

# Summary of findings of Northern Ireland 2016 Nitrates Article 10 Report and 2015 Derogation Report



## Context

- The Nitrates Directive (91/676/EEC) (the Directive) is currently implemented in Northern Ireland (NI) through the Nitrates Action Programme Regulations (Northern Ireland) 2014 as amended (The NAP Regulations).
- The NAP Regulations limit the amount of nitrogen (N) from livestock manure that can be applied to land to 170 kg/ (ha year).
- Member States must report every four years to the European Commission (the Commission) on the status of water quality and the impact of action programmes on water quality and agricultural practices. The report for 2012 to 2015 has been completed.
- Northern Ireland (NI) has been granted derogation from the Directive to permit up to 250kg / (ha·year) N of grazing livestock manure to be applied to land on farms which meet certain criteria. NI must report annually to the Commission on the uptake of derogation by farm businesses, the implementation of controls and the status of water quality.

## Key findings

- Nitrate levels in both groundwaters and surface waters (lakes and rivers are generally low) and the majority show either stable or decreasing trends in nitrate concentrations between the two reporting periods (2008-11 and 2012-15).
- Long term analysis, using a 24-year data set for NI shows a significant decreasing trend across all years for the mean monthly nitrate concentrations at 622 river sites.
- 54.4 % of river water bodies across NI are considered to be of High/Good trophic status and 40.6 % are classed as Moderate/Poor trophic status (indicative of eutrophic conditions) with 0.2 % of river water bodies considered to be of Bad trophic status equating to hyper-eutrophic.
- 66.3 % of river sites were classified as High or Good using Water Framework Directive (WFD) Soluble Reactive Phosphorus (SRP) standards. 33.7 % of river sites were classified as less than Good status using WFD SRP standards indicating that these sites are subject to

nutrient enrichment. Of these sites, 5.6 % were classified as Poor status for WFD SRP, indicating they are eutrophic. No sites were classified as Bad status.

- The majority (87.1 %) of river sites experienced a decrease or stabilisation in phosphorus (P) levels between the previous and current reporting periods (2008-2011 and 2012-2015). 12.8 % of sites exhibited a weak increase in P between the two reporting periods
- Long term analysis (using an 18-year data set) for Northern Ireland shows a significant decreasing slope across all years for the mean monthly phosphorus concentrations at 622 river sites.
- 23% of lake water bodies across NI are considered to be of High/Good trophic status and 58% are classed as Moderate/Poor status (indicative of eutrophic conditions) with 19% of lake water bodies considered to be of Bad status equating to hyper-eutrophic.
- 43% of lakes were classified as High or Good for Water Framework Directive (WFD) Total Phosphorus (TP) status. 57% of lakes had WFD TP classification less than Good status which is considered to be at risk from eutrophication or eutrophic. Of these sites, 10% were classified as Bad status for WFD TP, indicative of hypertrophic conditions.
- The majority (95.2%) of lakes experienced a decrease or stabilisation in total phosphorus (TP) classification between the previous and current reporting periods (2008-2011 and 2012-2015). 4.8% of lakes exhibited deterioration in TP class between the two reporting periods (2009-11 and 2012-14).
- Between the current (2012-2015) and the previous reporting period (2008-2011) the total amount of manure Nitrogen (N) produced ( $118 \text{ kg N ha}^{-1}$ ) on farms in NI has remained virtually unchanged.
- A 6 % increase in the agricultural component and a 3 % increase in the domestic sewage (human population) component of the total contributed an overall increase of 5 % from the previous period in the combined total N discharged resulting from.
- Agricultural N balance is currently  $130 \text{ kg / (ha year) N}$  and N efficiency is 23.2 %. The N balance increased by 7.3 % compared to the previous period (2008-2011) and the N efficiency by 0.3 %

- Agricultural P balance in 2014-2015 increased to 11.4 kg/(ha year) P from 9.5 kg/(ha year) P and P efficiency declined to 43 % from 46 % in comparison to the previous reporting period.
- For 2012-2015, the compliance rate from scheduled NAP inspections currently varies between 91.5 % and 100 % for various compliance standards. When reactive inspections were taken into account the compliance rate was 72 %-100 %.
- The Department of Agriculture Environment and Rural Affairs (DAERA) (formally the Department of Environment (DOE) and now the Department of Agriculture and Rural Affairs (DARD)) have produced updated guidance information for the NAP Regulations.
- DAERA also continues to provide press articles, workshops, online tools, outreach and training events to help farmers comply with the action programme and derogation requirements.
- DAERA and Agri-Food Biosciences Institute (AFBI), the agricultural industry and environmental organisations undertake a wide range of activities to promote best farming practice and reduce diffuse water pollution from agriculture.

## **Implementation of the Nitrates Directive in Northern Ireland**

The Nitrates Directive (91/676/EEC) (the Directive) is currently implemented in Northern Ireland (NI) through the Nitrates Action Programme (NAP) Regulations (Northern Ireland) 2014 (the 2014 NAP Regulations) and subsequent amending regulations<sup>1</sup>. From 2011-2014 it was implemented through the Nitrates Action Programme (NAP) contained in the Nitrates Action Programme Regulations (Northern Ireland) 2010 and subsequent amending regulations<sup>2</sup>.

The 2014 NAP Regulations limit the amount of N from livestock manure that can be applied to land to 170 kg/ (ha year) Non all farms and are the responsibility of DAERA (the Department). In accordance with the Directive, Member States must report every four years to the Commission on the status of water quality (including estimation of future trends) and the impact of the action programme on water quality and agricultural practices. NI authorities provide a part report to DEFRA for inclusion in the overall UK Article 10 report to meet this reporting requirement.

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<sup>1</sup> The Nitrates Action Programme (Amendment) Regulations (Northern Ireland) 2015

<sup>2</sup> The Nitrates Action Programme (Amendment) Regulations (Northern Ireland) 2012

After application to the Commission, NI had been granted derogation from the Directive (Commission Decision 2011/128/EU) to permit an increase in the amount of grazing livestock manure that may be applied to land from 170 kg/ (ha year) N up to a limit of 250 kg/ (ha · year) N, for intensive grassland farms which meet certain criteria.

An application for renewal of derogation was made in 2014. Following this further application and discussion with the Commission and a positive Member State vote at the EC Nitrates Committee in November 2014, NI derogation was renewed (until 31 December 2018) (Commission Decision 2015/346/EU – the 2015 Decision). Measures relating to the 2015 Decision have been included in the 2014 NAP Regulations and subsequent amending regulations.

In accordance with the conditions of derogation, NI reports annually to the Commission on the uptake of derogation by farm businesses, the implementation of derogation controls and the status of water quality.

## **Water quality assessment**

### ***Nitrate in groundwaters***

Alterations to the groundwater monitoring network were initiated in 2007 to ensure that the requirements of the Water Framework Directive (WFD) would be met while also taking into account the need to ensure long-term reporting of nitrate concentrations in groundwater across NI.

Monitoring for the current reporting period (2012–2015) indicates that 30 of the 35 sites monitored in both reporting periods experienced a decrease or stabilisation in groundwater N concentrations in comparison to the previous reporting period (2008-2011). 55 out of 56 sites currently monitored show an annual average of less than 25 mg/l NO<sub>3</sub>.

### ***Nitrate in surface waters***

In the current reporting period (2012-15) 100% of surface water sites had an average nitrate concentration below 25 mg NO<sub>3</sub>/l, of which 89% were below 10 mg NO<sub>3</sub>/l. Overall, the annual average nitrate concentrations in surface water rivers and lakes were generally stable or decreasing (98.1% of sites) when compared to the previous reporting period.

Seasonal trend analysis showed that the monthly trends in average N concentrations in 288 out of 302 river monitoring sites in NI were decreasing or stable over a 24-year period, 1992-2015.

### ***Nitrates in coastal and transitional waters***

Monitoring programmes and practices have been modified since the last reporting period (2008-2011) in order to better address the requirements of WFD.

These changes included the addition of more representative coastal transect data by area, and a more focussed winter monitoring programme, in place of the previous temporal spread of monitoring during the last reporting period.

In comparison, current monitoring shows an apparent increase in nitrate concentrations in marine waters since the last reporting period (2008-2011). The absence of monitoring that reflects the normally lower summer Nitrate values may however have led to this face value increase in Nitrate for this reporting period.

### ***Assessment of trophic status of rivers***

Overall WFD trophic assessment shows that in 2012-2015, 54.4% of river water bodies across NI were considered to be of High/Good trophic status. 40.6% of river water bodies are classed as Moderate/Poor status (indicative of eutrophic conditions) and of these, 0.2% bodies were considered to be of Bad status (equating to hyper-eutrophic conditions). Data were not available for 4.7% of river water bodies because the 6-year rolling programme of monitoring for biological parameters for WFD now means that some data falls outside the 4-year reporting period.

Within the overall trophic assessment of rivers, the majority of river sites (87.1 %) showed stable or decreasing SRP concentrations at monitored sites compared to the previous reporting period. 66.3 % of rivers were classified as High or Good for SRP status, a decrease from 71% in the previous reporting period. 33.7 % of river sites had a WFD SRP classification of less than Good status which means they are at risk from eutrophication or are eutrophic.

Seasonal trend analysis showed that monthly trends of average SRP concentrations in 97 % (160) river sites in NI were predominantly decreasing or stable over the 18-year period, 1998-2015.

### ***Assessment of trophic status of lakes***

The latest classification period for lakes in WFD was 2012-2014 and the WFD classification tools and standards used for this monitoring period have changed significantly since the last Article 10 reporting period (2009-2011). Therefore, the two reporting periods were not compared for trophic WFD status as classifications determinations would be significantly affected by the new standards and tools. Of the 21 lakes monitored in NI, 16 lakes were classed as Moderate, Poor or Bad trophic status (indicative of eutrophic conditions). When annual average TP concentrations were compared with the previous reporting period (2008-2011) one

lake showed improvement in TP, 19 lakes remained stable and concentrations in one lake increased.

When chlorophyll- $\alpha$  concentrations were considered the majority of the 21 lakes remained stable when compared to previous reporting period. Two lakes, however, showed improvement but five lakes showed deterioration.

### ***Assessment of trophic status of transitional and coastal marine waters***

Methodology and monitoring programmes for assessment of trophic status of transitional and coastal marine waters have changed since the last reporting period (rolling monitoring programme basis is now applied) to meet requirements of WFD and to focus on areas of concern with known pressures.

True or accurate assessment of marine water body status will require more representative monitoring in future, in order to clarify the fluctuations in class status between reporting cycles. Overall the report finds that WFD trophic assessment of transitional and coastal marine waters showed that several NI marine water bodies have been below Good status for WFD assessment in recent years. These have been in areas where there have been long standing issues over nutrient enrichment, and also tend to be transitional and/or heavily modified water bodies.

## **Agricultural practices**

### ***The status of agriculture in Northern Ireland***

Agriculture plays an important role in the NI economy. It accounts for approximately 1 % of Gross Value Added (GVA) and is responsible for 2.8 % of civil employment in NI. When food processing is included, the shares of GVA and employment in NI rise to 3.2 % and 4.5 % respectively.

Farms in NI are almost entirely owner-occupied and are small by UK standards with an average area of 40.1 ha (overall average size for EU-28 countries is 16.1 ha). There are currently 24,900 farm businesses in NI, of which approximately 23 % are regarded as large enough to provide full-time employment for one or more persons (based on a standardised labour requirement).

Farm numbers have been declining at an annual average rate of approximately 0.8 % over the past 10 years. Farming in NI is dominated by cattle and sheep production and the dominant land use is grassland.

There have been few significant changes in land use and animal numbers in NI since the last reporting period. Total agricultural area has decreased slightly since the last reporting period, now standing at 9,959 km<sup>2</sup> from 10,003 km<sup>2</sup>.

From 2012-2015 managed or permanent grassland accounted for 79 % of the total agricultural area. Arable crops accounted for only 5 % of the agricultural area. The other main component of agricultural land is rough grazing. This is mainly upland moorland and mountains areas with low agricultural potential; and accounts for 14 % of the agricultural area. The land areas available for application of chemical fertiliser or organic manure are taken to be the sum of the managed grass and arable crops.

Manure production continues to be dominated by cattle with cattle manure accounting for more than 70 % of the total manure N production. While manure N from sheep has declined, excretions from pigs and poultry have increased since the last reporting period. The quantity of manure-N collected from housed animals, including pigs and poultry and applied to land has remained quite constant at 54 kg/ (ha · year) N in 2004-2007, 52 kg/ (ha year) N in 2008-2011, and 53 kg/ (ha year) N in 2012-2015. Between current and previous reporting periods, the absolute amount of manure N produced on farms in NI has remained relatively unchanged, now standing at 118.1 kg/ha N.

### ***Nutrient losses and balances***

Agriculture is calculated to be the largest source of N discharges to surface waters. This reflects the large proportion of the land area of Northern Ireland devoted to agriculture (75 %) and the current level of animal production. Agriculture can lead to loss rates in the region of 20 kg/ (ha year) N or 2 t/(km<sup>2</sup> year) N.

By comparison, the average human population density in the period 2012-2015 is approximately 136 persons/km<sup>2</sup>. On the basis of a per capita N loading of 2.45 kg/(person·year) N (6.7 g/(person · year) N ; Smith, 1976; Jordan & Smith, 2005), this equates to an area-weighted loss of N from the urban population of 0.333 tonnes/(ha year) N.

Compared to the previous reporting period (2008-2011), there was an overall increase of nearly 5 % in the combined total N discharged. This resulted from a 6 % increase in the agricultural component and a 3 % increase in the domestic sewage (human population) component of the total.

Following a pronounced decline in the use of chemical nitrogen (N) fertiliser between 2003 and 2009, fertiliser N inputs have fluctuated up and down, and currently (2015) are 78 kg/ (ha year) N, just 2 kg/ (ha year) N greater than in 2011. Over the recent reporting period, the amount of N imported in feedstuffs has also marginally increased. As a consequence, the total amount of N entering the system has increased 2015 by 4.5 %.

However, alongside the increased N inputs, outputs of N from agriculture, which are dominated by exports of meat and milk, also increased in 2015, and hence N efficiency within agriculture remained stable. It is important to note, however, that



inputs of both fertiliser and feedstuff N appear to have stabilised again over the past two years, possibly in response to the economic pressures facing the industry and particularly the dairy sector.

The gross inputs of N to agriculture increased by 7.1 % in the current reporting period compared to the previous period causing a 7.1 % increase in the N balance, which was primarily driven by the 6.5 kt increase in feedstuff N input. However, outputs of N also increased by 7.2 % and as a result N efficiency remained stable at 23 %.

The N balance increased by 7.3 % compared to the previous period, i.e. from about 121 to 130 kg/ (ha year) N, primarily as a result of the 10.5 % increase in feedstuff N input. However, it should be noted that this balance remains substantially lower than previous peak N balances during the mid 1990s which exceeded 165 kg/ (ha year) N.

Chemical fertiliser P inputs declined dramatically from 2003 and reached its lowest level since records began (ninety years ago) in 2009 [2.5 kg/ (ha year) P, but then increased before levelling off at 4.1 kg/ (ha year) P in 2014-2015. Feedstuffs P inputs declined between 2006 and 2008 but then increased and levelled off at 16 kg/ (ha · year) P in 2014-2015. As a result, total P inputs are currently about 20 kg/ (ha year) P.

From 2003 to 2011, the net P balance or surplus declined from 17.7 kg/ (ha · year) P in 2003 to 9.5 kg/ (ha year) P in 2011. This decline reflects both a reduction in inputs and small increases in outputs. As a consequence, the P efficiency for agriculture in Northern Ireland showed a very marked increase from 28 % in 2003 to 46 % in 2011.

After 2011, owing to the increases in chemical fertiliser P and feedstuffs P, the P balance increased and the P efficiency declined to 43 % in 2014-2015, which is still considerably better than it was just 12 years ago. However, there is still scope for improvement in P efficiency and for reductions in the agricultural P surplus or balance.

### ***Scientific research***

A number of research projects have been commissioned by the Department and taken forward by AFBI to meet both the requirements of the Derogation Decision and to inform the development of the current and future NAP Regulations.

### ***Evaluation of the implementation of the action programme measures***

For NIEA's annual inspection programme of compliance with environmental statutory management requirements (under cross compliance), 1 % of farm businesses

(currently approximately 300 businesses) claiming direct aid are selected for inspection using a risk based approach.

However, reactive inspections are carried out in response to referrals from other agencies, complaints from members of the public, etc. As the requirements of the 2015 NAP Regulations have become better understood, there has been an increase in the number of these referrals; from 213 in 2012 to 357 in 2014 (figures for 2015 inspections are not fully finalized for this report). All such reports are investigated by NIEA and enforcement action is taken when a breach of the 2014 NAP Regulations is confirmed. The great majority of these reports are substantiated, accounting for the higher rate of non-compliance reported from reactive inspections.

As mentioned previously figures for 2015 are not fully finalised, and also reflect changes to the classification of active farm businesses in NI, resulting in fewer farm businesses overall. Also, under the 2014 NAP Regulations farm records do not have to be available for inspection until 30 June of the following calendar year. It is, therefore, not possible to check against certain measures in year x until records are available in year x+1. It should also be noted that non-compliances are reported relating to the year of detection which is not necessarily the year of occurrence.

## **Derogation**

### ***Water quality assessment for derogation***

The annual derogation report assessed the results of water quality monitoring for NI as a whole, and for the two sub- catchments (Lower Bann and Blackwater) where the concentration of derogated farms was highest in 2015 (high derogation catchments). Data are also presented for the Strangford and Ballinderry catchments (where the concentration of derogated farms was highest in the 2014 reporting period) for continuity with the previous derogation report submitted to the Commission in 2015.

Comparisons of the mean annual average data for the period 2008-2011 (as reported in the NI 2012 Nitrates Article 10 Report) and the most recent annual average data for the current reporting year (2015) were presented. Biological indicators of eutrophication were not assessed. The 2015 derogation report also compares data of derogated farms in four high derogation catchments (Ballinderry, Blackwater, Strangford and Lower Bann). Nitrate concentration trends indicate that the annual average nitrate concentrations in common surface freshwater stations across NI were generally stable or decreasing (99 % of stations) between 2008-2011 and 2015. For the high derogation catchments, nitrate concentration trends indicate a decrease or stabilisation of annual average concentration at 100 % of monitoring stations in the four catchments between the two reporting periods.

Groundwater nitrate concentrations across NI are also generally low with 51 of the 53 stations below 25 mg/l NO<sub>3</sub> in 2015. Average nitrate concentrations in three of the four high derogation catchments (Ballinderry, Blackwater and Lower Bann) were generally low with all of the monitoring sites below 25 mg/l NO<sub>3</sub> in 2015. Four of the six groundwater sites in the Strangford catchment were also below 25 mg/l NO<sub>3</sub>, but one site (Ards groundwater body) had an average concentration between 25 and 40 mg/l. Another site (Belfast East groundwater body) had an average concentration >50 mg/l in 2015.

Nitrate concentration trends in groundwater across NI indicate a decrease or stabilisation in three of the four high derogation catchments in 2015 compared to 2008-2011. The parts of the two groundwater bodies (Ards groundwater body, Belfast East groundwater body) within the Strangford catchment both show increases within the range of +1 to +5 mg/l.

P concentrations were assessed using current WFD standards for rivers and lakes. Annual average SRP concentrations across NI in 2015 were generally low, with 85.8 % of sampling sites classed as High or Good status compared with 83.4 % in the period 2008-2011.

Trends in annual average SRP concentration indicate a decline or stabilisation at 100 % of common surface freshwater monitoring stations in rivers and streams between 2008-2011 and 2015 across NI. However, some changes in concentrations did occur which led to changes in WFD status at individual sites. 11.8 % (15 sites) deteriorated by one class for WFD P status. 80.3 % (102 sites) remained stable in WFD P status and 7.9 % (10 sites) exhibited an improvement in class between the two reporting periods.

For P in rivers, this showed a large majority of stations (85.8 % overall) classed as either High or Good status. However, in the middle and eastern parts of NI the majority of catchments were classed as Moderate status. A comparison of phosphorus classes in the four high derogation catchments showed higher P concentrations in the Strangford catchment compared with the Ballinderry, Upper Bann and Blackwater catchments.

As for nitrates, the general trend was for a decrease or stability in overall P levels across NI between 2008-2011 and 2015. This trend was similar in the high derogation catchments.

13 of the 21 lakes monitored in NI were classified as Moderate or Poor status for Total Phosphorus in 2015. However, the overall trend between 2009-2011 and 2015 was largely stable.

### ***Other activities to reduce diffuse water pollution from agriculture***

As in previous years, DARD (now DAERA) delivered a number of training and advisory events for farmers across NI and provided information and guidance to farm businesses using a wide range of media, including one to one advice for derogated farms, where requested.

Updated guidance documents on the NAP 2015-2018 and derogation workbooks were published. Regular press articles and management notes were published in the agricultural press, Departmental e-newsletter and the Farm Advisory System Newsletter to update farmers on water quality and nutrient issues, promote the nitrates derogation and nutrient management planning.

These articles are also published on DAERA's website along with frequently asked questions, NAP regulations and derogation information booklets, and booklets for derogation fertilisation plans, accounts and worksheets.

Training related to the NAP and Nitrates Derogation that took place in 2015-2016 included 32 courses on Nitrates and Nutrient Management with 576 farmers attending.

There was also continued uptake of Departmental on-line calculators designed to help farmers comply with various aspects of the 2014 NAP Regulations.

DAERA continues to highlight the 2014 NAP regulations, including nitrates derogation, at a variety of agricultural shows, events and meetings. For example, in meetings held by the CAFRE Dairy Development Advisers in January and February 2016, farmers were reminded about the need to meet the 1 March 2016 deadline for submission of their Fertilisation account and next year's derogation application.

To underpin the implementation of the Nitrates Directive and the action programme measures in NI, alongside on-going research commissioned by DARD (now DAERA), AFBI has been commissioned to carry out a range of new research projects.

A new amplified monitoring programme is being set up to meet the additional monitoring requirements of the 2015 Derogation Decision. The data collected from the programme will provide evidence for the next annual derogation report (2016). The new programme will help to protect vulnerable water bodies and will demonstrate our continued commitment to making progress on water quality issues.

### ***Forecasting future agriculture and water quality trends***

Overall only small changes are forecast for both land use and N loading from livestock manures within NI by 2019. It is predicted that animal numbers in the sheep, pig and poultry sectors are expected to increase with related increases in N excretion.

However, cattle numbers are predicted to decline, and, therefore, total N excreted by livestock is not expected to change noticeably by 2019, and if anything, may decline by about 0.4 %. Given that predicted increases in livestock numbers in sheep, pig and poultry sectors are expected to be balanced by a decrease in bovine numbers, going forward, improvements in the N balance will depend on the degree to which protein content and total usage of imported animal feedstuffs may be reduced, as opposed to reductions in chemical fertiliser nitrogen (N) usage.

Currently fertiliser N usage is at its lowest level in 40 years, and will need to increase if more livestock products are to be produced from grass and less from imported N and P-containing feedstuffs. Nitrate losses from land to water are directly correlated with agricultural N surpluses. Reducing feedstuff N inputs, and increasing the use of grass and forage in ruminant diets, would reduce farm N surpluses, and also reduce the amount of N excreted by animals, and thereby the risk of nitrate loss from land to water.

Results from water quality trend analysis indicate that in both 2019 and 2023, 99.7 % of average nitrate concentrations are predicted to be below 25 mg/l NO<sub>3</sub> in surface waters. 76.4 % of river sites are predicted to be High or Good status for SRP classification in 2019 and 78.8 % in 2023.

The trend of WFD phosphorus classification in rivers between the current reporting period, 2012-2015 and 2019 and 2023 indicates that there will be a 51.8 % decrease and 48.2 % stabilisation across all sites in the next four years to 2019. Predictions of trend of P concentrations for 2023 indicate that over 99 % of sites will show a decrease or remain stable.