I. 272 of 2009*[7]).

Table 2.9 *Summary of the Relevant BOD Standards (as mg/l O_2)*

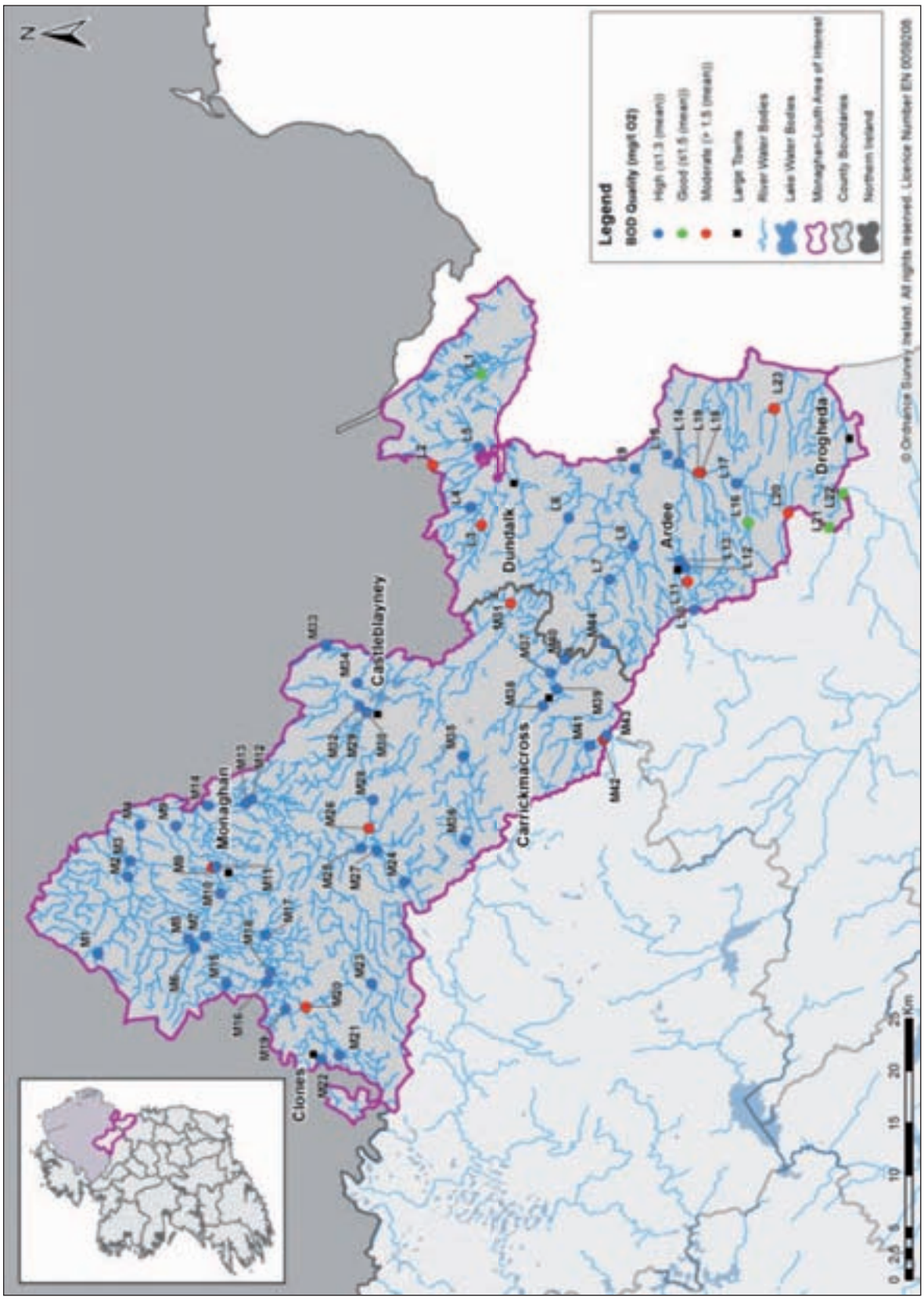
Water Framework Directive Inland Surface Waters SI 272 of 2009	
Annual Mean	**95%ile**
1.50 good	2.60 good
1.30 high	2.20 high

The European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. 293 of 1988) specifies a limit for BOD of 5 mg/l O_2.

Figure 2.7 shows the annual average BOD concentration in Monaghan and Louth Rivers in 2012. The map is based on a face value comparison of the annual mean against the EQS for 'High' and 'Good' Status.

7 http://www.environ.ie/en/Legislation/Environment/Water/FileDownLoad,20824,en.pdf

Figure 2.7 *Annual Average BOD in Monaghan and Louth Rivers in 2012*



In 2012, the annual average for 18% of the river stations monitored was above the EQS for 'Good' status (i.e. 1.5 mg/l O_2). This represents an improvement on the figure for 2011 (24%). The worst affected river stations in decreasing annual average BOD concentration are presented in table 2.10 below.

Table 2.10 *River Stations with the Highest Average BOD Concentration in 2012*

River Name	River Code/Station Number
Termonfeckin	06T01-0250
Drumsallagh Stream	06D07-0070
Dee	06D01-0600
White (Louth)	06W01-0500
Fane	06F01-0650

Diffuse agriculture is the main pollution source in the case of the Termonfeckin and Dee river stations. Diffuse agriculture as well as cattle access is the main problem at station 0500 on the White River. Agricultural (including cattle access), mixed rural influences, bank erosion and past drainage works are the main pressures on the Drumsallagh Stream. Station 0650 on the Fane is impacted by agricultural activities while diesel laundering activities in the area are also suspected to be impacting.

2.3 Biological Monitoring of Rivers

2.3.1 Biological Monitoring

This is generally carried out on a three-year cycle. The freshwater reaches of rivers and streams are surveyed from an upper 'survey limit' to their confluences with other rivers or to their tidal limit. The survey limit is a point in the headwaters above which biological sampling is impracticable, usually because of lack of flow. Sampling sites are typically located at five kilometre intervals with extra stations located in some reaches to reflect better the effects of point discharges or other known or potential pollution sources. In order to determine the channel lengths in the various water quality classes it has been necessary to interpolate conditions between the individual sampling points. This procedure has been carried out in a systematic and standardised fashion, having regard to typical or expected patterns of water quality recovery in rivers affected by waste discharges. Where possible, chemical and biological sampling sites coincide.

2.3.2 Biological Assessment

In the presence of pollution, characteristic and well-documented changes are induced in the flora and fauna of rivers and streams. Particularly well documented are the changes brought about by organic pollution in the macroinvertebrate community i.e., the immature aquatic stages of aerial insects (mayflies, stoneflies etc.) together with Crustacea (e.g. shrimps), Mollusca (e.g. snails and bivalves), Oligochaeta (worms) and Hirudinea (leeches). For the purposes of the EPA assessment procedure benthic macroinvertebrates have been divided into five Indicator Groups.

Relationships between water quality and macroinvertebrate community structure are usually described by means of a numerical scale of values. The EPA scheme of Biotic Indices or Quality (Q) Values and its relationship to WFD status is set out in the table. Where a toxic effect is apparent or suspected the suffix '0' is added to the biotic index (e.g. Q1/0, Q2/0 etc) and attention is sometimes drawn to siltation or atypical effects by appending an asterix to the biotic index (e.g. Q1*, Q2* etc). The Q-rating assessment has been adapted to meet the requirements of the WFD and to ensure it is comparable with methods used in other EU countries (Table 2.11).

Table 2.11 *Reference Table for WFD Status and Q Value*

Q-Value	WFD Status
5, 4-5	High
4	Good
3-4	Moderate
3, 2-3	Poor
2, 1-2, 1	Bad

In the overall assessment for WFD status at surveillance sites, in addition to macroinvertebrates, other biological elements, i.e. plants (macrophytes), algae (including diatoms) and fish, as well as hydromorphological and chemical criteria, are taken into account although the results reported here rely largely on the macroinvertebrate biological survey using Q-Values. In the 2010-2012 period 98 river sites were surveyed in the Monaghan-Louth Region (Table 2.12).

Table 2.12 *Results from 2010-2012 Monitoring in the Monaghan and Louth Region*

Ecological Status	No. Sites	%
Bad	0	0%
Poor	40	40.8%
Moderate	28	28.6%
Good	27	27.5%
High	3	3.1%
No. Stations	98	

In table 2.13 below, rivers in the Monaghan and Louth region are classified based on the length of river channel. This is based on the biological surveys (primarily macro-invertebrates), with assessments carried out in the period 2010-2012.

Trends

The EPA and its predecessor organisations have been monitoring rivers in the Northeast of Ireland using biological methods since the early 1970s, using essentially the same methodology. This allows for a long timeline for analysis of trends and changes in water quality over time. The results are available online at: *http://www.epa.ie/water/wm/rivers/results/* in a variety of ways from maps to reports on individual stations. The results are broken down on a hydrometric area basis at *http://www.epa.ie/QValue/webusers/*. The Monaghan-Louth region is covered by hydrometric areas 03, 06 & 36. The online reports are available within a short time after the biological surveys have been carried out during the summer months.

Table 2.13 *Combined Monaghan and Louth River Channel Length based on Macroinvertebrate Surveys 2010-2012*

Status ➔	**High**	**Good**	**Moderate**	**Poor**	**Bad**
Class ➔	**A**	**A**	**B**	**C**	**D**
Monaghan/Louth River Channel Length (km)	17.0	147.6	110.2	137.8	0.0
% of the River Channel Length	4.1%	35.8%	26.7%	33.4%	0.0%
% of the River Channel Length	39.9%		26.7%	33.4%	0.0%

2.3.3 High Status Sites

Nationally the percentage of high quality (Q5 and Q4-5) sites almost halved in the 21 years between 1987 and 2008 with those attaining Reference Condition (Q5) down to 2%. The number of high quality sites in the north-east region in the period 2010-2012 is shown below in table 2.14.

Table 2.14 *Number of High Quality Sites in the Monaghan and Louth Region*

County	Sites
Monaghan	1
Louth	2

In the 2010-2012 period, just three high quality sites were recorded in the parts of Hydrometric Areas 03, 06 and 36, relevant to the above counties – a disappointing drop from the five sites recorded at high status in 2009-2011. The current three sites are down from a peak of some 14 sites that achieved high status in Monaghan and Louth in 1987, so there is a significant danger of losing high status altogether. The loss of high status on the Drumsallagh (Station 0070 at County Bridge dropped from Q4-5 in 2009 to Q3-4 in 2012) is attributable mainly to agricultural influences, particularly cattle access. A Water Quality Management Plan has been implemented by Monaghan County Council on foot of these results. The loss of high quality on the River Glyde at Lagan Bridge (0400) can be attributed to agricultural and mixed rural effects. Influences from Kingscourt town, commercial and unsewered areas in an upstream tributary and abstraction industries upstream are all factors in the decline. The remaining three sites are shown in table 2.15 below. The EPA has recently published a

study aimed at producing guidance for local authorities in the management and protection of high status sites, bearing in mind that not all high status waters are in SACs or other protected areas. This report is published under the STRIVE research programme and is available as a download on *www.epa.ie*. (B. Ní Chatháin *et al.*, 2010).

Table 2.15 *Remaining High Status River Sites in Monaghan and Louth*

River	Station Code
Scotstown	03S020200
Big (Louth)	06B010100
Big (Louth)	06B010300

2.3.4 Poor and Moderate Status

There are no seriously polluted sites currently in the area – this follows the national trend of the virtual elimination of serious pollution (currently some 10 sites are recorded nationally with none of these being in the north-eastern area under consideration here). Some 69% of all river sites examined are polluted, however, and these 68 sites are the target of programmes of measures under the Water Framework Directive River Basin Management Plans. In terms of river channel length and based on the 2010-2012 period, 40% of rivers in Monaghan and Louth are at least good status. This compares very unfavourably with national figure of 73%. Figure 2.8 provides a breakdown of figures for each county. This is based on 157.6km (Louth) and 255.0km (Monaghan) of river channel length surveyed.

Figure 2.8 *Breakdown of River Water Quality for Monaghan and Louth based on River Channel Length Surveyed in 2010-2012*

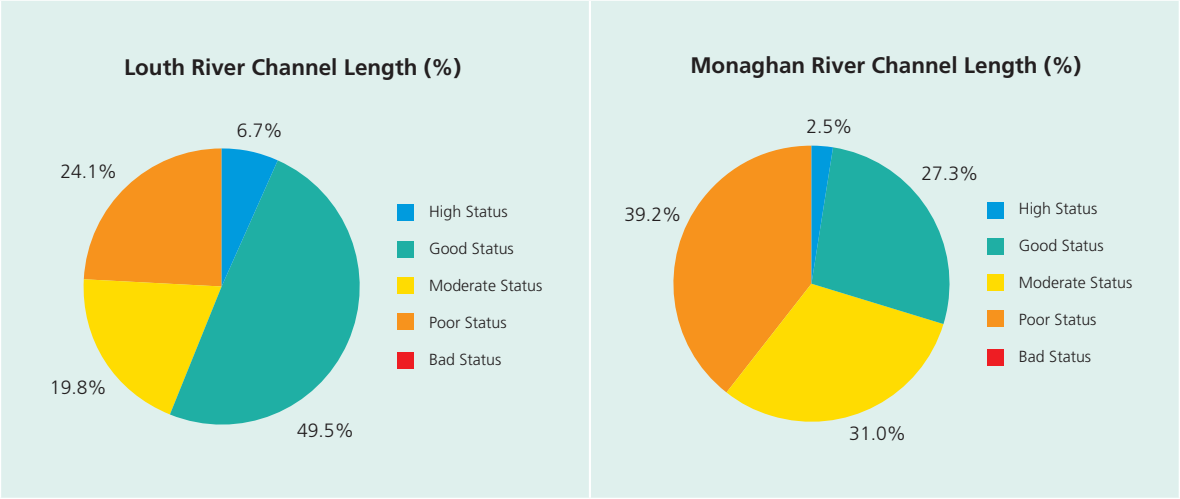
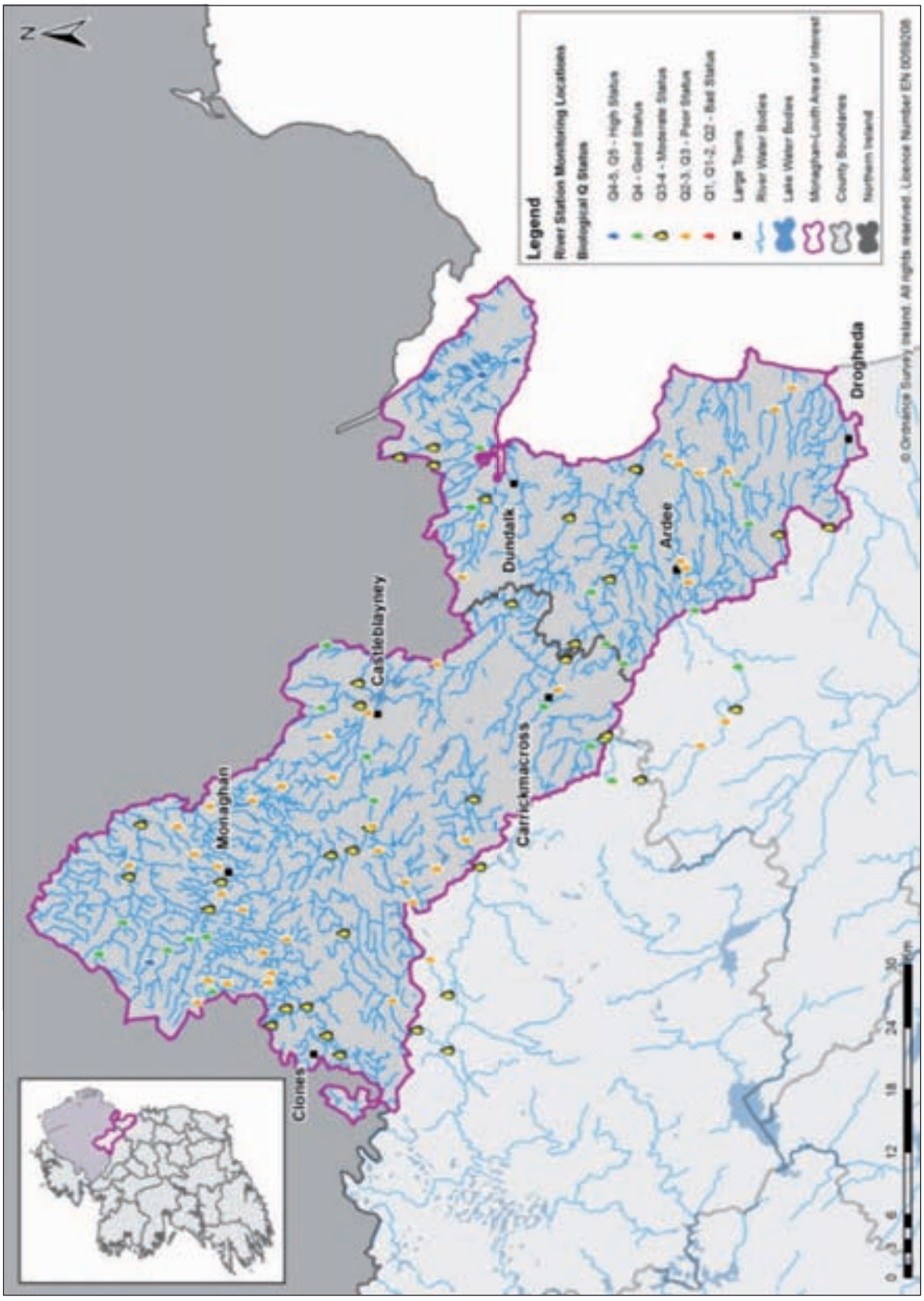


Figure 2.9 *Biological Classification of Rivers in Monaghan and Louth*



2.4 WFD Priority Polluted Sites and Key Pressures

The area covered in this report relates to parts of three River Basin Districts (RBDs) – the North-Eastern, the Neagh-Bann and the Eastern. Each RBD can be subdivided into hydrometric areas (HAs) and water management units (WMUs). This section gives a general overview of the pressures on water quality in counties Monaghan and Louth.

Monaghan and Louth are predominantly rural counties and diffuse pollution from agriculture as well as small point sources such as DWWTS and farmyards are significant contributory pressures in this area. In addition, discharges from wastewater treatment plants, storm water overflows and industrial discharges are the more predominant pollution sources in the more urbanised areas.

Sixty-eight WFD priority polluted river sites have been identified in Monaghan and Louth. These sites have undergone biological assessment and have Q-values of less than four (i.e. less than good status). These are the sites that should be the focus of future investigative monitoring as indicated in section 2.5 of this Report.

Figure 2.10 displays the key pressures in the Monaghan and Louth area along with the priority river sites. It must be borne in mind that multiple pressures may impact on any given site. Note that further work is required also in order to better distinguish between the impacts of DWWTS and diffuse agricultural sources. The pathways by which pollutants reach water are similar for those emanating from DWWTS and from agricultural sources, whether farmyard or field. A new catchment index which will provide a relative risk weighting for individual catchments is currently under development.

Further details of the key pressures for each of these sites are also presented in Appendix 4. More detailed information may also be found on *www.wfdireland.ie* and in the river basin management plans of the relevant RBD.

The *Water Services Investment Programme*[8] is the larger of the DECLG's two water services investment programmes. It relates to the provision of major water and wastewater schemes (projects over 1 million euro) to meet key environmental and economic objectives.

This investment in the upgrade of wastewater treatment plants has helped reduce the levels of phosphorus and nitrogen being discharged and can at least in part, account for the reduced levels of these nutrients observed in Monaghan and Louth rivers over the last 10 -20 years (refer to Appendices 5 & 6 for long term trend data). However further investment is required to further reduce nutrient levels. The *Urban Waste Water Treatment in 2011 Report*[9] provides data on the performance of urban waste water treatment plants and waste water infrastructure in place in Ireland in 2011.

The EPA is responsible for the licensing or certification of all discharges to the aquatic environment from sewerage systems owned, managed and operated by water service authorities. The licensing and certification authorisation process was introduced on a phased basis commencing on 14th December 2007 in accordance with the requirements of the Waste Water Discharge (Authorisation) Regulations,

8 http://www.environ.ie/en/Environment/Water/WaterServices/WaterServicesInvestmentProgramme/

9 http://www.epa.ie/pubs/reports/water/wastewater/uww/Urban%20Waste%20Water%20Treatment%20in%202011.pdf

2007 (S.I. No. 684 of 2007). Up to the end of 2012 there have been 13 certificates and eight licences issued in the Monaghan-Louth region. This includes three licences issued in 2012 as indicated in table 2.16 below.

Table 2.16 *Wastewater Discharge Licences issued in Monaghan and Louth in 2012*

Agglomeration	Licence No.	Authority	Date Issued
Ballinode	D0435-01	Monaghan County Council	02/05/2012
Emyvale	D0346-01	Monaghan County Council	23/05/2012
Scotstown	D0494-01	Monaghan County Council	10/05/2012

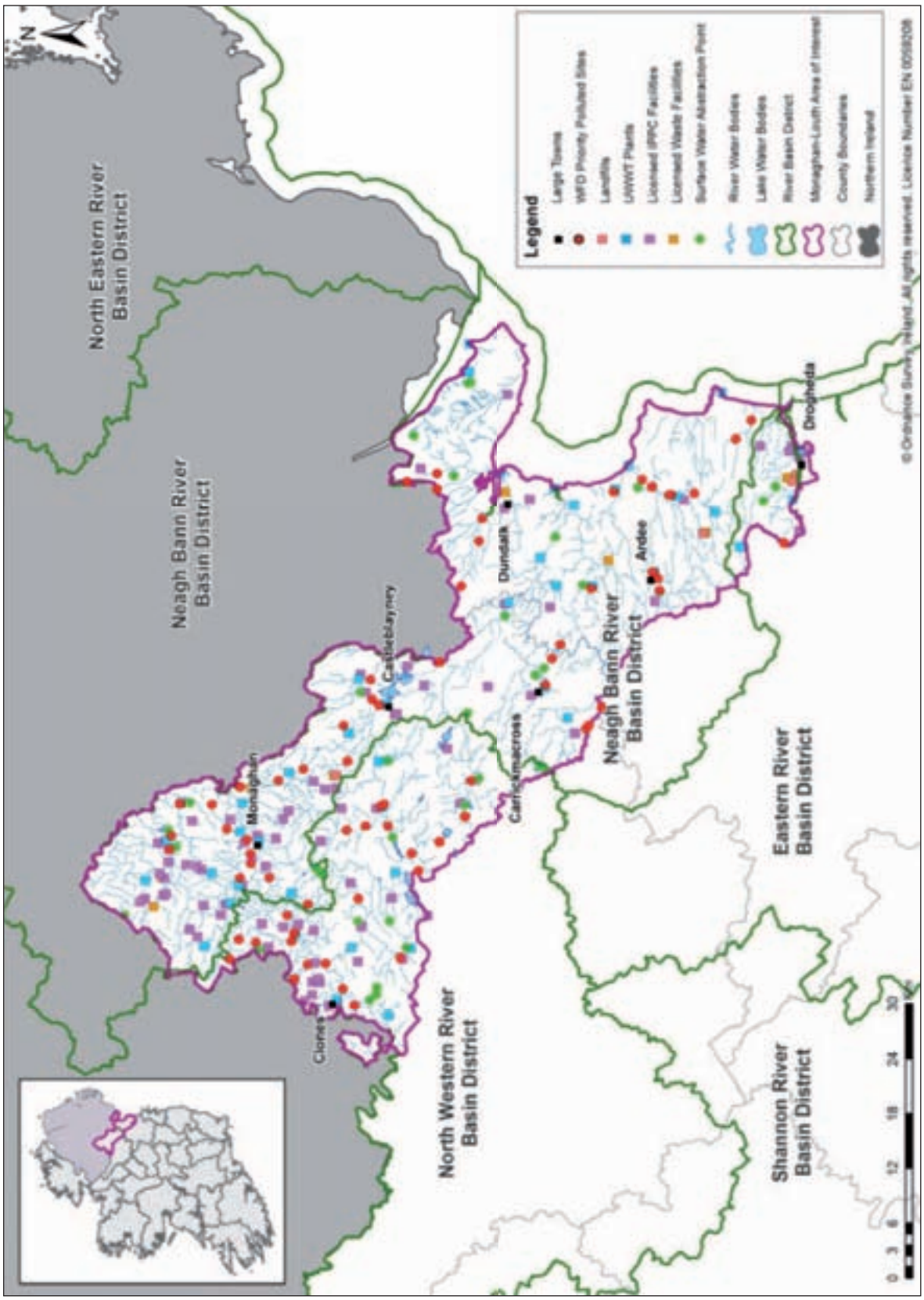
It is apparent that diffuse agricultural pollution is a key pressure in both counties. It has been identified as a contributory factor in 58 out of the 68 WFD priority polluted sites listed in Appendix 4. Tracking down the sources of diffuse pollution is a difficult issue. The use of risk assessments such as the Small Stream Risk Score (SSRS) as an aid to pinpointing, for example, bad practices on farms can be useful in this respect. Blanket measures such as the GAP regulations are essential but it may also be necessary to find local critical source areas or pollution 'hotspots' especially where bad practice is occurring such as direct discharges from farmyards to rivers or allowing serious poaching of land surfaces near rivers to develop. Animal access to rivers is an ongoing problem and in many smaller rivers fencing animals out will help. Control of the spreading of wastes produced by intensive animal rearing enterprises such as pigs and poultry operations is particularly important in those areas with gley soils where surface runoff is more likely in wet weather and where the soils have an inherent tendency to release phosphorus into surface runoff. Nutrient management planning is very important in reducing soil phosphorus levels to a more environmentally acceptable level. Research has shown that high soil phosphorus levels in riparian areas close to water can be particularly damaging in wet weather events.

Agriculture is likely to become an even more significant factor in the region's economy and water quality in the next few years. Food Harvest 2020, which was developed as a cohesive road map for the agriculture, fisheries and forestry sector to build capacity, predicts the value of primary output in this country will increase by 33% from the 2007-2009 average. There will be regional variations, but the proposed increase in output from the poultry sector will be particularly challenging in the north-east.

The focus on domestic waste water treatment systems (DWWTS) has increased in recent years. It is estimated that there are almost 500,000 DWWTS in the country, which if not properly maintained may contaminate water supplies, groundwaters and surface waters causing harm to human health and the environment. Part of the programme of measures under WFD to improve water quality is the *National Inspection Plan*[10] for DWWTS. Inspections will commence in 2013, starting with areas at greatest risk of damage to human health or the environment. Inspections may lead to the requirement for remediation of DWWTS where they are causing pollution to surface or groundwaters.

10 http://www.epa.ie/pubs/advice/water/wastewater/EPA_National_Inspection_Plan_2013.pdf

Figure 2.10 *Environmental Pressures in the North East of Ireland*



2.5 Investigative Monitoring

According to the Water Framework Directive, investigative monitoring shall be carried out:

- Where the reason for any exceedances is unknown;
- Where surveillance monitoring indicates that the objectives set under Article 4 of the WFD for a body of water are not likely to be achieved and operational monitoring has not already been established, in order to ascertain the causes of a water body or water bodies failing to achieve the environmental objectives;
- To ascertain the magnitude and impacts of accidental pollution;
- To inform the establishment of a programme of measures for the achievement of the environmental objectives and specific measures necessary to remedy the effects of accidental pollution.

In the case of rivers, at least one quarter of the effort/resources applied to physico-chemical monitoring generally should be devoted to snapshot monitoring of river stations not included in the main operational or surveillance programmes as well as smaller streams not currently in either programme in order to provide a wider geographical assessment of water bodies than is possible with main-stem river monitoring only.

In 2012, physico-chemical investigative monitoring was carried out at 11 river stations which represents just over 16% of the total number of stations for which physico-chemical monitoring was carried out in 2012. These stations are presented in table 2.17 below. Local Authorities are encouraged to allocate further resources to investigative monitoring to ensure that it is an integral part of the overall WFD monitoring programme and to place particular emphasis on the 68 WFD priority polluted sites listed in Appendix 4.

Table 2.17 *Investigative Monitoring Sites 2012*

River Name	Station Code
Blackwater (Monaghan)	03B010100
Blackwater (Monaghan)	03B010600
Bunnoe	36B050300
Clontibret Stream	03C011200
Conawary (Upper)	36C110700
Dromore	36D020100
Fane	06F010300
Knappagh	36K010100
Lackey	36L071800
Maghery	36M030900
Rossdreenagh Stream	06R030400

2.6 Summary

In total there are 109 river sites on 35 rivers that are monitored in Monaghan and Louth under the WFD. Of these sites, 98 were monitored for biological parameters (biological programme) during 2010-2012. In total, 68 of these sites (over 69%) were less than good status and have been identified as WFD priority polluted sites for tackling the causes of pollution. The counties and number of priority polluted sites are listed below.

County	No of WFD Priority Polluted Sites
Monaghan	47
Louth	21

A continued focus on investigative monitoring should identify the causes of pollution at these sites and allow for more targeted measures to be implemented in order to address these causes.

Compared with the national average, the north-east seems to be performing poorly in general. For example in terms of river channel length and based on the 2010-2012 period, 40% of rivers in Monaghan and Louth are of high or good status, compared with 73% nationally. Biological monitoring also indicates that there has been a disappointing drop in the number of high quality sites – down to three from the five observed in the previous 2009-2011 period.

On the positive side, nutrient levels have generally dropped in Monaghan and Louth rivers over the last 10-20 years. In 2012 the annual average o-phosphate level for 48% of the river stations monitored was above the EQS for 'Good' status compared to 65% in 2011 while that for nitrate was 28% in 2012 compared to 30% in 2011. However nutrient levels do need to be further reduced and the projected increase in primary output from the agriculture sector under Food Harvest 2020, will prove challenging in this regard.

As well as having effects on the ecological status of rivers themselves, nutrient levels in rivers also affect the quality of the lakes and transitional and coastal waters they feed. A reduction in the total amount of nutrients delivered to lakes and transitional and coastal waters from river catchments is a key focus of the WFD programme of measures.

3. LAKE WATER QUALITY

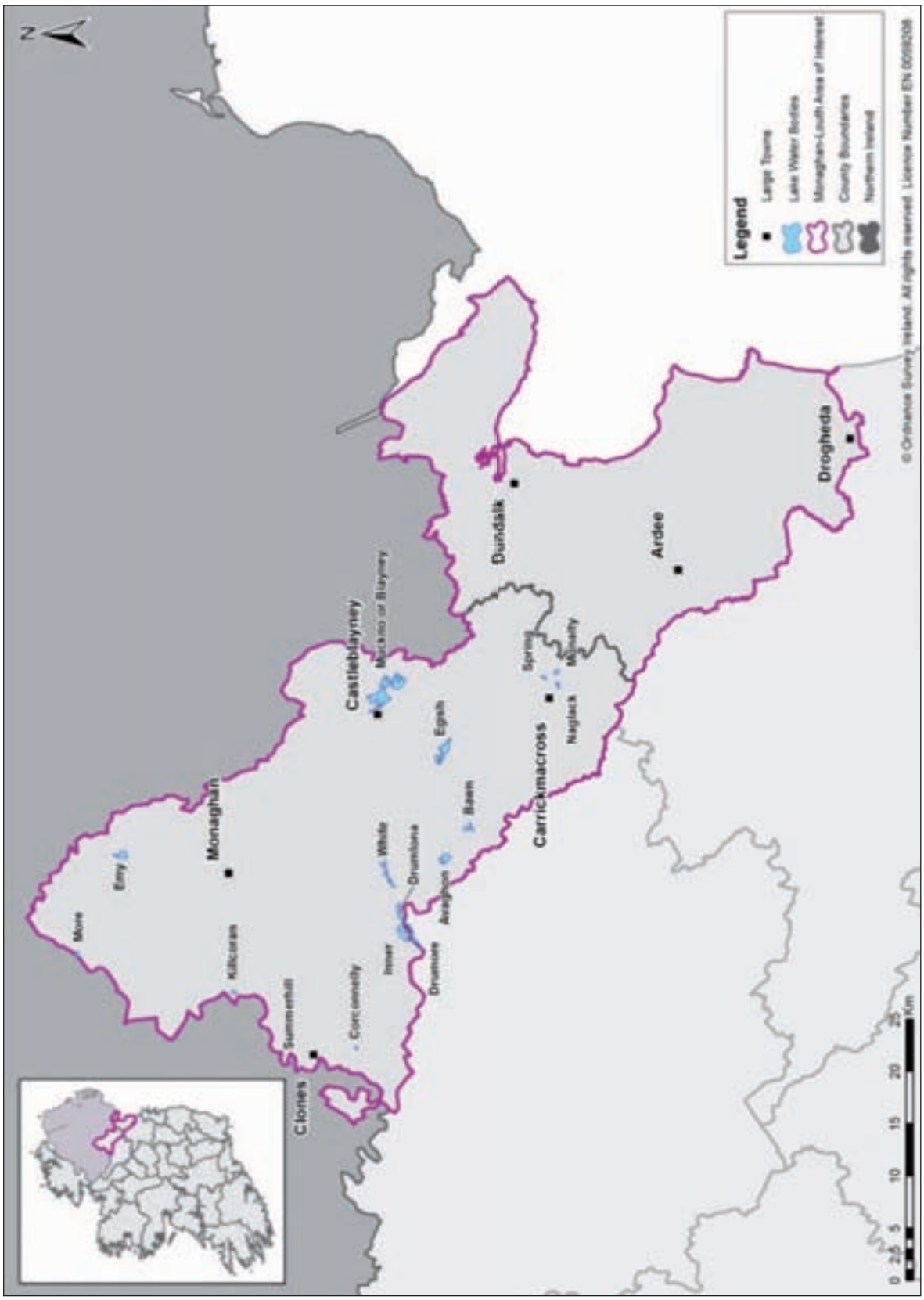
3.1 Physico-Chemical and Biological Monitoring

Physico-chemical monitoring to meet the requirements of the Water Framework Directive is undertaken at 16 lakes in County Monaghan (Figure 3.1). There are no monitored lakes in County Louth. Lakes are designated either as surveillance (SM) or operational monitoring (OM) sites; the objective of the surveillance monitoring programme is to assess long term changes within lakes, while the objective of the operational monitoring programme is to assign status to lakes identified as being at risk of failing to meet their environmental objectives. Of the 16 lakes monitored in Monaghan three have been designated as SM and 13 as OM. The surveillance physico-chemical monitoring programme is undertaken by the EPA while the operational monitoring programme is undertaken by (or on behalf of) the Local Authorities. Lakes are sampled for physico-chemical parameters between four and 12 times per year, depending on the legislative requirements. A number of the lakes are also surface water abstraction points, providing water to towns such as Carrickmacross and Emyvale, these lakes are also monitored for metals, total coliforms, *E. coli* and intestinal enterococci.

The general physico-chemical parameters (GPC) measured at the operational monitoring sites include alkalinity, conductivity, pH, transparency, temperature, dissolved oxygen, total phosphorus, total ammonia, total oxidised nitrogen, nitrate, nitrite, silica and true colour. Surveillance monitoring sites require these parameters as well as specific priority substances, including certain metals and organic compounds.

The biological monitoring programme for both the surveillance and operational monitoring lakes is undertaken by the EPA. Given that biological communities typically exhibit longer response times to gradual changes in their environment, the biological sampling is completed once every three years, apart from phytoplankton which is sampled annually. Phytoplankton, aquatic plants (macrophytes), benthic diatoms and fish are currently used to assign biological status in the surveillance monitoring lakes, while macrophytes and chlorophyll a are used to assign biological status in the operational monitoring lakes.

Figure 3.1 *Location of WFD Monitored Lakes in County Monaghan*



A number of biological tools have been developed specifically to meet the requirements of the WFD and enable each lake to be assigned high, good, moderate, poor or bad status. The macrophyte index combines a number of different aspects of the plant community present in each lake, for example, the average depth at which plants can be found growing, the maximum depth of colonisation and the relative frequency of pollution tolerant and sensitive taxa. The phytobenthos metric scores diatom species based on their sensitivity or tolerance to nutrient pollution and these scores are averaged to provide an overall score for each lake. The phytoplankton index is a similar composition based metric which uses chlorophyll a and nine groups of indicator taxa which are scored based on their abundance and sensitivity to pollution; these scores are combined with the chlorophyll a score to give an overall lake score. Inland Fisheries Ireland (IFI) has developed a multi-metric tool for status assessment using the fish communities. This tool incorporates a number of different fish metrics, including total biomass per unit effort of all fish, of native fish and relative abundance of perch.

General physico-chemical status was assigned to the lakes using the Environmental Quality Standards (EQS) for total ammonia, dissolved oxygen and pH as published in S.I. 272 surface water regulations. There is currently no formal EQS for total phosphorus (TP), however given that it is often the key nutrient driving enrichment, it is important that phosphorus is included in any assessment of lake quality. Surrogate EQS values of 10 and 25 µg/l total phosphorus for the high/good and good/moderate boundary were also used. The phosphorus regulations (S.I. 258, 1998) set the annual mean target value for TP at 25 µg/l (0.025 mg/l). A formal EQS for phosphorus in lakes will be set in the next phase of the standard setting for the WFD.

Status is initially assigned to each biological quality element (BQE) separately and then the results are joined to produce the overall BQE status using a "one-out-all-out" approach, in that it is the element with the lowest status which determines overall BQE status. A similar approach is adopted for assigning GPC status. The BQE status is then combined with the physico-chemical (GPC) status, also using one-out-all-out. High status is dependent upon agreement between all the BQE status assessments and GPC status. A lake cannot be considered at high status if it is infested with certain invasive alien species such as the zebra mussel or roach; a lake also cannot be considered to be at high status if it has significant morphological alterations to its shoreline or a regulating structure on its outflow.

3.2 Assessment of Water Quality

Fifteen (94%) of the lakes surveyed are currently of moderate or worse status (Table 3.1) with only one lake, Spring Lough, achieving good status. Ecological status remains unchanged from the previous report (Smith, 2012)[11] for 14 of the lakes with two exceptions, Killcoran and White. Killcoran, previously reported as being of good status (Smith, 2012)[11], is now at moderate status and White Lough has deteriorated from moderate to bad status. Killcoran is at moderate status as a result of its nutrient concentrations whilst White is at bad status as a result of an assessment of its fish community[12]. Bawn, Corconnelly, Killcoran, More and Spring were added to the monitoring programme in 2010.

11 Integrated Water Quality Report, Co. Monaghan & Co. Louth. Environmental Protection Agency, 2012.

12 http://wfdfish.ie/wp-content/uploads/2012/09/White_report_2012.pdf

Table 3.1 *Overall Ecological Status for WFD Monitored Lakes in Co. Monaghan for the Periods 2007-2009, 2008-2010 and 2010-2012. GPC Status and BQE Status are also presented for 2010-2012*

Lake Code	Lake	SM/OM	Ecological Status 2007-2009	Ecological Status 2008-2010	BQE Status 2010-2012	GPC Status 2010-2012	Ecological Status 2010-2012
NW_36_638	Avaghon	OM	Moderate	Moderate	Moderate	Moderate	Moderate
NW_36_623	Bawn	OM		Bad	Bad	Moderate	Bad
NW_36_192	Corconnelly	OM		Moderate	Moderate*	Moderate	Moderate
NW_36_525b	Drumlona	OM	Poor	Poor	Poor	Moderate	Poor
NW_36_525a	Drumore	OM	Poor	Poor	Poor	Moderate	Poor
NW_36_671	Egish	SM	Bad	Bad	Bad	Moderate	Bad
NB_03_102	Emy	OM	Poor	Bad	Bad	Moderate	Bad
NW_36_526	Inner	OM	Bad	Bad	Bad	Moderate	Bad
NW_36_329	Killcoran	OM		Good	Good	Moderate	Moderate
NB_06_234	Monalty	OM	Poor	Moderate	Moderate	Moderate	Moderate
NB_03_87	More	OM		Moderate	Moderate	Moderate	Moderate
NB_06_56	Muckno/Blayney	SM	Bad	Bad	Bad	Moderate	Bad
NB_06_55	Naglack	OM	Poor	Poor	Poor	Moderate	Poor
NB_06_198	Spring	OM		Good	High	Good	Good
NW_36_721	Summerhill	OM	Moderate	Moderate	Good	Moderate	Moderate
NW_36_647	White	SM	Moderate	Moderate	Bad	Moderate	Bad

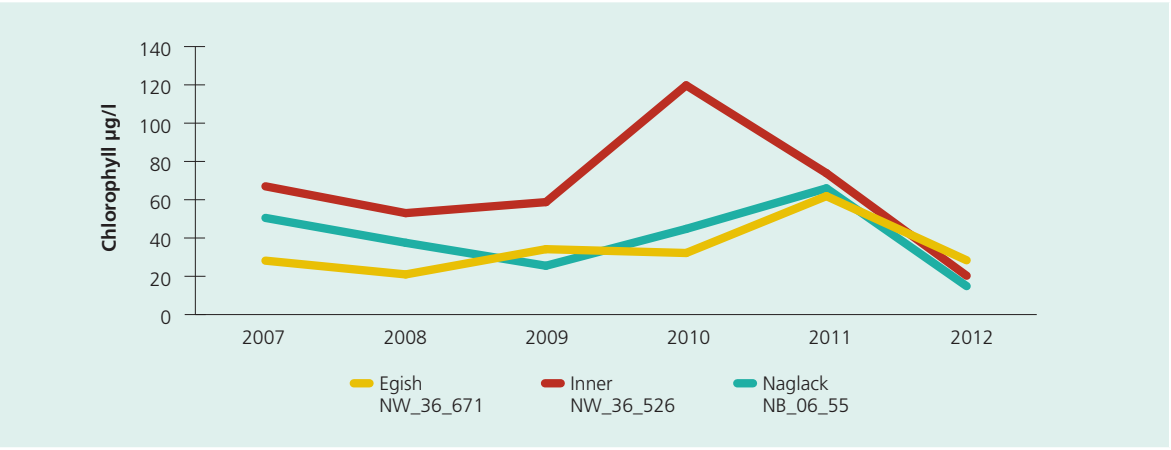
** Corconnelly Lough BQE Status 2010-2012 based on Chlorophyll only.*

Trends in chlorophyll, total phosphorus and nitrate (using total oxidised nitrogen as a surrogate) are shown below (Figures 3.2-3.5). Analyses of trends in chlorophyll is complicated by the presence of the zebra mussel *(Dreissena polymorpha L.)* at a number of lakes (Drumlona, Egish, Monalty, and Naglack) which may or may not impact chlorophyll levels and/or total phosphorus levels. This is in addition to normal interannual fluctuations and climatic induced changes.

The environmental quality standard for the chlorophyll good/moderate boundary ranges between 10 µg/l and 10.94 µg/l for the Monaghan lakes, depending on lake type. The majority of lakes sampled do not fall below this level. Loughs Killcoran, More, Spring and Summerhill all have relatively low average chlorophyll values that have decreased further in 2012 (Figure 3.2). Loughs Egish, Inner and Naglack stand out as having high annual average chlorophyll levels compared to other monitored lakes in Monaghan (Figure 3.3). However, the average chlorophyll value for 2012 in these three lakes has also decreased; both Egish and Naglack have zebra mussel populations.

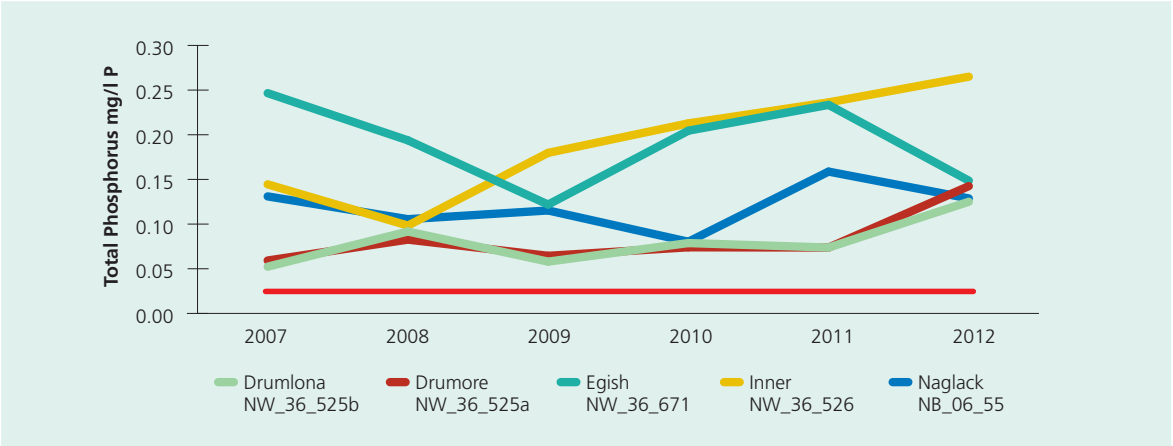
Figure 3.2 *Four Monaghan Lakes, Killcoran, More, Spring and Summerhill with Relatively Low Annual Average Chlorophyll Values*

Figure 3.3 *Examples of Lakes in Monaghan with Relatively High Annual Average Chlorophyll Values*



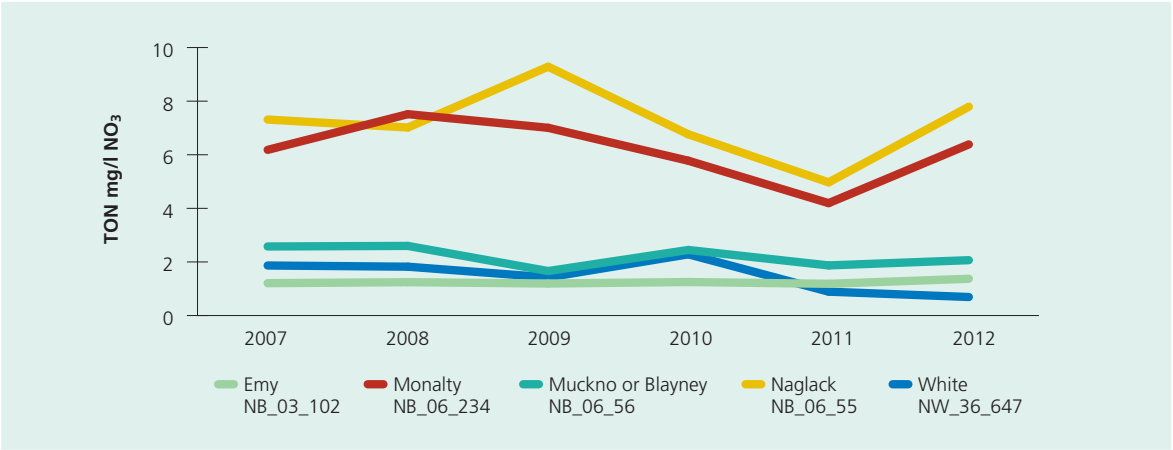
Total Phosphorus levels across most of the lakes in Monaghan are well above 0.025 mg/l. The three lakes that exhibited high annual average chlorophyll levels also have very high annual average TP levels, namely Egish, Inner and Naglack (Figure 3.4). Drumlona and Drumore are also exhibiting an increasing trend in annual average TP. Spring Lough is the only monitored lake that achieves good status and has an annual average TP that does not exceed 0.025 mg/l, however the average TP has shown an increasing trend and has been at the 0.025 mg/l boundary for both 2011 and 2012, this is a cause for concern.

Figure 3.4 *Relatively High Total Phosphorus Trends at Loughs Drumlona, Drumore, Egish, Inner and Naglack. Interim EQS Standard of 0.025 mg/l depicted as red line*



Monalty and Naglack have exceptionally high nitrate levels (>4 mg/l NO_3), with Emy, Muckno and White also showing relatively high levels (Figure 3.5).

Figure 3.5 *Relatively High Nitrate Trends in Five of the Monitored Lakes in Monaghan; Emy, Monalty, Muckno, Naglack and White*



Annual Average TP and TON levels for the Monaghan lakes are illustrated in Figures 3.6 and 3.7 respectively.

3.3 Summary

Both Spring and Killcoran were the only lakes to achieve good ecological status in the previous report (Smith, 2012). Killcoran has subsequently deteriorated to moderate ecological status, leaving Spring Lough as the only lake to achieve the objectives of the WFD in Monaghan for the period 2010-2012. The current annual average TP levels of Spring Lough are at the good/moderate boundary so any further increases in phosphorus will cause the lake to be assigned moderate status, thus causing it to fail to meet the objectives of the WFD. The remaining 15 lakes monitored in the county have failed to meet the minimum standard of being of good ecological status. Most of the lakes failed to meet the objectives across the range of BQEs and GPC parameters. The elevated levels and continued rising trend for both chlorophyll and total phosphorus in some lakes is cause for concern. The main pressures appear to be diffuse pollution from intensive agriculture and small point sources such as DWWTS, resulting in nutrient enrichment as typified by elevated phosphorus and chlorophyll. It is unlikely that many of lakes in Monaghan will meet the WFD standard of good ecological status to be achieved by 2015.

Figure 3.6 *Annual Average Total Phosphorus in Monaghan Lakes in 2012*

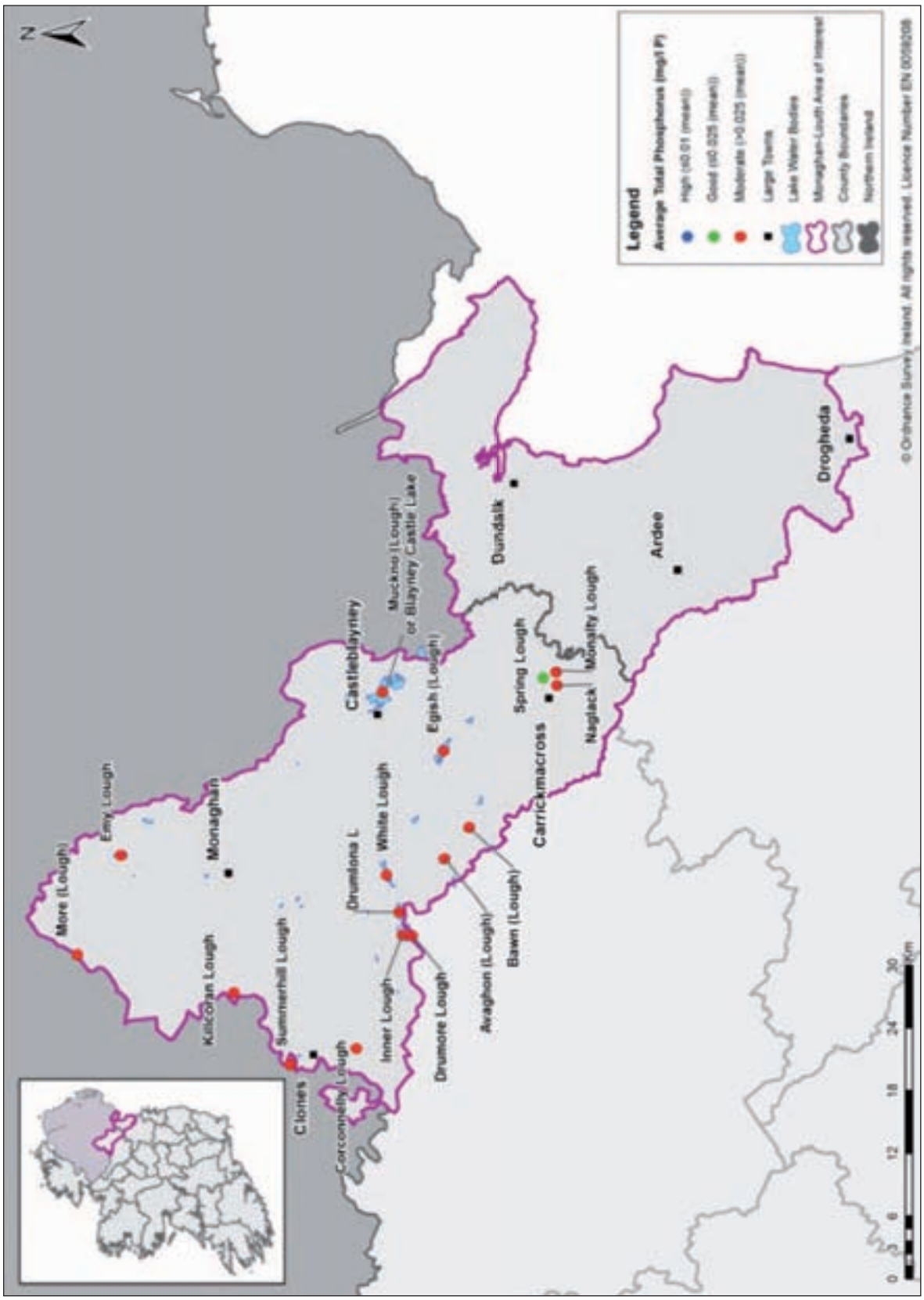
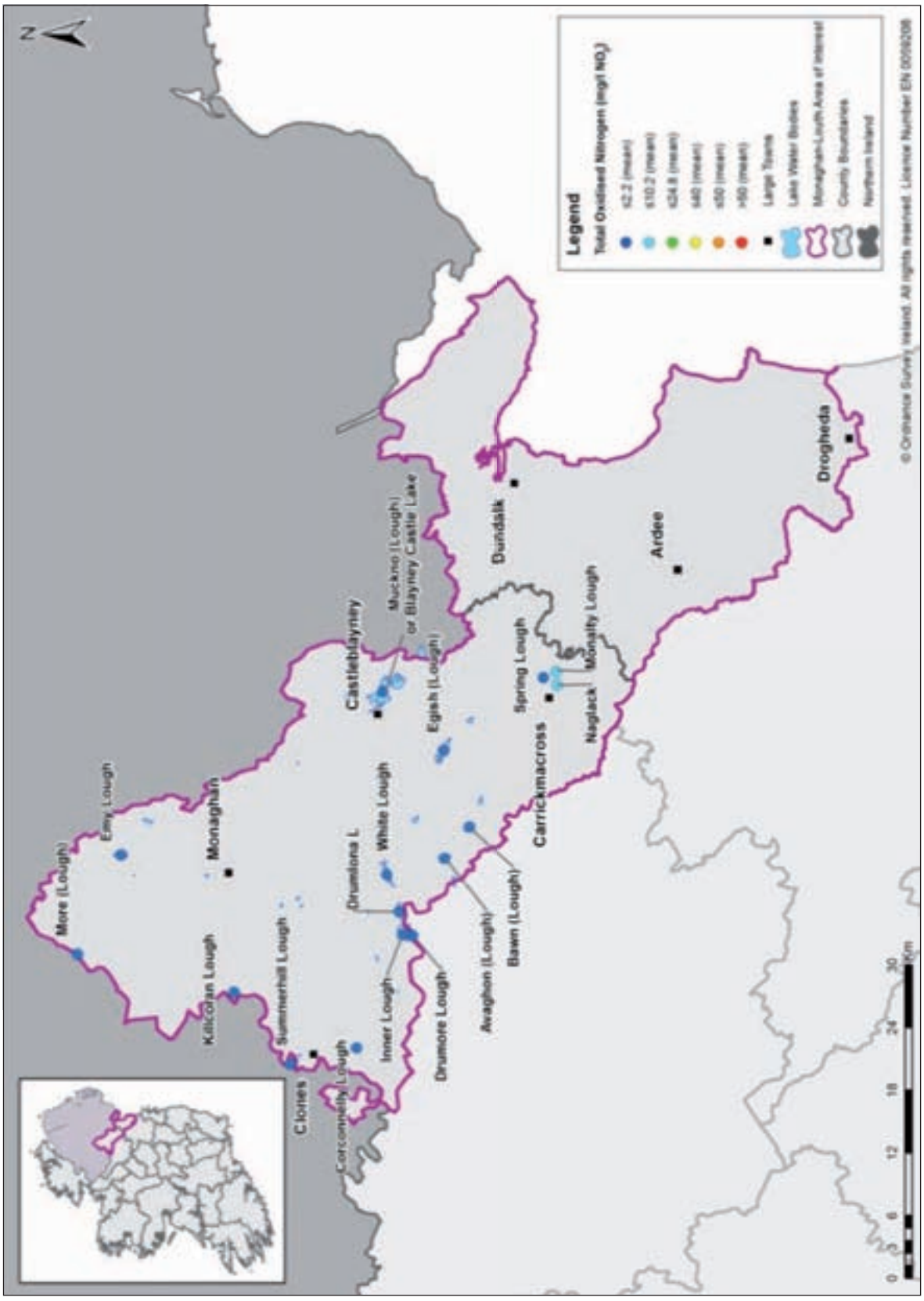


Figure 3.7 *Annual Average Total Oxidised Nitrogen in Monaghan Lakes in 2012*



4. GROUNDWATER QUALITY

Groundwater, which originates from rain that soaks into the ground, is an important natural resource in Ireland. It flows through and is stored in the fractures in bedrock and the pore spaces of sand and gravel deposits. In the past the focus was on its use as drinking water; however under the WFD there is an increased emphasis on the environmental quality of groundwater, as well as its value as a potable water supply. Groundwater plays an essential role in the hydrological cycle and is critical for maintaining river levels and surface water ecosystems. In many Irish rivers, more than 30% of the flow is derived from groundwater, rising to 90% in periods of low flow. Therefore, the quality of groundwater can have a major impact on the quality of river water.

In Ireland approximately a quarter of all public and private drinking water supply is from groundwater. Most of the private group schemes and small supplies are reliant on groundwater and many have inadequate treatment. Therefore it is critical that groundwater is protected to maintain the quality of drinking water and ensure the water is safe to drink without the requirement for excessive levels of treatment.

4.1 Physico-Chemical and Biological Monitoring

In 2012 the Environmental Protection Agency's groundwater monitoring programme included 13 monitoring locations in counties Monaghan and Louth. The breakdown of these groundwater monitoring points is presented in Table 4.1.

Table 4.1 *Number of Groundwater Monitoring Points in 2012*

County	Number of Groundwater Monitoring Points
Louth	7
Monaghan	6

These sites were monitored for a variety of physico-chemical and microbiological parameters. Nitrate and ortho-phosphate, two of the main indicators of anthropogenic pollution from diffuse and small point sources, were measured and these are discussed in more detail in Section 4.2.

4.2 Assessment of Water Quality

Nitrate in Groundwater

Figure 4.1 shows the locations and the associated average nitrate concentrations in 2012 for the groundwater monitoring points in counties Monaghan and Louth.

Figure 4.1 *Average Nitrate Concentrations in counties Monaghan and Louth in 2012*

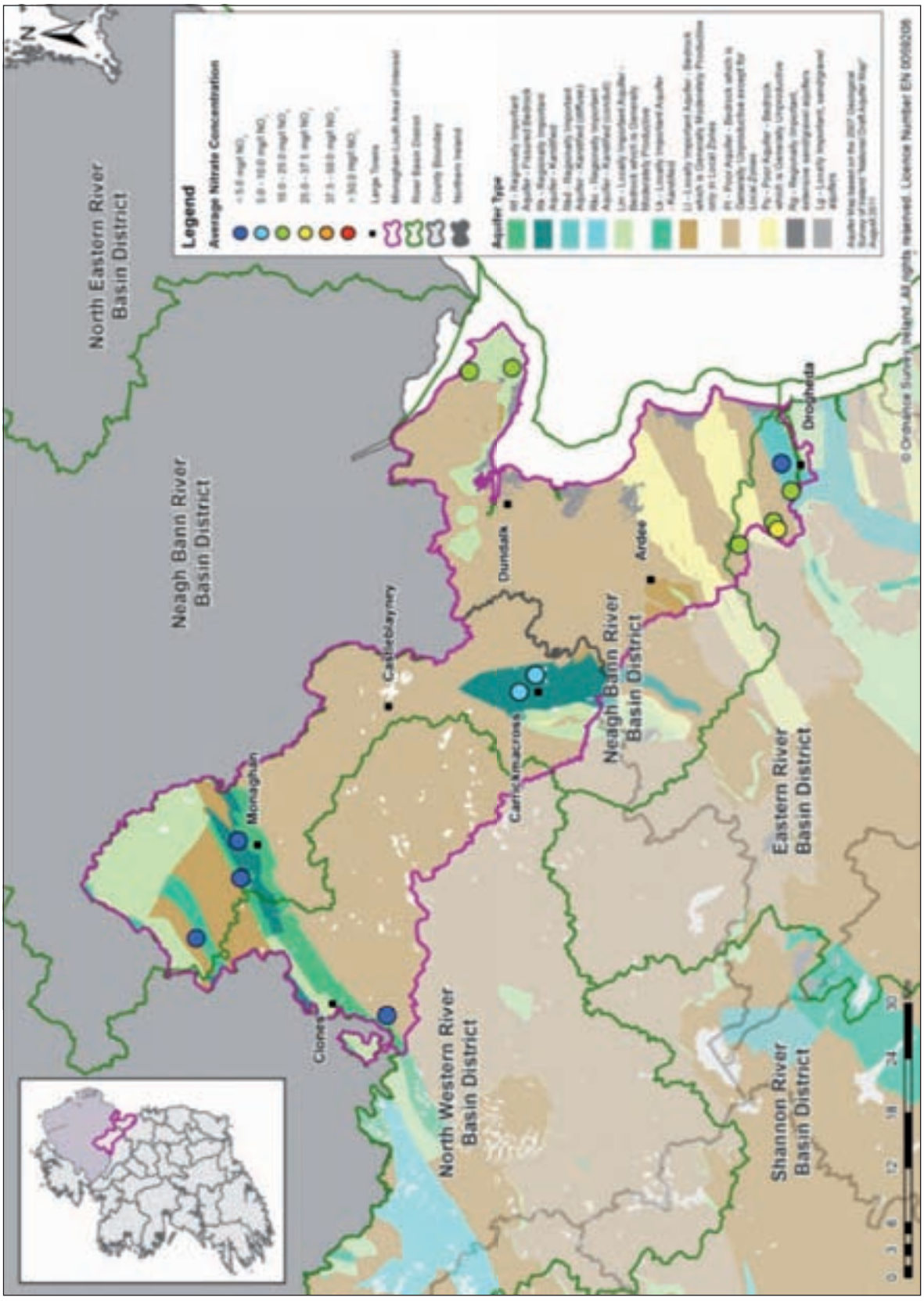
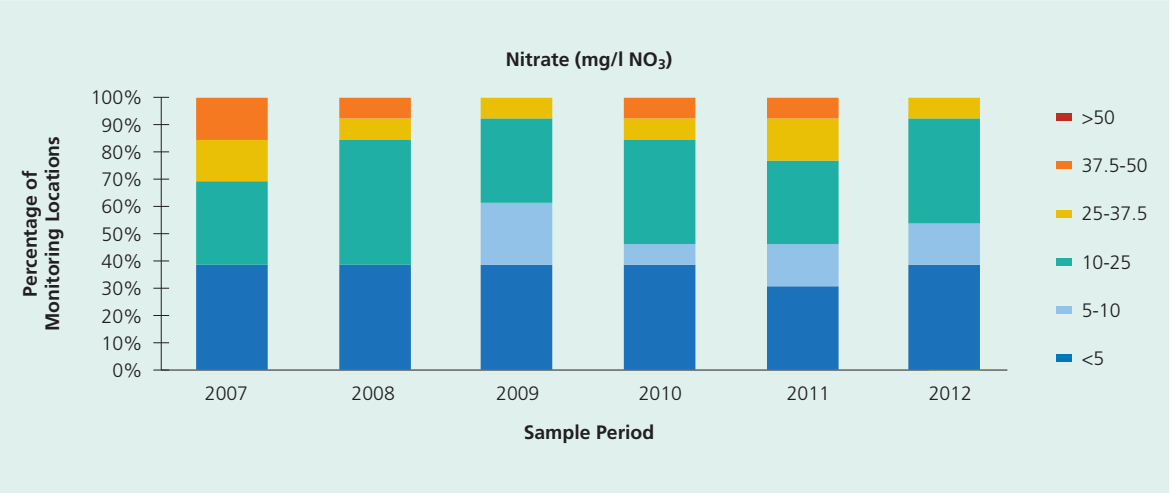


Figure 4.2 summarises the annual average nitrate concentrations from 2007-2012 for the groundwater monitoring programme in counties Monaghan and Louth.

Figure 4.2 *Annual Average Nitrate Concentrations in Groundwater in counties Monaghan and Louth*



The average nitrate concentration at groundwater monitoring locations in counties Monaghan and Louth has decreased over the period 2007 to 2012. There was a noticeable decrease in average nitrate concentrations in 2012 with an improvement evident at 5 of the 13 monitoring points. A number of factors may have influenced the reduction in average nitrate concentration including: reductions in inorganic fertiliser applications, improvements in storage for organic fertiliser and the implementation of landspreading restrictions as part of the Good Agricultural Practice Regulations. Above average rainfall in 2008-2009 and the resultant increase in dilution (particularly in 2009) also contributed to a noticeable decrease in the average nitrate concentration. In 2012 the average nitrate concentration at any monitoring location did not exceed the Irish WFD Threshold Value concentration of 37.5 mg/l NO_3 and the concentration in any individual sample did not exceed the Drinking Water Standard of 50 mg/l NO_3. The average nitrate concentrations were <10 mg/l NO_3 at all monitoring locations in County Monaghan during 2012.

Phosphate in Groundwater

Figure 4.3 shows the locations and the associated average ortho-phosphate concentrations in 2012 for the groundwater monitoring points in counties Monaghan and Louth.

Figure 4.3 *Average ortho-Phosphate Concentrations in counties Monaghan and Louth in 2012*

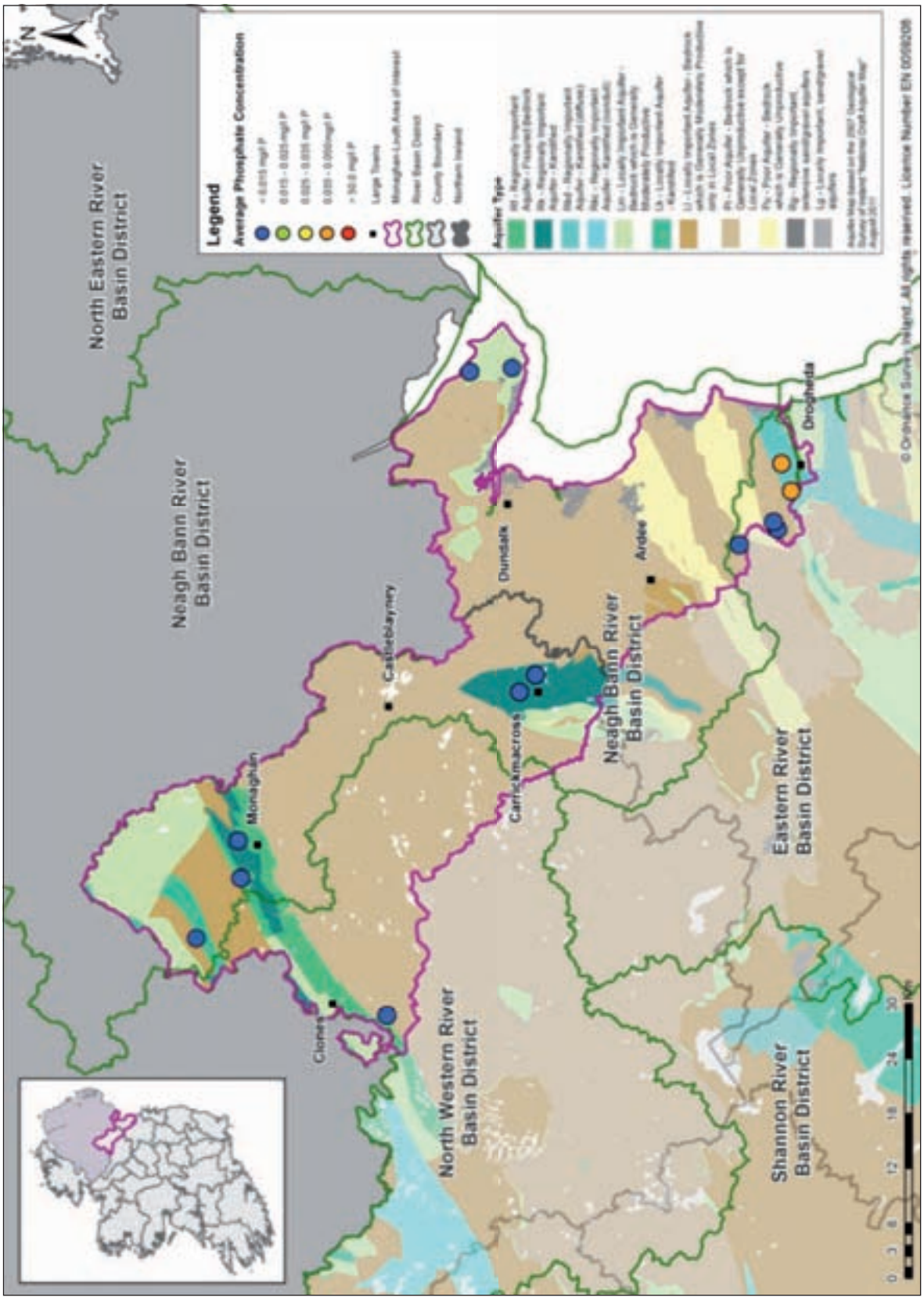
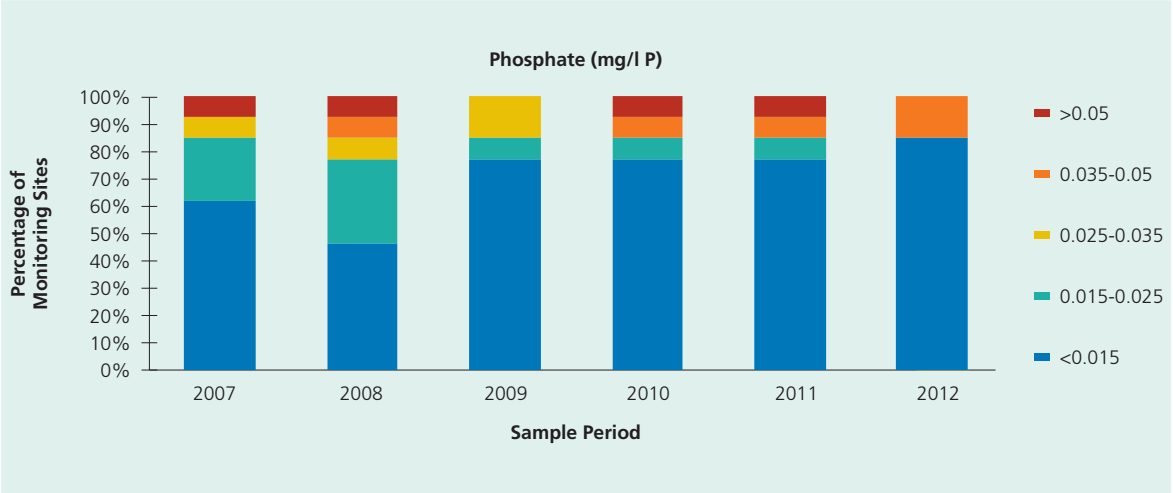


Figure 4.4 summarises the annual average ortho-phosphate concentrations from 2007-2012 for the groundwater monitoring programme in counties Monaghan and Louth.

Figure 4.4 *Annual Average ortho-Phosphate Concentrations in Groundwater in counties Monaghan and Louth*



Overall there has been a general decrease in ortho-phosphate concentrations over the period 2007-2012. A number of factors may have influenced the reduction in average ortho-phosphate concentration including: reductions in inorganic fertiliser applications, improvements in storage for organic fertiliser and the implementation of landspreading restrictions as part of the Good Agricultural Practice Regulations. The Irish WFD Threshold Value concentration of 0.035 mg/l P should be considered when assessing the contribution of ortho-phosphate in groundwater to rivers. Three groundwater bodies in County Louth and two groundwater bodies in County Monaghan are classified at poor chemical status during the first WFD reporting cycle because of groundwater contributions of ortho-phosphate to rivers that are less than good status. The proportion of monitoring locations with an average ortho-phosphate concentration >0.035 mg/l P in counties Monaghan and Louth did not change in 2010-2012 (two sites, both located in County Louth). However, in 2012 there were no longer any sites with an average concentration >0.05 mg/l P. In 2012 the average concentration was <0.015 mg/l P at all monitoring locations in County Monaghan and at five of the seven monitoring locations in County Louth.

Other Parameters

In 2012 faecal coliforms were detected at four of the thirteen sites monitored in counties Monaghan and Louth, with 19% of all samples taken in counties Monaghan and Louth indicating the presence of faecal contamination. Between 2007 and 2010, monitoring was undertaken to assess the impacts of diffuse pollution from pesticides and organic carbon compounds, including hydrocarbons. The Drinking Water Standard for individual pesticides (0.1 µg/l) was exceeded in 16 out of 18,722 groundwater samples taken nationally, and there were no organic carbon compound exceedances.
In response to this a less intensive risk based monitoring programme has been put in place for these chemicals.

Sources of Pollutants

It is generally unlikely that the impact from point sources, such as mines, quarries and landfills, will have a significant effect on an entire groundwater body (McGarrigle *et al.,* 2010). No groundwater bodies in counties Monaghan and Louth were classified as being at poor status for the WFD because of large point source pressures. It is likely that groundwater body scale water quality issues are due to diffuse sources of pollution including nutrient pressures from agricultural activities and small point sources such as domestic wastewater treatment systems and farmyards.

4.3 Summary

It is important that groundwater is protected to maintain the quality of drinking water and so that the groundwater contribution to ecosystems, including rivers, is of good quality. Nitrate and ortho-phosphate concentrations in groundwater in County Monaghan are relatively low. This is likely to be a reflection of the low to moderate groundwater vulnerability in many parts of the county that relate to the natural protection provided by the overlying soils and subsoils. The average nitrate and ortho-phosphate concentrations in County Louth are more variable than those in County Monaghan, with the wider range of concentrations comparable to the range seen nationally. Three groundwater bodies in County Louth and two groundwater bodies in County Monaghan are classified at poor chemical status under the WFD.

The progress made in improvement of nitrate and ortho-phosphate concentration in counties Monaghan and Louth highlights the importance of continuing with programmes of measures to ensure that overall nutrient loss to groundwater of nitrate and ortho-phosphate is minimised.

Nitrate concentrations in groundwater were below the drinking water quality standard. However, as microbial pollution was evident at some of the monitoring locations and may also be present in other private group schemes and small supplies, groundwater protection measures need to be maintained to ensure that water is safe to drink without the need for increased levels of treatment.

Continued improvements in the understanding of the interactions between groundwater and surface water are very important to maximise the effectiveness of any programmes put in place. Considerable progress has been made in understanding the role of agricultural activities as a source of water pollution from research undertaken by Teagasc and EPA-funded projects, particularly in the lag times for reductions of N and P in surface water and groundwater, following the implementation of the mitigation measures in the GAP regulations. Research by Fenton *et al.* (2011) has shown a time-lag for nitrate to flush from bed-rock aquifers that ranges from 7-16 years, where the groundwater in the aquifer is overlain by 3-10m of unsaturated subsoil. Where subsoil thickness is less, as it is in much of Ireland, the lag-time would be less.

5. TRANSITIONAL AND COASTAL WATER QUALITY

5.1 Physico-Chemical & Biological Monitoring

The EPA has been monitoring and assessing the water quality of estuaries and coastal waters since the early 1990s. Following the introduction of the WFD, the monitoring programme has intensified and the EPA now monitors 120 water bodies up to four times per year, once in winter and three times in summer. In addition to more traditional trophic status monitoring, such as nutrient and oxygen concentrations, the assessment now covers a wide range of biological elements such as seaweeds, phytoplankton and seagrass. This holistic ecological assessment is an essential part of the WFD and in conjunction with the Marine Institute and Inland Fisheries Ireland programmes, a comprehensive overview of the ecological status of Ireland's tidal waters environment can now be provided.

The transitional and coastal waters of the Louth area cover an area of just over 300 km^2. This is broken down into 14 water bodies in and Neagh Bann RBD and two in the Eastern RBD. These water bodies comprise partially mixed estuaries (e.g. the Boyne and Castletown Estuaries), transitional lagoons (e.g. Carlingford Lagoons) and tidally mixed coastal waters (e.g. Outer Dundalk Bay and the Louth Coast). A subset of these water bodies is assessed for WFD ecological status and for trophic status.

Transitional and coastal water bodies are monitored for the following parameters: salinity, temperature, pH, turbidity, Secchi depth, dissolved oxygen, biochemical oxygen demand (BOD), total oxidised nitrogen (TON), total ammonia, dissolved inorganic nitrogen (DIN), ortho-phosphate and chlorophyll a.

The trophic status of these waters is assessed using the EPA's Trophic Status Assessment Scheme (TSAS) which captures the cause-effect relationship of the eutrophication process and considers the following:

- Enrichment of waters by nutrients (dissolved inorganic nitrogen and phosphorus)
- Accelerated algal growth (phytoplankton and opportunistic macroalgae)
- Undesirable disturbance (oxygen content)

Trophic status assessments are based on the analysis of data collected over a period of three years, and each water body assessed is categorised as either eutrophic, potentially eutrophic, intermediate or unpolluted with respect to nutrient enrichment.

Priority substances are also monitored and details of this programme, undertaken by the Marine Institute, are available at *http://hdl.handle.net/10793/635*

5.2 Assessment of Water Quality

In 2011, the river Boyne contributed 2,350 tonnes of nitrogen, as total nitrogen, and 77 tonnes of phosphorus, as total phosphorus, to the Boyne estuary. This represents 2.3% of the national total for nitrogen and 3.4% of the national total for phosphorus. The catchment of the Boyne at 2695 km^2 represents 2.4% of the national catchment area. A trend assessment of loadings between 1990 and 2010 indicates a statistical downward trend in nutrient loadings of total phosphorus and total ammonia but no statistically significant decline in the overall loading of total nitrogen.

In terms of point sources there are two major waste water treatment plants discharging to tidal waters. Both the Drogheda and Dundalk agglomerations have a treatment plant PE greater than 100,000. The Castletown estuary is currently classified as eutrophic with elevated nutrients in summer and winter, disturbed oxygenation conditions and elevated phytoplankton growth. Inner Dundalk Bay was previously classified as intermediate, but is now unpolluted with respect to nutrient enrichment. Previous results for this water body indicated that the winter DIN levels, chlorophyll concentrations and oxygen conditions had all improved, and this improvement has continued in 2010-2012. The parameters are still only marginally below the assessment criteria but this area continues to show improvements. The decline in status of the upstream estuary is of concern with the water body breaching all three TSAS criteria. In addition, a series of high BOD measurements indicate a serious disruption to the trophic status of this water body.

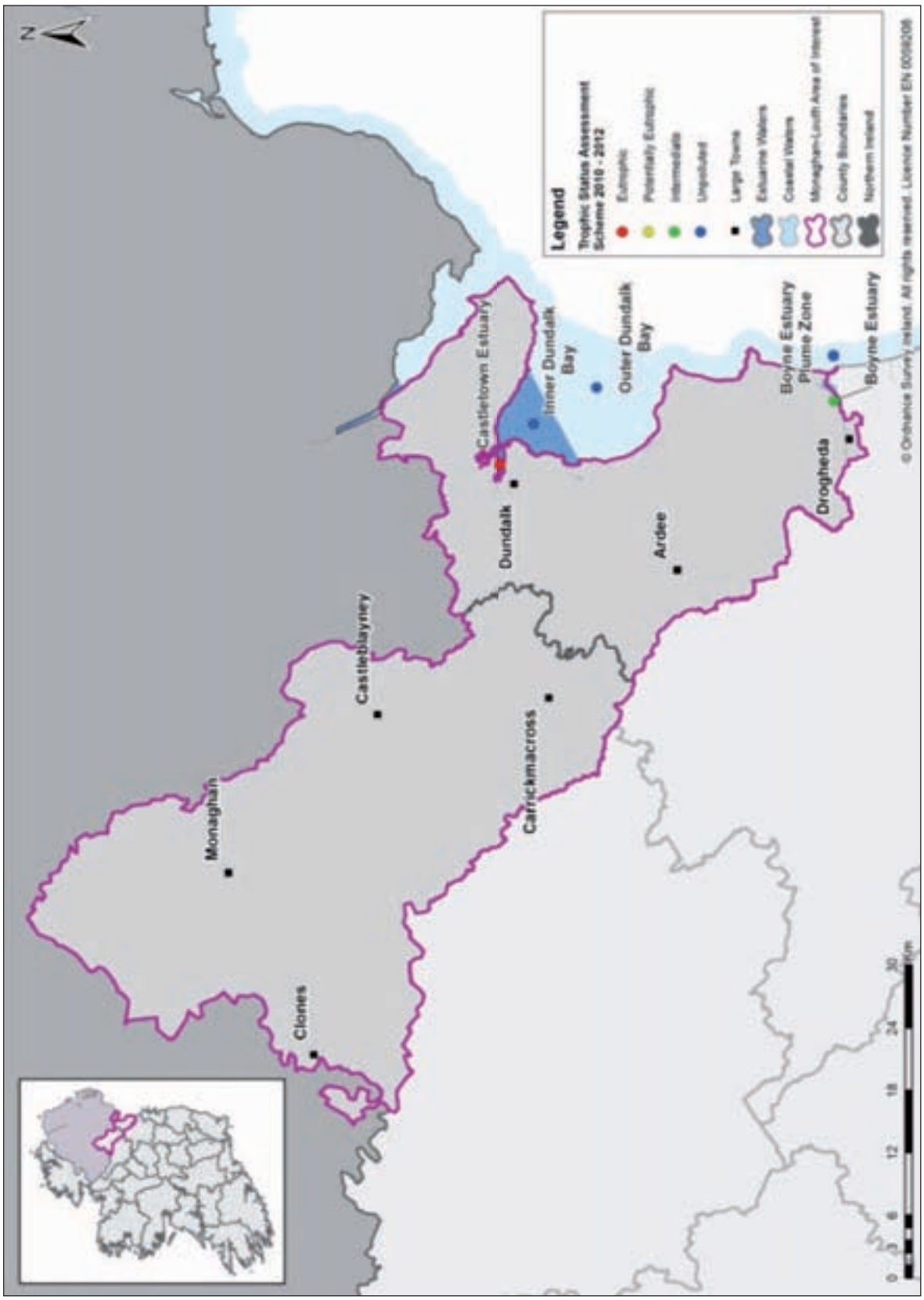
The Boyne estuary continues to show Intermediate status due to elevated winter nitrogen concentrations. The coastal waters in this area are all currently unpolluted in relation to trophic status.

Table 5.1 *Trophic Status of Coastal Waters in the North-East*

Trophic Status	Louth (%)	National (%)
Eutrophic	20	7
Potentially Eutrophic	0	8
Intermediate	20	28
Unpolluted	60	57

Five of the 16 water bodies are assessed for ecological status, as defined under the WFD. The Castletown estuary and inner Dundalk Bay are both classed as moderate or worse exceeding the standards for both general physico-chemical elements and biological quality elements. The Boyne estuary is currently classified as good, although it has elevated nitrogen concentrations currently not covered by an EQS under SI 272 of 2009. Outer Dundalk Bay is classified as good status based on oxygenation condition and benthic invertebrate fauna. The remaining coastal water is classified as high status.

Figure 5.1 *Trophic Status of Louth Transitional and Coastal Waters 2009-2011*



5.3 Bathing Waters

In 2012, four bathing waters in Co. Louth were monitored during the bathing season, out of a total of 136 locations nationally. The monitoring of bathing waters is the responsibility of the relevant local authority, and sampling must be undertaken at regular intervals during the bathing season which runs from June 1st to September 15th each year with a pre-season sample taken in late May. There were no designated inland bathing waters monitored in the Monaghan-Louth area in 2012, and only nine nationally. Local authorities are encouraged to re-examine bathing patterns in their regions with a view to providing more extensive coverage of bathing areas.

The revised Bathing Water Directive (2006/7/EC) was transposed into Irish law in 2008 (S.I. 79 of 2008) and fully replaces the existing regulations (S.I. 155 of 1992) on 31st December 2014. This directive sets tighter microbiological standards for two new parameters – intestinal enterococci (IE) and *E. coli*. Previous assessments were based on Total and Faecal coliforms and some physico-chemical measurements. Since 2011 transitional arrangements are in place and the new microbiological parameters have been monitored. At present bathing waters are classified as Good, Sufficient or Poor depending on their compliance with existing EU guide or mandatory standards. From 2015 however microbiological assessments will be used to add a further category of 'Excellent'. A classification of 'Sufficient' will be required for all bathing waters by 2015.

To date only Louth County Council has any designated bathing waters. Results for the bathing waters for the 2012 bathing season are provided in Table 5.2 and Figure 5.2. These show that all but one (75%) of the designated bathing areas in the county achieved 'Good' status compared to the national total of 67%.

Table 5.2 *Bathing Water Quality in County Louth, 2012*

Responsible Local Authority	Bathing Area	Water Quality Status 2012	Compliance with Mandatory/Guide Values		
			E. Coli.		IE
			Mandatory	Guide	Guide
Louth County Council	Clogherhead	Good	√	√	√
	Port, Lurganboy	Sufficient	√	X	√
	Seapoint	Good	√	√	√
	Shelling Hill/ Templetown	Good	√	√	√

Overall bathing water quality in Louth continues to be of a high standard but at times was affected by extreme rainfall events. During the month of August all beaches in the county showed elevated bacterial levels most likely associated with run-off from agricultural lands where livestock grazing was in place or where animal manures had been spread.

Sampling frequency in the county is among the best nationally with typically 20 samples being taken over the course of the bathing season. This far exceeds the minimum EU requirement of just five samples but is justified on the basis that individual elevated samples have less overall impact on percentage compliance than if the frequency were reduced.

In 2015, assessment of bathing waters will be undertaken using a statistical approach based on evaluating 4 years of bathing water data. This should minimise the variability observed in the present annual assessments. Based on examination of data covering 2009-2012, inclusive assessment shows that all four bathing waters are likely to be able to achieve 'Excellent" status however efforts should be made to identify potential sources of microbial pollution which could impact on this outcome.

5.4 Summary

The Louth coast contains two very large WWTP and as such the estuaries are under increased pressure. However, improvements have been seen. The transitional waters and the coastal waters remain of good environmental status. Recent improvements in inner Dundalk Bay require close analysis to see if the upward trend continues. The Boyne Estuary is currently at Intermediate status compared to potentially eutrophic in the 1990s.

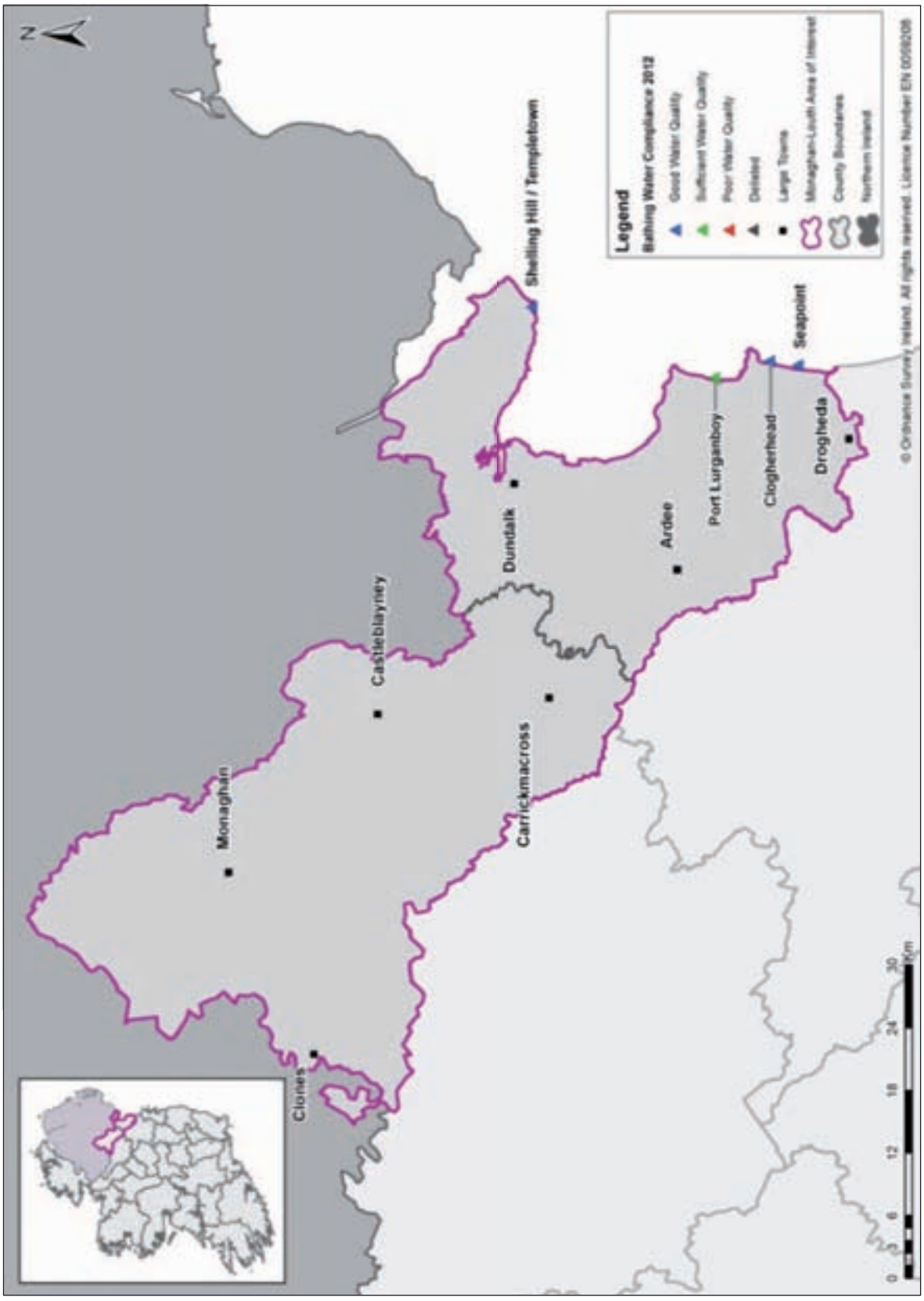
Other pressures are continuing to affect ecological status under the WFD, which is reflected in the conditions of the benthic invertebrate fauna. Both inner and outer Dundalk Bay show deviations from unimpacted status.

As with lakes, reduction in nutrient loadings from rivers is critical in improving the status of Ireland's transitional and coastal waters. This will be achieved by targeting larger point sources of pollution from WWTPs as well as smaller point sources such as DWWTS and reducing the nutrient loads emanating from them, as well as continuing investigative monitoring of rivers and streams that feed into estuaries in order to reduce diffuse sources of pollution from agricultural sources.

The proportion of water bodies in potentially eutrophic status (20%) appears higher than the national picture, but this is skewed by the low numbers of waterbodies in this assessment area.

In relation to bathing water, three of the four sites (75%) achieved good status, compared with 67% nationally. Based on examination of data covering 2009-2012, inclusive assessment shows that all four bathing waters are likely to be able to achieve 'Excellent" status however efforts should be made to identify potential sources of microbial pollution which could impact on this outcome.

Figure 5.2 *Location of Bathing Waters in County Louth*



6. SUMMARY AND ASSESSMENT

The Water Framework Directive requires that by 2015 the following must be achieved:

- Prevent deterioration of water bodies
- Achieve good status for all water bodies
- Reduce chemical pollution
- Achieve water related protected area objectives.

Monitoring of rivers, lakes, groundwater and transitional & coastal waters in Monaghan and Louth indicates that while there have been welcome improvements in some areas, work remains to be done in others, particularly in addressing the larger point source pollution such as Waste Water Treatment Plants (WWTPs), smaller point sources such as domestic wastewater treatment systems (DWWTS) as well as diffuse pollution from agricultural sources.

One of the aims of this report is to present an assessment of progress towards meeting the objectives of the WFD as set out in the respective River Basin Management Plans. The target is to have 100% of waterbodies achieving at least good status by 2021. Given the current status of many water bodies, this will be a significant challenge for all concerned.

Rivers

On the positive side there are no seriously polluted river sites in Monaghan and Louth, which follows the national trend of virtually eliminating all seriously polluted sites. That aside, the overall picture for river water quality in this area is quite poor. In the period 2010-2012, just 40% of rivers (by channel length) were of high or good status, compared with 73% nationally. Of equal concern is the continuing drop in the number of high status sites in Monaghan and Louth. Since 1987 the number of these sites has dropped from 14, to just five in the period 2009-2011 and further still to the current level of three. Should this trend continue, there is a real danger that high status sites will be lost altogether. Protection of the existing pristine sites and restoration of other good status sites to the highest quality will be a challenge for all stakeholders.

Nutrient levels have dropped in most rivers over the last 10-20 years. In 2012, the annual average for 48% of the river stations monitored was above the EQS for 'Good' status compared to the 65% in 2011. The annual average nitrate level for 28% of the river stations monitored was above the EQS for 'Good' status compared to 30% in 2011. Despite these improvements, nutrient levels remain too high and greater efforts are needed to reduce levels further. Tackling pollution at these sites should lead to an improvement in the quality of groundwater, lakes and transitional & coastal waters as well.

Lakes

All of the sixteen lakes monitored under the WFD are in County Monaghan. Based on the current assessment period 2010-2012 there is now just one lake (Spring) at good ecological status. This represents a deterioration from the previous assessment period 2008-2010 when two lakes were at good ecological status. Furthermore, 38% of lakes are now at bad ecological status compared to 31% in the period 2008-2010. Nutrient enrichment, as is evidenced from the elevated chlorophyll and total phosphorus levels is the main cause for concern with diffuse pollution from intensive agriculture and small point source discharges from DWWTS thought to be the main pressures. Egish, Inner and Naglack are the worst affected in this regard. Given the current high nutrient levels and indeed the upward trend observed in some cases, there is a real danger that none of the lakes in Monaghan will meet the WFD target of good ecological status by 2015.

Groundwater

Overall, groundwater quality in Monaghan and Louth is quite good with over 95% of groundwater bodies by area currently at good status, compared with 85% nationally. Nitrate and ortho-phosphate levels in Monaghan groundwater are relatively low and there has been a gradual decrease in observed levels over the period 2007-2012. While levels in Louth groundwater are more variable and more comparable to those seen nationally, there has also been a general downward trend in the same period. This can at least in part be attributed to reductions in inorganic fertiliser applications, improvements in storage for organic fertiliser and the implementation of landspreading restrictions as part of the GAP Regulations. Despite a slight improvement in the percentage of samples with detected levels of faecal coliforms in 2012, faecal contamination of groundwater remains an issue. Given the importance of groundwater as a source of drinking water, groundwater protection measures need to be maintained to ensure that water is safe to drink without the need for increased levels of treatment.

Transitional and Coastal Waters

Transitional and coastal waters continue to be under pressure from high nutrient loadings from rivers in the Monaghan-Louth area. The nutrient loading of the Boyne alone represents 2.3% of the national total for nitrogen and 3.4% of the national total for phosphorus. Diffuse pollution arising mainly from agricultural activities is a significant factor. However, a substantial portion comes from point sources, with two large WWTPs each with a population equivalent greater than 100,000 discharging to tidal waters. In terms of ecological status, as defined under the Water Framework Directive, 3 of the 5 water bodies (60%) assessed were found to be at least 'Good'. In 2012, there was a deterioration in bathing water quality in Louth with 3 of the 4 bathing waters (75%) at 'Good' status compared to 100% in 2011. Heavy rainfall events in 2012 resulting in increased run-off from agricultural lands are thought to have contributed to this deterioration.

Pressures

Urban Waste Water Discharges

Municipal waste water discharge is one of the main sources of pollution in Monaghan and Louth rivers. Nationally 72% of waste water receives secondary treatment, and a further 21% receives secondary treatment with nutrient reduction. The latter treatment is specified for discharges to sensitive areas with a population equivalent of greater than 10,000.

In 2012, nutrient levels were elevated in the Ballymascanlon, Blackwater (Monaghan), Dee, Finn (Monaghan), Glyde, Mattock, Proules and Shambles rivers in particular, at least in part due to discharges from Wastewater Treatment Plants (WWTP). While improvements in wastewater treatment has contributed to a reduction in nutrient levels in many rivers in Monaghan and Louth over the last 10-20 years, further improvements are required to further reduce nutrient loadings.

In accordance with the requirements of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007), the EPA is responsible for the licensing or certification of all discharges to the aquatic environment from sewerage systems owned, managed and operated by water service authorities. In 2012 licences were issued to Ballinode, Emyvale and Scotstown agglomerations bringing the total number of licences and certificates issued in the Monaghan-Louth region to 13 and 8 respectively by the end of 2012. The authorisation process is an on-going with a further 23 certificates/ licences at the 'applied' stage. It is expected that the licensing of wastewater discharges will further drive the upgrade of treatment plants and corresponding improvement in water quality.

Agriculture

Progress has been made in recent years in mitigating the impacts of large point sources of pollution on water quality. Progress in relation to diffuse sources has proved to be much more challenging however. Mitigating the effects of diffuse agricultural sources of pollution such as landspreading is much more difficult to address than point sources. Legislation through the Nitrates Directive (S.I. 610 of 2010) is the main measure for addressing agricultural pollution. These regulations also provide statutory support for good agricultural practice to protect waters against pollution. While there have been improvements in agricultural pollution in recent years, there may be a significant portion of farms nationally that are non-compliant with the Nitrates Regulations. The risk-based approach adopted by Local Authorities in conjunction with the Department of Agriculture, Fisheries and Food, for farm inspections is welcomed and has helped as an efficient way of tacking this problem up to now.

However, in the context of *Food Harvest 2020* which is likely to involve large increases in farm outputs over the coming years, resulting in even greater pressures, an improved approach to dealing with these pressures may be warranted. Improved awareness at a local level including better consultation with local communities as part of a more integrated catchment management approach may pay greater dividends.

Under Ireland's derogation to the Nitrates Regulations approved by the EU Commission, increased spreading of livestock manure (and thus increased live-stocking rates) is permitted. This derogation is only permitted if it is demonstrated not to have a negative impact on water quality. The current derogation runs to the end of 2013, coinciding with the next review of Ireland's *Nitrates Action Plan*[13]. This second review is currently under being carried out, and the retention of derogations already received from the commission will be critical to the success of Food Harvest 2020. However any derogation received will depend on Ireland's ability to show that water quality will not be adversely affected by any increase in agricultural outputs.

Domestic Waste Water Treatment Systems

Discharges from Domestic Waste Water Treatment Systems (DWWTS) pose a potential threat to human health because of the presence of microbial pathogens in particular. Nutrient loss from DWWTS in the form of phosphorus and nitrogen is of concern in terms of its threat to surface water and groundwater quality. In large catchments, it is likely that the nutrient load from DWWTS to surface water is relatively low compared to other pollution sources such as agriculture and urban wastewater treatment plants. In small catchments, however where the housing density is relatively high and where percolation conditions are problematical, DWWTS are likely to be significant contributor to pollution of surface water. Overall, nutrient levels are relatively low in Monaghan and Louth groundwater. Where elevated levels are observed, DWWTS are unlikely to be the main source except where there is a relatively high density of DWWTS overlying extremely vulnerable groundwater. It should be noted that DWWTS located, constructed and installed in accordance with the best practice guidance generally provide adequate treatment and disposal of domestic waste water. In 2009, the EPA published a new binding Code of Practice to provide guidance on the provision of waste water treatment and disposal systems for new single houses.

The National Inspection Plan for DWWTS was launched by the EPA in 2013. Following risk assessments, inspections will be targeted at the higher risk areas. Risk ranking, indicating the likelihood of DWWTS in the area presenting a risk to human health or the environment, shows certain areas of the country being at higher risk, including large parts of Monaghan and Louth.

Forestry

Forestry occupies a relatively low percentage of land in Monaghan and Louth compared to the rest of the country. Figures from 2010 indicate that 5.0% and 4.1% of land is covered by forest in Monaghan and Louth respectively, well below the national average of 10.8%. Pressures exerted by forestry include artificial acidification of waters arising from the presence of coniferous afforestation on acid sensitive soils; nutrient enrichment, siltation and sedimentation impacts from forestry operations. Despite the relatively low level of forestry cover, there needs to be adequate control of forestry operations, particularly in sensitive areas.

13 http://www.environ.ie/en/Legislation/Environment/Water/FileDownLoad,25133,en.pdf

Conclusion

In general, counties Monaghan and Louth face significant challenges in achieving the targets of the Water Framework Directive. Rivers and lakes in particular compare poorly with national figures as regards number of water bodies achieving good status. Greater focus needs to be placed on the 68 Priority Polluted Sites identified in section 2.4 of this report. Tackling the causes of pollution at these sites will not only improve the water quality in these rivers but may also improve the water quality of lakes into which they flow.

The biggest threat to water quality is from excessive nutrients – ortho-phosphate in freshwaters and nitrate in transitional and coastal waters. The main sources of these nutrients are waste water treatment plants, runoff from agricultural land and contamination from DWWTS. Targeted, risk based farm inspections have also brought about some improvements, and it is hoped the inspection and public awareness campaign relating to DWWTS will do likewise.

The projected increased output under *Food Harvest 2020*, as well as the removal of the dairy quota at the end of 2015, will provide significant challenges in managing the quality of all water bodies, and achieving the aims of the Water Framework Directive.

Further improvements in water quality may prove more challenging for the future, and an integrated catchment management approach may help. In the UK, the second round of river basin plans will use this approach on a pilot basis. Rather than having a top-down system, a more participative and collaborative approach will encourage local communities to have a greater say in setting priorities and delivering solutions themselves.

7. REFERENCES

C.E.C. (COUNCIL OF THE EUROPEAN COMMUNITIES), 1975. Council Directive of the 16 June 1975 concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (75/440/EEC). *Official Journal of the European Communities,* No. L 194/26.C.E.C. (COUNCIL OF THE EUROPEAN COMMUNITIES), 1991. Council Directive of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources. *Official Journal of the European Communities,* No. L 375/1.C.E.C. (COUNCIL OF THE EUROPEAN COMMUNITIES), 1998. *COUNCIL DIRECTIVE 98/83/EC of 3 November 1998 on the quality of water intended for human consumption. Official Journal of the European Communities,* No. L 330/32.

COUNCIL DIRECTIVE of 21 May 1991 concerning urban waste water treatment (91/271/EEC). Directive 2006/44/EC of the European Parliament and of the Council of 6 September 2006 on the quality of freshwaters needing protection or improvement in order to support fish life. *EC (Good Agricultural Practice for Protection of Waters) Regulations 2006,* (S.I. No. 378 of 2006).

EEA Signals 2004 – A European Environment Agency update on selected issues. European Environment Agency, Copenhagen. ISBN 92-9167-669-1.

EPA, 2010 Code of Practice: Wastewater Treatment Systems for Single Houses. EPA, Wexford.

EPA, 2012 An Assessment of Discharges from Domestic Waste Water Treatment Systems in Relation to Human Health and Water Quality in Ireland. EPA, Wexford.

European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272 of 2009). European Parliament and Council of the European Union, 2000. *Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (00/60/EC).*

HMSO (Her Majesty's Stationery Office), 1986. Department of the Environment Control Directorate of Environmental Protection, *Nitrate in Water.* A report by the Nitrate Co-ordinating Group, London. Pollution Paper No. 26.

McGarrigle, M., Lucey, J. and Ó Cinnéide, M. (Eds.), 2010. *Water Quality in Ireland 2007-2009.* Environmental Protection Agency, Wexford.

Ryan, M. and Fanning A., 1995. *The Nitrogen Cycle in Irish Farmland,* Farm & Food, Teagasc, July/Sept 1995.

Smith, R. (Ed.), 2012. *Integrated Water Quality Report, Co. Monaghan & Co. Louth,* Environmental Protection Agency, Wexford.

S.I. 293 of 1988 – European Communities (Quality of Salmonid Waters) Regulations 1988.

S.I. No. 254 of 2001 – Urban Waste Water Treatment Regulations, 2001.

S.I. No. 722 of 2003 – European Communities (Water Policy) Regulations, 2003.

S.I. No. 278 of 2007 – European Communities (Drinking Water) (No. 2) Regulations.

S.I. No. 684 of 2007 – Waste Water Discharge (Authorisation) Regulations.

S.I. No. 79 of 2008 – Bathing Water Quality Regulations, 2008.

S.I. No. 272 of 2009 – European Communities Environmental Objectives (Surface Water) Regulations, 2009.

S.I. No. 9 of 2010 – European Communities Environmental Objectives (Groundwater) Regulations, 2010.

S.I. No. 48 of 2010 – Urban Waste Water Treatment (Amendment) Regulations, 2010.

S.I. No. 610 of 2010 – European Communities (Good Agricultural Practice for the Protection of Waters) Regulations, 2010.

S.I. No. 327 of 2012 – European Communities Environmental Objectives (Surface Water) (Amendment) Regulations, 2012.

8. ABBREVIATIONS and ACRONYMS

BOD	Biochemical Oxygen Demand	**NO_2**	Nitrite ion
BQE	Biological Quality Element	**NO_3**	Nitrate ion
Br	Bridge	**NPWS**	National Parks and Wildlife Service
CBOD	Carbonaceous Biochemical Oxygen Demand	**NTU**	Nephelometric Turbidity Units
DIN	Dissolved Inorganic Nitrogen	**OM**	Operational Monitoring
DO	Dissolved Oxygen	**o-PO_4**	ortho-Phosphate
DOC	Dissolved Organic Carbon	**OS**	Ordinance Survey
DWWTS	Domestic Waste Water Treatment Systems (Septic Tanks)	**P**	Phosphorus
d/s	Downstream	**PE**	Population Equivalent
EC	European Commission	**RBD**	River Basin District
EPA	Environmental Protection Agency	**SAC**	Special Area of Conservation
EQS	Environmental Quality Standard	**SI**	Statutory Instrument
EU	European Union	**SM**	Surveillance Monitoring
GAP	Good Agricultural Practice	**SSRS**	Small Stream Risk Score
GPC	General Physico-Chemical	**STP**	Sewage Treatment Plant
IAE	Intensive Agricultural Enterprises	**THM**	Trihalomethane
IFI	Inland Fisheries Ireland	**TOC**	Total Organic Carbon
INAB	Irish National Accreditation Board	**TON**	Total Oxidised Nitrogen
IPPC	Integrated Pollution Prevention and Control	**TSAS**	Trophic Status Assessment Scheme
IRBD	International River Basin District	**TP**	Total Phosphorus
ISO	International Standards Organisation	**u/s**	Upstream
mg/l	Milligrams Per Litre	**WFD**	Water Framework Directive
MRP	Molybdate Reactive Phosphorus	**WMU**	Water Management Unit
N	Nitrogen	**WWTP**	Wastewater Treatment Plant
NH_3	Ammonia	**UV**	Ultra Violet
NH_4^+	Ammonium ion	**µg/l**	micrograms per litre

9. GLOSSARY

Acidification: Continuing loss of capacity to neutralise acid inputs indicated by declining alkalinity and increasing hydrogen ion concentration (i.e. the decrease in pH of water or soil resulting from increases in acidic anion inputs such as sulphate)

Ammonia (NH_3): A simple compound of nitrogen primarily originating in waste discharges. It can be toxic to fish under certain circumstances and is a source of nitrogen for plants and algae.

Ammonium (NH_4^+): The ionised form of ammonia, which is more commonly found in water.

Anthropogenic: Produced as a result of human activities.

Biochemical Oxygen Demand (BOD): A measure of the potential oxygen consumption of decaying organic matter in water. It is a widely used measure of organic pollution in rivers and in effluents discharged to water.

Biodiversity: Word commonly used for biological diversity and defined as assemblage of living organisms from all habitats including terrestrial, marine and other aquatic ecosystems and biological complexes of which they are part.

Diffuse source pollution: Pollution that arises from diffuse areas in a catchment such as runoff from agricultural lands and forestry, especially during heavy rainfall when surface runoff is more likely to occur.

Ecology: The study of the relationship among organisms and between those organisms and their non-living environment.

Ecosystem: A community of interdependent organisms together with the environment they inhabit and with which they interact, and which is distinct from adjacent communities and environments.

Effluent: Liquid wastes.

Erosion: Wearing away of earth or rock by the effects of rain, wind, sea or rivers or by the action of toxic substances.

Eutrophication: The enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned.

Food Harvest 2020: A strategic plan to develop Ireland's agricultural sector in an environmentally sustainable way.

Groundwater: Water that occupies pores and crevices in rock and soil, below the surface and above a layer of impermeable material.

Habitat: The dwelling place of a species or community, providing a particular set of environmental conditions (e.g. forest floor, sea shore).

Heavy metals: Elements such as mercury, cadmium and lead that occur naturally in the environment but can be toxic to humans, animals and plants at elevated concentrations.

Hydromorphological pressures: Physical disturbances of water such as impoundments and other water regulation structures.

Invasive alien species: Species that have been introduced to Ireland (deliberately or accidently) by humans and have a negative impact on its economy, wildlife or habitats.

Invertebrate: An animal that does not possess a backbone.

Limit value: A level fixed on the basis of scientific knowledge, with the aim of avoiding, preventing or reducing harmful effects on human health and/or the environment as a whole, to be attained within a given period and not to be exceeded one attained.

Mixed rural influences: Term used to describe any one or a combination of agricultural runoff, cattle access, DWWTS, commercial activities, small industrial activities, rural schools, rural housing settlements, community centres etc suspected of having an impact on water quality.

Nitrate (NO_3): An ion of nitric acid (HNO_3).

Nitrite (NO_2): An ion of nitrous acid (HNO_2).

Nutrient: Element or chemical essential for growth, e.g. phosphorus, nitrogen, silica, oxygen, carbon.

ortho-Phosphate (PO_4): The simplest in a series of phosphates and an ion of phosphoric acid (H_3PO_4). It is commonly occurring form of phosphorus taken up by plants in the aquatic environment and is essential for their growth.

Phosphate: A general term to include ortho-phosphate, condensed phosphates and organically bound phosphates.

Point source pollution: Pollution that arises from a well-defined point, typically the end of a discharge pipe, but may include farmyard sources.

Priority Substances: Substances found in water that are harmful to health and the environment.

River Basin District: A river basin/catchment is an area of land from which all surface run-off flows through a series of streams, rivers and possibly lakes in the sea at a single river mouth or estuary. A River basin District comprises one or more neighbouring river basins together with their associated wetlands, groundwaters and coastal waters.

Urbanisation influences: Term used to describe any one or a combination of waste water treatment plant discharges, unauthorised discharges, hard surface runoff or sewer misconnections suspected of having an impact on water quality.

Water Framework Directive: An EU-wide law introduced in 2000 to bring a common approach to safeguarding all Community waterbodies and water dependent ecosystems.

APPENDIX 1. WFD Physico-Chemical Monitoring Stations 2012

Louth

			Grid Reference (ING)	
Reference	River Name	Station ID	Easting	Northing
L1	Big (Louth)	RS06B01-0100	315156	309883
L2	Ballymascanlan	RS06B02-0100	306465	314446
L3	Castletown	RS06C01-0200	300729	309852
L4	Cully Water	RS06C02-0200	302435	310849
L5	Flurry	RS06F02-0700	308137	310098
L6	Fane	RS06F01-0900	301390	301567
L7	Glyde	RS06G02-0700	295497	297731
L8	Glyde	RS06G02-0900	298637	295436
L9	Glyde	RS06G02-1230	306076	295303
L10	Dee	RS06D01-0600	292551	289685
L11	Dee	RS06D01-0670	295281	290330
L12	Dee	RS06D01-0680	296593	290520
L13	Dee	RS06D01-0710	297279	291051
L14	Dee	RS06D01-1000	306596	291170
L15	Dee	RS06D01-1100	307391	292195
L16	White (Louth)	RS06W01-0040	300889	284557
L17	White (Louth)	RS06W01-0100	304628	285661
L18	White (Louth)	RS06W01-0400	305723	289025
L19	White (Louth)	RS06W01-0500	305719	289280
L20	Mattock	RS07M01-0100	301855	280761
L21	Mattock	RS07M01-0200	300458	276919
L22	Mattock	RS07M01-0300	303686	275639
L23	Termonfeckin	RS06T01-0250	311830	282094

Monaghan

			Grid Reference (ING)	
Reference	River Name	Station ID	Easting	Northing
M1	Mountain Water	RS03M01-0100	259662	346197
M2	Mountain Water	RS03M01-0400	267050	343345
M3	Mountain Water	RS03M01-0500	268546	343108
M4	Mountain Water	RS03M01-0650	272000	342200
M5	Scotstown	RS03S02-0500	261106	337600
M6	Blackwater (Monaghan)	RS03B01-0100	260200	337081
M7	Blackwater (Monaghan)	RS03B01-0130	261322	335999
M8	Blackwater (Monaghan)	RS03B01-0600	267920	335344
M9	Blackwater (Monaghan)	RS03B01-0800	271921	338773
M10	Conawary (Lower)	RS03C02-1300	265434	334559
M11	Shambles	RS03S01-0500	268040	334982
M12	Clontibret Stream	RS03C01-1100	274525	331604
M13	Clontibret Stream	RS03C01-1200	274020	332180
M14	Clontibret Stream	RS03C01-1400	273851	335733
M15	Maghery	RS36M03-0900	256817	333997
M16	Maghery	RS36M03-1200	256957	330156
M17	Conawary (Upper)	RS36C11-0700	261500	330300
M18	Magherarney	RS36M01-0200	257868	329856
M19	Finn (Monaghan)	RS36F01-0100	254401	328407
M20	Finn (Monaghan)	RS36F01-0200	254563	326483
M21	Finn (Monaghan)	RS36F01-0500	249939	323331
M22	Lackey	RS36L07-1800	249552	325015
M23	Bunnoe	RS36B05-0300	256803	320224
M25	Dromore	RS36D02-0100	269806	321222
M26	Dromore	RS36D02-0150	271686	320500
M27	Dromore	RS36D02-0300	269589	319748
M28	Major Lough Stream	RS36M08-0036	274323	320129
M29	Fane	RS06F01-0200	282770	320680

			Grid Reference (ING)	
Reference	River Name	Station ID	Easting	Northing
M30	Fane	RS06F01-0300	287357	316783
M31	Fane	RS06F01-0650	293175	307040
M32	Gentle Owen's Lake Stream	RS06G04-0100	283409	321432
M33	County Water	RS06C03-0050	289250	324600
M34	County Water	RS06C03-0170	285596	321605
M35	Knappagh	RS36K01-0100	278594	311575
M36	Knappagh	RS36K01-0400	270618	311430
M37	Rossdreenagh Stream	RS06R03-0400	286533	303274
M38	Proules	RS06P01-0100	283385	304013
M39	Proules	RS06P01-0300	284961	302669
M40	Proules	RS06P01-0500	287803	301952
M41	Magheracloone Stream	RS06M01-0096	279552	299582
M42	Drumsallagh Stream	RS06D07-0070	280160	298260
M43	Glyde	RS06G02-0100	280537	297971
M44	Glyde	RS06G02-0500	289375	298093

An Ghníomhaireacht um Chaomhnú Comhshaoil

Is í an Gníomhaireacht um Chaomhnú Comhshaoil (EPA) comhlachta reachtúil a chosnaíonn an comhshaol do mhuintir na tíre go léir. Rialaímid agus déanaimid maoirsiú ar ghníomhaíochtaí a d'fhéadfadh truailliú a chruthú murach sin. Cinntímid go bhfuil eolas cruinn ann ar threochtaí comhshaoil ionas go nglactar aon chéim is gá. Is iad na príomh-nithe a bhfuilimid gníomhach leo ná comhshaol na hÉireann a chosaint agus cinntiú go bhfuil forbairt inbhuanaithe.

Is comhlacht poiblí neamhspleách í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) a bunaíodh i mí Iúil 1993 faoin Acht fán nGníomhaireacht um Chaomhnú Comhshaoil 1992. Ó thaobh an Rialtais, is í an Roinn Comhshaoil, Pobal agus Rialtais Áitiúil.

ÁR bhFREAGRACHTAÍ

CEADÚNÚ

Bíonn ceadúnais á n-eisiúint againn i gcomhair na nithe seo a leanas chun a chinntiú nach mbíonn astuithe uathu ag cur sláinte an phobail ná an comhshaol i mbaol:

- áiseanna dramhaíola (m.sh., líonadh talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh., déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta);
- diantalmhaíocht;
- úsáid faoi shrian agus scaoileadh smachtaithe Orgánach Géinathraithe (GMO);
- mór-áiseanna stórais peitreail.
- scardadh dramhuisce
- dumpáil mara

FEIDHMIÚ COMHSHAOIL NÁISIÚNTA

- Stiúradh os cionn 1200 iniúchadh agus cigireacht de áiseanna a fuair ceadúnas ón nGníomhaireacht gach bliain.
- Maoirsiú freagrachtaí cosanta comhshaoil údarás áitiúla thar sé earnáil – aer, fuaim, dramhaíl, dramhuisce agus caighdeán uisce.
- Obair le húdaráis áitiúla agus leis na Gardaí chun stop a chur le gníomhaíocht mhídhleathach dramhaíola trí comhordú a dhéanamh ar líonra forfheidhmithe náisiúnta, díriú isteach ar chiontóirí, stiúradh fiosrúcháin agus maoirsiú leigheas na bhfadhbanna.
- An dlí a chur orthu siúd a bhriseann dlí comhshaoil agus a dhéanann dochar don chomhshaol mar thoradh ar a ngníomhaíochtaí.

MONATÓIREACHT, ANAILÍS AGUS TUAIRISCIÚ AR AN GCOMHSHAOL

- Monatóireacht ar chaighdeán aeir agus caighdeáin aibhneacha, locha, uiscí taoide agus uiscí talaimh; leibhéil agus sruth aibhneacha a thomhas.
- Tuairisciú neamhspleách chun cabhrú le rialtais náisiúnta agus áitiúla cinntí a dhéanamh.

RIALÚ ASTUITHE GÁIS CEAPTHA TEASA NA HÉIREANN

- Cainníochtú astuithe gáis ceaptha teasa na hÉireann i gcomhthéacs ár dtiomantas Kyoto.
- Cur i bhfeidhm na Treorach um Thrádáil Astuithe, a bhfuil baint aige le hos cionn 100 cuideachta atá ina mór-ghineadóirí dé-ocsaíd charbóin in Éirinn.

TAIGHDE AGUS FORBAIRT COMHSHAOIL

- Taighde ar shaincheisteanna comhshaoil a chomhordú (cosúil le caighdéan aeir agus uisce, athrú aeráide, bithéagsúlacht, teicneolaíochtaí comhshaoil).

MEASÚNÚ STRAITÉISEACH COMHSHAOIL

- Ag déanamh measúnú ar thionchar phleananna agus chláracha ar chomhshaol na hÉireann (cosúil le pleananna bainistíochta dramhaíola agus forbartha).

PLEANÁIL, OIDEACHAS AGUS TREOIR CHOMHSHAOIL

- Treoir a thabhairt don phobal agus do thionscal ar cheisteanna comhshaoil éagsúla (m.sh., iarratais ar cheadúnais, seachaint dramhaíola agus rialacháin chomhshaoil).
- Eolas níos fearr ar an gcomhshaol a scaipeadh (trí cláracha teilifíse comhshaoil agus pacáistí acmhainne do bhunscoileanna agus do mheánscoileanna).

BAINISTÍOCHT DRAMHAÍOLA FHORGHNÍOMHACH

- Cur chun cinn seachaint agus laghdú dramhaíola trí chomhordú An Chláir Náisiúnta um Chosc Dramhaíola, lena n-áirítear cur i bhfeidhm na dTionscnamh Freagrachta Táirgeoirí.
- Cur i bhfeidhm Rialachán ar nós na treoracha maidir le Trealamh Leictreach agus Leictreonach Caite agus le Srianadh Substaintí Guaiseacha agus substaintí a dhéanann ídiú ar an gcrios ózóin.
- Plean Náisiúnta Bainistíochta um Dramhaíl Ghuaiseach a fhorbairt chun dramhaíl ghuaiseach a sheachaint agus a bhainistiú.

STRUCHTÚR NA GNÍOMHAIREACHTA

Bunaíodh an Ghníomhaireacht i 1993 chun comhshaol na hÉireann a chosaint. Tá an eagraíocht á bhainistiú ag Bord lánaimseartha, ar a bhfuil Príomhstiúrthóir agus ceithre Stiúrthóir.

Tá obair na Gníomhaireachta ar siúl trí ceithre Oifig:

- An Oifig Aeráide, Ceadúnaithe, Taighde agus Úsáide Acmhainní
- An Oifig um Fhorfheidhmiúchán Comhshaoil
- An Oifig um Measúnacht Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáide

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag ball air agus tagann siad le chéile cúpla uair in aghaidh na bliana le plé a dhéanamh ar cheisteanna ar ábhar imní iad agus le comhairle a thabhairt don Bhord.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ENVIRONMENTAL PROTECTION AGENCY

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