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Statistics and Analytical Services Branch
Department of Agriculture, Environment and Rural
Affairs (DAERA), Room 816, Dundonald House
Belfast BT4 3SB

Contact: David Finlay

Telephone: 028 9054 0916

Email: env.stats@daera-ni.gov.uk

URL: <https://www.daera-ni.gov.uk/articles/northern-ireland-environmental-statistics-report>



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Reader Information

As this is an environmental publication, no hard copies have been published. This document may be made available in alternative formats, please contact us to discuss your requirements.

Purpose

Report on a range of environmental indicators and provide links to government strategies.

Data Quality

Good or very good depending on dataset. Full details can be found in [Appendix 3](#).

Reporting Period

Varies depending on dataset

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Introduction

Welcome to the ninth annual Northern Ireland Environmental Statistics Report. This report is intended to be the first reference point for a range of environmental indicators and will provide, where available, annual updates on the indicators contained within it. It is of both public and academic interest and provides a valuable resource across government in providing links to government strategies.

The first annual 'Northern Ireland Environmental Statistics Report' was launched on 29 January 2009 as a follow on to the first Northern Ireland Environment Agency (NIEA) State of the Environment Report (March 2008). The 2008 State of the Environment Report¹ prepared by the Environment & Heritage Service (now called the Northern Ireland Environment Agency) within the Department of the Environment (now called Department of Agriculture, Environment and Rural Affairs) was technical in nature and was the first assessment of the state of Northern Ireland's environment. Its aim was to set out baseline data to provide a future measure of the changing state of the environment in Northern Ireland. Northern Ireland Environmental Statistics Reports, however, provide an annual update to the figures and provide commentary around the trends. There has since been a follow up to the first State of the Environment Report, entitled 'From Evidence to Opportunity - A Second Assessment of the State of Northern Ireland's Environment'¹ published in December 2013 by NIEA. This report uses the data in the Northern Ireland Environmental Statistics Report published in January 2012, but adds further background and context to the figures, as well as highlighting the key challenges within each theme.

The indicators that have been chosen for inclusion in this current report, in most instances, complement those that were included in the original State of the Environment Report. Additional indicators have been added, particularly with regard to demographics, environmental pressures and public opinion. Some of the indicators reported in the original State of the Environment Report have not been continued in this report. This is either because there is no further up-to-date data available, or because the indicator is not suitable for annual updates.

During September 2012, a survey was issued to users of these Environmental Statistics. The following link will take you to a paper, published on the Department of Agriculture, Environment and Rural Affairs (DAERA) website, summarising the findings of this user survey: <https://www.daera-ni.gov.uk/sites/default/files/publications/doe/ni-environmental-statistics-report-user-survey-2012.pdf>

The survey was followed up by a Stakeholder Workshop event which took place in November 2012, providing further opportunity for consultation with users. An overview of the workshop can be found at the following link: <https://www.daera-ni.gov.uk/sites/default/files/publications/doe/soe-stakeholder-workshop-report-nov-2012.pdf>

¹ State of the Environment Reports (December 2013), <https://www.daera-ni.gov.uk/publications/state-environment-report-2013>

A number of suggestions for improvement were brought forward by way of these user engagement activities and a number of improvements have been implemented:-

- To accompany this report, excel tables containing the data behind the charts have been published online, so that users may access these data to perform further analyses of their own;
- The explanatory notes have been reviewed and a focus was placed upon improving these for users;
- Further data quality and data usage information has been incorporated;
- An attempt has been made to improve commentary and the overall presentation of the report.

The survey results and the Workshop also presented further areas of potential improvement which will continue to be addressed in the longer term, including the incorporation of additional indicators within existing themes; further interpretation and policy context/drivers; and the further use of maps or spatial data analysis.

In the 2017 report there are indicators covering eight main topics: Demographics & Public Opinion, Air & Climate, Water, Marine, Land, Biodiversity, Built Heritage and Waste. Each of these datasets reports the most recently available data at the time of publication for each indicator, and most provide data on trends over time and, where applicable, performance against quantified targets. The indicators that were included were determined in agreement with key data providers, policy colleagues and other interested parties.

This report provides some commentary on each of the datasets and describes any trends that they illustrate. All figures in the report, apart from those with maps only, have corresponding tables which can be found in the associated Excel workbook available online at: <https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>.

This report is updated annually and each year the indicators will be reviewed for their usefulness and relevance. Additional indicators will also be considered for future years. Any comments on the indicators currently published or suggestions for future reports will be gladly received.

Summary of changes to indicators since previous publication

When the report is reviewed each year, some additional indicators may be added and in some instances indicators may need to be removed. Details of such changes this year can be seen in the tables below.

Indicators added to / amended in the publication

Indicator		Figure number	Details
Waste	Amended	8.1, 8.2, 8.3, 8.4 and 8.5	Chapter 8 has been updated to provide data on key themes for waste - arisings, recycling, energy recovery and landfill. This brings this chapter into line with the annual waste report which was updated after consultation in summer 2016 as a result of local government reorganisation and the move to 11 councils.

Indicators removed from the publication

Indicator	Table Number	Details
Housing completions	5.4	Since the transfer of planning functions to councils in April 2015, due to local government re-organisation, figures on housing completions have not been held centrally therefore there is no update available for this indicator. Councils will monitor housing land and units in their Local Development Plans. It will be a number of years before these plans are in place. This indicator will be kept under review and updated if this data is centrally collated in the future.
Sites of Local Nature Conservation Importance	6.5	Given that the councils have taken on the responsibility for preparing new local development plans due to local government reorganisation in April 2015, this indicator cannot be updated and has been removed.

Demographics & Public Opinion

People and households use up significant levels of resources, such as water, energy and food, and can exert pressure on the environment. Our lifestyle choices also impact upon the state of the environment. This chapter will look at Northern Ireland's changing population and environmental pressures, as well as our changing attitudes towards the environment.

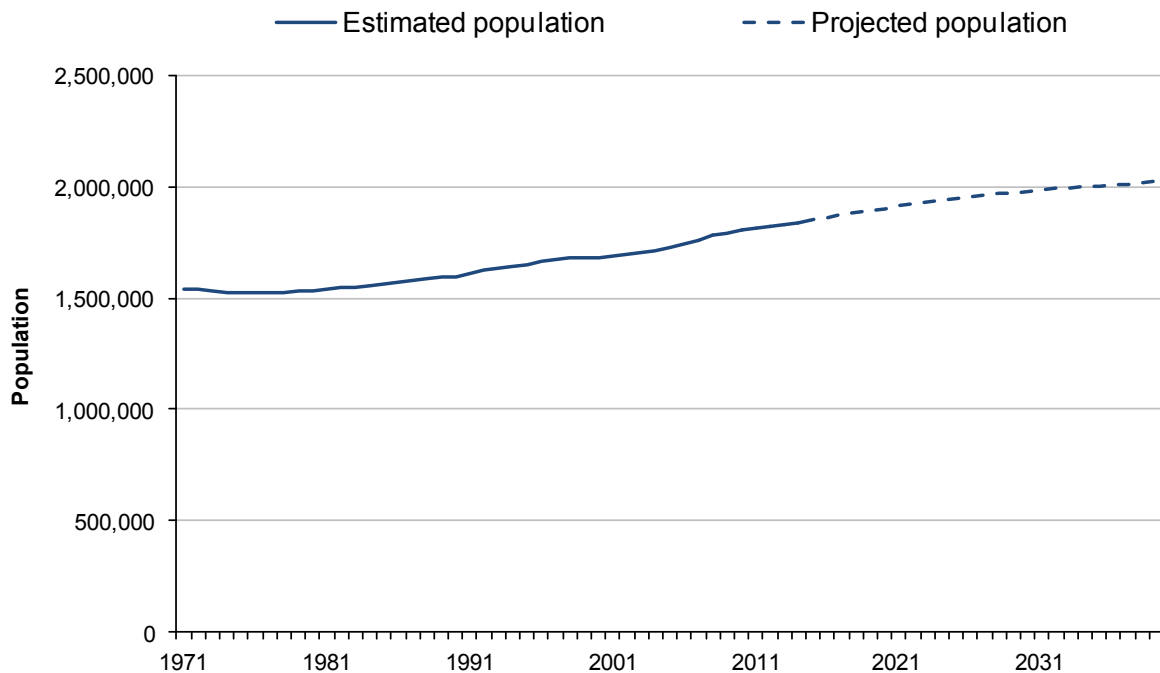
Key points in this chapter:

- In 2015, the Northern Ireland population was estimated to be 7% larger than it had been ten years previously and 20% larger than it was in 1971. The population projections indicate that the population will continue to increase over the next 20-25 years.
- As the population increases, the number of households has also increased. The number of households has, however, increased at a faster rate than the population, as a result of a declining number of people per household.
- Air passenger numbers have increased by 48% in Northern Ireland between 2001 and 2015, with the advent of low-fare airlines a major factor in this. A drop in air passenger numbers had been observed each year since the peak in 2008, which is likely attributable in part to the economic downturn, although 2015 saw the largest number of air passengers pass through Northern Ireland's airports since 2009.
- Car travel continues to dominate the way we do most of our day-to-day travelling, with 72% of our journeys being made by car.
- The level of public concern for the environment had been increasing, peaking in 2008/09 (at 82%) but has since fallen so that the levels in 2015/16 (68%) are lower than those in 2003/04 (76%).
- Illegal dumping of waste is the biggest environmental concern for households in Northern Ireland.
- Similarly to the previous year, the most common actions taken by households for environmental reasons in 2015/16 were reusing plastic bags or using a reusable bag, using energy saving light bulbs and ensuring clothes/furniture are reused.

Data tables and more information for this chapter can be found in the excel tables provided online (<https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>) and the relevant chapter in [Appendix 3](#).

Demographics

Figure 1.1 NI population, estimated (1971-2015) and projected (2016-2039)



Source: NISRA

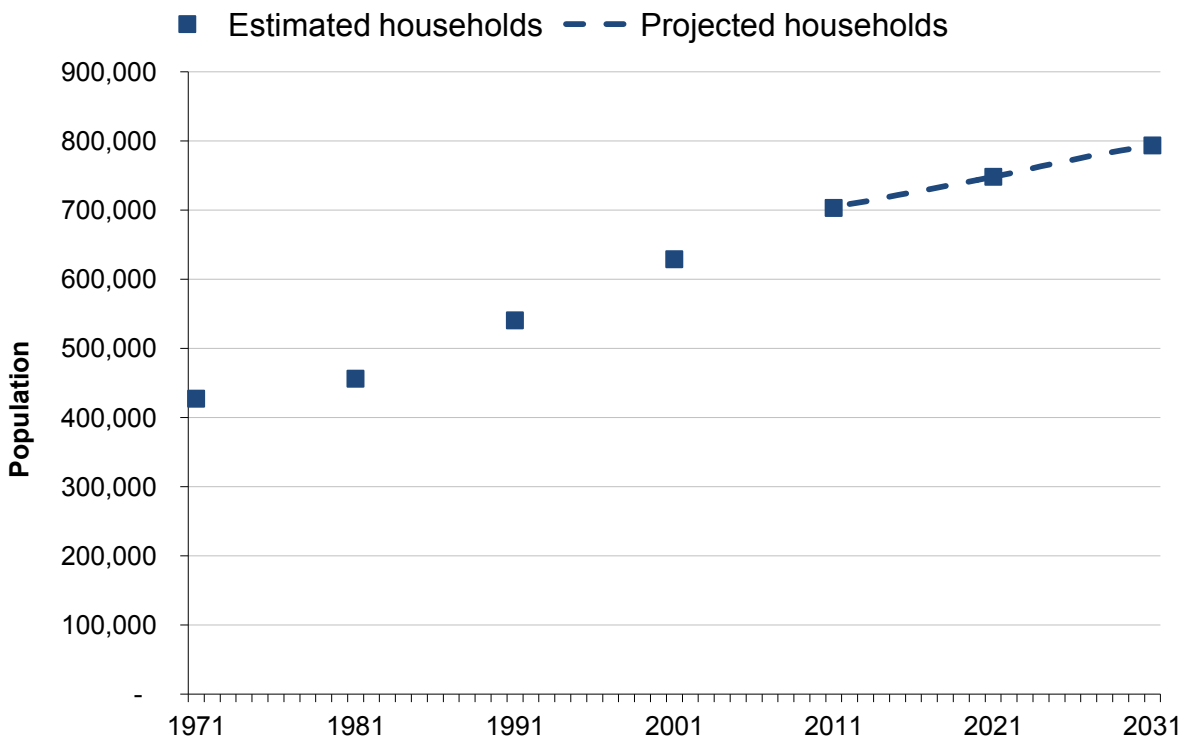
Northern Ireland mid-year population estimates are based on the figures collected during the census of population which is carried out every ten years by the Census Office for Northern Ireland. The most recent census was carried out in 2011. The first results from the 2011 Census were published in July 2012.

The latest figures from NISRA show that in June 2015, the Northern Ireland population was estimated to be 1,851,621, an increase of 7.2% over the decade from 2005 and an increase of 20% since 1971. The population is projected to top 1.90 million by 2020, with further growth to 1.99 million by 2031. The 2 million milestone is anticipated to be reached by 2034.

The chart above displays population estimates and 2014-based population projections. These are the latest projections available at the time of publication. Although 2015 mid-year estimates are now available, the biennial production of population projections means that projections currently use the 2014 mid-year estimates as a base. The next set of population projections will be 2016-based and are due for release in autumn 2017.

Demographics

Figure 1.2 NI households, Census figures (1971-2011) and projected (2012-2031)



Source: NISRA

The historic data on the number of households in Northern Ireland are taken from the census of population.

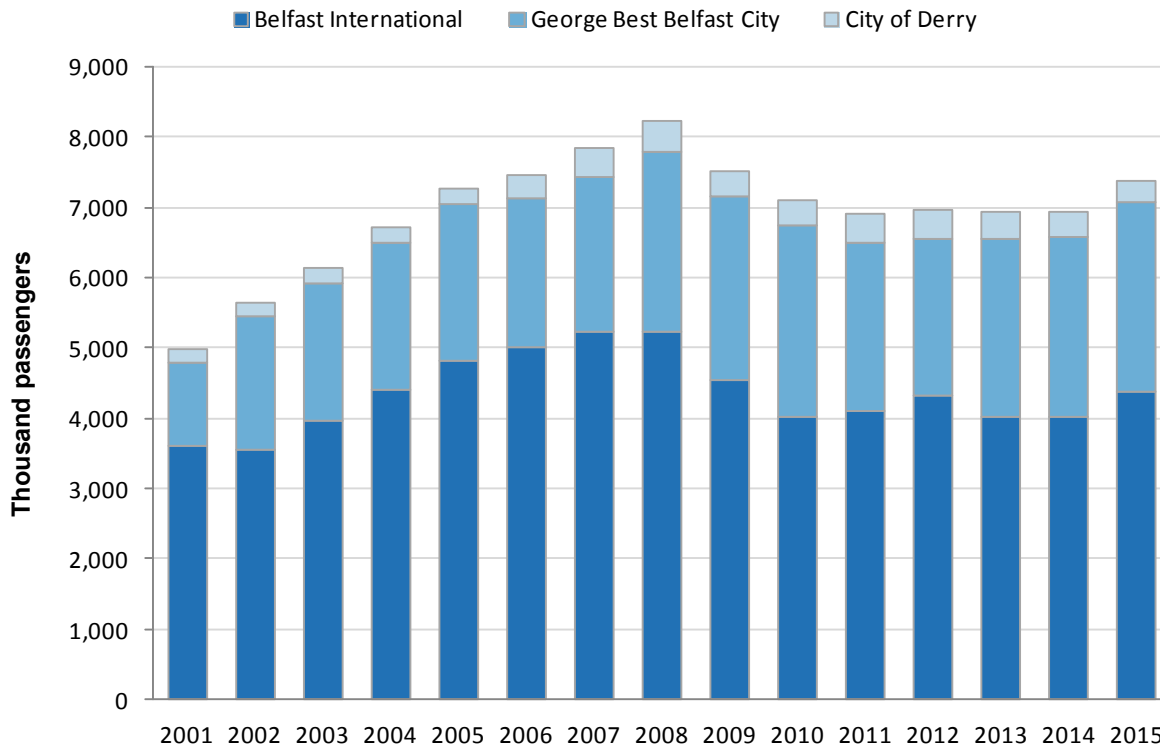
The projected number of households in Northern Ireland, shown in Figure 1.2 above, is derived using a series of assumptions on household formation and the 2012-based population projections (<http://www.nisra.gov.uk/demography/default.asp21.htm>).

The number of households in Northern Ireland in 2012 was estimated to be 708,600, an increase of 66% since 1971.

By 2031, the number of households in Northern Ireland is projected to increase by 12% on 2012 figures (to 793,500).

Environmental Pressures

Figure 1.3 Northern Ireland airport passenger numbers, 2001 - 2015



Source: Civil Aviation Authority

Airport passenger numbers have increased by 48% in Northern Ireland, from 5.0 million in 2001 to 7.4 million in 2015. In 2015, total passenger numbers fell 11% to 7.4 million, from a peak of over 8.2 million in 2008.

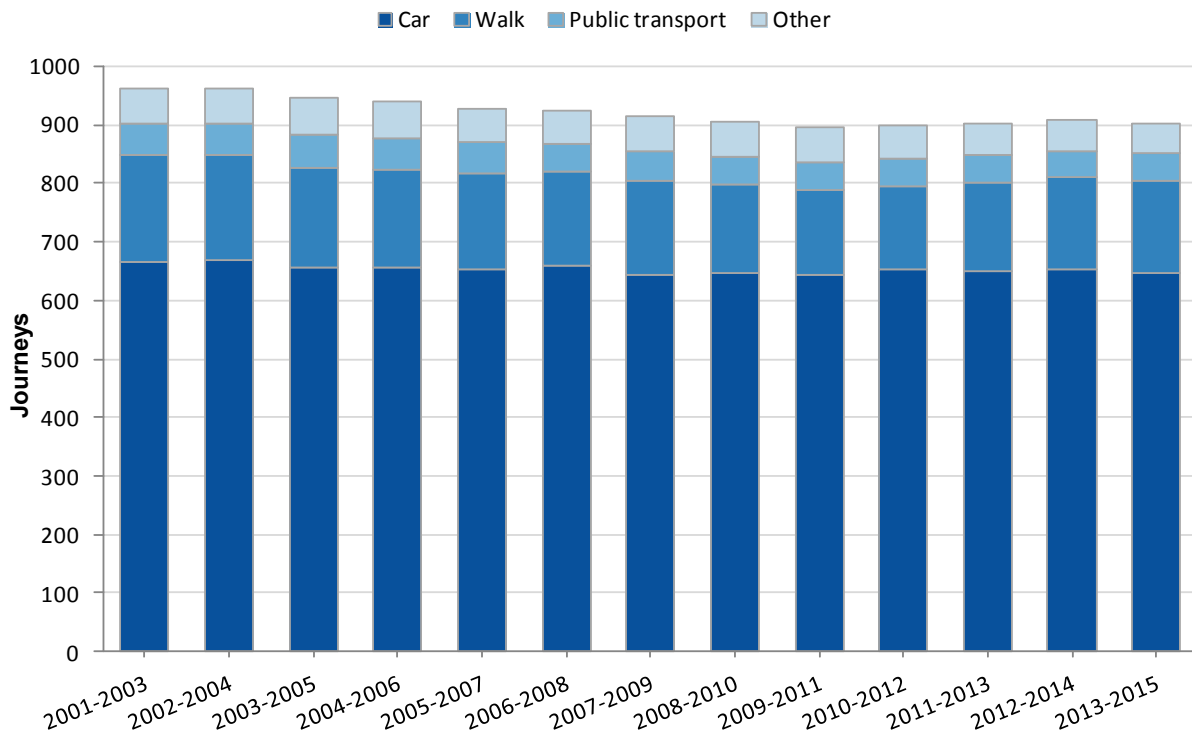
Between 2008 and 2015, passenger numbers at Belfast International fell from 5.2 million to 4.4 million, a decrease of 16%, George Best Belfast City rose by 5% to 2.7 million and City of Derry fell by 35% to 0.3 million.

Total airport passenger numbers have increased by 6% since last year. Prior to this, passenger numbers were similar from 2011-2014. There was also a year on year fall between 2008 and 2011 which may be due to the wider economic downturn.

In 2015, Belfast International accounted for 60% of all airport passengers in Northern Ireland, with George Best Belfast City accounting for 37% of all airport passengers. The City of Derry accounted for the remaining 4% of all airport passengers in Northern Ireland.

Environmental Pressures

Figure 1.4 Number of journeys per person per year by main mode of transport, 2001-2003 to 2013-2015



Source: Travel Survey for Northern Ireland, DfI

Each person made an average of 901 journeys each year (less than 3 journeys per day). This has decreased by 6% from the 2001-2003 average of 960 journeys per person per year.

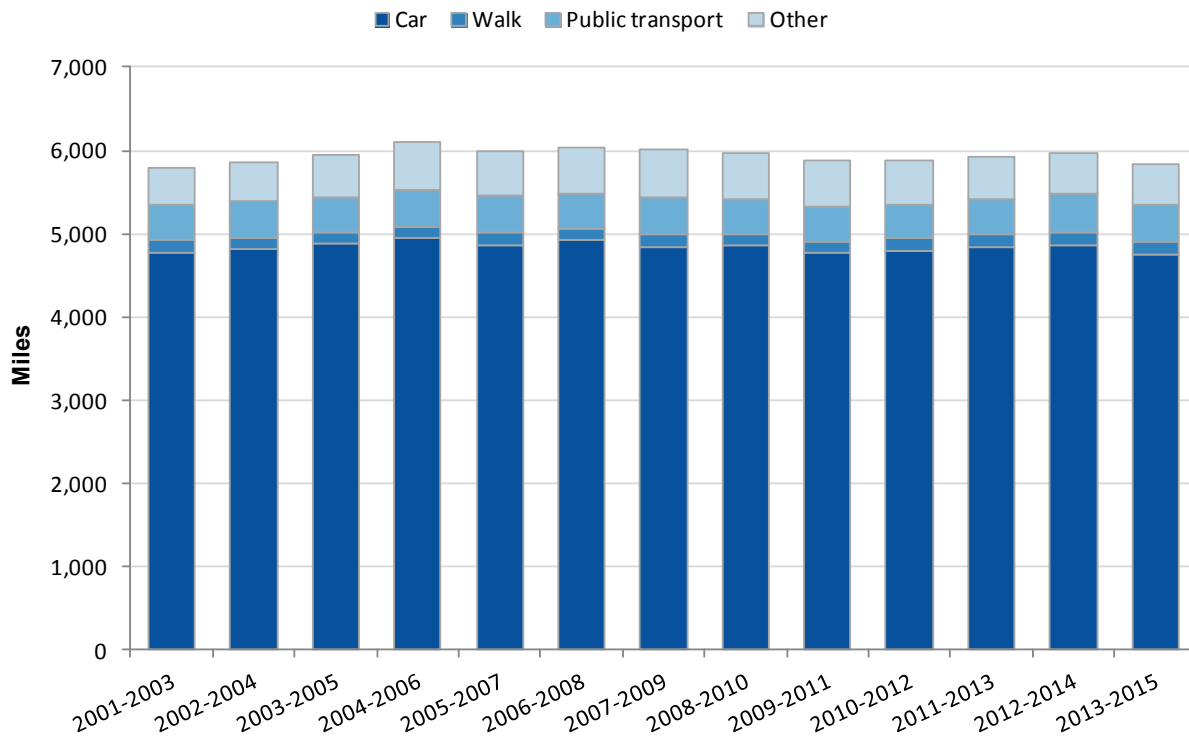
On average, 72% of all journeys were made by car, either driving the car or as a passenger in 2013-2015. During the period 2001-2003 to 2013-2015, car has been the most popular method of transport at between 69% and 73% of all journeys.

Over the same period, the proportion of all journeys made by walking fell from 19% in 2001-2003 to 15% in 2009-2011 and has remained at around that level since, reaching 17% in 2013-2015.

Public transport accounted for only 5% of journeys in 2013-2015. Since 2001-2003, the proportion of journeys made by public transport remained stable at between 5 and 6%.

Environmental Pressures

Figure 1.5 Average distance travelled per person per year by mode of transport, 2001-2003 to 2013-2015



Source: Travel Survey for Northern Ireland, DfI

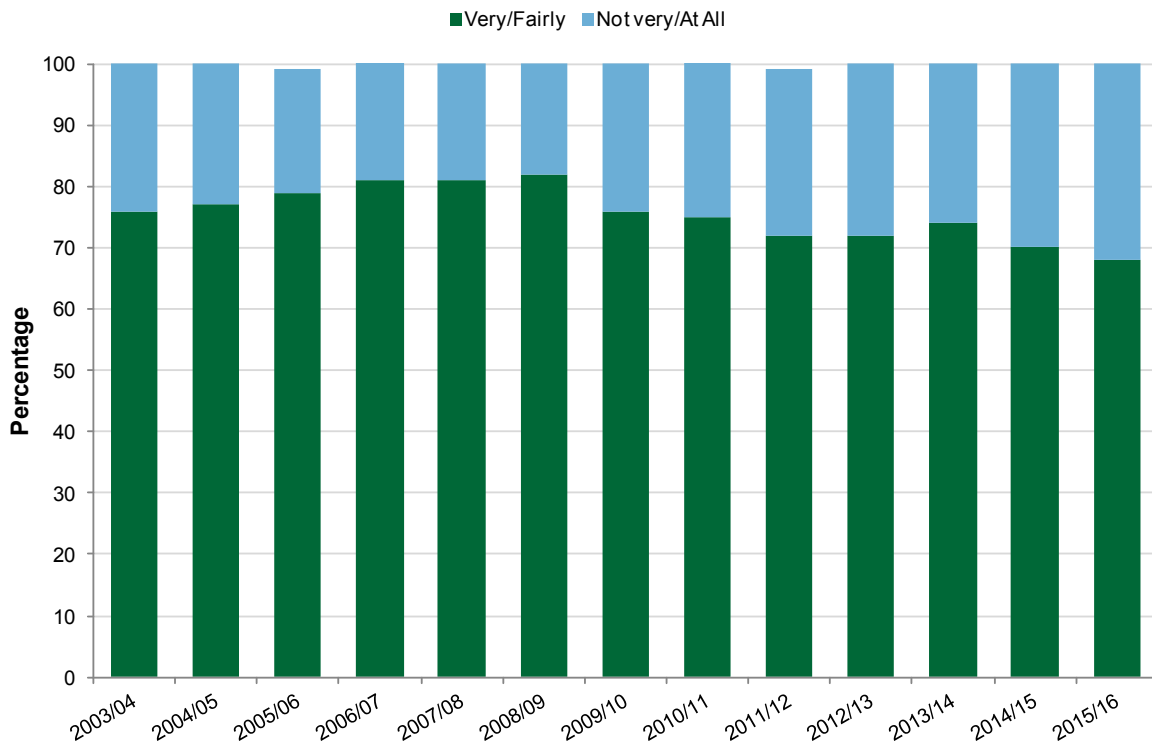
During the period 2013-2015, each person in Northern Ireland travelled on average 5,827 miles per year (approximately 16 miles travelled per person per day), similar to 2012-2014 (5,958 miles).

Car travel accounted for the majority of the total distance travelled at 81% in 2013-2015 while walking accounted for just 3%. People travelled on average 447 miles per year by public transport, 8% of the total distance travelled.

The total average distance travelled per person per year has stayed around the same over the years.

Public Opinion

Figure 1.6 Level of concern for the environment, 2003/04 – 2015/16



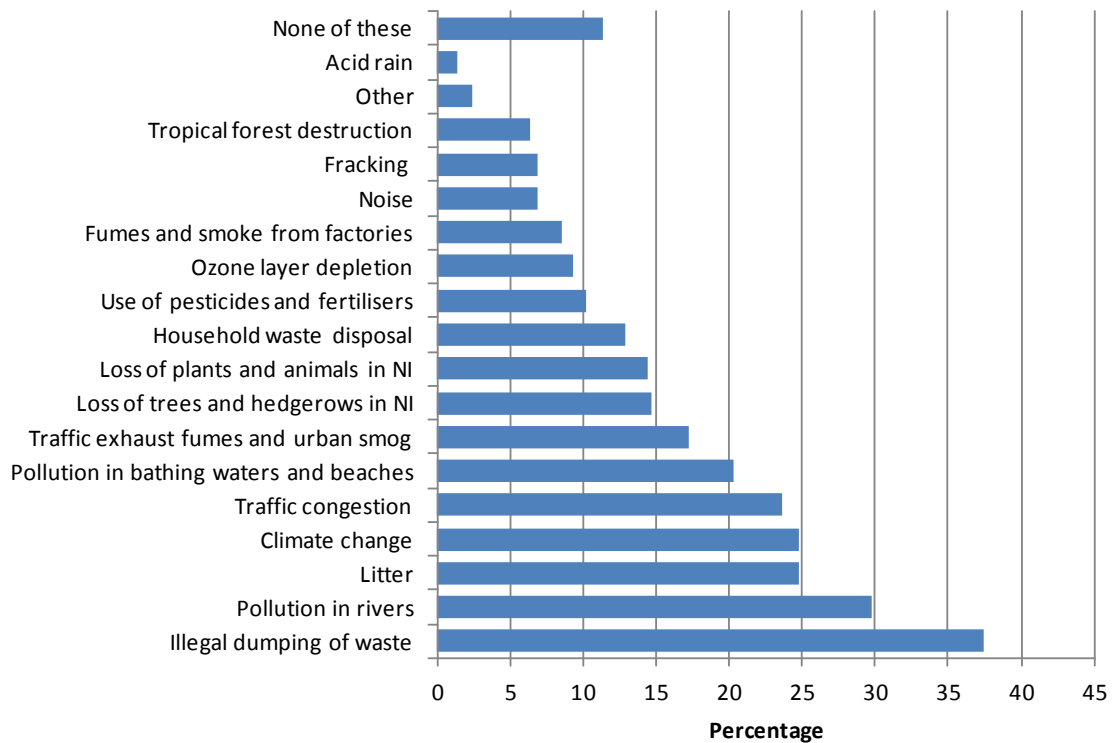
Source: Continuous Household Survey, NISRA

Northern Ireland Households were asked to provide their views on environmental issues in NISRA's Continuous Households Survey (CHS).

In 2015/16, the proportion of households very or fairly concerned about the environment dropped to a 13-year low at 68%. This was similar to the 70% of respondents who were very or fairly concerned in 2014/15; however it was a 14 percentage point drop from a high of 82% high recorded in 2008/09. This may be linked to financial concerns assuming a higher priority in peoples' lives during the recent economic downturn.

Public Opinion

Figure 1.7 Environmental problems considered most important, 2015/16



Source: Continuous Household Survey, NISRA

Households were also asked to provide their views on their three most important environmental problems. Results show that in 2015/16, the most commonly selected environmental problems were illegal dumping of waste (37%), pollution in rivers (30%), litter and climate change (both 25%) and traffic congestion (24%). These were the same reasons as selected in 2014/15 with illegal dumping of waste at 42%, pollution in rivers at 31%, traffic congestion at 29% and climate change at 26%. Litter was a new option added to the question in 2015/16 and therefore wasn't one of the most common reasons in 2014/15. Fracking was also a new option added for 2015/16 and 7% of households reported it as one of their most important environmental problems.

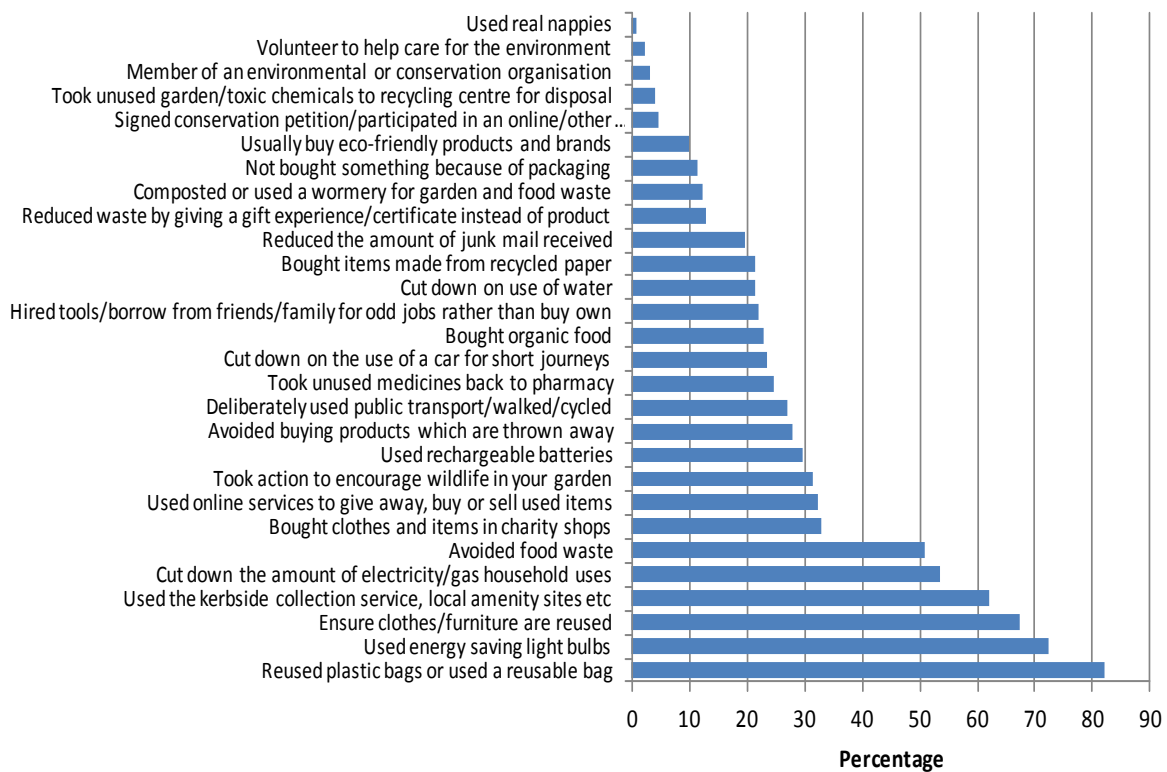
Since 2003/04, climate change has been reported as an important environmental problem by an increased proportion of NI households. In 2015/16, 25% of households cited it, compared to 13% reporting it in 2003/04. This could be linked to increased media exposure of extreme weather events which have occurred in recent years. However, only 9% considered ozone layer depletion to be a problem in 2015/16 compared with 22% in 2003/04 suggesting that the public do not link climate change with ozone depletion.

In 2015/16 traffic exhaust fumes and urban smog was mentioned by 17% of households as one of their most important environmental problems. However the proportion of households who consider it a problem had more than halved (35% in 2003/04). Similarly, 31% of households considered household waste disposal as one of their most important environmental problems in 2003/04. This dropped by 18

percentage points in 2015/16 to 13%. Although Figure 1.7 only presents data for the most recent year available the accompanying table online (<https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>) includes data from previous years.

Sustainability of Lifestyle

Figure 1.8 Actions taken that have a positive impact on the environment, 2015/16



Source: Continuous Household Survey, NISRA

The survey additionally asked households what actions they had taken in the last 12 months that have a positive impact on the environment. Results indicate that in 2015/16, the most common actions taken by households were reusing plastic bags or using a reusable bag (82%), using energy saving light bulbs (72%) and ensuring clothes/furniture are reused (67%). The same top 3 actions were observed in 2014/15 with percentages of 82%, 77% and 68% respectively.

The proportion of households cutting down on the amount of electricity/gas used fell by 6 percentage points to 54% in 2015/16 whilst the proportion using energy saving light bulbs reported a similar drop of 5 percentage points to 72%. An increased proportion of households, up 3 percentage points, reduced the amount of junk mail they received bringing it up to the same level reported in 2013/14 (20%). All other actions reported similar results to the previous year.

Two new actions were added, taking unused medicines back to pharmacy and taking unused garden/toxic chemicals to a recycling centre for disposal. Whilst the latter only had 4% of households reporting it as an action, 25% of households reported that they took unused medicines back to the pharmacy for disposal.

Although the figure above only presents data for the most recent year available the accompanying table in the excel tables online includes data from previous years (<https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>).

Air & Climate

The air that we breathe is vital to our health and wellbeing. Good air quality is essential for human health, the climate, habitats and the built environment. Pollutants from human activity are present in our atmosphere which may adversely impact upon our health and natural environment. This chapter will report on the quality of our air, on greenhouse gas emissions, renewable energy, environmental installations and the climate.

There are 22 air quality monitoring stations in Northern Ireland. Levels of carbon monoxide, nitrogen oxides, sulphur dioxide, particles, ozone, benzene and polycyclic aromatic hydrocarbons are monitored at many of these stations and are measured against UK Air Quality Strategy objectives and EU Air Quality Directives.

Weather conditions can be a contributing factor to some periods of poor air quality and subsequent elevated levels of air pollutants. This is true of hot, sunny weather which can lead to higher levels of ozone, and winter weather where temperature inversions can lead to increased levels of pollutants, especially particulate matter, at ground level.

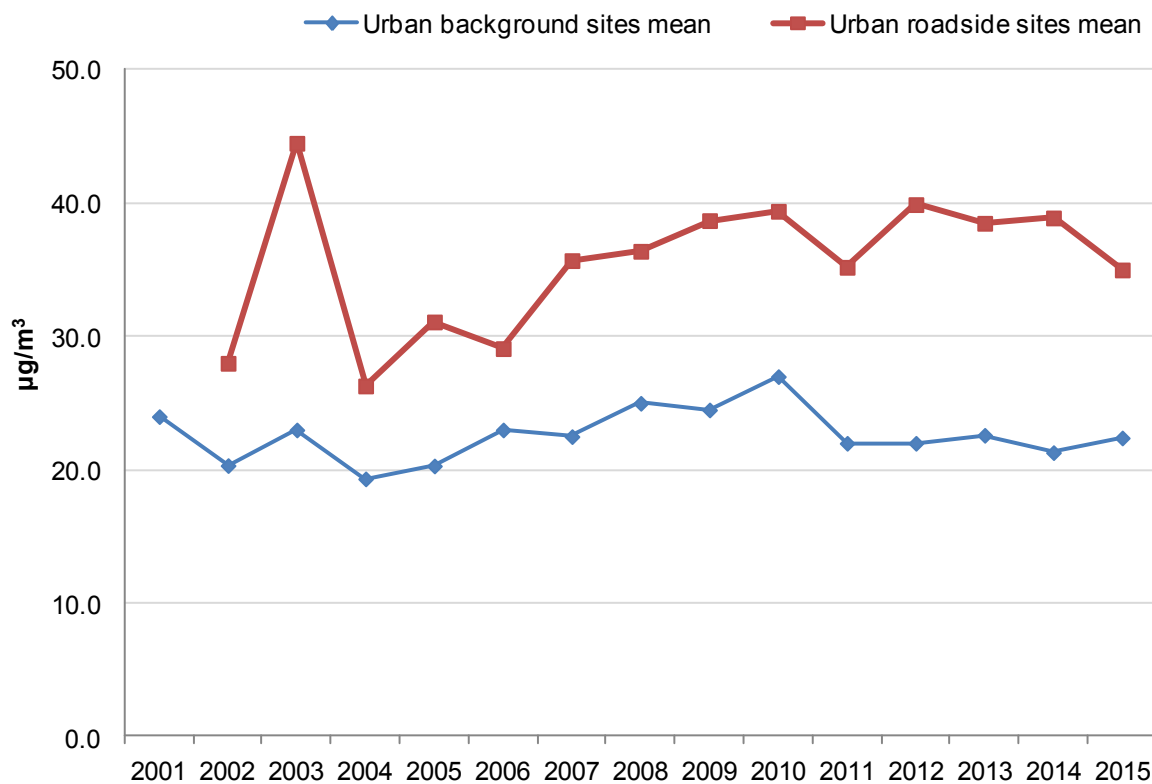
Key points in this chapter:

- Greenhouse gas emissions in Northern Ireland have decreased since 1990, with a reduction of 17% by 2014.
- In 2015/16, 1,987 GWh of electricity in Northern Ireland was generated from indigenous renewable sources. This was equivalent to 25.5% of total electricity consumption in that period
- Over time, the ten year moving average for summer rainfall has varied from a high of 35% in 1897 to a low of 19% in 1984, however there has been an increase in the ten year moving average in recent years, with the latest average for 2015 showing 28%.
- Climate change is of increasing concern to the Northern Ireland public, and some of the climate records do suggest that the average temperature in Northern Ireland has increased since the start of the 20th century.

Data tables and more information for this chapter can be found in the excel tables provided online (<https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>) and the relevant chapter in [Appendix 3](#).

Nitrogen Dioxide

Figure 2.1 Annual mean concentration of nitrogen dioxide (NO₂), 2001 – 2015



Source: Ricardo Energy & Environment

Nitrogen dioxide is part of a group of gaseous air pollutants produced as a result of road traffic and other fossil fuel combustion processes. It can irritate the lungs and lower resistance to respiratory infections such as influenza. Continued or frequent exposure to adverse concentrations may cause increased incidence of acute respiratory illness in children.

In 2015, nitrogen dioxide was monitored using automatic techniques at 15 urban sites across Northern Ireland. The UK Air Quality Strategy sets objectives for an hourly mean limit of 200µg/m³ and no more than 18 exceedences of this hourly limit are allowed per year. In addition, there is an annual mean limit of 40µg/m³. These objectives are the same as those set out in the EU Air Quality Directive 2008/50/EC.

The average annual mean concentration of NO₂ across Northern Ireland's urban background areas has remained relatively stable over the past thirteen years, varying between 19 and 27µg/m³ since 2001. Background nitrogen dioxide levels have not shown a clear trend or decrease because emissions from road vehicles are still a problem.

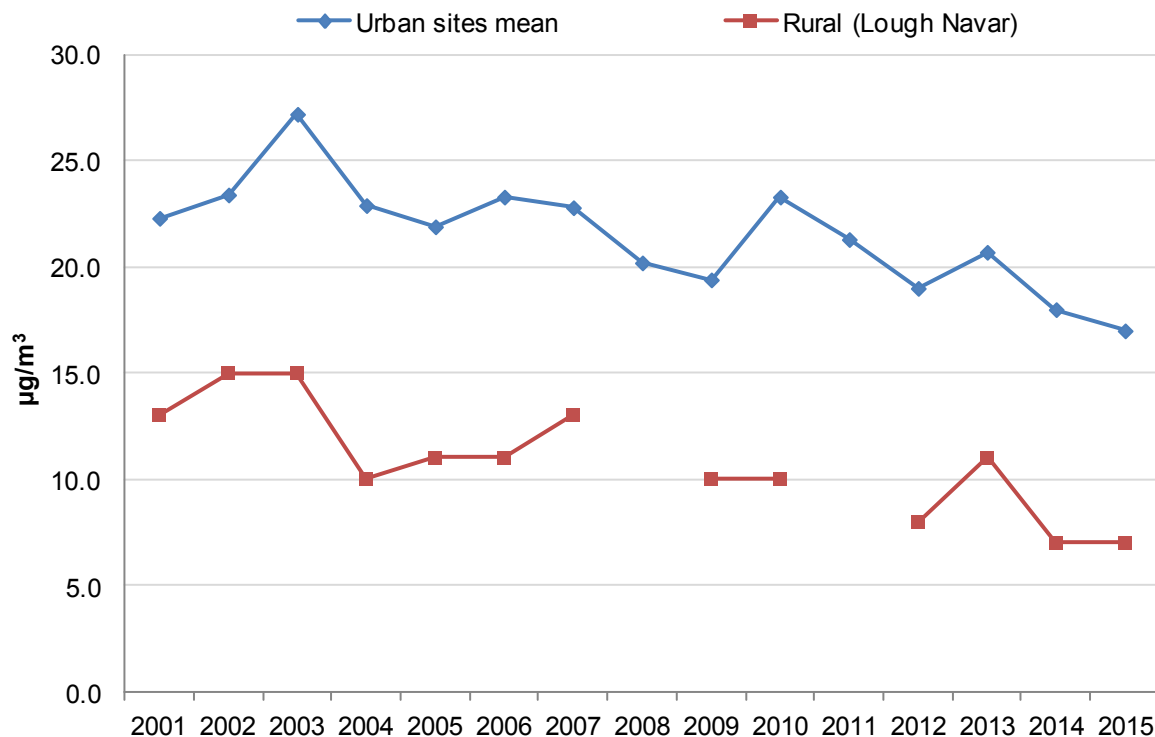
The data series for annual mean urban roadside levels, which have been monitored since 2002, shows more variation, with the consolidated annual mean for all sites ranging from a low of 26 to a high of 45µg/m³. In 2015, two individual roadside sites breached the UK Air Quality Strategy annual mean limit value of 40µg/m³. Of these

sites, one is used for reporting to the EU to assess UK compliance with the EU Air Quality Directive: Belfast Stockman's Lane.

Monitoring sites are only included in the calculation of the mean when they have met a minimum data capture of 75% over the year. Therefore, the number of sites included can vary from year-to-year and this can have an impact on the mean. The number of sites included each year is shown in the appendix tables that accompany this report.

Particulate Matter

Figure 2.2 Annual mean concentration of particulate matter (PM₁₀), 2001 – 2015



Source: Ricardo Energy & Environment

Particulate matter in the atmosphere with a diameter of less than or equal to 10 microns (PM₁₀) arises from both man-made and natural sources. Road transport and fossil fuel combustion produce the majority of airborne particulate matter found in the air in urban locations. Fine particles can be carried deep into the lungs where they can cause inflammation and a worsening of symptoms in people with heart and lung diseases. In addition, they may carry surface-absorbed carcinogenic compounds into the lungs.

The UK Air Quality Strategy sets objectives for an annual mean limit of 40µg/m³ for PM₁₀. It also sets a daily mean limit (24-hour mean) of 50µg/m³ which is not to be exceeded more than 35 times a year. These objectives are the same as those set out in the EU Air Quality Directive.

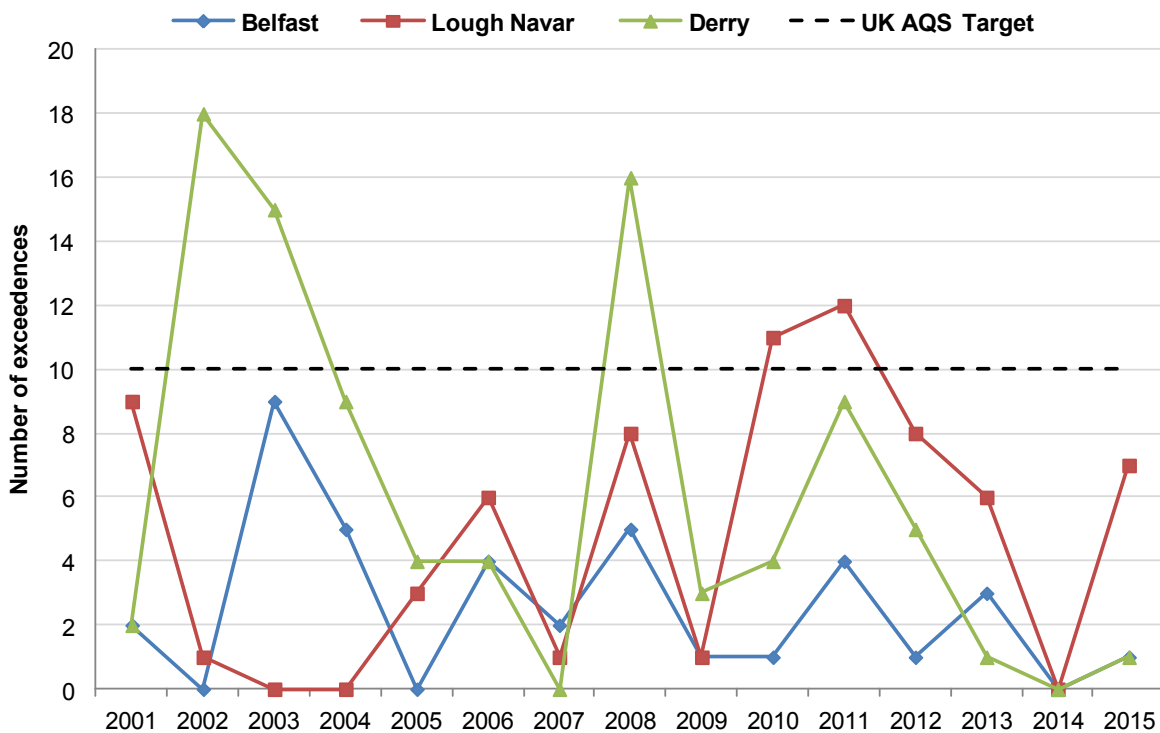
In 2015, all sites met the objective of 40µg/m³ for the annual mean concentration of PM₁₀. The annual mean concentration of PM₁₀ across urban areas in Northern Ireland was 17µg/m³ and the annual mean for the Lough Navar rural background monitoring site was 7µg/m³. In the period since 2001, the annual mean concentration of PM₁₀ at the rural Lough Navar site has been no higher than 15µg/m³ and the annual mean concentration averaged over Northern Ireland's urban monitoring sites has always been less than 28 µg/m³ and has been on a downward trend.

The annual mean concentration of PM₁₀ for the Lough Navar rural background monitoring site is not shown for 2011 because data capture was too low for a reliable annual mean to be calculated (this was also the case for 2008).

Monitoring sites are only included in the calculation of the mean when they have met a minimum data capture of 75% over the year. Therefore, the number of sites included can vary from year-to-year and this can have an impact on the mean. The number of sites included each year is shown in the appendix tables that accompany this report.

Ground Level Ozone

Figure 2.3 Annual exceedences of 8-hour mean objective for ozone, 2001 - 2015



Source: Ricardo Energy & Environment

Ozone is a gas which naturally occurs high up in the atmosphere, where it performs a protective role in reducing the amount of ultra-violet radiation which reaches the earth's surface. However, when ozone occurs near ground-level in the air we breathe, it is usually as a result of chemical reactions involving other types of air pollution like nitrogen oxides.

Ground-level ozone irritates the eyes and lungs, and increases the symptoms of those suffering from asthma and lung diseases. In addition to its serious impacts on human health, ozone is phytotoxic, causing damage to many plants and commercial crops. It can also damage or age some man-made materials such as rubber, as well as bleaching paints and fabrics. Ozone is monitored using automatic sites at Belfast, Lough Navar and Londonderry.

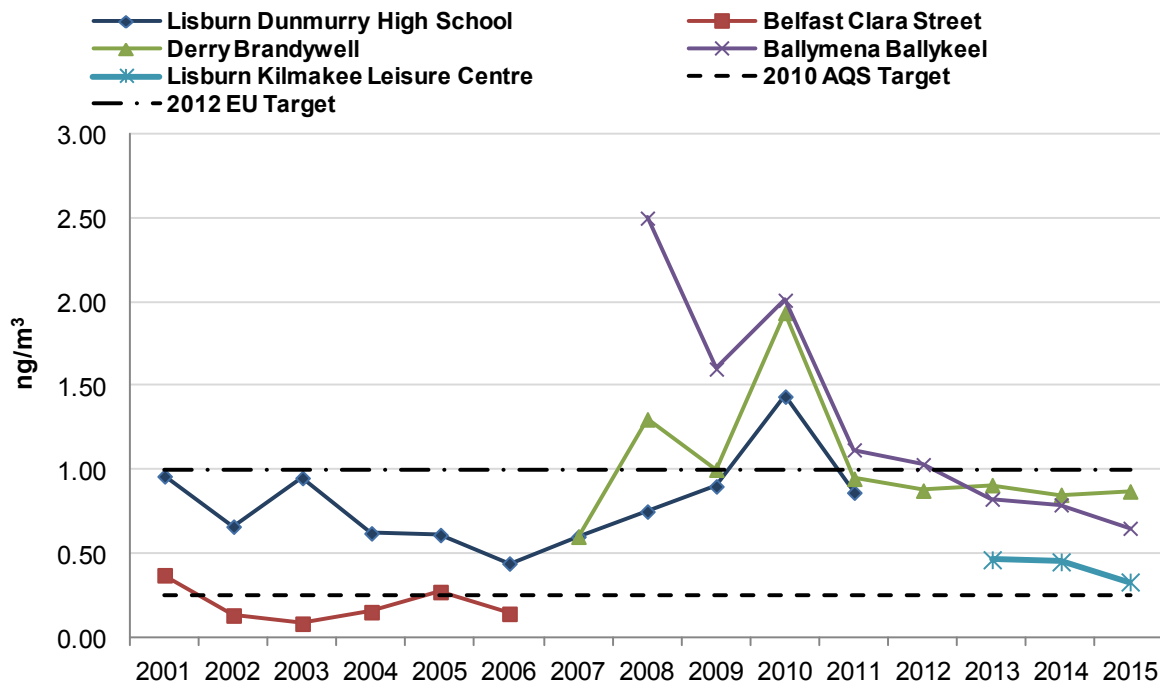
The UK Air Quality Strategy (AQS) sets an objective for the maximum daily eight-hour mean concentration of ozone not to exceed $100\mu\text{g}/\text{m}^3$ on more than ten occasions per year at each particular site. This is more stringent than the Target Value for human health protection as set out in the EU Air Quality Directive. This Target Value says that the maximum daily 8-hour mean concentration of ozone should not exceed $120\mu\text{g}/\text{m}^3$ on more than 25 days each year.

Unlike some other pollutants, levels of ozone in Northern Ireland do not appear to be decreasing, but remain variable from year to year, depending on weather conditions and transboundary levels of ozone i.e. ozone crossing provincial, territorial or national boundaries. Therefore, ozone exceedences remain a possibility.

From 2001 to 2015, the AQS objective has been missed three times at Derry (in 2002, 2003 and 2008). Lough Navar has missed the objective twice (in 2010 and 2011). The objective has never been missed at the Belfast site during the entire monitoring period. In 2015, no sites exceeded the AQS objective or the EU Target Value for human health of $120\mu\text{g}/\text{m}^3$ (for the maximum daily 8-hour mean) on more than the permitted 25 days in specific years.

Polycyclic Aromatic Hydrocarbons

Figure 2.4 Annual mean concentrations of Benzo(a)pyrene, 2001 – 2015



Source: Ricardo Energy & Environment

Polycyclic aromatic hydrocarbons (PAHs) are a group of more than 100 different chemicals that are released from burning coal, oil, gasoline, waste, tobacco, wood, or other organic substances. They are harmful and are of particular concern to human health. Benzo(a)pyrene (B[a]P) is one of seventeen PAHs, and has been closely linked to causing some forms of cancer.

The UK Air Quality Strategy sets an objective for B[a]P, where the annual average concentration should not exceed 0.25ng/m³. In addition, the EU set a less stringent annual mean Target Value of 1ng/m³.

B[a]P has been measured at five different sites in Northern Ireland since 2001.¹ The longest monitoring sequence (at Lisburn Dunmurry High School and replaced by Lisburn Kilmakee Leisure Centre in 2012) has shown annual mean concentrations fluctuating between 0.44 and 1.44ng/m³ since 2001. In 2015, and as was the case in previous years, all operational sites (in Derry, Ballymena and Lisburn) breached the UK AQS objective; however, since 2011, they have all shown compliance with the EU Target Value (no more than 1 ng/m³ for annual mean B[a]P).

Air pollution levels in different years can be affected by a number of factors, with weather conditions being one of these. 2010 had an unusually cold winter, and as a result, levels of B[a]P – produced mainly as a result of residential combustion of solid

¹ In 2012, the monitoring site at Lisburn Dunmurry High School was decommissioned, and replaced by a monitoring site at Kilmakee, Dunmurry. However readings/data capture was not sufficient in either site in 2012.

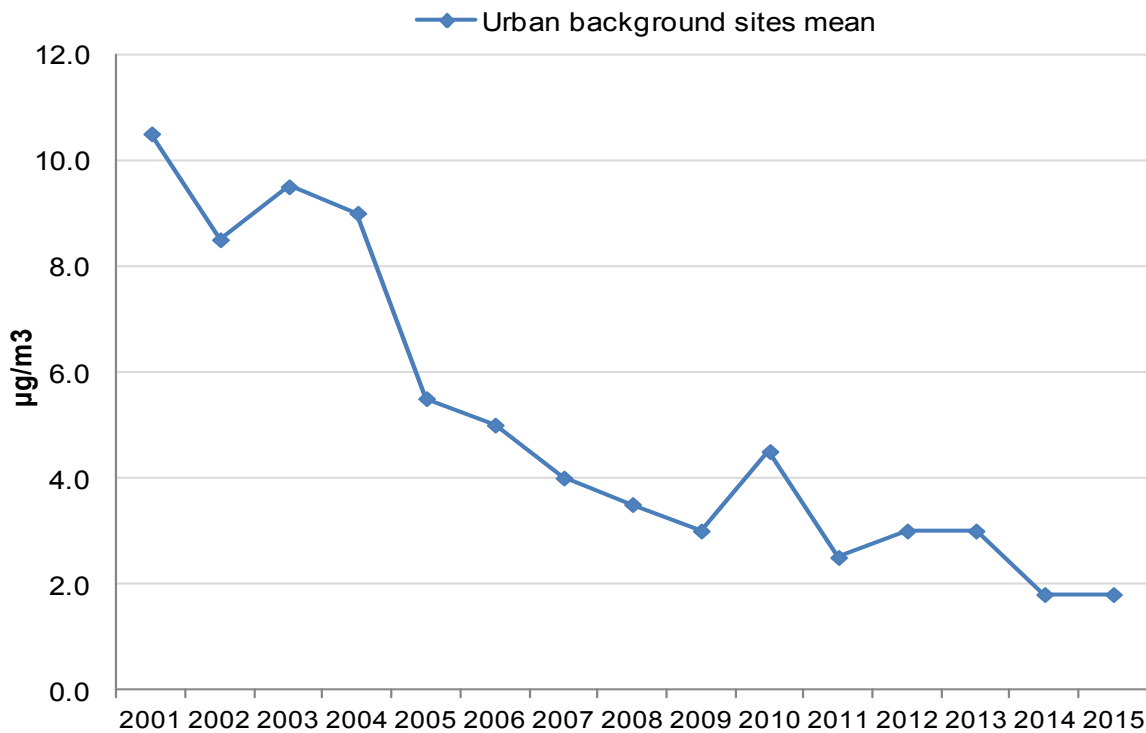
fuel - were particularly high. In 2010, all three monitoring sites showed breaches of the EU Target Value for B[a]P. Cold, calm, weather conditions can trap pollutants near ground level. This is another reason why levels could be relatively high in colder years like 2010.

The current Northern Ireland sites, although situated in predominantly residential areas, show annual mean B[a]P concentrations similar to those seen in industrial areas in GB such as Scunthorpe, Middlesbrough and Port Talbot.

Research commissioned by DOE (now DAERA) in 2012 showed that high PAH concentrations recorded at these locations are likely due to widespread residential combustion of smoky (bituminous) coal. This is demonstrated by the lower PAH levels recorded at Belfast Clara Street from 2001 to 2006. The levels monitored at this site in Belfast were comparable to levels recorded in other large UK cities, where air pollution from households is limited by councils having Smoke Control Areas in place. In Smoke Control Areas, the burning of unauthorised fuels, such as smoky coal, is banned.

Sulphur Dioxide

Figure 2.5 Annual mean concentration of sulphur dioxide (SO₂), 2001 – 2015



Source: Ricardo Energy & Environment

Sulphur dioxide (SO₂) is formed from the combustion of fuels containing sulphur (such as some coals and oils). The sharp, eye-watering smell of coal smoke is partly due to SO₂. High concentrations of this pollutant, for even short periods, can cause coughing, mucus secretion, and a worsening of symptoms for people with existing breathing problems such as asthma.

The marked reduction in this pollutant over recent years (83% less in 2015 compared with 2001) is linked to the expansion of the mains natural gas network in Northern Ireland, with an increasing amount of uptake of natural gas as a heating fuel. Uptake of this fuel has reduced the use of oil and solid fuel (coal) (which produce higher amounts of SO₂) in the domestic and industrial sectors.

The EU Air Quality Directive and the UK Air Quality Strategy set objectives for a 1-hour mean limit of 350µg/m³ which is not to be exceeded more than 24 times a year and a 24-hour mean limit of 125µg/m³ which is not to be exceeded more than 3 times a year. These standards were to be achieved by December 2004 and maintained thereafter. A further objective for a 15-minute mean of 266µg/m³ which is not to be exceeded more than 35 times a year was to be achieved by December 2005.

Sulphur dioxide was measured at five automatic monitoring sites in Northern Ireland in 2015. All sites in 2015 met the requirements of the Air Quality Strategy for 1-hour and 24-hour mean levels of sulphur dioxide. All have also met the 15-minute mean

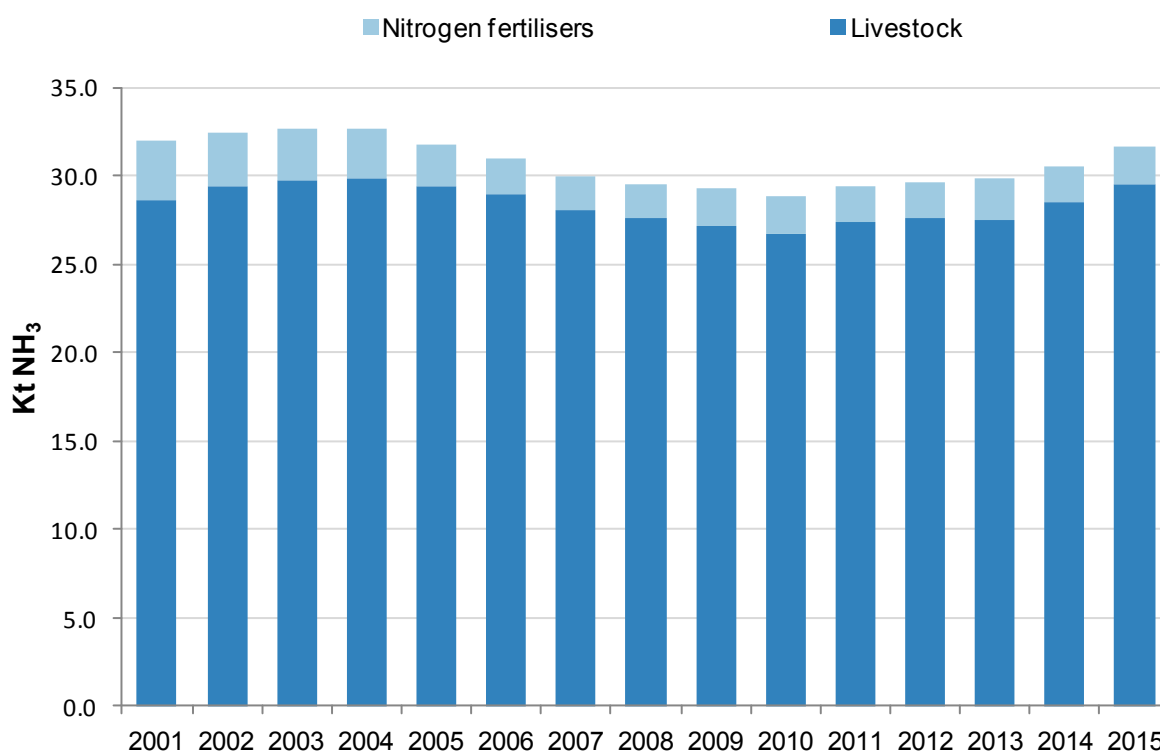
objective by the due date. A significant downward trend in annual mean sulphur dioxide concentrations has been identified at monitoring locations.

In 2015, the average annual mean concentration of SO₂ in urban areas was 1.8µg/m³. This is the same as the previous year. This has fallen from a high of 10.5µg/m³ in 2001.

Monitoring sites are only included in the calculation of the mean when they have met a minimum data capture of 75% over the year. Therefore, the number of sites included can vary from year-to-year and this can have an impact on the mean. The number of sites included each year is included in the appendix tables that accompany this report.

Ammonia

Figure 2.6 Annual ammonia emissions from agriculture, 2001 – 2015



Source: Rothamsted Research, North Wyke

Ammonia is an air pollutant which arises mainly from agricultural practices. The agriculture sector accounted for the majority of ammonia emissions in Northern Ireland in 2015. Other sources include transport, commercial and domestic combustion and industrial processes.

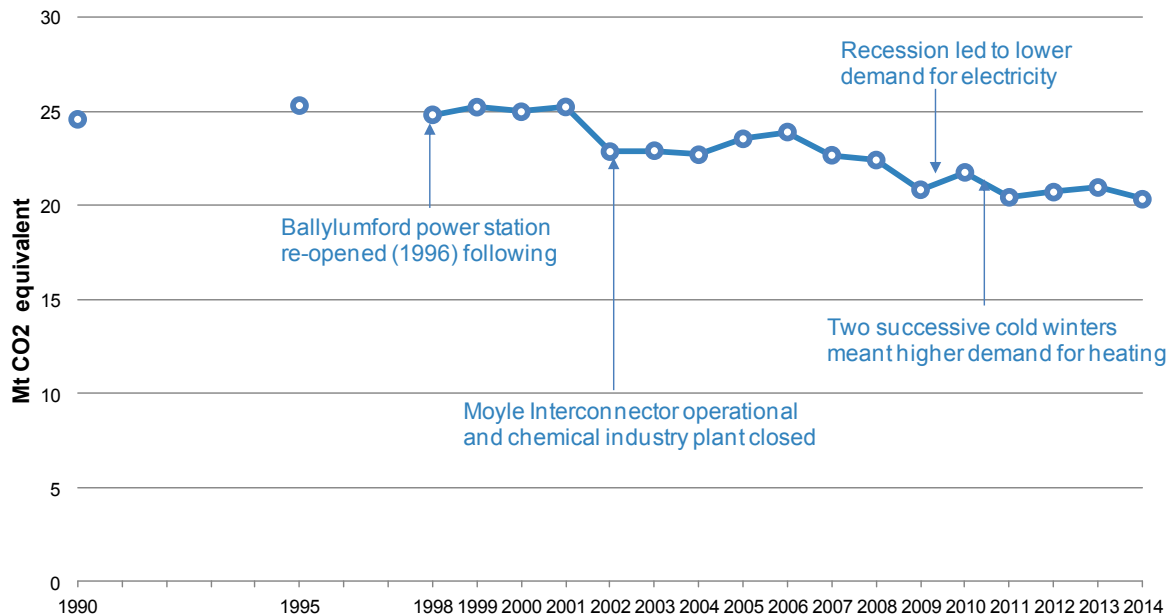
In 2015, of the ammonia emissions from agriculture, 93% was derived from livestock, and only 7% from the application of fertilisers containing nitrogen. Estimates of total ammonia emissions from agriculture are based on numbers of cattle, sheep, pigs, poultry, horses, goats and deer together with associated information on livestock and manure management practices and the use of nitrogen-containing fertilisers.

Emissions from livestock have increased by 2.8% since 2001 (from 28.7kt to 29.5kt in 2015). This compares with a 9.4% decrease for the UK as a whole. Cattle numbers (dairy cows in particular) have declined to a lesser extent in NI compared with the UK as a whole and pig and poultry numbers have increased over this period in NI in contrast to decreasing populations for the UK as a whole.

The ammonia emissions from nitrogen fertilisers have declined by 1.1 kilotonnes (from 3.3kt in 2001 to 2.2kt in 2015), a 33% decrease. This is directly associated with a significant reduction in fertiliser use, particularly on grassland. Overall, ammonia emissions have fallen slightly, by 1.2%, from 32.1kt in 2001 to 31.7kt in 2015.

Greenhouse Gas Emissions

Figure 2.7 Total greenhouse gas emissions in Northern Ireland, 1990 – 2014



Source: Aether and Ricardo Energy & Environment

Note: The base year for UK greenhouse gas emissions is 1990 for carbon dioxide, methane and nitrous oxide, and 1995 for fluorinated gases.

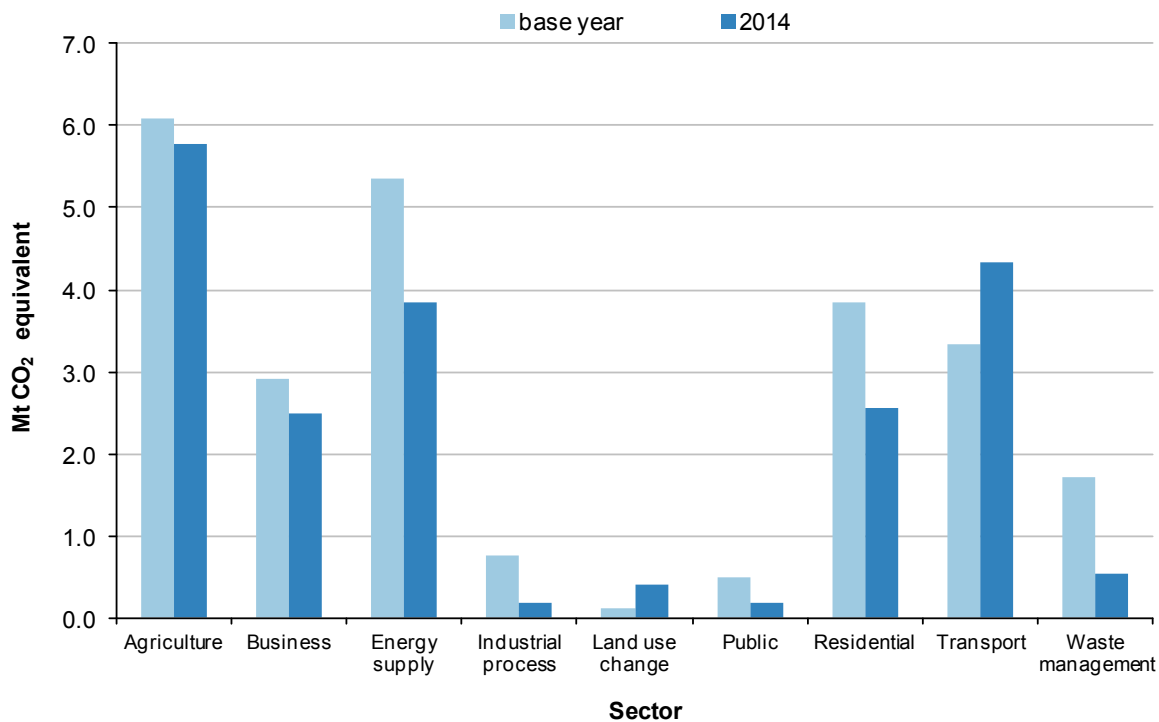
Greenhouse gas emissions for England, Scotland, Wales and Northern Ireland are published annually, detailing estimates of greenhouse gas emissions since 1990. The estimates are consistent with the United Nations Framework Convention on Climate Change reporting guidelines.

The UK Climate Change Act commits the UK to reducing emissions by at least 80% by 2050 from 1990 baseline levels. In 2014, Northern Ireland's total greenhouse gas emissions accounted for 4.0% of the UK total. Since the base year (1990), Northern Ireland's total greenhouse gas emissions have decreased by 17.4% from 24.6 to 20.3 million tonnes of carbon dioxide equivalent (MtCO₂e). This is less than the reduction seen for the UK as a whole, which saw a decrease of 36% compared to the base year.

Emissions in a particular year can be influenced by the weather. For example the two successive cold winters in early and late 2010 resulted in high demand for heating and subsequently an increase in emissions. In 2012 there was an increase in emissions from widespread forest wildfires which occurred during a spell of particularly dry, windy weather. Global fuel prices have caused a shift in recent years from burning natural gas to coal in the energy supply sector which has increased emissions from the energy supply sector since 2011.

Greenhouse Gas Emissions

Figure 2.8 Greenhouse gas emissions in Northern Ireland by sector, base year & 2014



Source: Aether and Ricardo Energy & Environment

Note: The base year for UK greenhouse gas emissions is 1990 for carbon dioxide, methane and nitrous oxide, and 1995 for fluorinated gases.

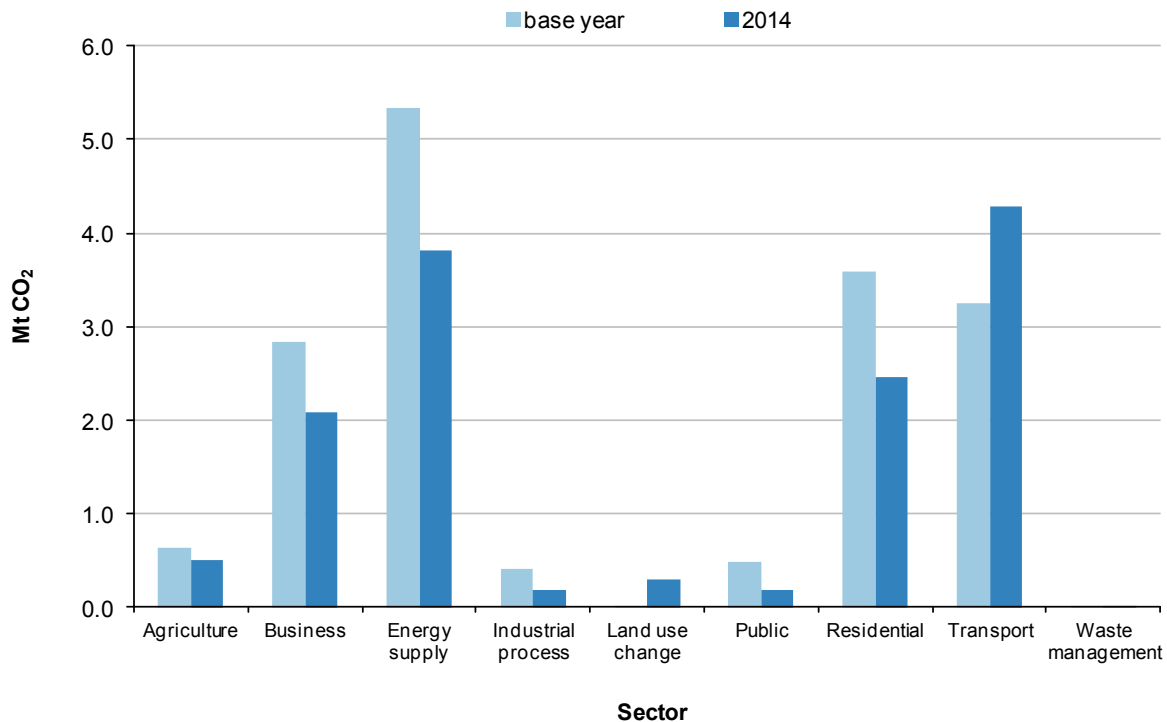
The largest sources of emissions in 2014 were agriculture (28%), transport (21%) and energy supply (19%).

Most sectors showed a decreasing trend since the base year, the largest decreases were in the energy supply, residential and waste sectors. They were driven by improvements in energy efficiency, fuel switching from coal to natural gas, which became available in the late 1990s, and the introduction of methane capture and oxidation systems in landfill management.

The transport and land use change sectors showed higher emissions in 2014 than in the base year. Overall transport emissions increased by 30% from the base year due to growth in demand for transport. However by 2014 there had been a decline of 9% from the peak in 2007 due in part to improvements in fuel efficiencies of newer vehicles, the switch from petrol to diesel cars, and a reduction in traffic volumes.

Greenhouse Gas Emissions

Figure 2.9 Carbon dioxide (CO₂) emissions in Northern Ireland by sector, base year & 2014



Source: Aether and Ricardo Energy & Environment

Note: The base year for UK greenhouse gas emissions is 1990 for carbon dioxide.

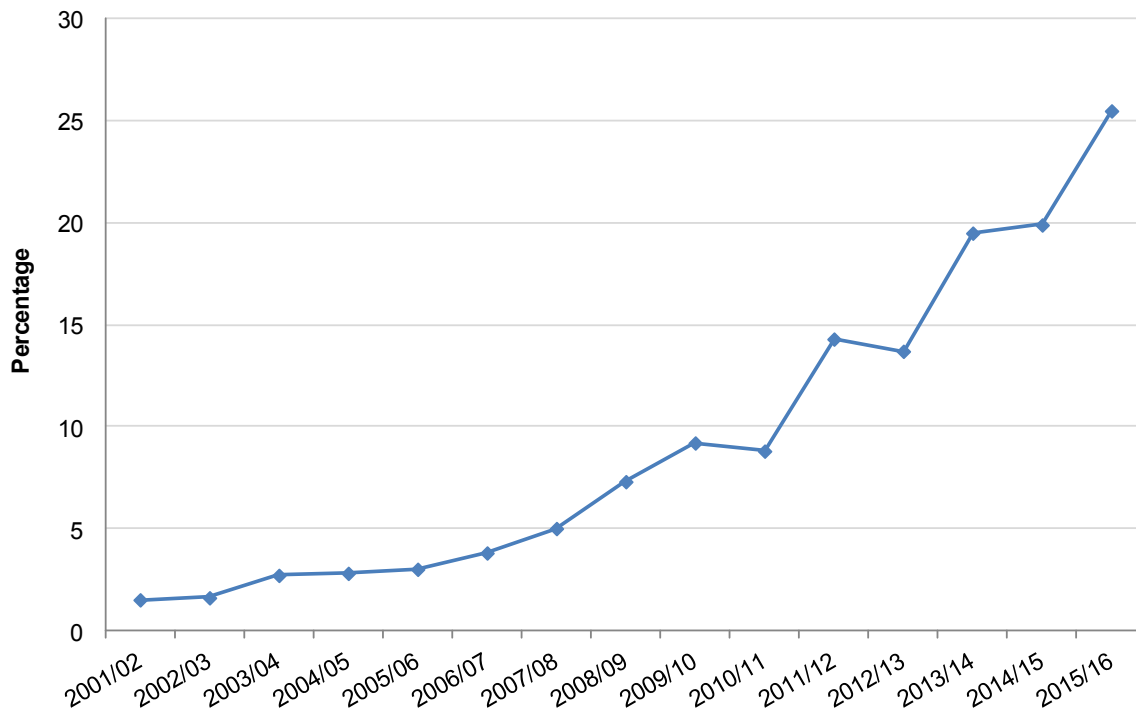
In 2014, Northern Ireland emissions of carbon dioxide (CO₂) amounted to 13.8 million tonnes of carbon dioxide equivalent (MtCO₂e), a decrease of 16% on emissions of CO₂ in the base year.

Transport, energy supply and residential were the most significant contributors to CO₂ emissions, being responsible for 76% of all the CO₂ produced in Northern Ireland in 2014. Emissions from waste management are mainly dominated by methane from landfill. Agriculture is the most significant source sector for methane and nitrous oxide, accounting for 87% and 86% of total Northern Ireland emissions of these two gases, respectively. Northern Ireland CO₂ emissions in 2014 represented 3.0% of UK CO₂ emissions, a similar proportion to the base year.

The majority of the CO₂ emission source sectors have seen a decreasing trend since the base year with residential, energy supply and business sectors reductions in CO₂ emissions of 32%, 28%, and 26% respectively. Natural gas has been available to the energy supply sector since 1996 and to industrial, commercial and domestic users since 1999. The emission of CO₂ per unit energy produced is lower for natural gas than other fossil fuels such as coal and oil. NI has also seen an increase in electricity generated from renewable sources in recent years.

Renewable Energy

Figure 2.10 Percentage of total electricity consumption generated from indigenous renewable sources, 2001/02 – 2015/16



Source: DfE

The Northern Ireland Executive's Programme for Government 2011-2015 set a target to "Encourage achievement of 20% of electricity consumption from renewable sources by 2015". The Northern Ireland Executive's Strategic Energy Framework has set a target of 40% electricity consumption from renewable sources by 2020.

In 2015/16, some 1,987 GWh of electricity in Northern Ireland was generated from indigenous renewable sources. This was equivalent to 25.5% of total electricity consumption in that period, an increase of some 5.6 percentage points on the previous year when 19.9% of total consumption was from renewable sources.

There has been a sizeable increase in the amount of electricity generated from indigenous renewable sources since 2001/02, when only 128GWh (1.5% of total electricity consumed) was from renewable sources.

In 2015/16, the vast majority (around 88%) of renewable electricity generated within NI is generated from wind sources. Changes are therefore heavily influenced by increases/decreases in stock (i.e. more or fewer wind turbines in operation) or weather (i.e. a particularly windy or non-windy year) or both.

A number of new wind turbines/wind farms have come into operation over recent years – a list of these by county is available at <http://www.iwea.com/windfarmsinireland>. The introduction of new wind farms can have the 'step change' effect that can be observed

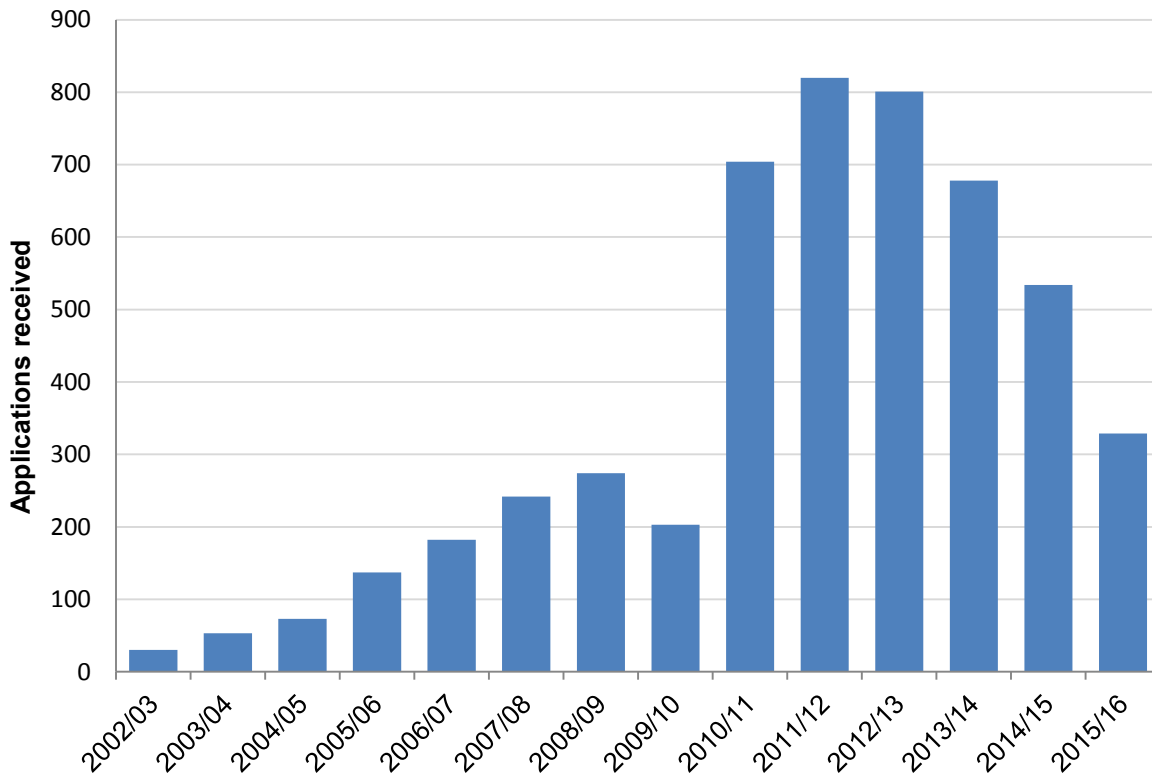
in recent years. In addition, more recently there has been increased generation from some other renewable sources (e.g. biomass and biogas).

Renewable electricity generation has linkages with other Government policies such as climate change, energy efficiency etc. These other policies can have a direct influence on future deployment of renewables and the generation and consumption of electricity.

The long term trend that can be observed from the figures is a general increase in the generation and consumption of renewable electricity in NI since 2001. A large part of this increase can be attributed to the introduction of the Northern Ireland Renewables Obligation (NIRO) in 2005 which provides a revenue stream for renewable electricity generation in the form of Renewable Obligation Certificates (ROCs). The NIRO closed to new large scale onshore wind projects on 31 March 2016, new small scale onshore wind on 30 June 2016 and will close to all non-wind technologies on 31 March 2017. Projects seeking to accredit after the closure dates must meet the eligibility criteria for grace periods as set out in the associated legislation.

Environmental Installations

Figure 2.11 Planning applications for environmental installations, 2002/03 – 2015/16



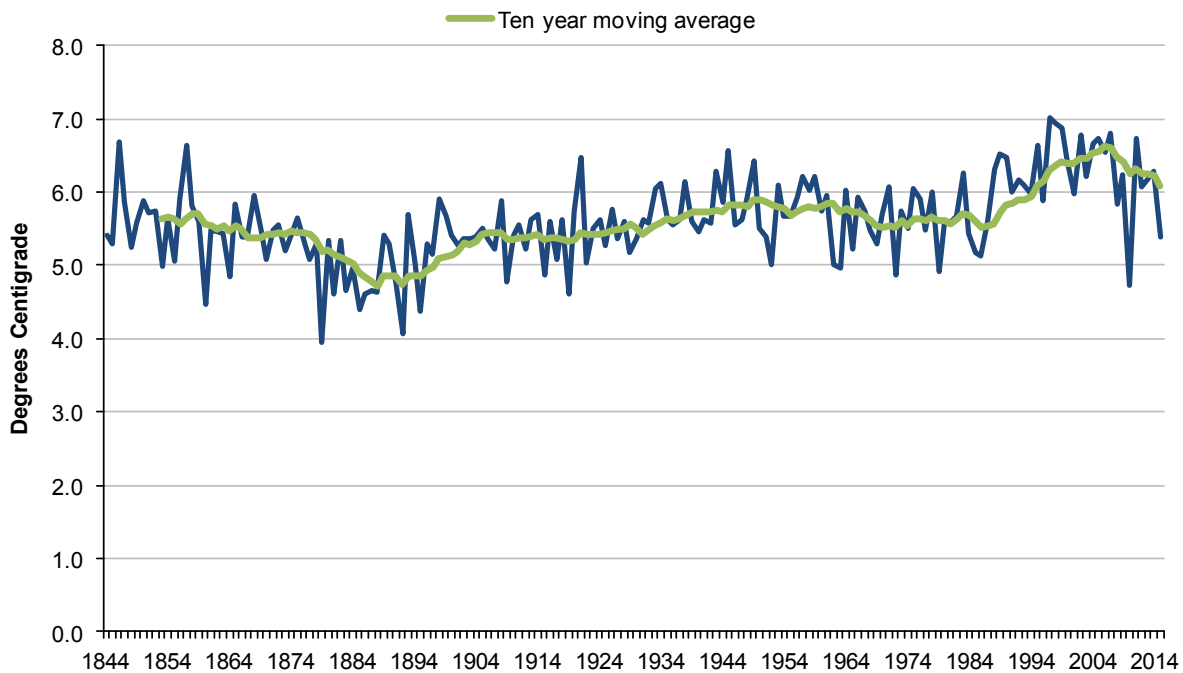
Source: DFI Planning NI

DFI Planning NI monitor the number of renewable energy applications. These include single wind turbines, wind farms, solar panels, biomass energy, heat pumps, anaerobic digestion, hydroelectric schemes etc. The majority of renewable energy applications are for single wind turbines. Planning permission is required for all environmental installations.

The overall number of renewable energy applications received in 2015/16 was 329, a decline of 38.4% when compared to 2014/15 and the lowest annual figure in the series from 2009/10. The number of applications received annually peaked in 2011/12 with 820 applications received in that year. It is likely that the high levels at this time were driven by the NI Executive's targets for electricity consumption from renewable sources, with a target of 20% to be achieved by 2015, and 40% by 2020. The decline in recent years may be partly due to a reduction in government funding available, as well as a lack of capacity on the power grid to allow for new connections.

Climate Change

Figure 2.12 Mean annual minimum temperature, 1844 – 2015



Source: Armagh Observatory

The mean annual minimum temperature for Northern Ireland has been calculated from the Armagh Observatory temperature records.

The ten year moving average trend line shows that the annual minimum temperature reached a low towards the end of the 19th century, and has been steadily increasing since.

At the end of the 20th century, the ten year moving average mean annual minimum temperature had risen to its highest levels since the temperature records began.

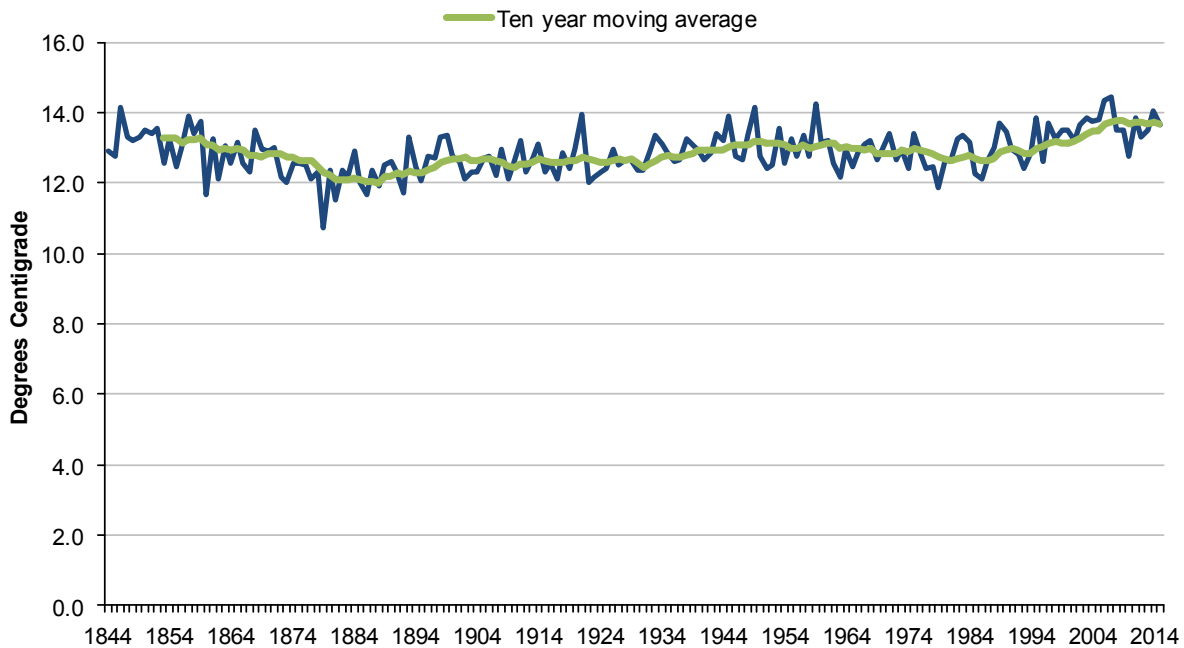
The lowest mean annual minimum temperature (3.95°C) was recorded in 1879.

The highest mean annual minimum temperature (7.02°C) was recorded in 1997.

The 2015 mean annual minimum temperature (5.38°C) was 0.90°C lower than the 6.28°C seen in 2014.

Climate Change

Figure 2.13 Mean annual maximum temperature, 1844 – 2015



Source: Armagh Observatory

The mean annual maximum temperature for Northern Ireland has been calculated from the Armagh Observatory temperature records.

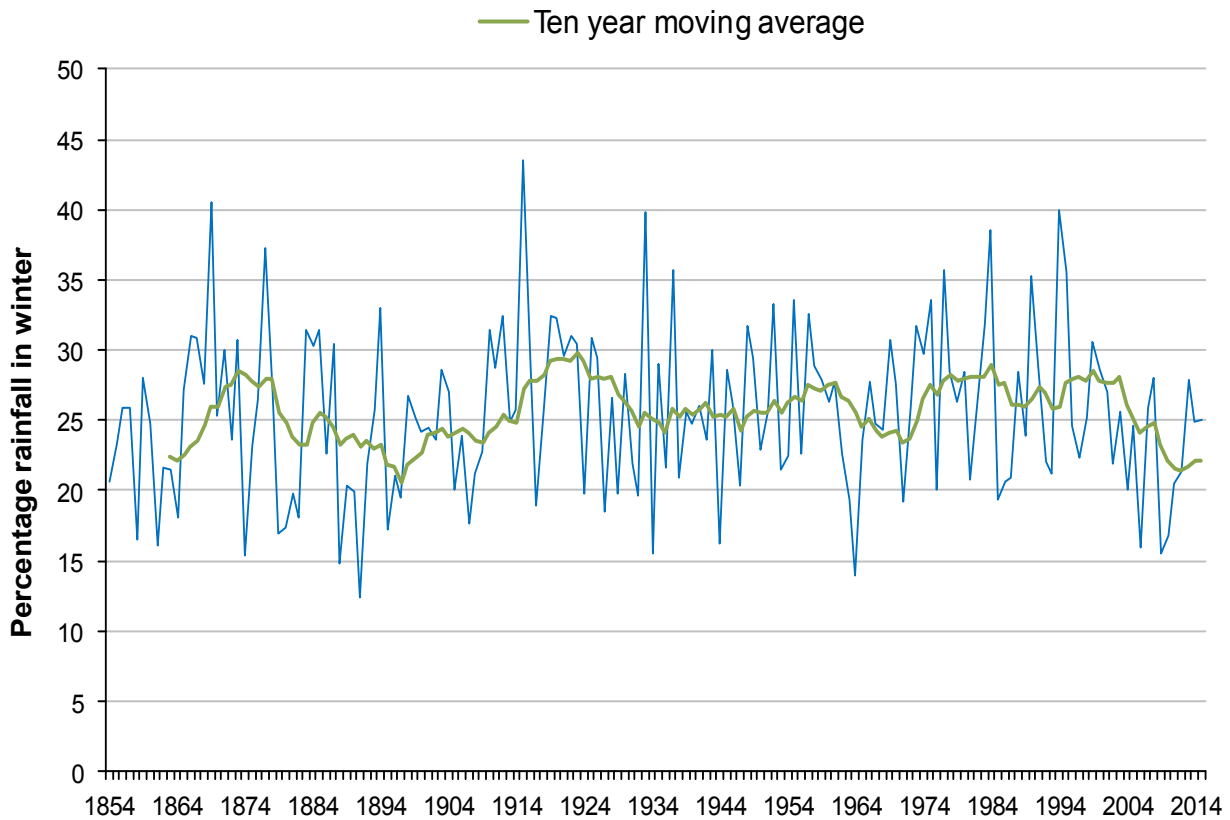
Similar to the mean annual minimum temperature, the lowest mean annual maximum temperature of 10.74°C was recorded in 1879.

The highest mean annual maximum temperature (14.44°C) was recorded in 2007.

The mean annual maximum temperature has varied over the years, between 12 and 14°C. In the most recent years, the ten year moving average for maximum temperature has been closer to 14°C.

Climate Change

Figure 2.14 Percentage of annual rainfall falling in winter (Dec – Feb), 1854 – 2015



Source: Armagh Observatory

Rainfall records are also kept at Armagh Observatory. The amount of rainfall observed in winter (December to February) is calculated as a percentage of annual rainfall (December to November).

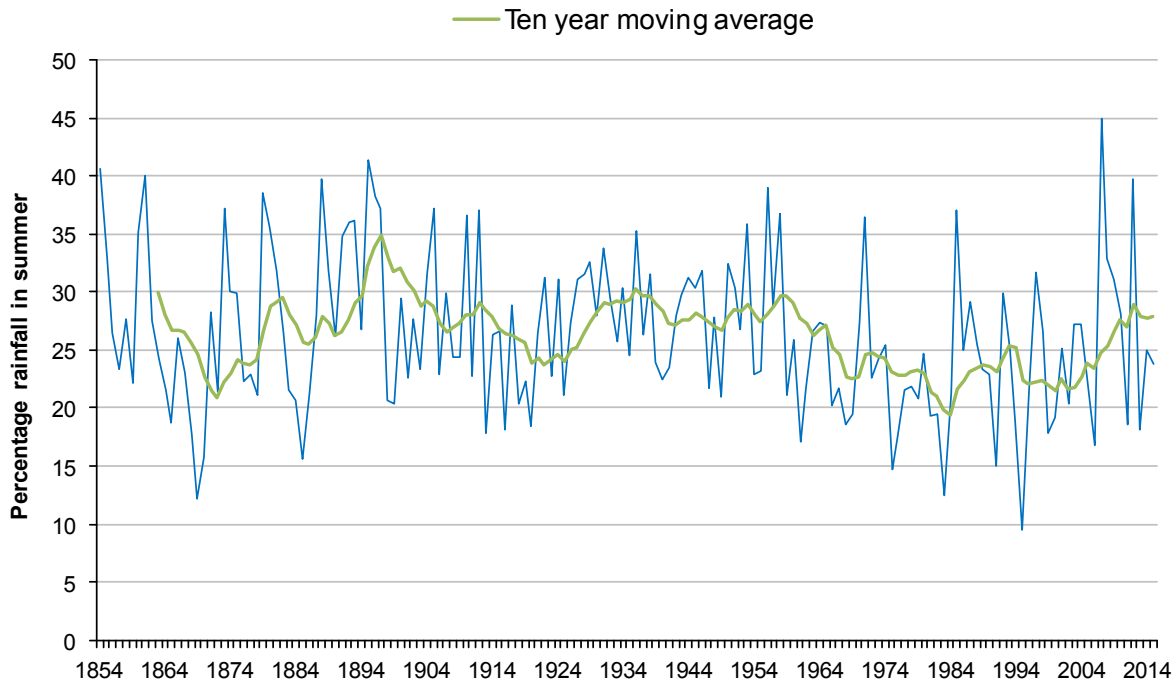
The greatest percentage of annual rainfall falling in winter occurred in 1915, when 43% of the year's rainfall fell in the three winter months.

In 1891 just 12% of the annual rainfall fell in winter. This is the smallest percentage of annual rainfall in winter recorded in Northern Ireland.

In 2015, 34% of the annual rainfall fell in winter, this is the highest proportion recorded over the past two decades. 1995 saw 36% of annual rain fall in winter.

Climate Change

Figure 2.15 Percentage of annual rainfall falling in summer (Jun – Aug), 1854 – 2015



Source: Armagh Observatory

The amount of rainfall observed in summer (June to August) is calculated as a percentage of annual rainfall (December to November).

Over time the ten year moving average has decreased from a high of 35% in 1897 to a low of 19% in 1984, however there has been an increase in the ten year moving average in recent years (to around 27-28%).

The 2012 year saw the second highest level (40%) of summer rainfall since 1895. The highest level recorded was in 2007, when 45% of the year's rainfall fell in the three summer months.

In 1995, less than 10% of the annual rainfall fell between June and August, the lowest percentage recorded in Northern Ireland.

Water

Water is an essential natural resource and plays a vital role in maintaining biodiversity, our health and social welfare and our economic development. Our rivers, lakes, estuaries, seas and groundwater provide water to sustain many of our core social and economic activities, and also provide drinking water for our population. This chapter will report on the condition of Northern Ireland's inland waters, and on the levels of compliance with waste water standards and drinking water standards. Indicators on the state of the marine environment are covered in Chapter 4.

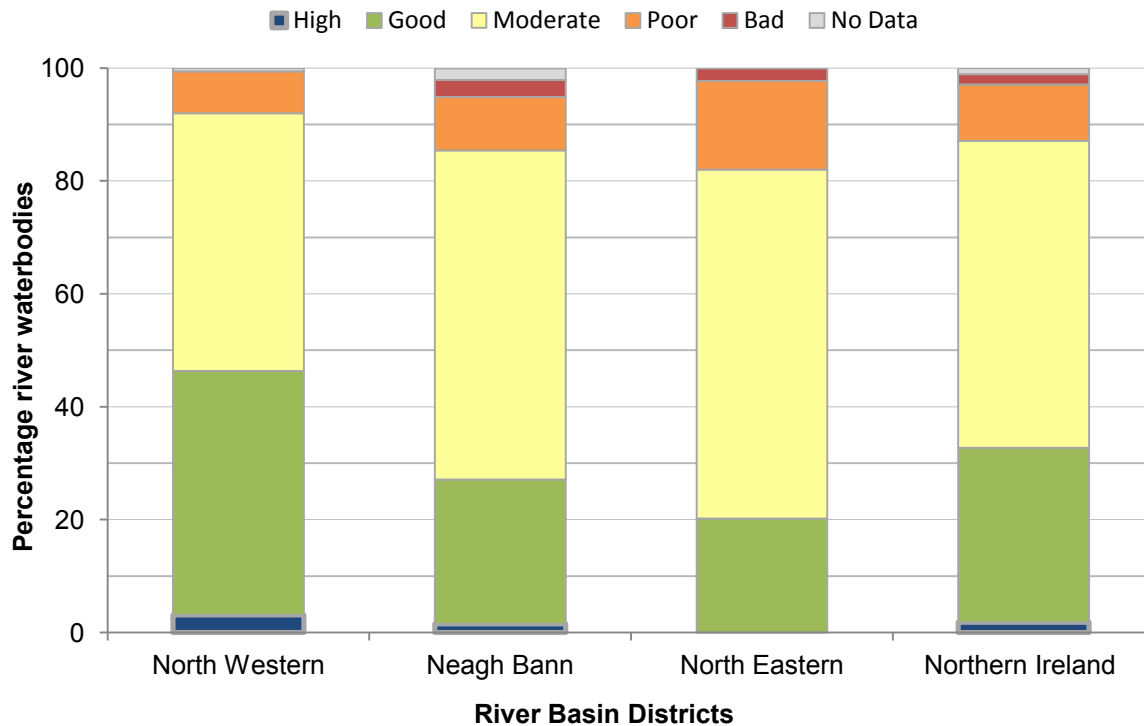
Key points in this chapter:

- River monitoring is carried out against national standards for the Water Framework Directive (WFD). Just under one third (32.7%) of monitored river waterbodies are of at least a good standard in 2015.
- Lakes are a significant source of drinking water supplies. Lough Neagh and Upper and Lower Lough Erne make up over 90% of the total area of lakes greater than 50 hectares in Northern Ireland. There are 21 lakes currently monitored in Northern Ireland, of which 5 achieved a 'good' standard when classified in 2015. 2015 Lake Classification uses data collected from 2012-2014.
- Effluent discharges to our water environment can affect its quality and come from many different sources such as commercial and industrial premises, wastewater and water treatment works and private dwellings. These discharges are controlled by the Department of Agriculture, Environment and Rural Affairs through the granting of consents and permits under the Water (NI) Order 1999 and the Pollution Prevention and Control Regulations (NI) 2003. Industrial discharge quality has improved in recent years with compliance rates in 2015 of 75% and 95% for private sewage and trade effluent respectively.
- Compliance of Waste Water Treatment Works against the numeric conditions of their Water Order (WO) consent is a key performance indicator (KPI) for the water utility sector and has continued to improve since 2007 having reached 93% in 2015.
- Drinking water quality compliance remains at over 99%.
- Water pollution incidents are investigated by NIEA. In 2015 there were 1,745 incidents reported to NIEA or discovered by NIEA during inspections, of which 978 (56%) were substantiated (confirmed) as having an impact on the water quality of the receiving waterway. Of these 14% were considered to be of High or Medium Severity.

Data tables and more information for this chapter can be found in the excel tables provided online (<https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>) and the relevant chapter in [Appendix 3](#).

River Quality

Figure 3.1 Water Framework Directive (WFD) overall classification (% river waterbodies), 2015 (second cycle water body set and environmental standards)



Source: NIEA

The river waterbody classification has been produced using the results from the Water Framework Directive quality elements. Overall classification utilises a combination of biological, chemical and hydromorphological quality elements including macroinvertebrates, pH (measure of acidity or alkalinity of a solution) and ammonia to assign status of river quality in one of five classes from 'high' through to 'bad'.

The Water Framework Directive requires NIEA to protect the status of waterbodies from deterioration and, where necessary and practicable, to restore waterbodies to good status.

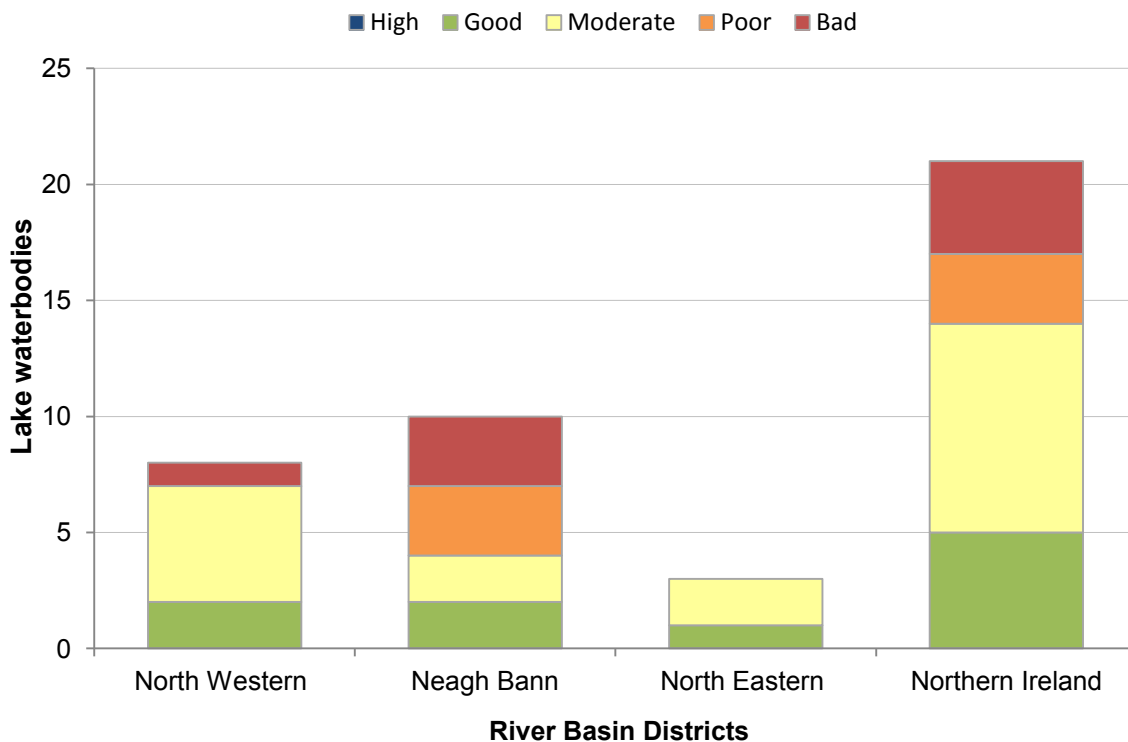
The environmental objectives established in the river basin plan set the water status to be achieved for surface waterbodies for each six year planning cycle starting from 2015. These data refer to 450 river water bodies.

In 2015, 32.7% of NI river waterbodies were classified as 'high' or 'good' quality.

Please note that this indicator has not been updated since last year's report. The WFD Classifications are required to report to Europe on a 6-yearly basis. The next update required is 2021, an interim update will be carried out and included in this report in 2018 (including updates to end of 2017).

Lake Quality

Figure 3.2 Lake Water Framework Directive status, 2015 (second cycle water body set and environmental standards)



Source: NIEA

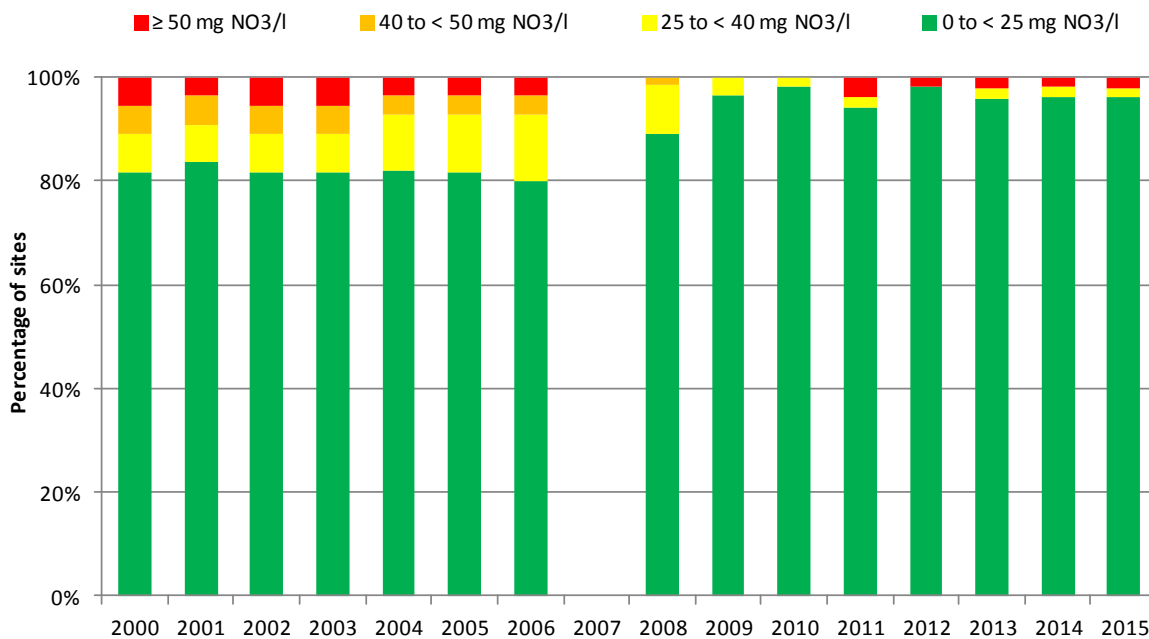
The Water Framework Directive requires NIEA to classify the 'surface water status' of Northern Ireland's lake waterbodies. There are 21 lake waterbodies in Northern Ireland, that is lakes with an area of greater than 50 hectares.

The ecological and chemical classification results for surface waters are combined to give an overall status in one of five classes: bad; poor; moderate; good; and high. Overall status of a water body is determined by the lower of a water body's 'ecological status' and its 'chemical status' and is based on a number of parameters including macrophytes, photoplankton, phytobenthos, total phosphorus, chlorophyll and dissolved oxygen. A flow chart presenting this can be found on page 4 of the Rationale for Water Framework Directive Freshwater Classification document. (<https://www.daera-ni.gov.uk/sites/default/files/publications/doe/UKTAG-recommendations-on-surface-water-classification-schemes-for-the-purpose-of-the-WFD.PDF>)

In 2015, five of the 21 lake waterbodies in Northern Ireland were classified as having a 'good' status and 16 lake waterbodies were classified as having a less than 'good' status. Please note that this indicator has not been updated since last year's report. The WFD Classifications are required to report to Europe on a 6-yearly basis. The next update required is 2021, an interim update will be carried out and included in this report in 2018 (including updates to end of 2017).

Groundwater Quality

Figure 3.3 Annual mean nitrate concentrations (in groundwater), 2000 – 2015



Source: NIEA

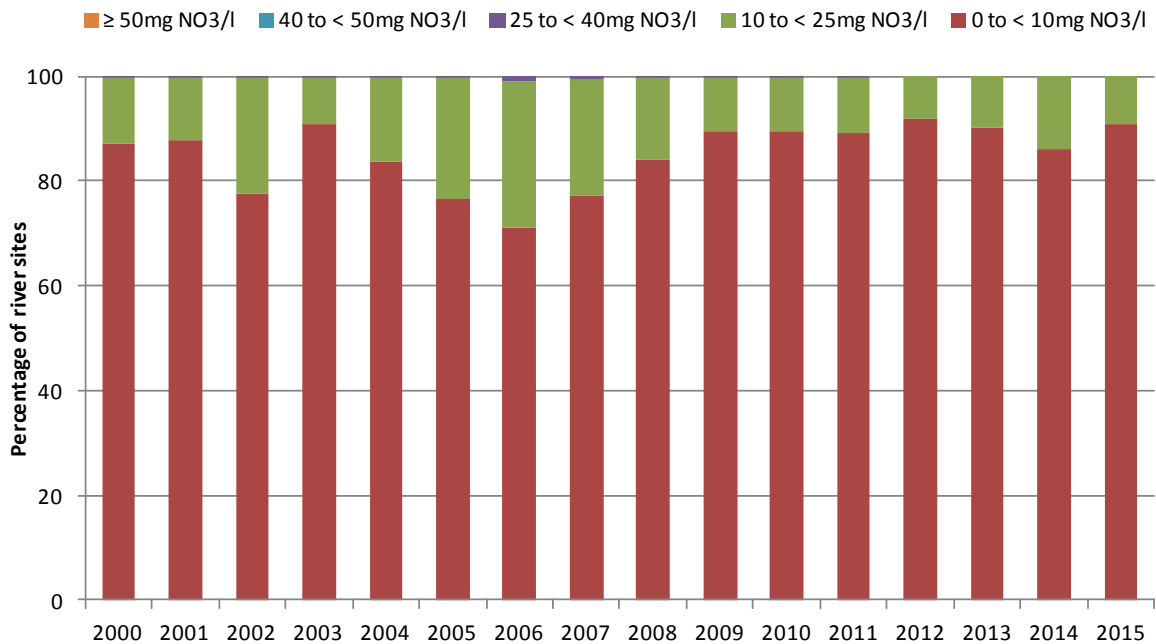
Regional monitoring of nitrate concentrations in groundwater across Northern Ireland began in 2000. The Groundwater Daughter Directive (2006/118/EC) sets the groundwater quality standard at 50 mg NO₃/l. In the period 2000 to 2006, approximately 91 % of sites had an annual mean concentration of less than 40 mg NO₃/l and approximately 82 % were less than 25 mg NO₃/l.

Regional monitoring re-commenced in 2008, after a major review of the network was undertaken. The figures both pre and post review are broadly comparable.

In 2015, nitrate concentrations were monitored at 51 groundwater sites across Northern Ireland giving an average concentration of 4.4 mg NO₃/l. Groundwater nitrate concentrations across Northern Ireland are generally low with 49 of the 51 (96.1 %) stations below 25 mg NO₃/l in 2015. Note that one station equals 2.0 %.

River Quality - nitrate

Figure 3.4 Annual mean nitrate concentrations (in rivers), 2000 – 2015



Source: NIEA

Under the Nitrates Directive, Northern Ireland must monitor surface waters for nitrate pollution against a mandatory standard of 50 mg NO₃/l. In addition a guide standard for surface waters is operational where 90% of samples should be less than 25 mg NO₃/l.

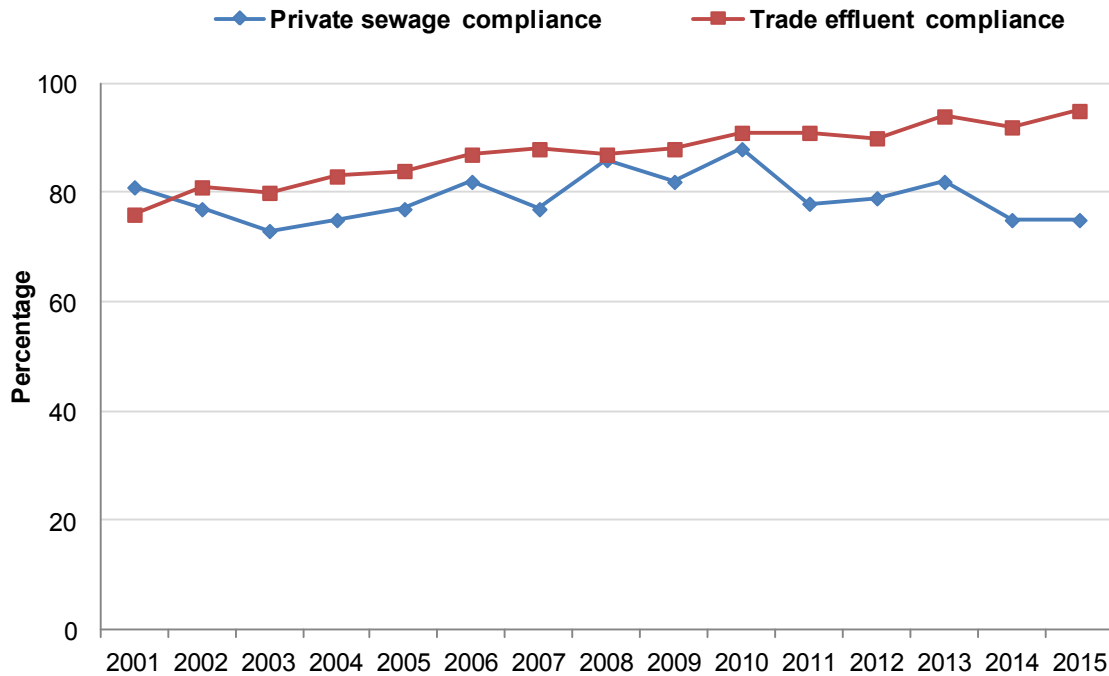
In the period 2000 to 2011, over 99% of sites had an annual mean concentration of less than 25 mg NO₃/l. Since then, all rivers that were monitored for nitrate had an annual mean concentration of less than 25 mg NO₃/l.

Long-term seasonal trend analysis shows that the monthly trends in average nitrate concentrations in rivers in Northern Ireland are predominantly decreasing or stable over the 24-year period, 1992-2015, which may be attributed to the measures implemented through the Nitrates Action Programme.

A similar trend is observed for phosphorus which may be attributed to the NI Phosphorus Regulations and Urban Waste Water Treatment Directive (UWWTD) implementation.

Industrial Discharge Quality

Figure 3.5 Trends in annual private and trade discharge consent compliance (EA 95-percentile), 2001 – 2015



Source: NIEA

The monitoring of effluent discharges gives an indication of levels of pollution to the water environment and improvements in controls.

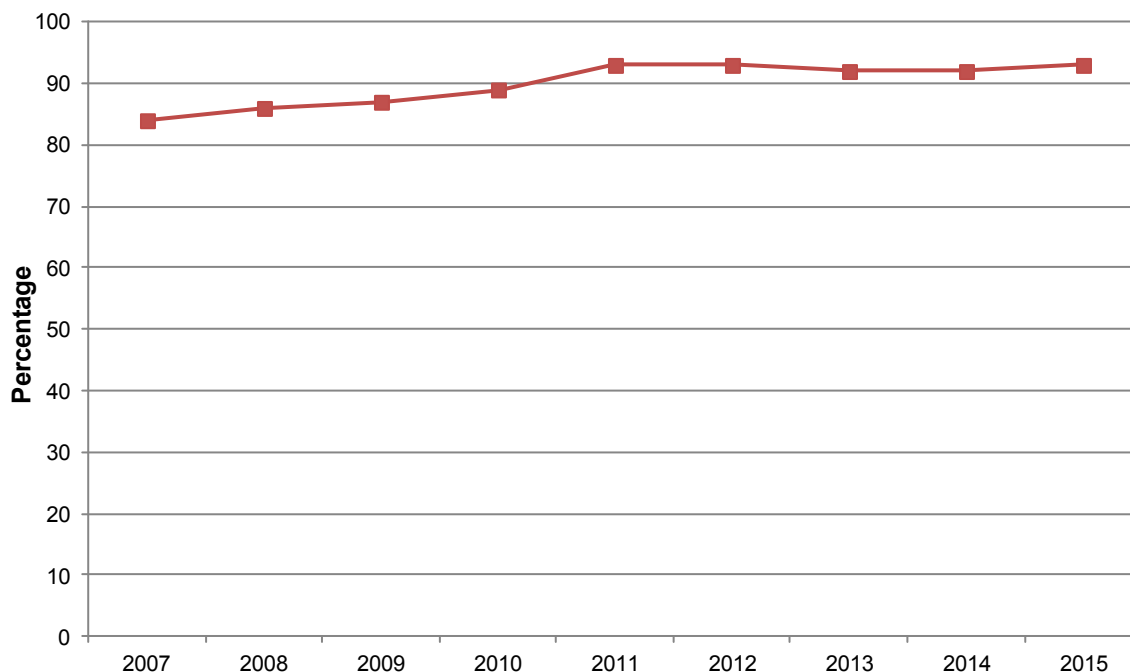
Numerical limits on Water Order consents for private sewage and trade discharges are set as absolute standards. However, compliance is assessed on a 95-percentile basis, i.e. a discharge must be within its consent conditions 95% of the time to comply.

Compliance for private sewage was 75% in 2015 which is below the high of 88% recorded in 2010 but higher than the minimum value of 73% in 2003. For trade effluent compliance there has been an increase from 76% in 2001 to 95% in 2015, which is higher than all previous years.

There has been an improved provision of support to and more consistent enforcement action against consent holders.

Water Utility Discharge Quality

Figure 3.6 Summary of compliance of Water Utility Sector Waste Water Treatment Works (WWTW), 2007 – 2015



Source: NIEA

Compliance of waste water treatment works against the numeric conditions of their Water Order consent was introduced in 2007, is a key performance indicator for the water utility sector and has continued to improve since 2007, having reached 93% in 2011 and remaining reasonably stable since then.

NI Water compliance was assessed against numeric standards set for discharges from 236 waste water treatment works, serving a population equivalent to or greater than 249. In addition numeric compliance was also assessed for six waste water treatment works operated under Public Private Partnership contracts.

There has been a sustained investment by Northern Ireland Water (NIW) to upgrade WWTW and sewage networks since 2007. The Public Private Partnership (PPP) operators that NIW allow to operate under contract have produced new WWTW that have very high performance.

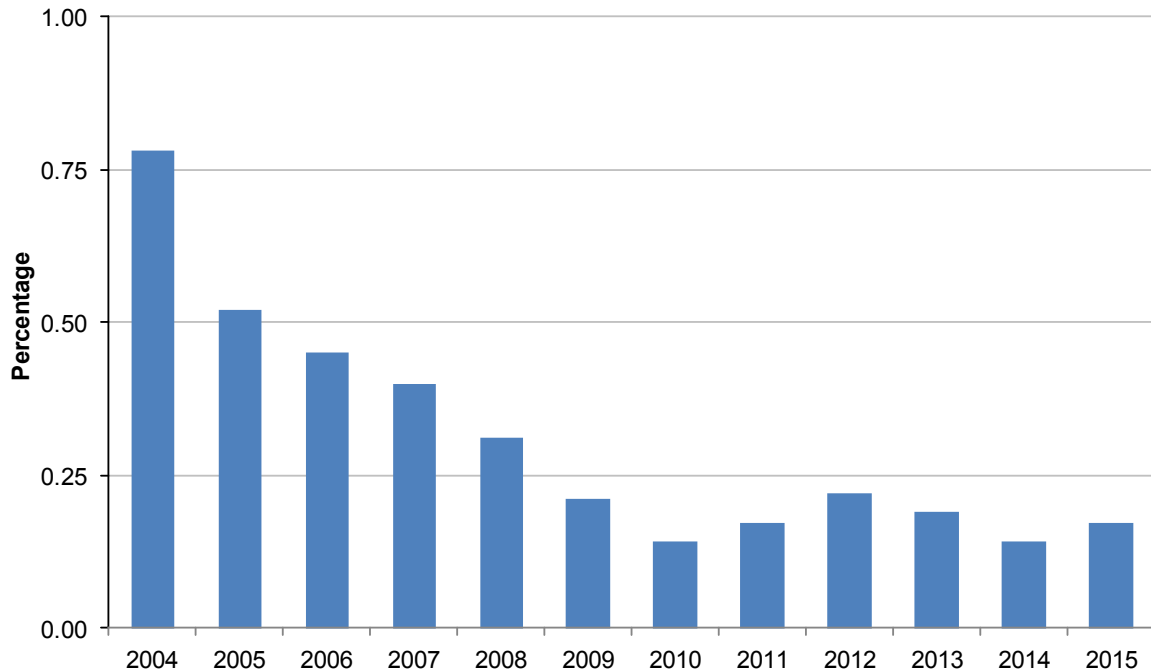
When DOE Water Service became NIW Ltd in 2007, crown immunity was lost and NIW has been successfully prosecuted for not complying with consent conditions. This has led to an increase in enforcement notices and convictions. Thus there is now an incentive to be compliant.

As Water Utility Regulation Group (WURG) has improved the efficiency of the compliance assessment process, WWTW that may have become non-compliant in the past have been identified early and NIW has been informed. This has also been a factor in improving compliance rates.

The reporting process to the European Commission of compliance with the Urban Waste Water Treatment Directive (UWWTD) has become more stringent in recent years with the Commission also streamlining its infraction process against Member States.

Drinking Water Quality

Figure 3.7 Percentage of tests failing to meet the standards with the Northern Ireland drinking water quality regulations, 2004 – 2015



Source: NIEA

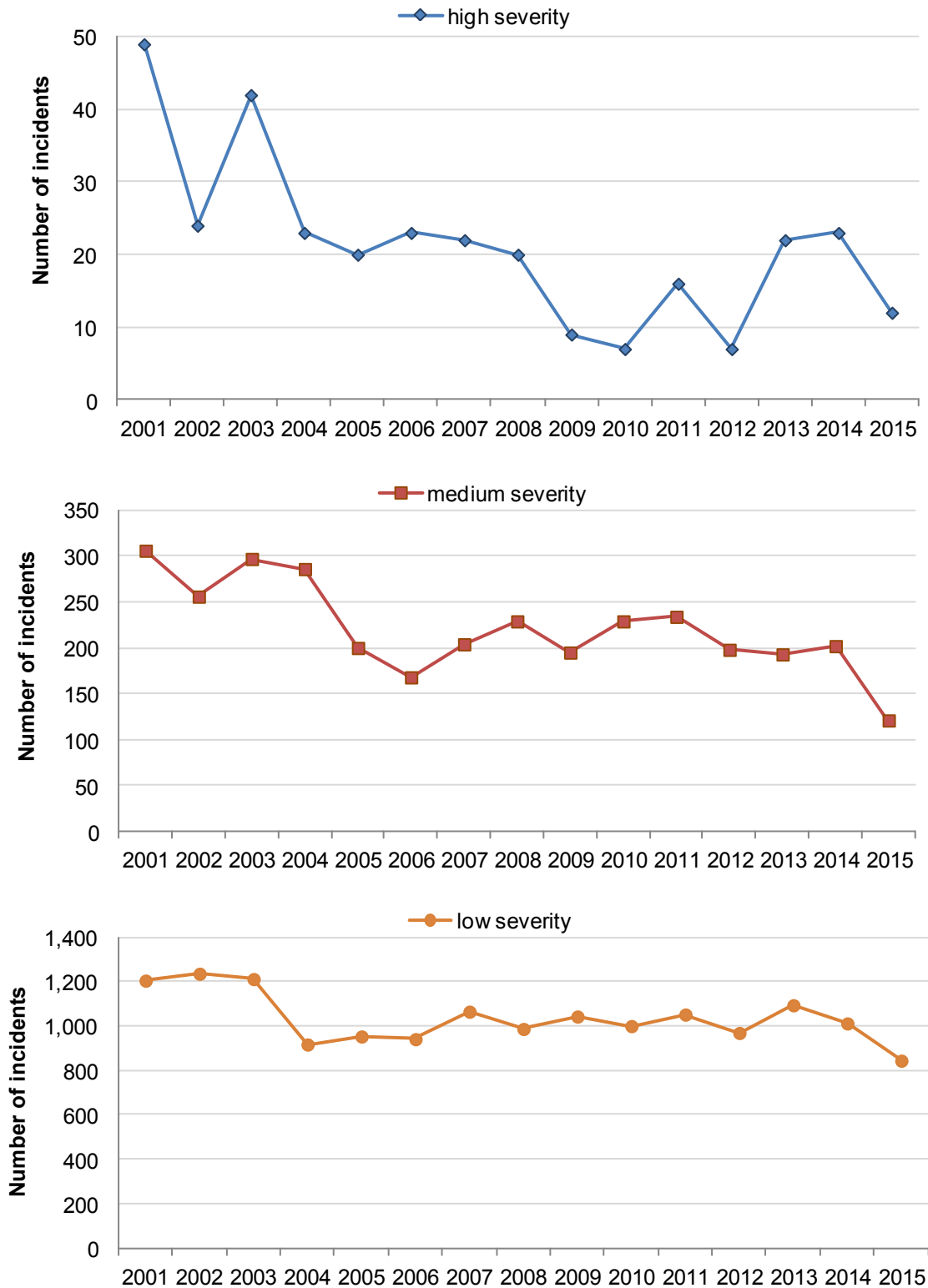
Drinking Water Quality of public drinking water supplied by NI Water is assessed using the key parameters monitored at water treatment works, service reservoirs and consumers' taps.

The results are based on upwards of 98,000 samples taken throughout the water supply chain across Northern Ireland each year. Overall compliance remains high at 99.83% in 2015. Please note that Figure 3.7 presents the overall percentage of all regulatory compliance tests failing to meet drinking water standards.

Looking at private water supplies (not supplied by NI Water) in 2015, 147 supplies were included in the regulatory sampling programme. Of the 11,248 samples taken at private water supplies, 98.94% complied with the regulatory standards.

Water Pollution Incidents

Figure 3.8 Severity of substantiated water pollution incidents, 2001 – 2015



Source: NIEA

In 2015, there were 1,745 incidents either reported to NIEA or discovered by NIEA during inspections, of which 978 (56%) were substantiated (confirmed) as having an impact on the water quality of the receiving waterway. The total number of reported incidents decreased by 18% compared with last reported year (2,133) and the number of substantiated incidents decreased by 21% compared with 2014 (1,238). The total number of substantiated incidents in 2015 is 37% lower than the average annual level recorded in the period 2001 – 2003 (1,543).

Substantiated pollution incidents are classified according to their environmental impact severity. A total of 133 (14%) high and medium severity incidents were investigated during 2015. This was a decrease of 41% compared with 2014 figures (225).

In 2015, farming accounted for the largest proportion of substantiated incidents investigated by NIEA (33%), followed by other (18%), domestic (17%), industry (15%), Northern Ireland Water Ltd (14%) and transport (2%).

Marine

The majority of Northern Ireland's 650 km of coastline is protected for its special interest and a number of our coastal species and habitats are recognised as internationally important. The marine life in the seas surrounding Northern Ireland is rich and varied and includes marine mammals such as harbour seals, whales and dolphins, seabirds, waterfowl and other species that migrate here. Our coastline also includes productive and biologically diverse ecosystems, with features which serve as critical natural defences against storms, floods and erosion. This chapter looks at the quality of Northern Ireland's bathing water, coastal water and shellfish water, and Irish Sea temperatures.

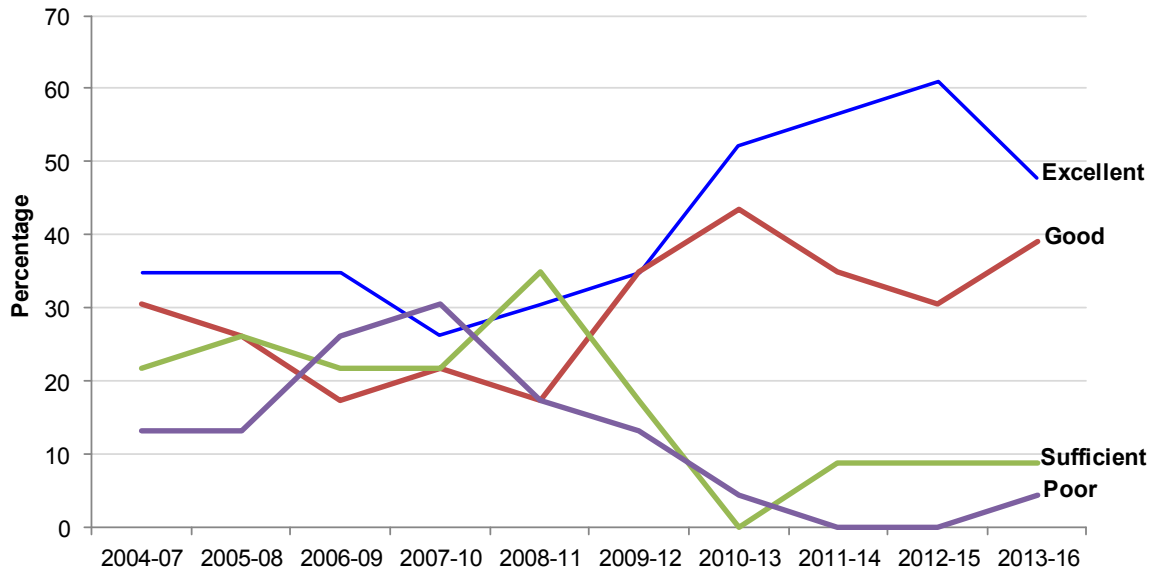
Key points in this chapter:

- Based on 2013 –2016 data, 11 of the 23 beaches (48%) monitored in Northern Ireland met the 'excellent' standard while nine beaches (39%) met the 'good' standard. Two beaches (9%) were classified as 'sufficient' and one as 'poor'
- Ten beaches and two marinas were awarded Blue Flag status, meeting a number of criteria such as water quality, safety, facilities and information.
- Over one third (36%) of marine water bodies around Northern Ireland's shores are classified as 'high' or 'good', with the remaining water body areas being classified as 'moderate' (56%) or 'poor' (8%).
- Two out of nine designated shellfish water protected areas (SWPAs) complying with the Water Framework Directive guideline E. Coli standard in Shellfish Flesh in 2016.
- In 2015/16, an average of 5,280 items of litter was observed per kilometre (items/km). This is lower than the 5,332 items/km in 2014/15 but 16% higher than the average for all of the surveys undertaken to date (4,568 items/km).

Data tables and more information for this chapter can be found in the excel tables provided online (<https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>) and the relevant chapter in [Appendix 3](#).

Bathing Water Quality

Figure 4.1 Bathing water compliance for microbial standards of EC Bathing Water Directive, 2004-07 to 2013-16



Source: DAERA Marine and Fisheries Division

DAERA works closely with other Departments and Agencies to drive improvements to water quality. Measures include maintenance and capital investments in new sewage treatment facilities and sewerage infrastructure, regulation of agricultural, domestic and industrial discharges and investigative monitoring of water catchments.

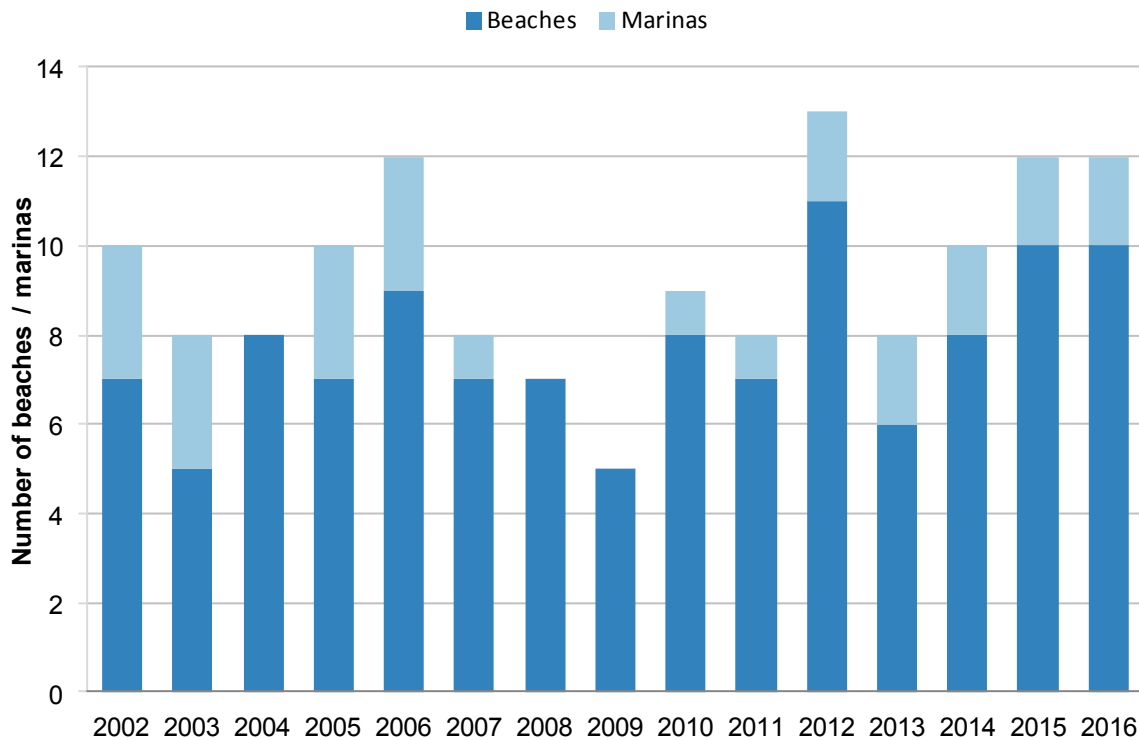
A full list of bathing waters and the standards reached each year from 2004 to 2016 is included in the excel tables that accompany this report (<https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>).

After a revision of the EC Bathing Water Directive (2006/7/EC), since 2015 bathing water quality assessments are carried using data gathered on a rolling 4 year period.

The number of beaches classified as 'excellent' has fallen to 11 in the 2013-16 period compared to 14 in the 2012-15 period.

Blue Flag Beaches

Figure 4.2 Number of Blue Flag Awards – Beaches & Marinas, 2002 – 2016



Source: Keep Northern Ireland Beautiful

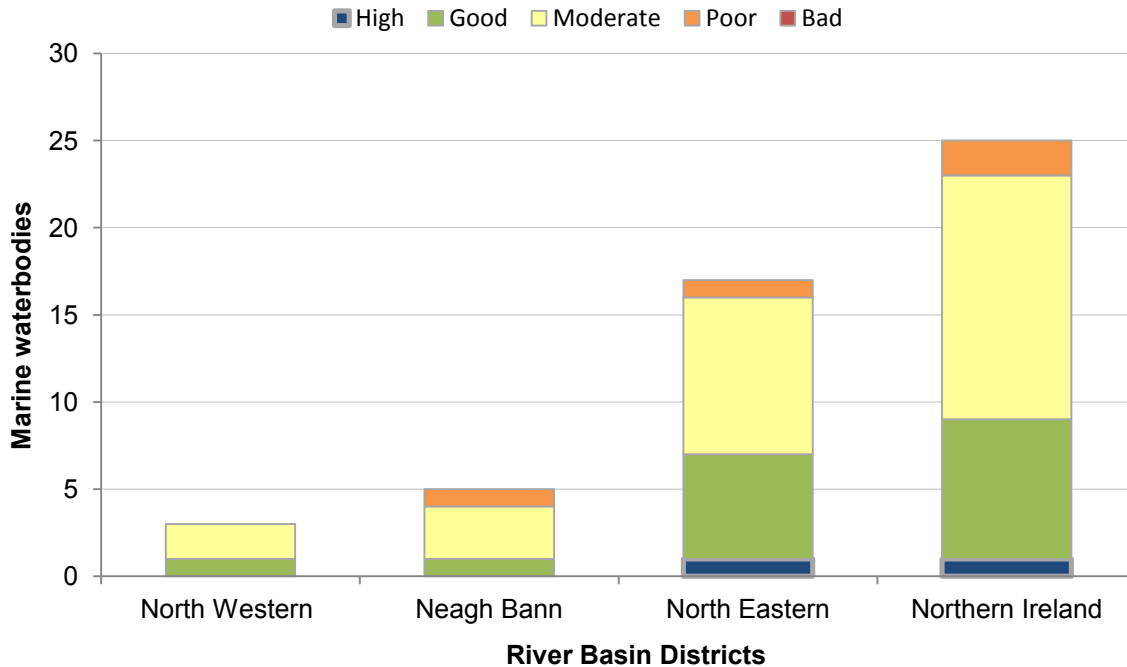
The Blue Flag Award is a voluntary eco-label for well managed beaches and marinas. The international Blue Flag Programme uses a number of criteria which beaches and marinas have to meet to gain the award such as water quality, safety, facilities and information.

In 2016, 10 beaches and 2 marinas were awarded with Blue Flag status. Beaches are assessed against 30 criteria, including safety, accessibility, facilities including toilets and provision of environmental education activities, and also must have 'Excellent' water quality under the revised EU Bathing Water Directive.

The recipients were Benone, Downhill, Castlerock, Portstewart Strand, Portrush West and Whiterocks on the north coast; and Crawfordsburn, Murlough beach, Tyrella and Cranfield on the east coast. The awarded marinas were Ballyronan on Lough Neagh and Ballycastle on the north coast. A further 9 beaches received a 'Seaside Award', a UK-designation in recognition of good facility management, while 3 beaches received a Green Coast award, a designation available in NI, ROI and Wales for strong community involvement and environmental management. Following an agreement between Ards and North Down Borough Council and local stakeholders, Cloughey beach received a Green Coast award, becoming the first new beach to receive an award in over five years. In Northern Ireland the programme is administered by Keep Northern Ireland Beautiful, with more information about these awards available at www.keepnorthernirelandbeautiful.org.

Marine Water Quality

Figure 4.3 Water Framework Directive overall status in transitional and coastal waters (number of marine water bodies), 2015 (second cycle transitional and coastal water body set and standards)



Source: DAERA Marine Division

The Water Framework Directive requires NIEA to protect the status of waterbodies from deterioration and, where necessary and practicable, to restore waterbodies to good status. The environmental objectives established in the river basin plan set the water status to be achieved for surface waterbodies for each six year planning cycle starting from 2015.

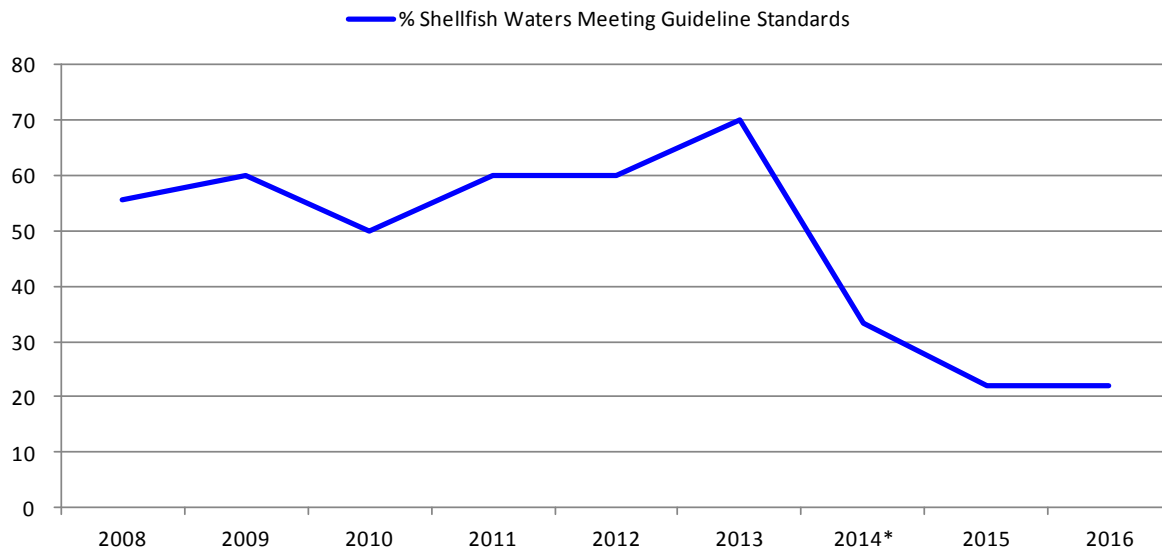
There are 25 marine water bodies in the water body data set.

The main factors driving classification in Northern Ireland coastal waters are dissolved inorganic nitrogen (DIN), specific pollutants (Annex VIII) and priority hazardous substances (Annex X). In transitional waters the most important elements in determining status were also DIN and Annex VIII and X pollutants with plants also contributing in some cases. Full details of classification are available at <https://www.daera-ni.gov.uk/topics/water/river-basin-management>

In 2015, 9 marine water bodies were classified as 'high' or 'good' status whilst the remaining 16 were at 'moderate', 'poor' or 'bad' status.

Shellfish Water Protected Areas

Figure 4.4 Shellfish waters directive compliance, 2008-2016



Note: From 2008-2013, compliance is measured against guideline EColi standard in flesh.

*In January 2014, the Shellfish Waters Directive was subsumed into the Water Framework Directive. The WFD Guideline standard is slightly tighter than the existing standard in the Shellfish Waters Directive.

Source: DAERA Marine and Fisheries Division

Designated Shellfish Water Protected Areas are areas designated for the protection of shellfish growth and production. Good water quality is important for the production of high quality shellfish. In Northern Ireland there are currently ten Shellfish Water Protected Areas which were designated under the Shellfish Waters Directive. These are located within Lough Foyle (Longfield Bank and Balls Point), Larne Lough, Belfast Lough, Strangford Lough (Skate Rock, Reagh Bay/ Paddy's Point and Marfield Bay), Killough Harbour, Dundrum Bay and Carlingford Lough.

A total of two out of nine designated shellfish waters (22%) complied with the guideline *E. coli* standard in 2016. No data were available for Marfield in Strangford Lough. In 2015, a total of two out of nine designated shellfish waters (22%) complied with the guideline standard for coliform standards. In January 2014, the Shellfish Waters Directive was subsumed into the Water Framework Directive.

Comprehensive monitoring programmes are in place to assess the status of Shellfish Water Protected Areas under the WFD and classification under the EU Hygiene Regulations (854/2004). A suite of determinants are assessed to determine ecological status and the overall objective under WFD. (Table 4.4iii included in the excel tables – available at <https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>)

DAERA Marine and Fisheries Division continue to manage Shellfish Water Protected Areas to ensure that there is no deterioration in water quality; also that steady progress is made towards compliance with guideline standards. Compliance with guideline standards are determined by measuring *E. coli* and other prescribed contaminants in shellfish flesh. Relevant shellfish waters contaminants are monitored

under Water Framework Directive Annex VIII and Annex X specific pollutants and priority hazardous substances. In recent years there have been no exceedences of any relevant Water Framework Directive environmental quality standards.

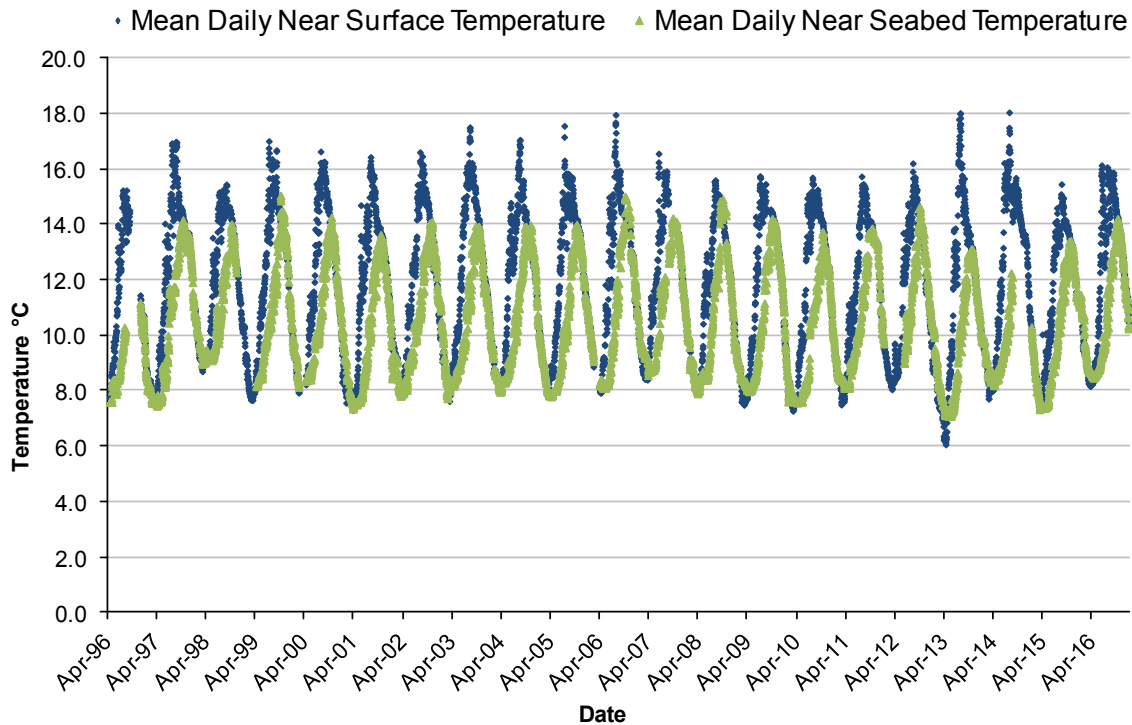
Shellfish beds are classified by the Food Standards Agency in Northern Ireland (FSA in NI) to determine the levels of post-harvest treatment that is required before shellfish can be placed on the market for consumption. Monitoring is conducted to ensure that the classification that has been awarded by the FSA in NI remains appropriate and that levels of marine biotoxins and chemical contaminants within the shellfish flesh do not exceed regulatory limits – thus potentially causing a risk to public health.

DAERA Marine and Fisheries Division work closely with the FSA in NI in managing shellfisheries from both an environmental and public health perspective.

A full list of shellfish waters and the compliance standard met for each year from 2008 to 2016 is included in the excel tables that accompany this report.

Sea Temperature

Figure 4.5 Daily sea temperature, Irish Sea, April 1996 - December 2016



Source: AFBI

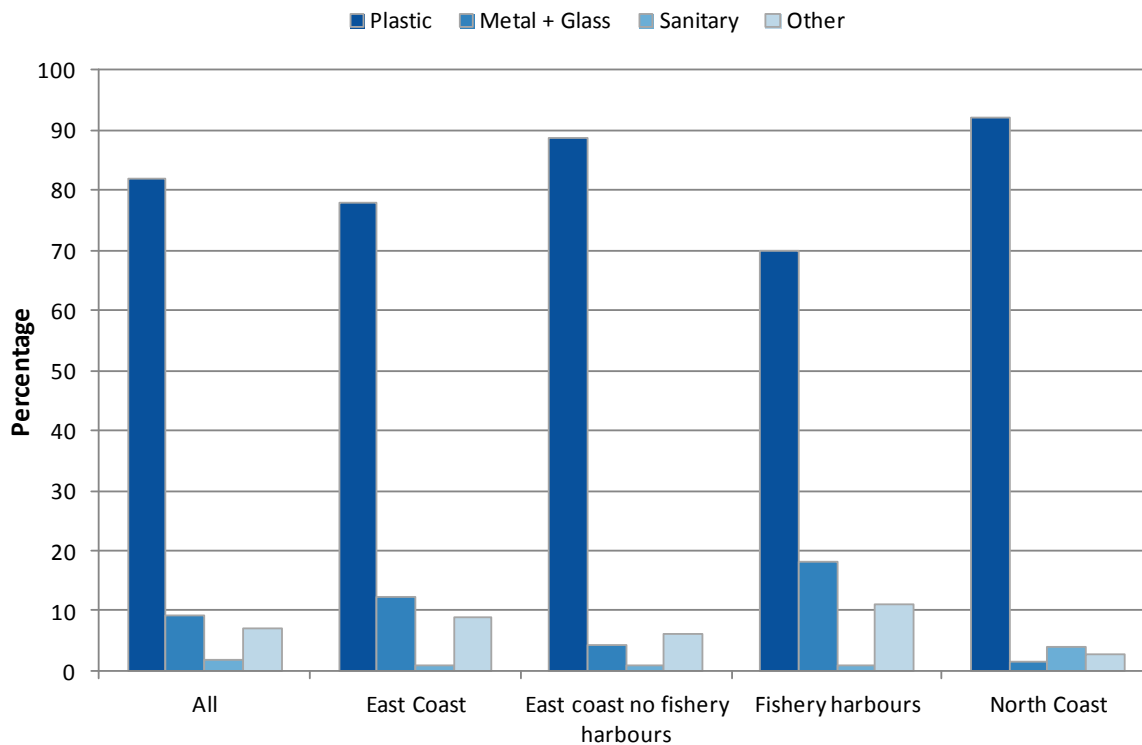
As part of a long-term research programme investigating the influence of the physical environment on the marine ecosystem in the Irish Sea, the Agri-Food and Biosciences Institute maintains an instrumented mooring in the western Irish Sea.

The temperature of the sea is recorded at different depths every three hours and from these measurements daily mean values can be calculated. The temperature is recorded by two moored thermistors. One is located close to an anchor on the seabed at a depth of ~90m, while the other is attached to the underside of a moored buoy at ~2m. These moorings are permanent and share the same grid reference point.

The lowest water temperature is usually recorded in February and the warmest in August. During the autumn and winter months there is generally little difference in the temperature of water close to the surface and near the seabed. However, warming of the surface layers during spring and summer causes the water column to stratify. This tends to isolate the bottom water and as a consequence it does not warm up as much. During the summer the temperature difference between the near surface and bottom water can be as much as 7 - 8 °C. Data are collected as part of a long-term research programme investigating the influence of the physical environment on the marine ecosystem in the Irish Sea. The time-series now consists of some 21 years of data and it will now be possible for marine scientists to undertake a detailed analysis of the data to investigate inter-annual variability in the seasonal development of water column stratification and to determine whether there are any trends in the data.

Beach Litter

Figure 4.6 Litter at beaches by material type, 2015/16



Source: DAERA/KNIB

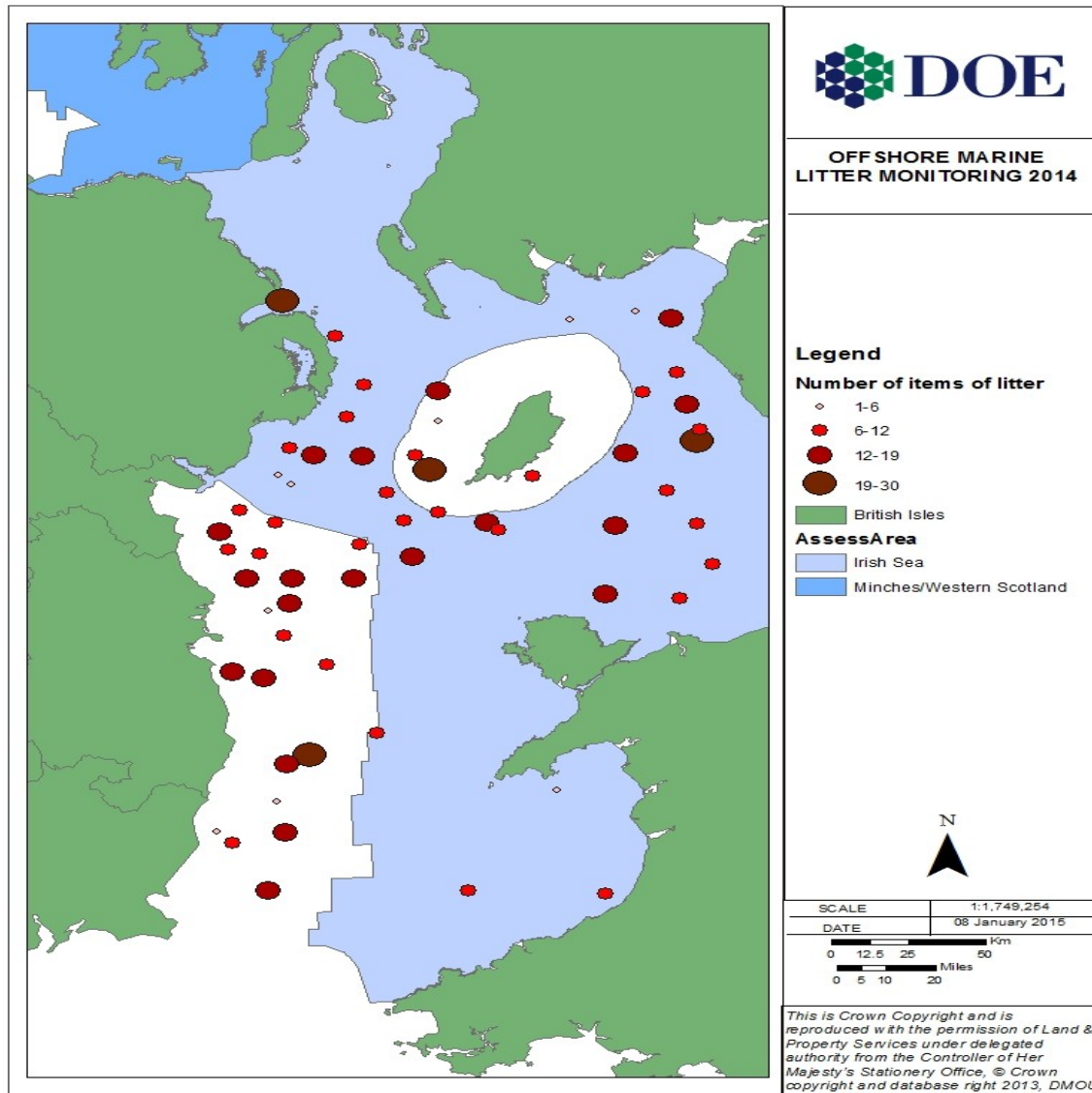
Surveys of litter stranded on the coastline are a primary tool for monitoring the load of litter in the marine environment and can be used to measure the effectiveness of management or mitigation measures and identify the sources and activities leading to litter pollution. Keep Northern Ireland Beautiful – (KNIB previously TIDY Northern Ireland) began surveying beach litter quarterly on behalf of DOE (now DAERA) in September 2012. Litter surveys are carried out by trained volunteer group surveyors. Ten Northern Ireland beaches are monitored annually for litter – Runkerry, White Park Bay, Rathlin, Ballywalter, Portavogie, Ballyhoran, Ardglass, Tyrella, Kilkeel North and Rostrevor.

In 2015/16, an average of 5,280 items of litter was observed per kilometre (items/km). This is 1% less than the 5,332 items/km in 2014/15 and 16% higher than the average for all of the surveys undertaken to date (4,568 items/km). The majority of litter items observed were made of plastic (82%), with another 9% made of metal and plastic and 2% sanitary waste such as cotton buds. The most common types of litter in 2015/16 were small pieces of plastic string and cord < 1cm (670/km and plastic drinks containers and lids over 2.5cm (approx. 1 inch) in length with 330 items/km.

Among the abundant items observed were plastic drinks bottles, bottle tops and sweet wrappers, tin cans and fast food containers. These items are frequently brought together, and are also among the most common items in terrestrial litter in Northern Ireland.

Marine Litter

Figure 4.7 Offshore Litter Items per trawl station, 2013/14



Source: DAERA Marine Division

Custom fit for purpose monitoring programmes have been developed by DAERA Marine Division to address Descriptor 10 of the Marine Strategy Framework Directive. The offshore programme is based on bottom trawl fisheries stock assessment surveys of 65+ stations in spring and autumn annually. Numbers of items per offshore trawl have been very consistent from survey to survey over recent years, however more data on litter and tidal currents is needed before informed assessment of hotspots and sources can be made. A pilot project has also begun on monitoring of micro-plastic particles which are breakdown products of legacy litter items.

This indicator has not been updated since last year's report. The offshore litter assessment is done at the UK level and once it has been agreed at that level, an update will be included in this report.

Land

Land and landscape management have the greatest visual impact on our environment and our appreciation of it. Whether the land is used for agriculture, housing or forestry its value is immense and perhaps most importantly, it is a limited resource. This chapter examines soil quality, forest and woodland plantings, the role of agri-environment schemes on our land and housing completions and designations of townscape and villagescape.

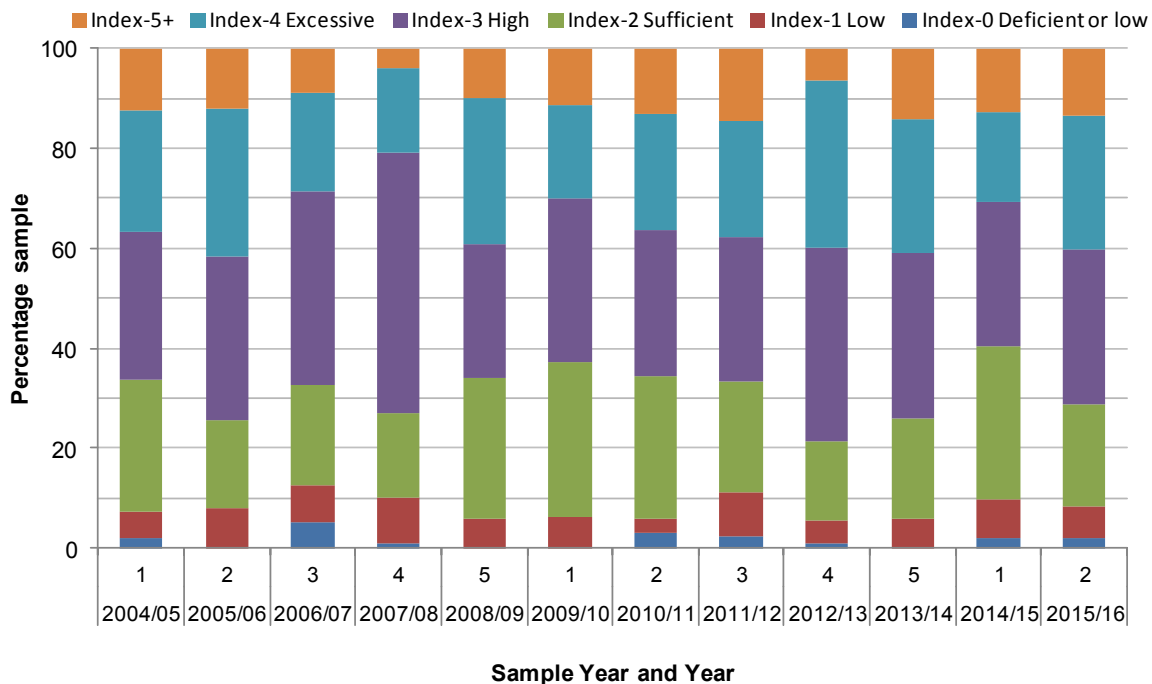
Key points in this chapter:

- From a random selection of 500 fields from intensive cattle farms across Northern Ireland, slightly more soils were deficient in phosphorus in 2015/16 compared to 2010/11, and slightly more had excessive phosphorus concentrations. It is expected that soil phosphorus concentrations will decline in the long-term as a result of the Nitrates Action Programme (NAP) and Phosphorus (P) Regulations (first published in 2007 with subsequent updates).
- Agri-environment schemes encourage farmers and landowners to manage their land to benefit the environment. At the end of 2016, 46,000 hectares of land in Northern Ireland were under agri-environment scheme agreement, down from 305,000 hectares in 2015. This decrease is attributable to the conclusion of the Countryside Management Scheme and New Environmentally Sensitive Areas Scheme in 2015 and 2016 respectively.
- Forests and woodlands provide important habitats, natural resources and diversity to landscapes. In 2016/17, 208 hectares of new woodland was created by private landowners supported under the Rural Development Programme. This is up from 54 hectares in 2015/16.

Data tables and more information for this chapter can be found in the excel tables provided online (<https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>) and the relevant chapter in [Appendix 3](#).

Soil Quality

Figure 5.1 Soil phosphorus (as Olsen-P) by P-index for managed grassland soils, 2004/05 – 2015/16



Source: AFBI

The Agri-Food and Biosciences Institute (AFBI) Representative Soil Sampling Scheme (RSSS) began in 2004/05. Five hundred fields were randomly selected from intensive cattle farms across Northern Ireland and each winter one hundred of these fields are sampled.

The quantity of 'plant-available' phosphorus (P) in soil (measured by the Olsen method) is expressed as an index from 0 (deficient in P) to 9 (excessive in P for all crops).

For grassland, Olsen P-indices normally range from 0 to 5. Furthermore:

- A P-index of 0 means deficient in soil-P and a soil-P concentration of 0-9 mgP/l.
- A P-Index of 5 means excessive soil-P and a soil-P concentration greater than 70 mgP/l.

For managed grassland soils, an Olsen P-Index greater than 3, indicating a soil-P concentration greater than 45 mgP/l, is considered to be excessive.

The completion of sampling in 2015/16 allows a direct comparison of changes in soil fertility with the results of soil samples taken from those same fields five years earlier (2010/11). A comparison of the annual summary soil datasets for 2010/11 and 2015/16 shows that there were small decreases in the proportion of samples at P-index 0 (-0.9 percentage points) and P-Index 2 (-7.7 percentage points) and increases

in samples at P-Index 1 (+3.2 percentage points), P-Index 3 (+1.6 percentage points), P-Index 4 (+3.5 percentage points) and P-Index 5+ (+0.3 percentage points).

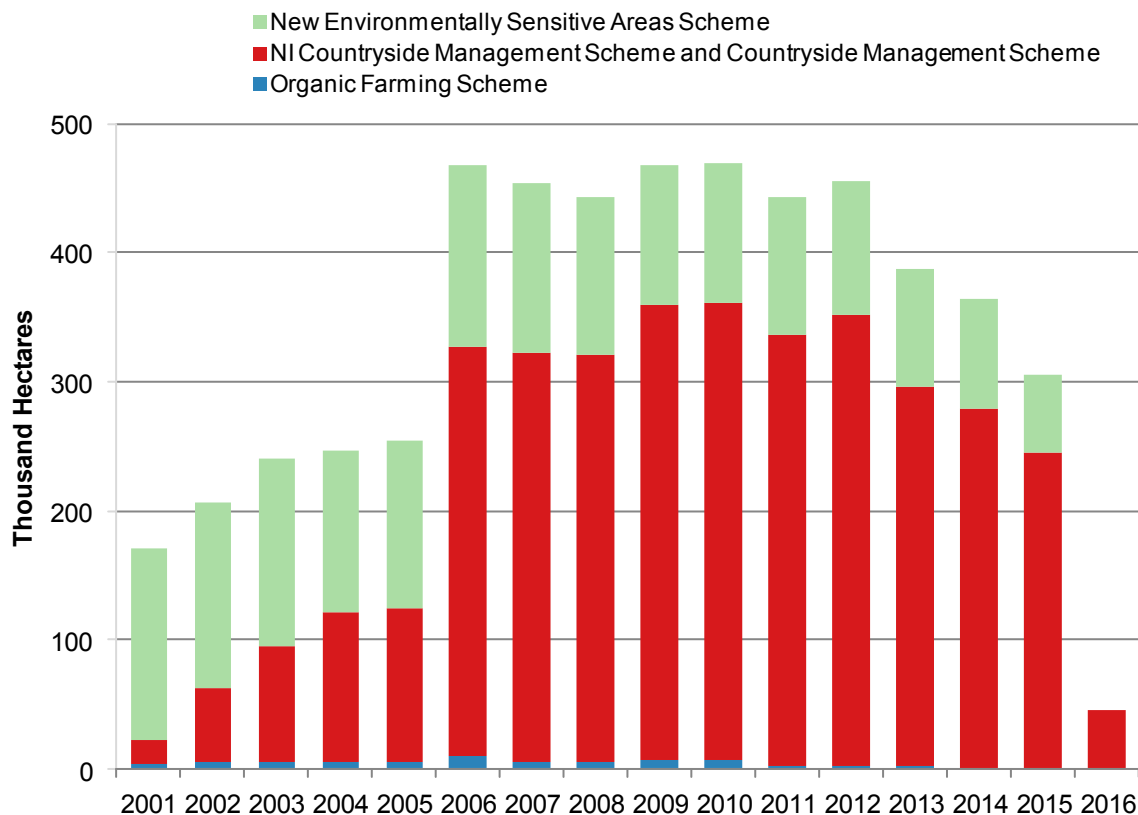
Therefore, in 2015/16, slightly more soils were deficient in P compared to in 2010/11, i.e. 8.2% in 2015/16 c.f. 6% in 2010/11, and slightly more soils had excessive P concentrations, i.e. 40.2% in 2015/16 c.f. 36.4% in 2010/11.

There is likely to be a linkage between chemical water quality and the soil-P data, with water quality improving as soil-P declines i.e. lakes, rivers and estuarine waters becoming less eutrophic.

In the long term, it is expected that soil-P will decline as a result of the Nitrates Action Programme (NAP) and Phosphorus (P) Regulations (first published in 2007 with subsequent updates). Thus, the first cycle of soil-P data represent the period before the NAP & P Regulations were in force while the second and subsequent cycles represent the period when the NAP & P Regulations were in force.

Sustainable Land Management

Figure 5.2 Northern Ireland agri-environment schemes, area under agreements, 2001 – 2016



Source: DAERA

The aim of agri-environment schemes is to enhance biodiversity, improve water quality, enhance the landscape and heritage features, and help reduce the impact of climate change by integrating sustainable environmental management into the everyday workings of the farm. In return for this, farmers and landowners receive a payment, based on the area of habitat and archaeological features present on the farm, and the area/length of habitat enhancement options carried out.

At the end of 2015, 305,000 hectares (approximately 29% of NI farmland) had been managed under agri-environment scheme agreements. These schemes include the Northern Ireland Countryside Management Scheme (NICMS) (<https://www.daera-ni.gov.uk/articles/environmentally-sensitive-areas-scheme-esa-and-countryside-management-scheme-cms>), the Countryside Management Scheme (CMS), the Environmentally Sensitive Areas Scheme (ESAS) and the Organic Farming Scheme (OFS) (<https://www.daera-ni.gov.uk/articles/organic-farming-your-questions-answered>). During 2016, the area of agricultural land managed through these schemes by 85% to 46,000 hectares (approximately 4-5% of NI farmland). This was due to the expiration in 2016 of those remaining 10 year agreements from the older agri-environment schemes (CMS and ESAS). Within the newer NICMS scheme, a significant proportion of the total number of agreements also came to the end of their 7 year term in late 2015. The land within this NIC1 proportion was considered to be outside the agreement period

from 01/01/2016. There are now only approximately 585 agreements still active within the NICMS scheme.

The trends for uptake of agri-environment schemes and the area under agreement have been determined by a number of factors including length of scheme agreement, farmer participation, available funding and resources to manage and deliver schemes.

The new Environmental Farming Scheme (EFS) opened for applications on 27 February 2017. This application period will close on 31 March 2017. The current target is to have up to 6,200 EFS agreements in place by 2020.

The EFS is a scheme under the NI Rural Development Programme 2014-2020, which is part financed by the EU. It will offer participants a 5-year agreement to deliver a range of environmental measures. The first agreements will commence on 1 July 2017.

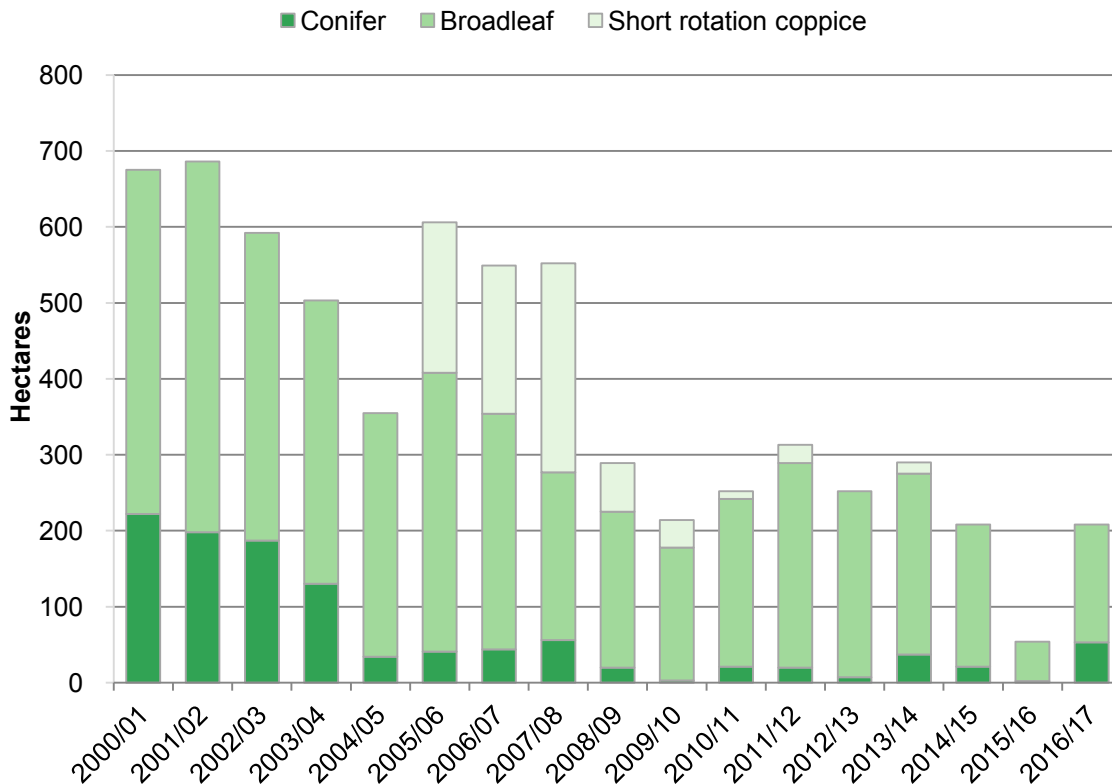
The EFS has three levels:-

- A Higher Level, primarily for environmentally designated sites;
- A Wider Level to deliver benefits across the countryside, outside of environmentally designated areas; and
- A Group Level to support co-operative action by farmers in specific areas such as a river catchment.

The EFS has been designed to address specific environmental needs, primarily related to biodiversity and water quality. It will be targeted and prioritised to deliver maximum environmental benefit and value for money.

Area of Woodland

Figure 5.3 Area of new forest and woodland plantings, 2000/01 – 2016/17



Source: Northern Ireland Forest Service

In Northern Ireland, over 55% of forests and woodlands are state-owned or managed.

Grant support to encourage afforestation and sustainable management of privately owned woodlands is provided by forestry measures in the Rural Development Programme. In 2016/17, 208 hectares of new woodland was planted and part funded by the European Commission under the 2014 -2020 Rural Development Programme. This is the same amount supported in 2014/15 and an increase on the 54 hectares supported in 2015/16. This dip in 2015/16 can be explained by the closure of the 2006-2013 Rural Development Programme and the opening of the 2014-2020 Rural Development Programme.

Biodiversity

Biodiversity describes the vast range of living organisms on earth. Biological diversity has been defined as:

“The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Convention on Biological Diversity, 1992

The state of our biodiversity reflects the state of our air, water and land environments. This chapter reports on the extent of nature conservation designations in Northern Ireland, the condition of some of these designations, bird populations, sites of local nature conservation importance and the condition of priority habitats and species.

Habitats and species in Northern Ireland are protected by a series of statutory designations. These include Areas of Special Scientific Interest (ASSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites (areas of wetland and waterfowl conservation), National Nature Reserves, Marine Nature Reserves and Local Nature Reserves. Protection is also afforded by non-statutory Sites of Local Nature Conservation Importance (SLNCI).

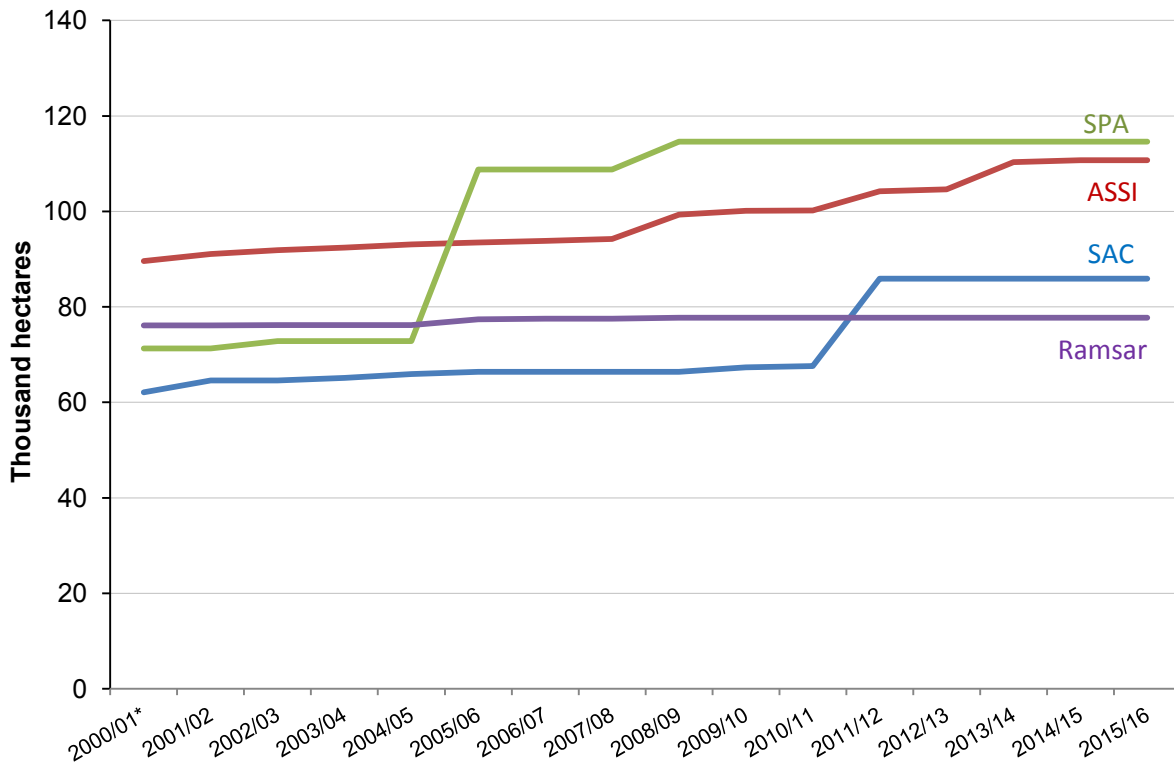
Key points in this chapter:

- Over 1,000 features on Areas of Special Scientific Interest (ASSIs) have been assessed, with 64% of the features in favourable condition, down from 68% in 2015, and 33% of features in unfavourable condition, up from 30% in 2015.
- Bird populations are considered to be a good indicator of the broad state of the wildlife and the countryside. Between 1994 and 2015, the wild bird population has increased by 62%, however it should be noted that the underlying bird populations are not all increasing.
- Between 1994/95 and 2014/15 the total wetland bird population is estimated to have decreased by 22%.
- The Green Flag Award is a national benchmarking standard for parks and green spaces. In 2016, 51 parks and green spaces were awarded with Green Flag Award status, compared with 43 in 2015.

Data tables and more information for this chapter can be found in the excel tables provided online (<https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>) and the relevant chapter in [Appendix 3](#).

Nature Conservation Designations

Figure 6.1(a) Area of nature conservation designations, 2000/01 – 2015/16



Source: NIEA

* These figures include all conservation designations up to and including 2000/01.

Identifying and protecting areas of special nature conservation interest, and the flora and fauna they support, has been a cornerstone of nature conservation action in the UK during the last 50 years. Some areas are deemed to be of such importance that they have been formally designated in accordance with a number of pieces of national and international legislation.

Many places throughout Northern Ireland have been designated and protected by these laws to ensure their nature conservation value is retained, and indeed enhanced. Such protection has been afforded to areas on land, to rivers and lakes, to parts of our coastline, and to areas of the surrounding sea.

At 31 March 2016, a total of 110,700 hectares across 387 sites had been declared as Areas of Special Scientific Interest (ASSI), 85,900 hectares across 57 sites as Special Areas of Conservation (SACs), 114,600 hectares across 17 sites as Special Protection Areas (SPAs) and 77,700 hectares across 21 sites as Ramsar sites (areas of wetland and waterfowl conservation). Both SACs and SPAs are designated in accordance with European Directives, and Ramsar sites under an international convention.

There is some overlap between these different types of designation and, therefore, these cannot be totalled to give an absolute figure on the extent of designations. Figures 6.1 (b) and 6.1(c) show the spatial extent and distribution of these areas.

Figure 6.1(b) Areas of Special Scientific Interest (ASSI), designated between 1976 and 2016

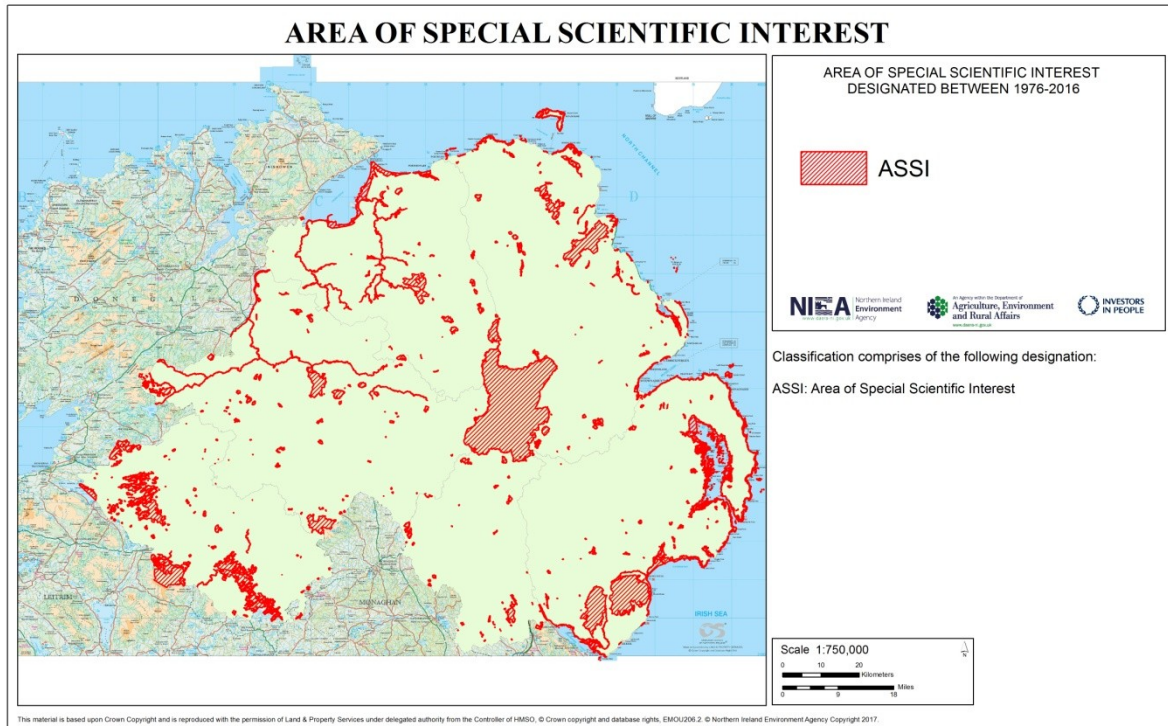
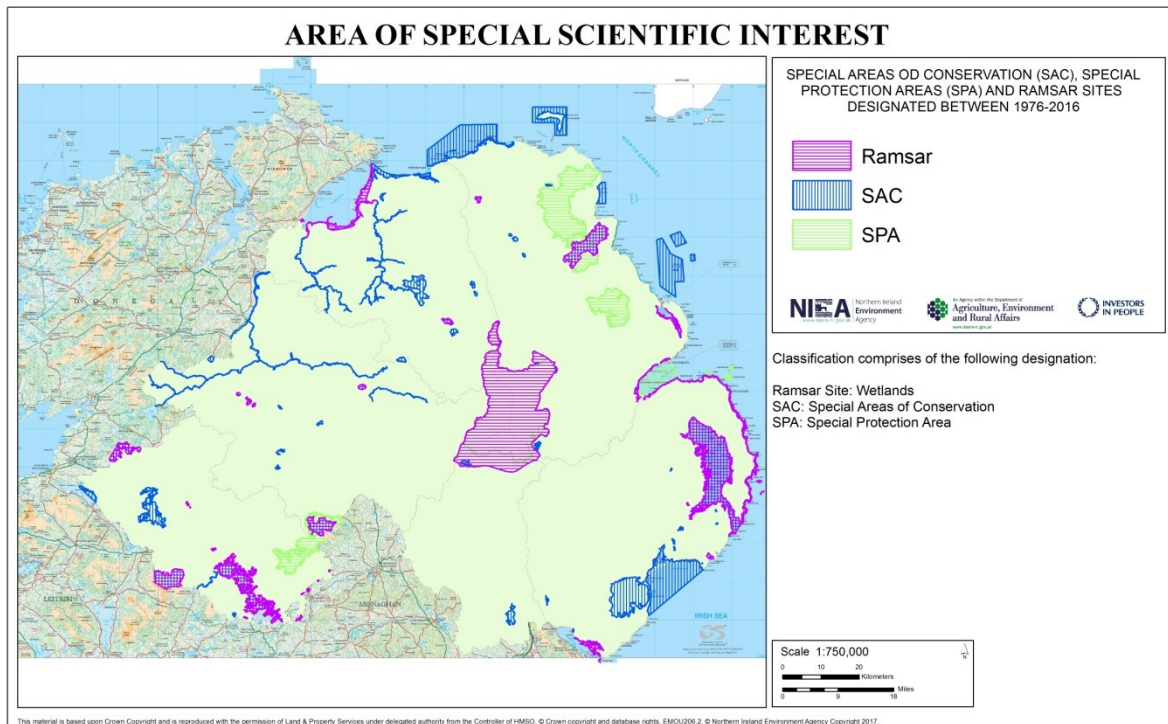
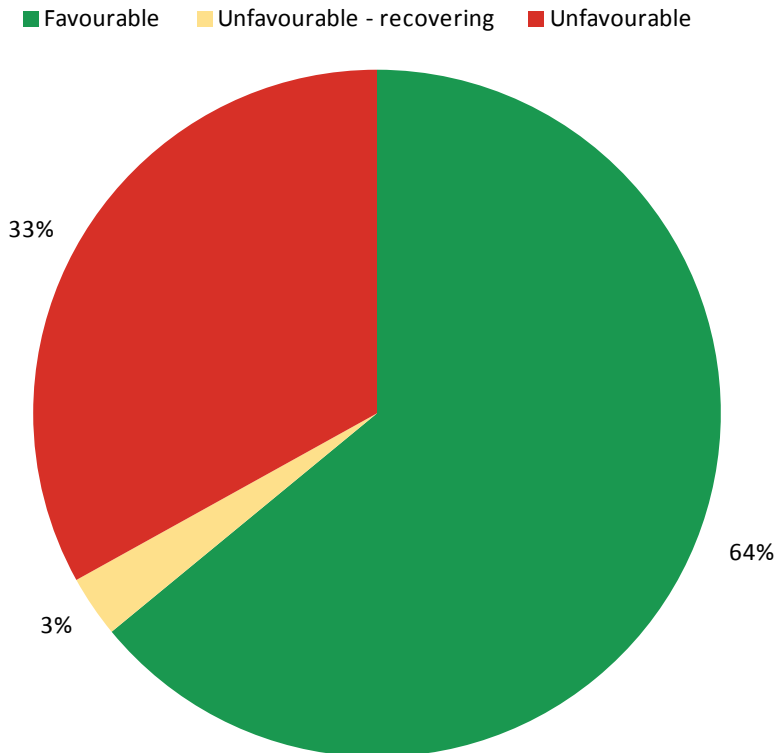


Figure 6.1(c) Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites, designated between 1976 and 2016



Nature Conservation Designations

Figure 6.2 Condition of features within Areas of Special Scientific Interest (ASSI), for the six year rolling period ending March 2016



Source: NIEA

Areas of Special Scientific Interest (ASSIs) are designated sites which are protected under Northern Ireland law for their nature and earth science value. They are selected based on specific qualifying features which include earth science features, habitats and species. The condition of these features is assessed over a six year monitoring programme.

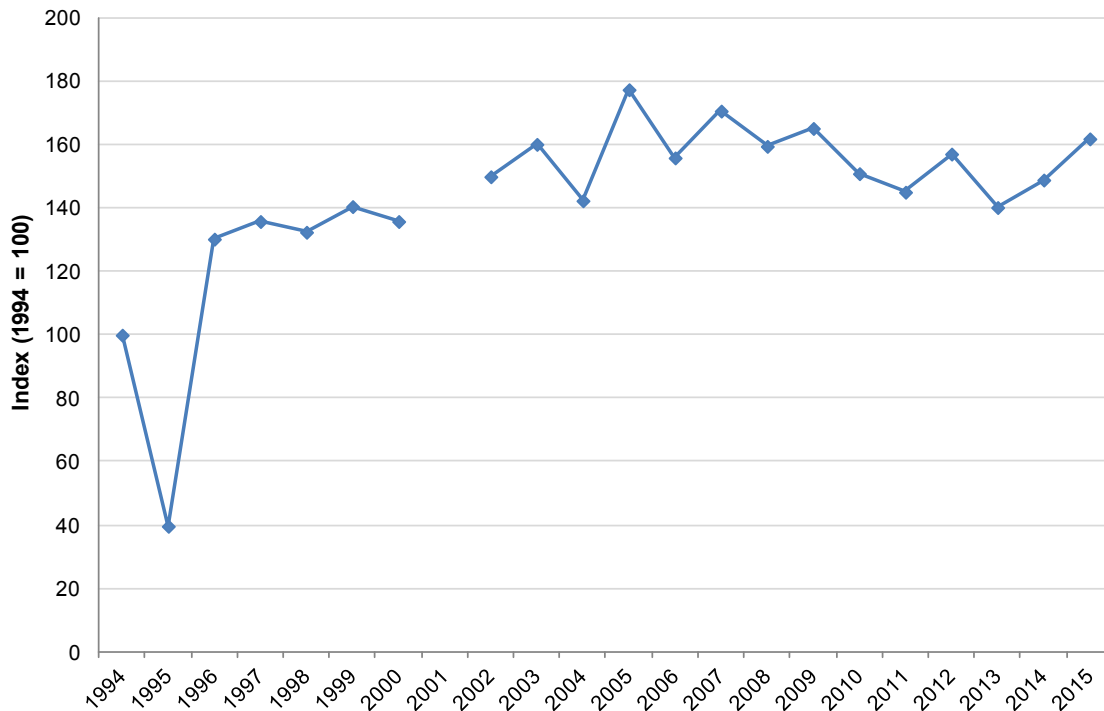
The first full cycle of monitoring was completed in March 2008, during which 916 features from 195 ASSIs were assessed. These data have been updated with the results from subsequent monitoring over the past 8 years. Over 1,000 features have now been assessed, including features re-assessed as part of the second and third six-year cycles, in addition to a number of new features on recently declared ASSIs.

The results show a different picture to previous years, with 64% of the features in favourable condition and 33% of features in unfavourable condition in 2016, compared to 68% and 30% respectively in 2015. This is, in part, due to how the data have been analysed (as detailed below), but also reflects a decline in the condition of some species, principally migratory birds. The reasons for these declines are complex, but for some species at least, it is believed that there are fewer birds travelling to our shores due to improved conditions elsewhere in Europe, probably as a result of climate change.

Restoring features to favourable condition will take time. Northern Ireland Environment Agency (part of Department of Agriculture, Environment and Rural Affairs (DAERA)) are working with landowners and other stakeholders, to ensure that sympathetic management of ASSIs is in place. A range of delivery mechanisms have been identified to help achieve this objective, including agri-environment schemes, EU Interreg Va Programme, the management of the DAERA estate (Forest Service lands, NIEA country parks and nature reserves) and grant-aid support from DAERA, in addition to direct funding by NIEA through the Management of Sensitive Sites scheme (MOSS).

Wild Birds

Figure 6.3 Wild bird populations in Northern Ireland, 1994 - 2015



Source: British Trust for Ornithology

Northern Ireland's wild bird population is monitored as part of the UK BTO/JNCC/RSPB (British Trust for Ornithology/Joint Nature Conservation Committee/The Royal Society for the Protection of Birds) Breeding Bird Survey, which is undertaken annually at just over 3,000 sites across the UK (77 in Northern Ireland during 2015).

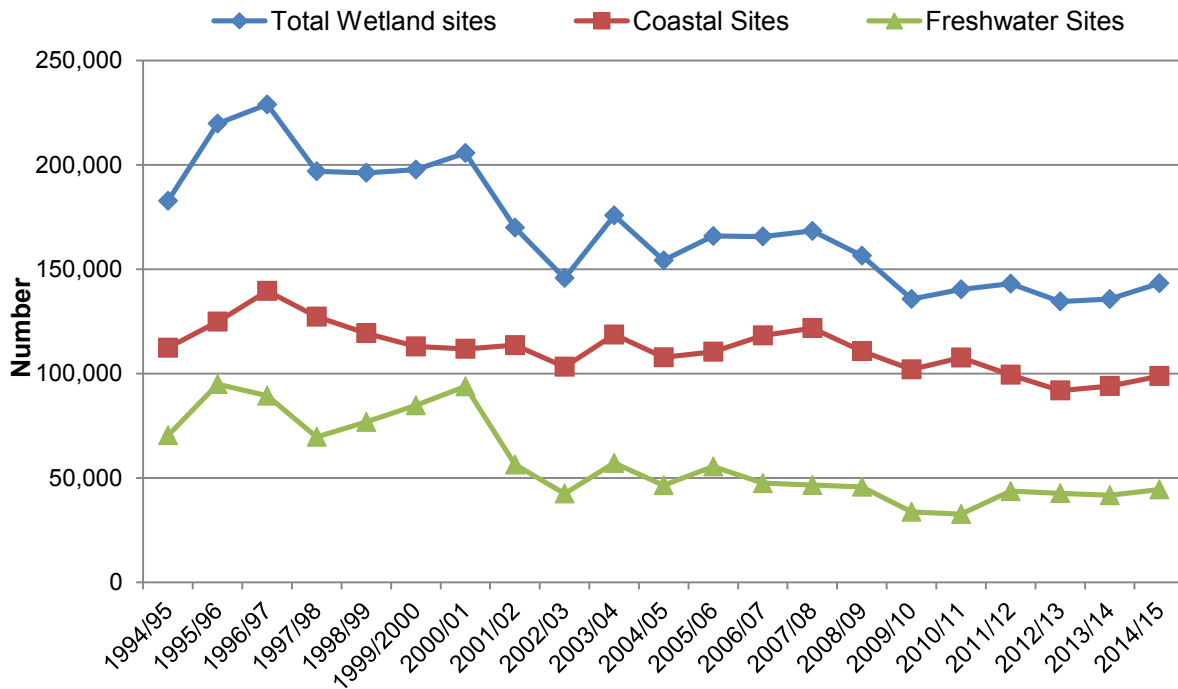
Due to the nature of the data analysis, the number of species for which trends are available can vary year-on-year. In 2015 information on trends is available for 35 of the most common species.

There is no figure for 2001, due to the impact that the foot and mouth outbreak had on the collection of data, i.e. observers not being able to access many rural areas.

Between 1994 and 2015, the wild bird population has increased by 62%, although it has been relatively stable since 2002. It should also be noted that the underlying bird populations are not all increasing. For example, while Great Tit and Hooded Crow have almost tripled their populations since 1995, the Skylark has declined by 50% over the same period. Climate change may be a significant factor in the continued increase of the Willow Warbler in Northern Ireland (up 73% since 1995) relative to more southern and eastern regions of the UK. Overall, the wild bird population has remained reasonably stable since 2006.

Wetland Birds

Figure 6.4 Wetland bird populations in Northern Ireland, 1994/95 – 2014/15



Source: British Trust for Ornithology

Between 1994/95 and 2014/15, the total wetland bird population of Northern Ireland is estimated to have decreased by 22%. Over that time, coastal populations declined by 12% while freshwater populations declined by 37%. The high decline recorded at freshwater sites is predominantly due to the marked fall in wintering diving duck numbers at Lough Neagh. The scale of this decline also accounts, to a large extent, for the decline in total waterbird numbers.

The trend since last years' assessment has shown an increase of 6% overall, with waterbird populations at coastal sites increasing by 5% and the freshwater figures showing a 7% increase. Strangford Lough which had its lowest ever count in 2012/13 and increased slightly last year fell to a new low this year after falling by 8%.

Larne Lough, Carlingford Lough and Outer Ards, who recorded their lowest ever counts in 2013/14 have recorded increases of 44%, 26% and 58% respectively for 2014/15. Lough Foyle continued to increase by 17% in 2014/15. Strangford Lough, which showed a slight increase last year has fallen this year by 8% to its lowest ever count. This highlights the variability in usage of many of these wetland sites and their continued importance.

Of our freshwater sites, Loughs Neagh and Beg reported a slight increase in 2014/15 but remained below the 2012/13 level while Upper Lough Erne's numbers increased by 31%. Despite the overall declines at Lough Neagh in the past 15 years, this is still the most important site in UK for Pochard, Tufted Duck, Scaup and Goldeneye (based on current 5 year averages).

Duck species which did well in 2013/14 generally failed to maintain the increasing trend in 2014/15. Shelduck declined by 24% overall, largely due to a substantial reduction from the exceptional numbers recorded in Belfast Lough during the previous season. Wigeon numbers stabilised following a notable increase during 2013/14, while a similar increase in Teal numbers was largely reversed by a decline of 34% with numbers halving on Lough Foyle.

Two species for which Northern Ireland is particularly important have experienced declines. Whooper Swan numbers again fell overall, most notably at Upper Lough Erne which recorded its lowest count since 1986/87. This reflects the apparent southward shift in wintering areas for this species in Ireland. Canadian Light-bellied Brent Goose (for which Northern Ireland is the most important wintering location in the world) continued to decline with numbers having approximately halved since 2010/11. This is likely to be a consequence of both varying breeding success and changes in wintering distribution patterns within Ireland.

Declines continue to affect a number of our shorebirds, notably Oystercatcher and Redshank, though trends vary considerably between species. Numbers of Ringed Plover and Turnstone, which have fallen in recent years, showed signs of stabilisation in 2014/15. In contrast Black-tailed Godwit numbers, which showed notable increases in the previous season, declined overall, with the population at Belfast Lough showing a particularly sharp fall. This trend probably reflects breeding performance in Iceland. Bar-tailed Godwits, however, increased by 21% overall.

Many of these site-based species increases and declines reflect changes at UK level suggesting these changes are driven by regional scale or international factors and may not be due to site related issues.

It is thought that milder winters throughout north-western Europe may be a factor behind some of these species declines here, resulting in their wintering closer to their breeding sites. While such migratory “short-stopping” by more easterly breeding species may be contributing to the fact that 32% of European waterbird populations are declining (Waterbird Population Estimates, Wetlands International, 5th edition), it is likely that other factors such as loss of breeding habitat and poor breeding success are also involved.

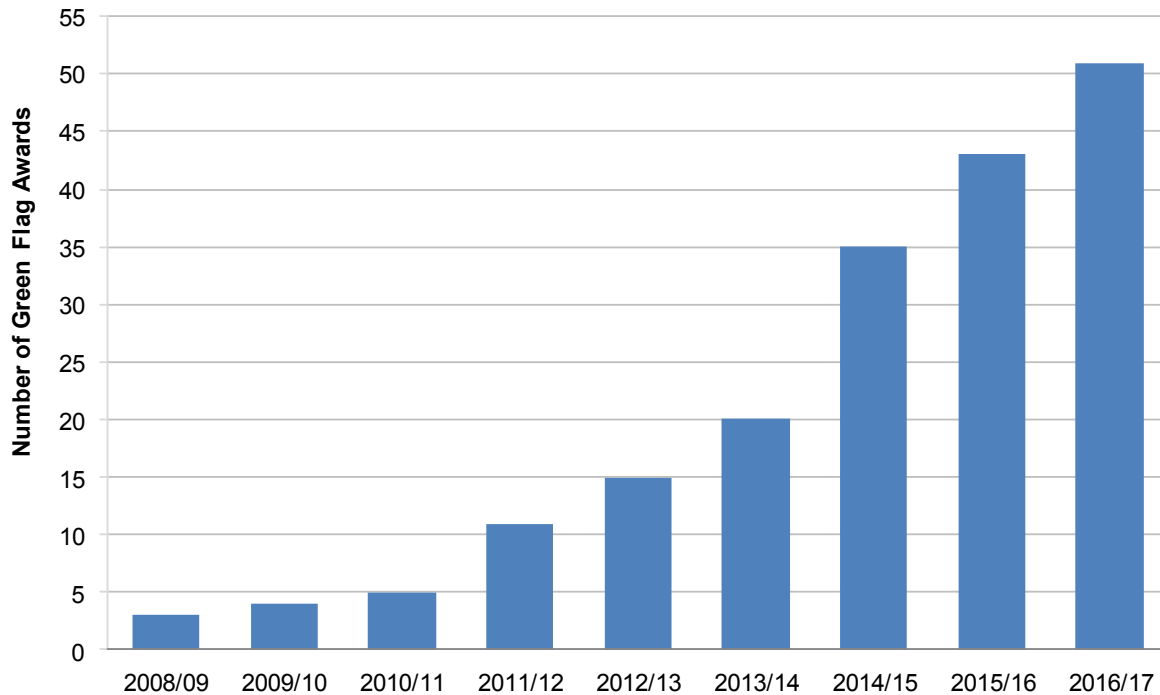
A recent UK report (CHAINSPAN) considered the effect of climatic changes to our most important ornithological sites. While ongoing declines of some species are anticipated e.g. as a result of changing migration patterns, populations of other species are expected to increase and overall, sites that have been and currently are important for our bird populations, will continue to be so. This underlines the need to continue to protect, maintain and enhance these sites through best management practices.

Northern Ireland’s wetland bird populations are monitored as part of the UK Wetland Bird Survey (WeBS). This survey monitors non-breeding waterbirds across the UK, collectively identifying population sizes at local and regional scales, determining trends in numbers and identifying important sites for waterbirds. A similar scheme in the Republic of Ireland (I-WeBS) allows population monitoring at an all-Ireland level.

The data above are based on the nine main sites for non-breeding waterbirds in Northern Ireland. There are seven coastal sites namely: Belfast Lough, Carlingford Lough, Dundrum Bay (Inner), Larne Lough, Lough Foyle, Outer Ards shoreline, Strangford Lough and two freshwater sites namely Upper Lough Erne and Loughs Neagh and Beg. The figures used are the site maximum monthly count over the winter survey period.

Green Flag Awards

Figure 6.5 Number of Green Flag Awards – Parks and Green Spaces, 2008/09 – 2016/17



Source: *Keep Northern Ireland Beautiful*

The Green Flag Award is a national benchmarking standard for parks and green spaces. The Green Flag Award aims to encourage the provision of good quality public parks and green spaces that are managed in environmentally sustainable ways. In Northern Ireland the programme is administered by Keep Northern Ireland Beautiful.

In 2016/17, 51 parks and green spaces were awarded Green Flag status, compared with 43 in 2015/16. The continued growth since the scheme began can, in part, be attributed to there being more applicants and better awareness of the scheme. Also, more local authorities have invested in their green spaces and are entering them for the award. It should be noted that awards are given on an annual basis and winners must apply each year to renew their Green Flag status.

A full list of recipients for 2016/17 can be found in Appendix 3.

Built Heritage

Northern Ireland has a rich heritage of archaeological sites, monuments and buildings representing the aspirations and achievements of past societies, providing evidence of settlement, agricultural, industrial and ritual activity from 9,000 years ago to the present day. This chapter looks at the numbers of scheduled monuments and listed buildings in Northern Ireland, including those which are at risk.

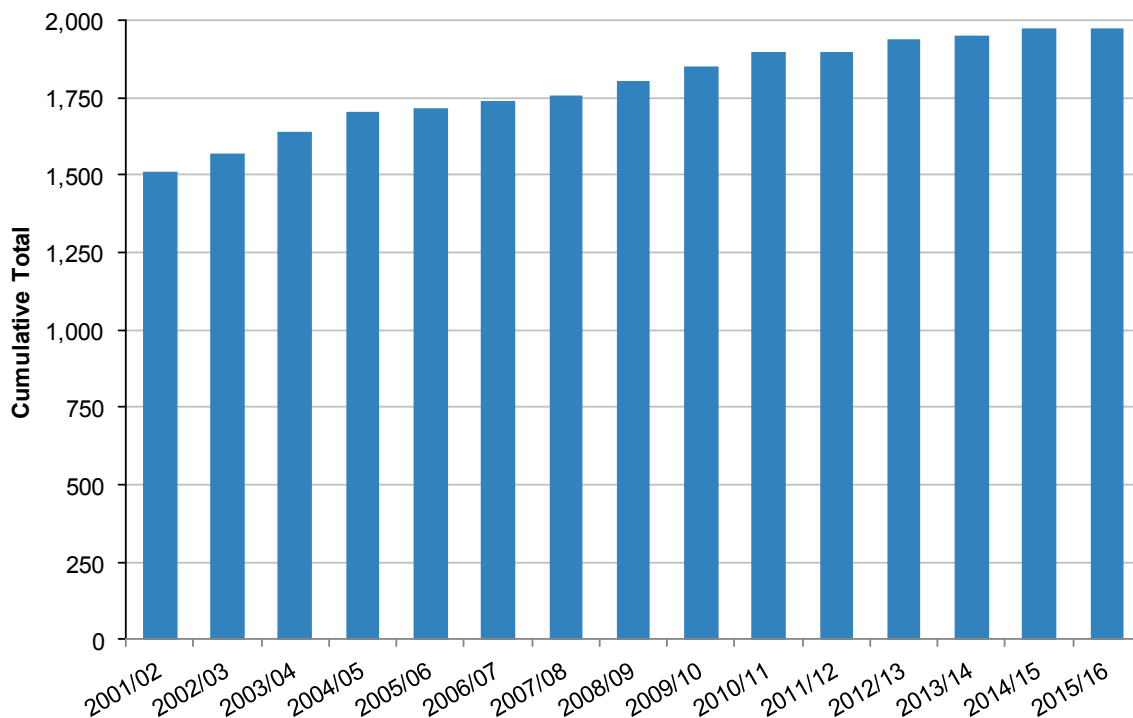
Key points in this chapter:

- In 2015/16, there were a total of 1,977 scheduled historic monuments protected under Article 3 of the Historic Monuments and Archaeological Objects (NI) Order 1995. Overall there has been a 31% increase in the number of scheduled monuments rising from 1,513 in 2001/02 to 1,977 in 2015/16.
- Listed buildings are those of special architectural or historic interest, and provide an indication of the extent of this historical architectural resource. There has been a modest increase in the number of buildings listed in recent years with a total of 8,774 statutory listings in 2015/16, compared with 8,191 in 2003/04.
- Buildings that are classified as 'at risk' in Northern Ireland are recorded on the online Built Heritage at Risk in Northern Ireland (BHARNI) database. In 2015/16, there were 487 listed buildings and structures on this database, and 8 buildings had been removed in the last year. During 2015/16, £304,107 in funding was spent on 31 grants.

Data tables and more information for this chapter can be found in the excel tables provided online (<https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>) and the relevant chapter in [Appendix 3](#).

Monuments

Figure 7.1a Total number of scheduled historic monuments, 2001/02 – 2015/16



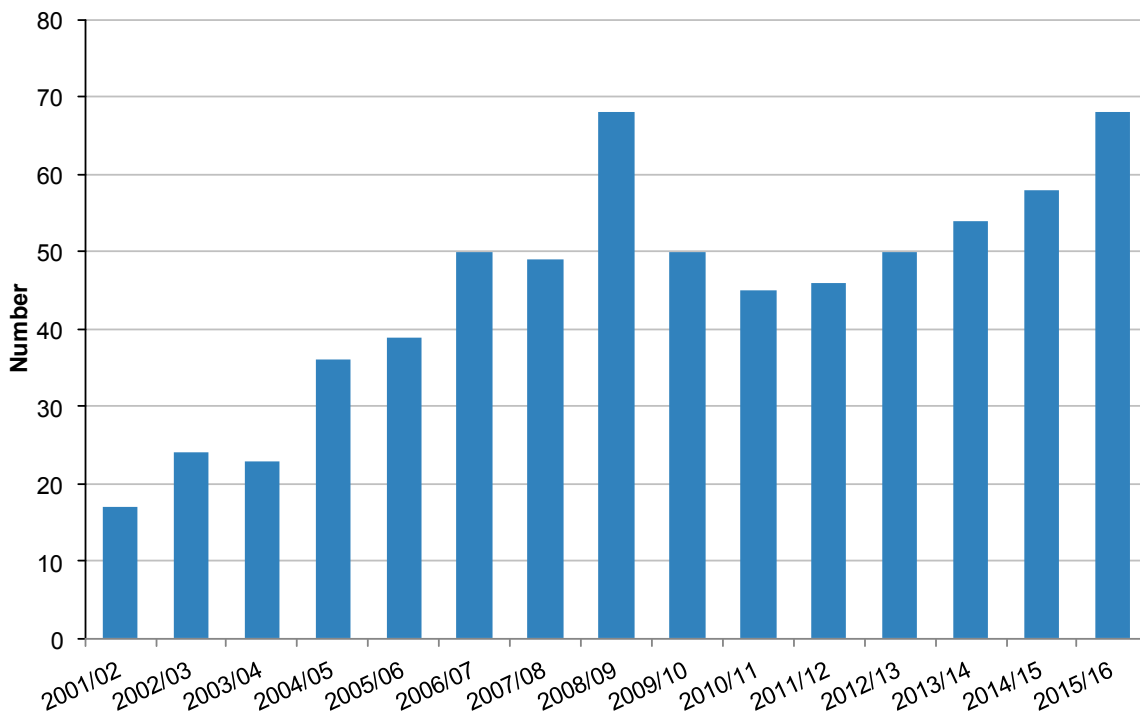
Source: DfC Historic Environment Division

Scheduled historic monuments comprise a selection of the best or most rare and vulnerable of our archaeological sites. They include a range of site types, such as megalithic tombs, prehistoric and early Christian ritual and settlement earthworks, church and castle ruins and features of industrial, defence or maritime heritage importance. These sites are generally in private ownership and the purpose of scheduling is to provide statutory protection to them and improve or stabilise their condition through guidance. Monuments are monitored for condition and risk by field monument wardens. From April 2015 a risk based inspection regime has been employed ensuring that the most vulnerable monuments receive increased inspections toward improving their condition.

There were 5 monuments newly scheduled during 2015/16, a decrease from 22 in 2014/15. The recorded numbers of scheduled monuments have increased since 2001/02 reflecting ongoing survey, designation and assessment. This provides an indication of the extent of these historical assets and recognises the value of our built heritage within Northern Ireland. Overall there has been a 31% increase in the number of scheduled monuments rising from 1,513 in 2001/02 to 1,977 in 2015/16.

The trend is a general increase as new sites are selected for scheduling each year, in line with the criteria for scheduling as outlined in Planning Policy Statement 6, and to better reflect and protect the array of cultural heritage across Northern Ireland. Scheduled monuments are managed by their owners under Historic Environment Division guidance.

Figure 7.1b Number of scheduled monument consent applications received, 2001/02 – 2015/16

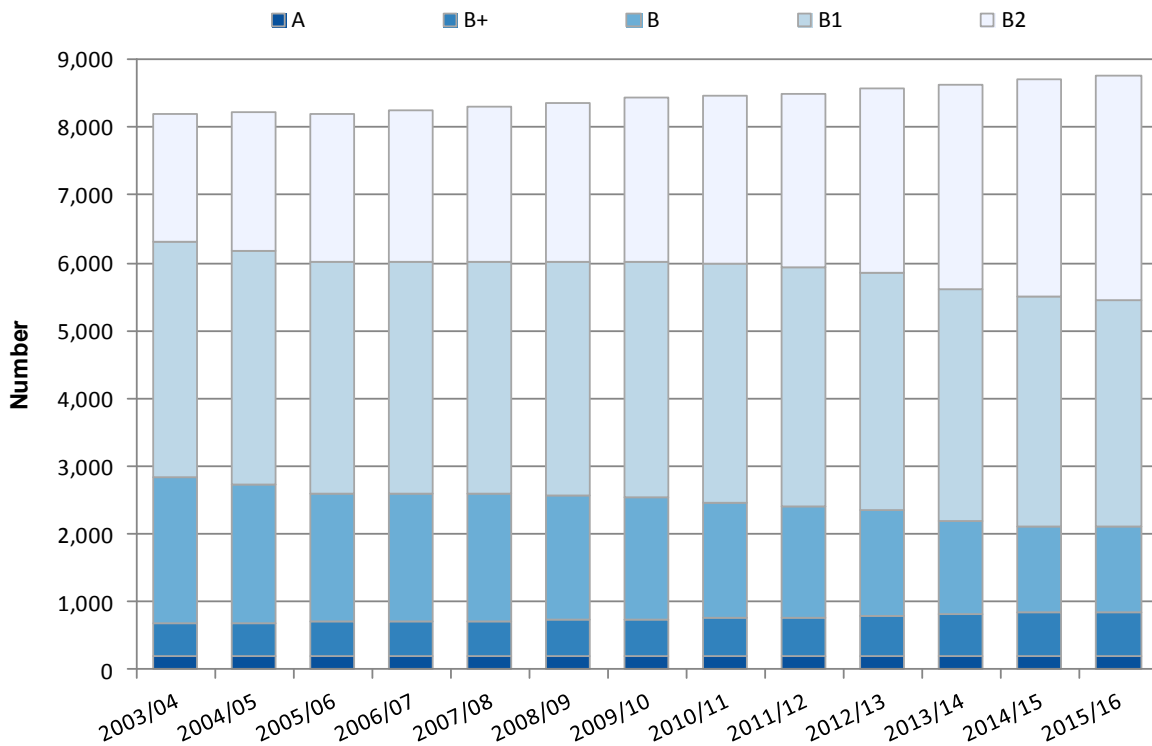


Source: DfC Historic Environment Division

Scheduled Monument Consent must be sought for proposed works which may alter or disturb the fabric of a scheduled historic monument, or its ground surface. The overall application numbers initially peaked at 68 at the beginning of the economic downturn in 2008/09 and then dropped quite dramatically in the middle of the downturn in 2010/11 and 2011/12 (to 45 and 46). Since then the number of applications have increased year on year and once again reached 68 in 2015/16. The lowest number of applications can be seen in 2001/02 at 17.

Listed Buildings

Figure 7.2 Number of listed buildings by grade, 2003/04 – 2015/16



Source: DfC Historic Environment Division

Listed buildings are those of special architectural or historic interest, and provide an indication of the extent of this historical architectural resource. They therefore represent our most important historic buildings.

All of Northern Ireland was surveyed between 1970 and 1995 and suitable buildings were protected by listing. Such structures can range from large stately homes to small gate screens but all must meet the test of Section 80 of the Planning Act (Northern Ireland) 2011 that they must be of 'special architectural or historic interest'.

There has been a modest increase in the number of buildings listed in recent years with a total of 8,774 statutory listings in 2015/16, compared with 8,191 in 2003/04. Some listings include multiple buildings, therefore, the total number of buildings protected in this way is slightly higher.

A second, area based survey of all historic buildings (The Second Survey) has been underway since 1997 and is largely responsible for the increase. However it should be noted that a significant number of buildings have also been found to no longer meet the legislative test and have therefore been removed.

There is expected to be changes to the number of listed buildings as a result of the on-going Second Survey. This will identify buildings which may be added to or removed from the 'List', as well as clarifying the Department for Communities understanding of the special Architectural and Historic interest of buildings remaining on the 'List'. The number of grade B buildings is expected to continue to reduce over time. Most of these buildings are

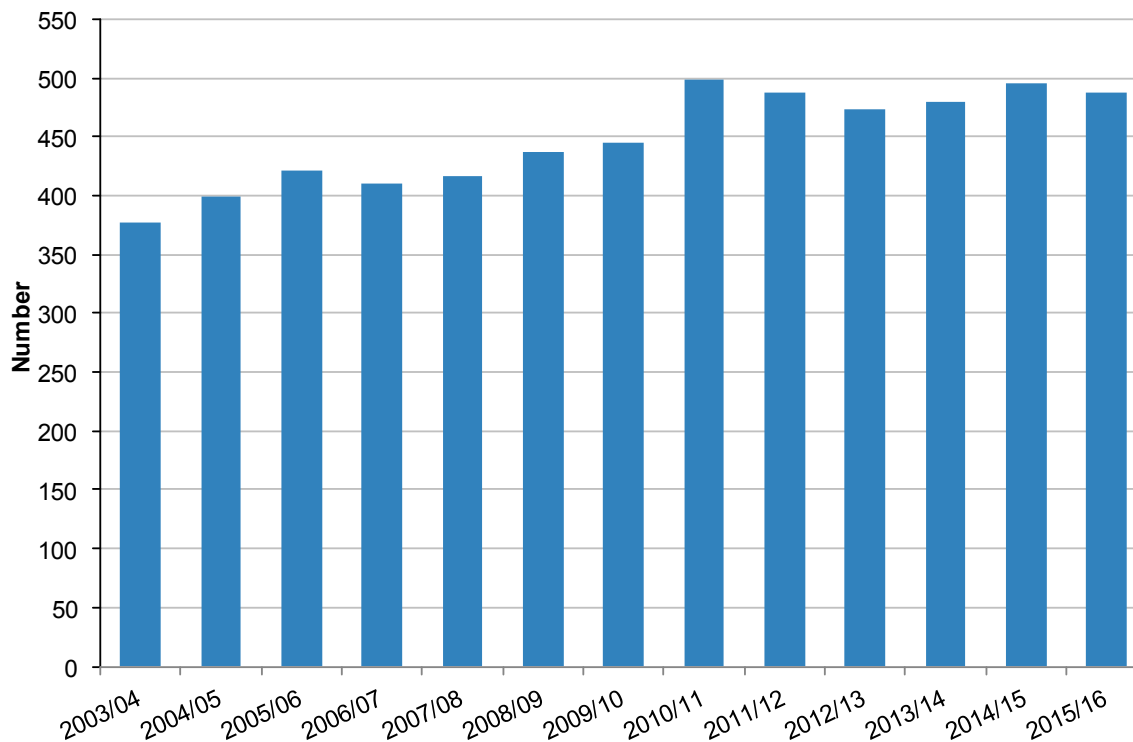
churches which were ineligible for grant aid in 1986 when the B category was split into grade B1 and B2 for grant purposes. Grade B buildings are being allocated to either the B1 or B2 category as part of the Second Survey.

More detail on the grading of listing buildings can be found on page 10 of Annex C of Planning Policy Statement 6 (March 2011)

[http://www.planningni.gov.uk/index/policy/planning_statements/pps6 -
_revised annex c criteria for listing.pdf](http://www.planningni.gov.uk/index/policy/planning_statements/pps6_-_revised_annex_c_criteria_for_listing.pdf)

Buildings and Monuments at Risk

Figure 7.3 Number of buildings and monuments at risk, 2003/04 – 2015/16



Source: DfC Historic Environment Division

A listed building or structure is at risk when its condition and management is deemed to be poor and unsustainable, placing the building or structure under threat of deterioration and/or demolition.

Such listed buildings, structures and some scheduled monuments are recorded on an on-line database Built Heritage at Risk in Northern Ireland (BHARNI) register.

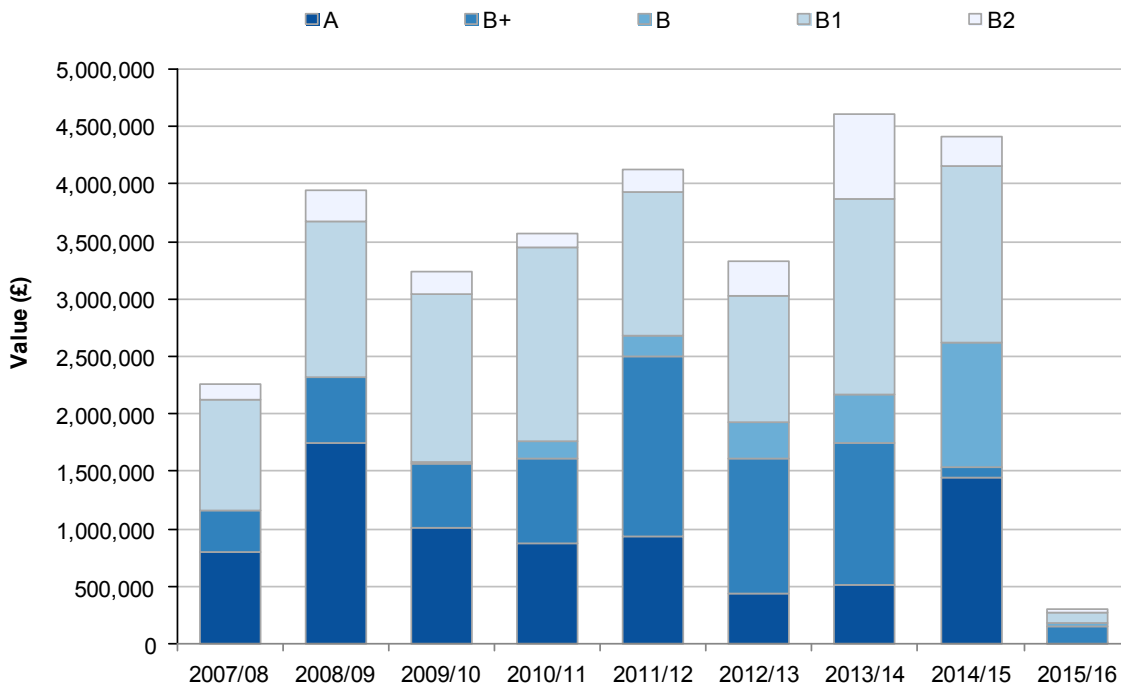
The BHARNI register provides an indicator of changes in the number of buildings judged to be at risk. In 2015/16, there were 487 buildings and structures on the BHARNI database, a decrease on the 496 on the register in 2014/15.

The number of buildings on the register can be expected to rise as more detailed information is made available through surveys. The number peaked at 499 in 2010/11 but has declined in recent years due to success in the removal of existing buildings at risk.

The NI Sustainable Development Strategy set a target of removing 200 buildings from the BHARNI register (based on the 2006 figure) by 2016. There were 8 buildings removed in 2015/16. Since 2006, 192 buildings have been recorded as removed, thereby almost meeting the target set.

Listed Buildings Grant Funding

Figure 7.4 Value of grant paid and the number of buildings in receipt of grant in each listed building grade, 2007/08 – 2015/16



Source: DfC Historic Environment Division

There is no statutory requirement for owners of listed buildings to maintain their properties in a good condition. While owners can be prosecuted for deliberately damaging or destroying listed buildings, they cannot be prosecuted for allowing them to fall into disrepair. In order to encourage building conservation activities, DfC offers repair grant aid to owners of listed buildings.

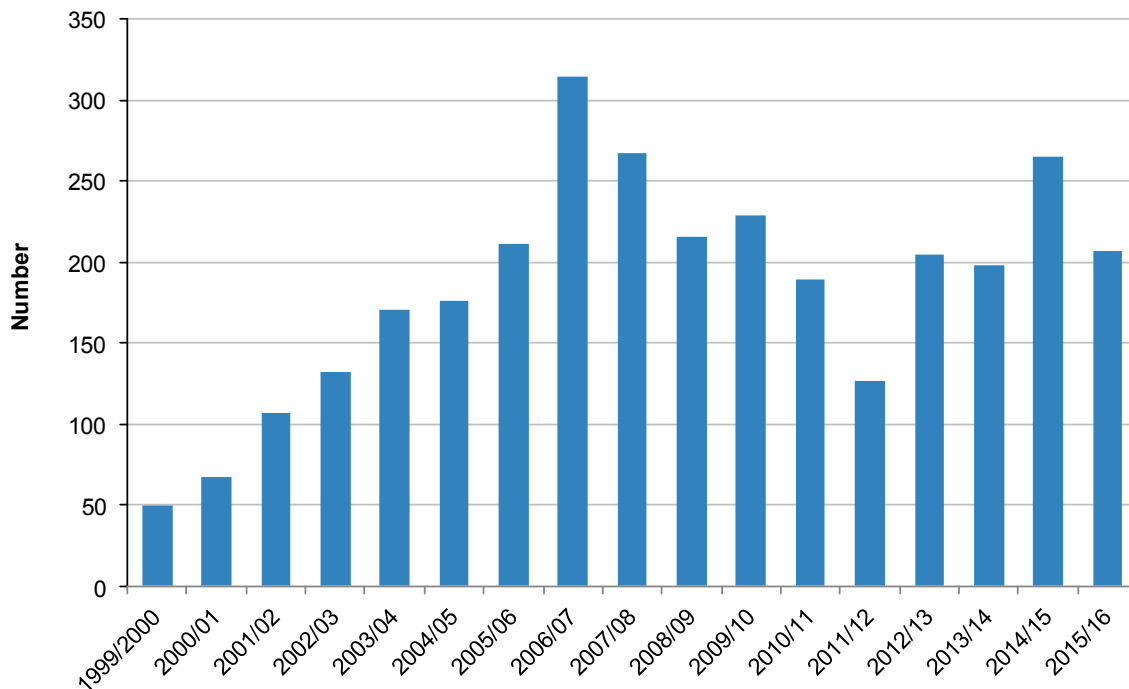
The rate of grant payable is intended to reflect the higher costs of approved repairs to listed buildings relative to more modern buildings, in order to conserve their special architectural features.

During 2015/16, the number of buildings which benefitted from the receipt of grants (31) was significantly less than in the previous nine years, as was the total value of grants awarded (£304,107). This compares to 136 buildings benefiting from £4,400,553 in 2014/15. The DOE business plan 2015/16 explained that this was because the outcome of the final 2015-16 Budget incorporating a reduction of 15.1% in the Department's previous budget. In order to ensure that the Department operates within its authorised spending limits, this meant that significant spending reductions were applied to all discretionary spending areas including a wide range of grant programmes.

In 2015/16, 52.5% of the total grant funding was spent in the two most important grades, A and B+. These two grades received 37.8% of the funding in 2013/14 and 34.9% in 2014/15. Over this nine year period, the largest number of buildings benefitting from grants was 166 in 2013/14, sharing £4,609,571 between them.

Excavation licences

Figure 7.5 Number of excavation licences issued, 1999/00 – 2015/16



Source: DfC Historic Environment Division

Excavations are carried out for a variety of reasons, including research, community engagement and in association with the conservation of a monument. Since the advent of Developer Funding in the late 1990s, however, the vast majority have been carried out as part of a planning approval as a condition of development. The number of excavations since then therefore reflects the number of planning cases with an associated archaeological requirement and more generally is a crude index of planned development.

The rise in excavation licenses to a peak of 314 in 2006-07 corresponds with increasing development projects during the 'boom'. The fall to 127 licences in 2011-12 reflects the decline in development during the succeeding 'bust'. In recent years the number of licences has been around 200 with the exception of 2014/15 when 265 licences were issued.

Waste

Waste and, especially, how we deal with it, is becoming an increasingly important issue. Waste is produced by households, by industrial processes, by the construction and demolition industry, through commercial activities and agricultural practices and by public services and utilities. Waste can affect the environment through its visual impact or by emissions to the air, groundwater and surface water as well as the contamination of land.

This chapter reports on the amount of local authority collected (LAC) municipal waste produced, the amount of LAC municipal waste sent for preparing for reuse, recycling, composting, energy recovery and sent to landfill, the amount of LAC waste produced per household and per capita, and the amount of LAC household waste produced and recovered. LAC municipal waste is defined as waste which is collected under arrangements made by a district council.

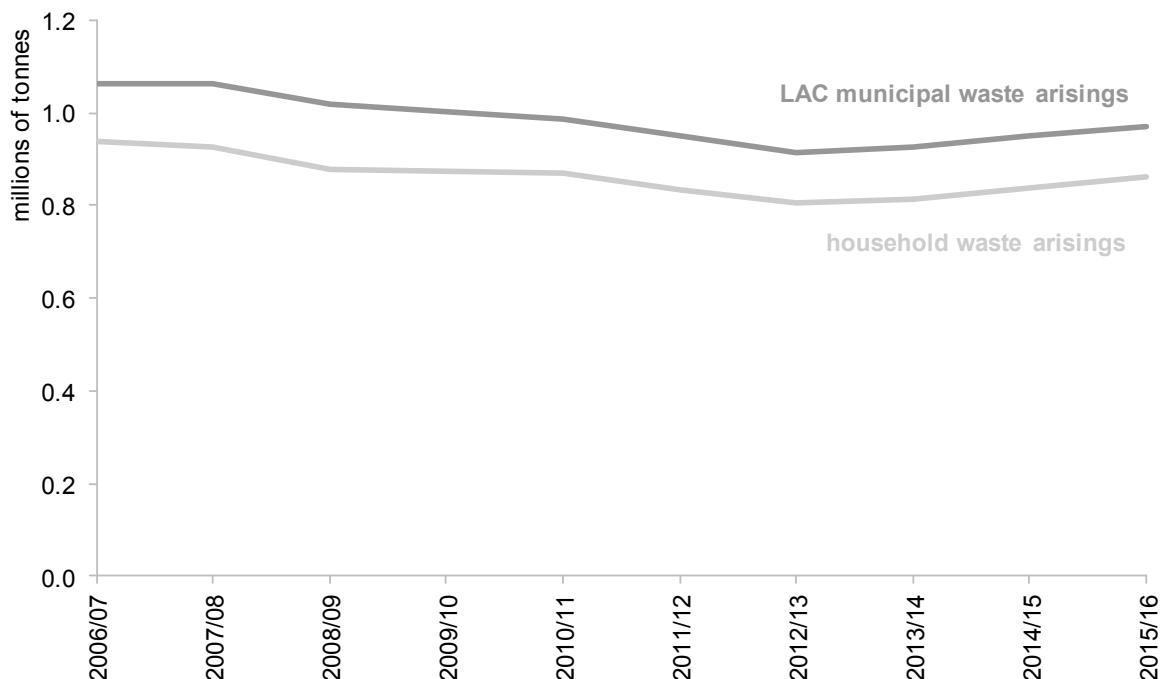
Key points in this chapter:

- In Northern Ireland, the total amount of LAC municipal waste arisings has declined by 8.9% between 2006/07 and 2015/16.
- In 2015/16, 1.179 tonnes of household waste were collected per household, a 13% decrease on the 2007/08 figure of 1.356 tonnes.
- In 2015/16, 42.2% of household waste was sent for recycling (including reuse and composting) and 41.8% of LAC municipal waste was sent for recycling (including reuse and composting).
- 170,913 tonnes of LAC municipal waste arisings was sent for energy recovery in 2015/16. This was a LAC municipal waste energy recovery rate of 17.6%.
- The quantity of LAC municipal waste sent to landfill in 2015/16 was 390,256 tonnes, a landfill rate of 40.3%. The landfill rate for household waste was 39.7%. Both landfill rates are the lowest ever recorded for Northern Ireland.

Data tables and more information for this chapter can be found in the excel tables provided online (<https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2017>) and the relevant chapter in [Appendix 3](#).

Waste Arisings

Figure 8.1 Waste arisings, 2006/07 – 2015/16



Source: NIEA

Local Authority Collected (LAC) municipal waste in Northern Ireland is defined as waste which is collected under arrangements made by a district council. It is predominantly made up of kerbside household collected waste, but also includes waste collected from civic amenity sites and some commercial waste.

LAC municipal waste data for Northern Ireland are collected via quarterly data returns submitted by all district councils through the WasteDataFlow system.

In 2015/16, Northern Ireland's councils collected 969,157 tonnes of LAC municipal waste. This was a 1.9% increase on the 951,423 tonnes collected in 2014/15.

Since 2006/07 household waste has accounted for 86-89% of total LAC municipal waste. In 2015/16 household waste accounted for 88.8%. Household waste includes materials collected directly from households via kerbside collections, material taken to bring sites and civic amenity sites as well as several other smaller sources. The remaining 11.2% was non-household waste.

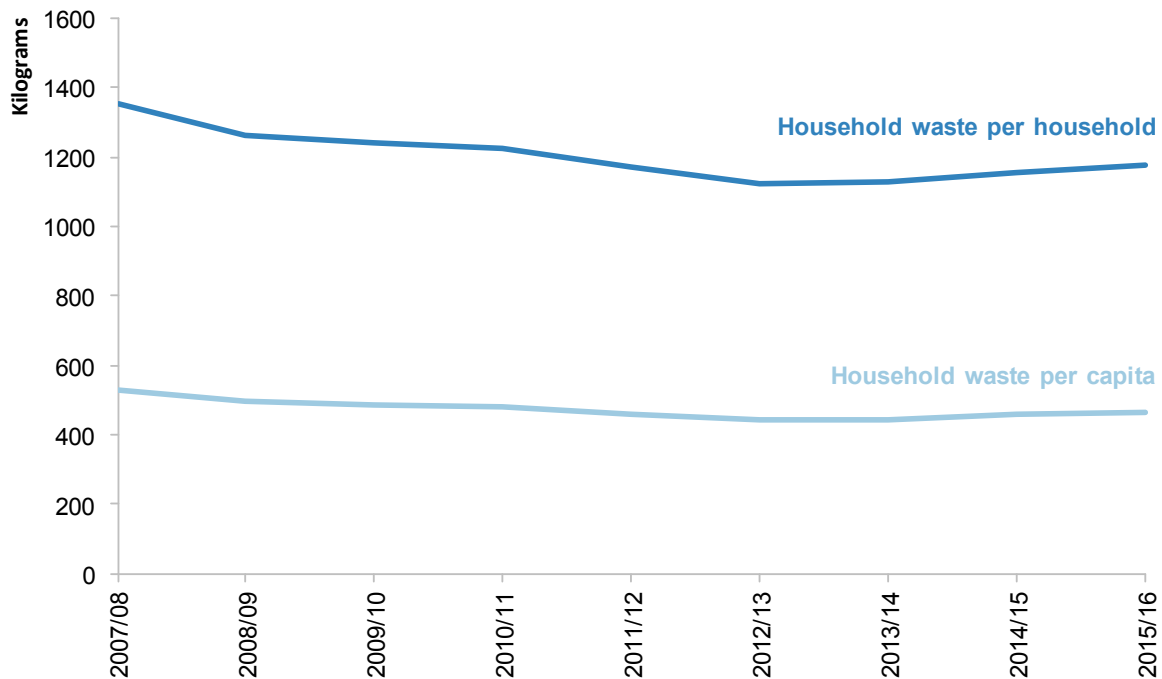
There were 860,786 tonnes of household waste collected in Northern Ireland in 2015/16, an increase of 2.5% on the amount collected in 2014/15 (839,569 tonnes). Since 2007/08, total household waste arisings in Northern Ireland have fallen by 7.3%.

The longer term trend has been a reduction in LAC municipal waste arisings from 1,064,090 tonnes in 2006/07 to a low of 913,546 in 2012/13, a 14.1% decrease. Since then arisings have increased by 6.1% over the last three years.

Factors affecting LAC municipal waste, the majority of which is household waste, range from demographic pressures, individual household behaviours, the advice and collection services provided by local authorities and to some extent the state of the economy.

Waste Arisings

Figure 8.2 Household waste arisings per capita and per household per year, 2007/08 – 2015/16



Source: NIEA

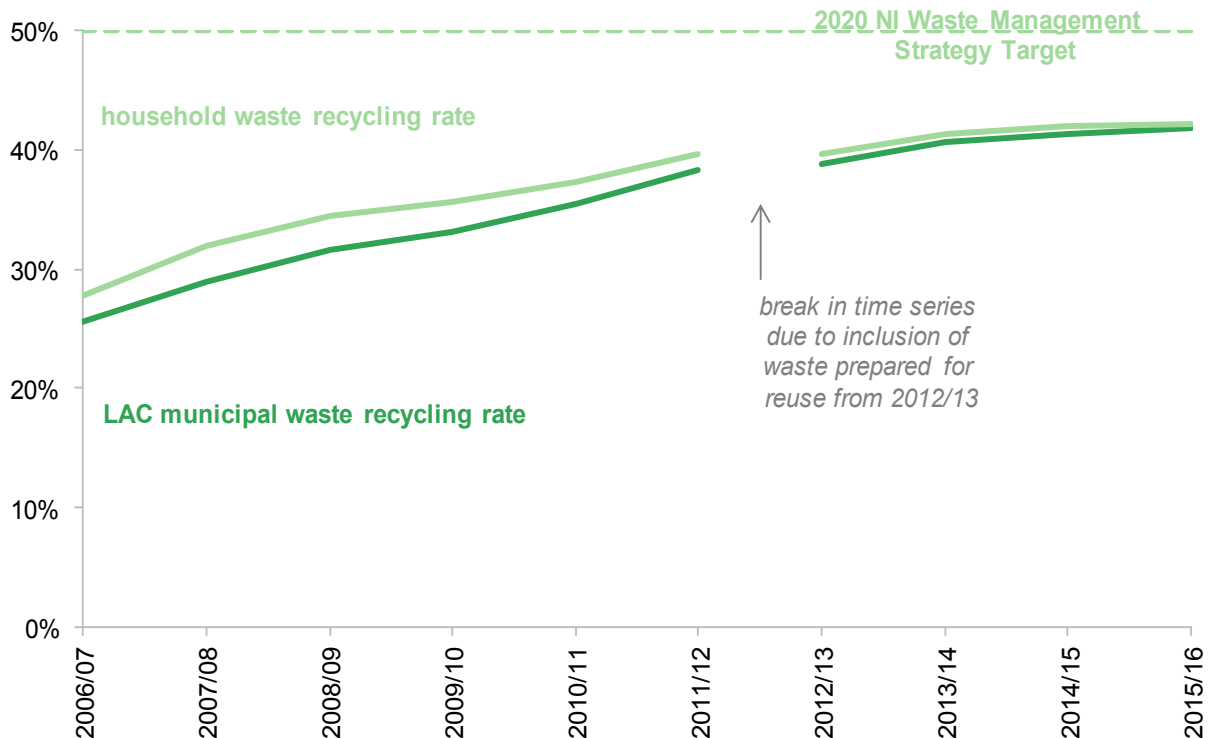
Household waste is one element of LAC municipal waste collected, and is recorded using the WasteDataFlow system as the amount of waste collected by the district council's regular household, kerbside, civic amenity and bring site collections.

In 2015/16, 1,179 kilograms of household waste were collected per household, a 13.0% decrease on the 2007/08 figure of 1,356 kilograms. Household waste per capita has fallen 12% since 2007/08, with 465 kilograms collected in 2015/16.

The amount of household waste per household and household waste per capita followed a similar trend to total waste arisings, showing a fall until 2012/13, and then a gentle increase since.

Recycling (preparing for reuse, dry recycling and composting)

Figure 8.3 Waste sent for preparing for reuse, dry recycling and composting, 2006/07 – 2015/16



Source: NIEA

Note: reuse was included with recycling and composting from 2012/13 onwards. The impact was small, adding less than 0.1 percentage points to the NI rate.

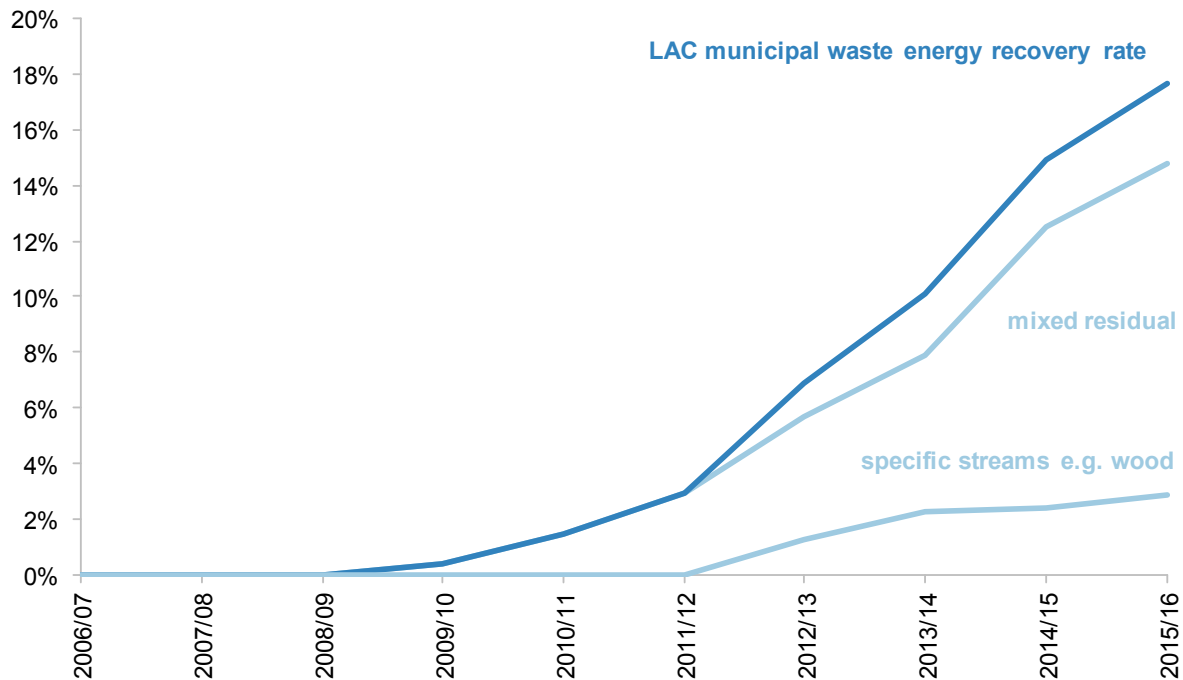
Reuse, dry recycling and composting (referred to as 'recycling' for the rest of this section) is based on materials collected for recycling at the kerbside, civic amenity sites, bring sites and those collected by a third party, such as charities/voluntary groups. Recycling of waste is becoming much more common in Northern Ireland. The revised Northern Ireland Waste Management Strategy (Delivering Resource Efficiency, 2013) proposed to achieve a 50% recycling rate by 2020 for local authority collected municipal waste.

In 2015/16, the tonnage of LAC municipal waste sent for preparing for reuse, dry recycling and composting (referred to as 'recycling' for the rest of this section) reached a record high at 405,414 tonnes. The LAC municipal waste recycling rate was 41.8%. This was similar to the 41.4% recycling rate recorded in 2014/15 although the tonnage sent for recycling increased by 3.0%, from 393,740 tonnes.

The household waste recycling rate was 42.2% in 2015/16. Again, this was similar to the 2014/15 recycling rate of 42.0% despite the tonnage sent for recycling recording a new high of 363,647 tonnes. The proportion of household waste sent for preparing for reuse was 0.1%, dry recycling made up 22.2% and composting was 20.0%. During 2014/15, the equivalent rates for preparing for reuse, dry recycling and composting were similar at 0.1%, 21.8% and 20.1%.

Energy Recovery

Figure 8.4 LAC municipal waste sent for energy recovery, 2006/07 – 2015/16



Source: NIEA

Energy recovery is the term used when value is gained from waste products by converting them into energy. The major method used is incineration with energy recovery, although other technologies exist.

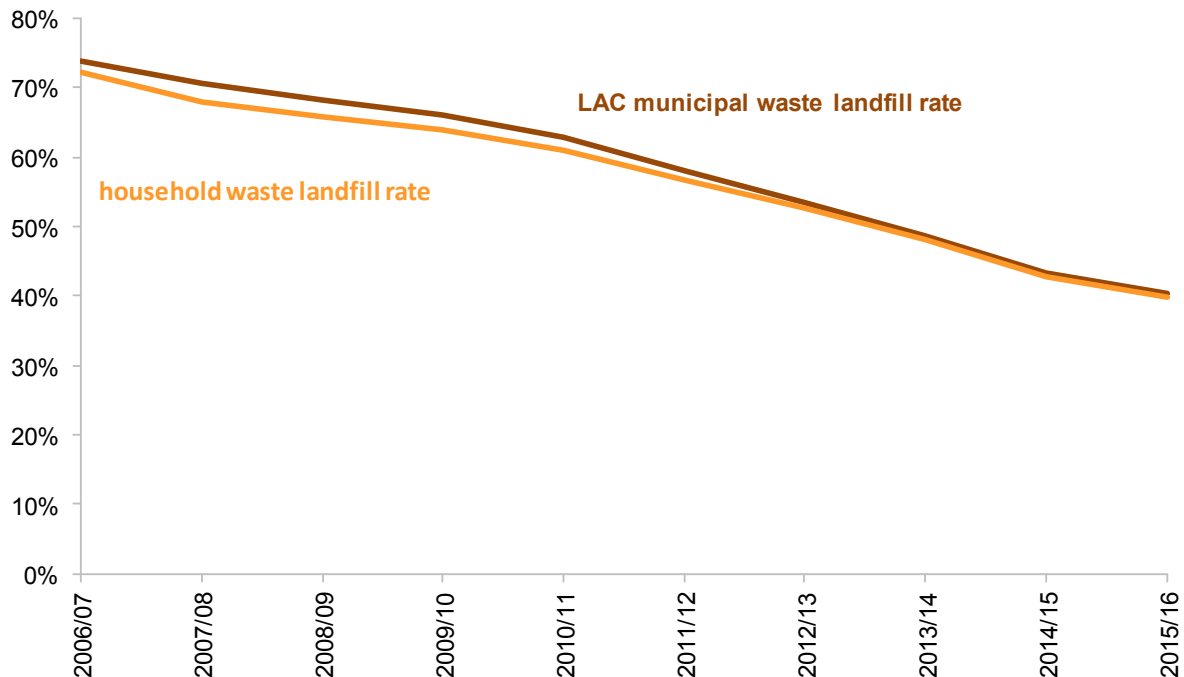
In 2015/16, 170,913 tonnes of LAC municipal waste arisings was sent for energy recovery. This gave a LAC municipal waste energy recovery rate of 17.6%, 2.7 percentage points higher than the 14.9% recorded in 2014/15. In each year, the majority was mixed residual LAC municipal waste with a smaller proportion from specific streams, e.g. wood.

There was zero, or very small quantities, of LAC municipal waste sent for energy recovery before 2009/10. Strong growth followed from 2010/11 to 2015/16 with the energy recovery rate increasing from 0.4% in 2009/10 to 17.6% in 2015/16. Most of the growth has been driven by mixed residual LAC municipal waste sent for energy recovery, with the specific streams proportion reaching 2-3% in 2013/14 and remaining around that level since.

Mixed residual LAC municipal waste sent for energy recovery is combustible residual waste collected from the kerbside and from civic amenity sites and processed into refuse derived fuel at material recovery facilities. The specific streams element of energy recovery is mostly wood but also includes furniture, carpets and mattresses, mostly collected from civic amenity sites.

Landfill

Figure 8.5 Waste sent to landfill, 2006/07– 2015/16



Source: NIEA

The quantity of LAC municipal waste sent to landfill decreased by 5.5% from 412,755 to 390,256 tonnes between 2014/15 and 2015/16. This gave a landfill rate of 40.3% for 2015/16, 3.1 percentage points lower than the 43.4% recorded in 2014/15 and the lowest ever recorded. Similarly, the landfill rate for household waste has recorded a new low of 39.7% in 2015/16, a drop of 3 percentage points on the 2014/15 rate of 42.7% and a fall from a high of 72.3% in 2006/07.

A large drop in landfill could be due to a change in the way in which a council(s) chooses to handle the residual waste that is collected. Instead of sending this straight to landfill, dirty MRFs (material recovery facilities) are becoming more popular as a way of capturing more recyclable material from residual waste. This material can also be sent for energy recovery in the form of refuse derived fuel (RDF) which also diverts it from landfill. In addition, the ongoing Rethink Waste campaign is encouraging the NI population to Reduce, Reuse and Recycle their waste. Generating energy from waste by incineration is preferable to landfill, although preparing for reuse and recycling are preferable to both.

Landfill Tax for household waste (the majority of LAC municipal waste) continues to be the main driver for local authorities to reduce landfill. Other considerations include a limit on the amount of biodegradable LAC municipal waste. Landfilled biodegradable waste emits methane and carbon dioxide into the atmosphere as it decomposes and leachate is produced when water becomes contaminated as it filters down through a landfill.

Appendix 1: User Guidance

This section contains some general information about the quality of the data used in the Northern Ireland Environmental Statistics Report including guidance to assist with interpretation. A more in-depth description of the data and assessment of data quality can be found in Appendix 3.

Data collection and timeliness

To inform this publication, data are supplied from a variety of sources. As most of this information is readily available it is not thought to create an unreasonable burden on the data suppliers. Due to the nature of compendium publications, some data are available earlier than others but we cannot publish until the final piece of data is provided. It should also be noted that the timing and availability of data varies across datasets and data suppliers. Therefore, more up-to-date data may become available directly from the individual data suppliers at differing points in time.

Main Uses of Data

This publication provides annual updates of key environmental indicators, ensuring that the most up to date information is readily available for policy makers, environmental interest groups, academics and the public.

Policy Development and Briefing

The information in the publication is used for input into and monitoring of a number of strategies and policies. For example, the indicator data have been used for the Second Report of the Northern Ireland Biodiversity Group 2005-2009 on Delivery of the Northern Ireland Biodiversity Strategy. In addition, the data were used to inform the major review of the Regional Development Strategy 2035. The data included in previous NI Environmental Statistics Reports have been included in the NI chapter of the UK National Ecosystem Assessment, the NI summary of which was officially launched in October 2011.² The data included in NI Environmental Statistics Report were used heavily in the development of the 2013 Northern Ireland State of the Environment Report: From Evidence to Opportunity. The data have also been used for associated European updates (via input to UK reporting) including the 2015 European State Outlook Report. The new councils in Northern Ireland will use the report to assist with the collation of environmental assets for the new development plans.

General Information and Research

The publication is generally used for reference and is a good starting point when looking for information on key environmental indicators specific to Northern Ireland. It is circulated to a number of external users including Sustainable Northern Ireland; Northern Ireland Environment Link; Northern Ireland Local Government Association and UK Climate Impacts Programme. In addition for future reporting some of the

² Full chapter: <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>
NI summary: <http://www.nienvironmentlink.org/cmsfiles/files/Publications/NEA-Summary-for-web.pdf>

indicators will be used for comparative statistics of key environmental indicators reported under EU Directives.

Rounding, Summing and Differences

There may be slight discrepancies between totals and the sum of the constituent items due to rounding.

Any statements made in this report regarding differences between groups, have been tested and are statistically significant at the 5% significance level. This significance level is the criteria for judging whether differences between groups might have arisen by chance. The standard criteria is to use the 5% level, i.e. the probability being one in twenty that an observed difference might have arisen by chance factors alone.

Data revisions/corrections

Balancing the aims of accuracy and timeliness of publication means that revisions of data are an expected part of the production of statistics as more information becomes available. Where significant revisions are made to final data, users will be provided with clear information indicating that this is the case. Despite best efforts, there may be occasions whereby publications need to be amended for errors.

If an error is deemed to be material, the electronic publication of the data will be amended as soon as possible and alerts placed on the website notifying the change.

If an error is deemed to be minor, a correction will be made within the next release for publication.

In all cases, the nature and extent of the revisions will be explained clearly for users.

Environmental Information Elsewhere in the United Kingdom and Europe

While it is our intention to direct users to environmental information elsewhere in the UK and Europe, users should be aware that environmental indicators are not always measured in a comparable manner to those in Northern Ireland. Details of environmental data published elsewhere in the UK and Europe can be found at the following links.

England

<https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs/about/statistics>

Scotland

<http://www.scotland.gov.uk/Topics/Statistics/Browse/Environment>

Wales

<http://wales.gov.uk/statistics-and-research/state-environment/?lang=en>

European Union Member States

<http://ec.europa.eu/eurostat/web/environment/statistics-illustrated>

Appendix 2: List of indicators, source, release and status

The table below shows the source, whether or not the indicator is first released within this publication and the 'status' of each indicator. Status definitions are as follows:

- **National Statistics** – Independently assessed as conforming to the Code of Practice for Official Statistics. (<http://www.statisticsauthority.gov.uk/assessment/code-of-practice/>)
- **Official Statistics** – Conform to the Code of Practice for Official Statistics but have not been independently assessed.
- **Non-Official Statistics** – Sourced from outside Government and not from a specified producer (<http://www.statisticsauthority.gov.uk/national-statistician/producers-of-official-statistics/index.html>) of Official Statistics e.g. Civil Aviation Authority.

Figure	Source	First released in this publication	Status
1.1 Population	NISRA		National Statistics
1.2 Households	NISRA		National Statistics
1.3 Airport passenger numbers	Civil Aviation Authority		Non-Official Statistics
1.4 Journeys per person	DFI		National Statistics
1.5 Average distance travelled	DFI		National Statistics
1.6 Concern for the environment	NISRA		National Statistics
1.7 Environmental problems	NISRA		National Statistics
1.8 Actions taken for the environment	NISRA		National Statistics
2.1 Concentration of nitrogen dioxide	Ricardo Energy & Environment		Official Statistics
2.2 Concentration of particulate matter	Ricardo Energy & Environment		Official Statistics
2.3 Ground level ozone	Ricardo Energy & Environment		Official Statistics
2.4 Concentration of Benzo(a)pyrene	Ricardo Energy & Environment		Official Statistics
2.5 Concentration of Sulphur dioxide	Ricardo Energy & Environment		Official Statistics
2.6 Ammonia emissions from agriculture	Rothamsted Research		Official Statistics
2.7 Total Greenhouse gas emissions	Aether and Ricardo Energy & Environment		Official Statistics
2.8 Greenhouse gas emissions by sector	Aether and Ricardo Energy & Environment		Official Statistics
2.9 Carbon dioxide emissions	Aether and Ricardo Energy & Environment		Official Statistics

2.10 Renewable energy	DfE		Official Statistics
2.11 Environmental Installations	DFI		Official Statistics
2.12 Mean annual minimum temperature	Armagh Observatory		Non-Official Statistics
2.13 Mean annual maximum temperature	Armagh Observatory		Non-Official Statistics
2.14 Rainfall falling in winter	Armagh Observatory		Non-Official Statistics
2.15 Rainfall falling in summer	Armagh Observatory		Non-Official Statistics
3.1 Overall river quality	NIEA		Official Statistics
3.2 Lake quality	NIEA		Official Statistics
3.3 Groundwater nitrate concentration	NIEA	✓	Official Statistics
3.4 River nitrate concentration	NIEA	✓	Official Statistics
3.5 Industrial discharge quality	NIEA	✓	Official Statistics
3.6 Water utility discharge quality	NIEA		Official Statistics
3.7 Drinking water quality	NIEA		Official Statistics
3.8 Water pollution incidents	NIEA	✓	Official Statistics
4.1 Bathing Water Quality	NIEA		Official Statistics
4.2 Blue flag beaches	Keep NI Beautiful (previously Tidy NI)		Non-Official Statistics
4.3 Marine water quality	DAERA Marine Division		Official Statistics
4.4 Shellfish waters	NIEA	✓	Official Statistics
4.5 Sea temperature	AFBI	✓	Official Statistics
4.6 Beach litter	DAERA Marine Division		Official Statistics
4.7 Marine litter	DAERA Marine Division	✓	Official Statistics
5.1 Soil Quality	AFBI		Official Statistics
5.2 Sustainable land management	DAERA		Official Statistics
5.3 Area of woodland	Forest Service		Official Statistics
6.1 Area of nature conservation designations	NIEA		Official Statistics
6.2 Condition of features within ASSIs	NIEA	✓	Official Statistics
6.3 Wild birds	JNCC/BTO		Official Statistics
6.4 Wetland birds	JNCC/BTO		Official Statistics
6.5 Sites of local conservation importance	NIEA		Official Statistics
6.6 Green Flag Awards	Keep NI Beautiful (previously Tidy NI)		Non-Official Statistics

7.1a Scheduled monuments	DfC		Official Statistics
7.1b Scheduled monuments consent applications	DfC		Official Statistics
7.2 Number of listed buildings	DfC		Official Statistics
7.3 Buildings and monuments at risk	DfC	✓	Official Statistics
7.4 Listed buildings grant funding	DfC	✓	Official Statistics
7.5 Excavation licences	DfC	✓	Official Statistics
8.1 Waste arisings	DAERA		National Statistics
8.2 Waste arisings per capita and per household	DAERA		National Statistics
8.3 Waste sent for preparing for reuse, dry recycling and composting	DAERA		National Statistics
8.4 LAC municipal waste sent for energy recovery	DAERA		National Statistics
8.5 Waste sent to landfill	DAERA		National Statistics

Appendix 3: Data Description and Assessment

Data Quality Assessment

Indicators selected for inclusion and subsequently published in this report meet the following criteria:

- Regular collection with timely release of the data;
- Use of sound statistical methods, and
- Validated/quality assured by data provider

Data classed as ‘very good’ in terms of quality meet all of the criteria listed above and are known to be complete.

Data classed as ‘good’ in terms of quality meet all of the criteria listed above, but there may be minor issues associated with the data or known gaps in coverage which will be identified for users.

Chapter 1: Demographics and Public Opinion

Demographics (Figures 1.1 & 1.2)

Description of data and methodology (including strengths and limitations)

These tables report on estimated and projected population figures and the number of households in NI. These data are provided by the Northern Ireland Statistics & Research Agency (NISRA). Further information relating to these statistics can be found at: <http://www.nisra.gov.uk/demography/default.asp3.htm>

The population estimates refer to the number of people in the population at 30 June each year. The statistics are, therefore, often referred to as the mid-year estimates. Population estimates for Northern Ireland are published annually by NISRA and are approximately one year in arrears. The latest population estimates for Northern Ireland are as of 30 June 2015 and are available on the NISRA website at: <http://www.nisra.gov.uk/demography/default.asp17.htm>.

Population projections for the United Kingdom and constituent countries are produced by the Office for National Statistics (ONS) at the request of the Registrars General for England and Wales, Scotland and Northern Ireland. These projections are then published by the constituent countries (NISRA publish Northern Ireland projections, National Records of Scotland (NRS) publish Scotland Projections, and ONS publish England and Wales Projections). Population projections are calculated every second year, with the current set of projections relating to a base year of mid-2014. <http://www.nisra.gov.uk/demography/default.asp20.htm>

Mid-Year population estimates

Each year population estimates for Northern Ireland are updated using a standard technique known as the cohort component method. In simple terms the previous year’s population estimate is “aged on” by one year, with births added and deaths removed. Net migration is also accounted for. The population estimates for each year in the

period from 2001 to 2011 were revised in light of the 2011 Census population estimates.

http://www.nisra.gov.uk/archive/demography/population/midyear/Methodology_2015.pdf

Population projections

The mid-year population estimates from each country are used as the starting population for projections. The numbers of births, deaths and migrants are calculated using the assumptions of future levels of fertility, mortality and migration. They are determined by a mixture of trend observation and extrapolation, and consideration of expert opinion, with actual data included in the calculation for the first year of the projection. The projections are computed for each of the constituent countries of the UK and the results are added together to produce projections for England and Wales, Great Britain and the UK. Variant projections are produced using the same method but using alternative assumptions of future levels of fertility, mortality and migration.

<http://www.nisra.gov.uk/demography/default.asp20.htm>

Census Household Figures

For the 2011 Census a household is defined as 'one person living alone, or a group of people (not necessarily related) living at the same address who share cooking facilities and share a living room, sitting room or dining area'. The Census is completed for all known households in Northern Ireland and some work was undertaken during the planning phases to ensure all households received a form.

http://www.ninis2.nisra.gov.uk/public/Theme.aspx?themeNumber=136&themeName=Census_2011

Household Projections

Household projections are derived by using Census household data to create age-sex-specific household membership rates, which are then applied to the latest population projections.

Both population and household projections do not take into account planned policy changes and other social and economic factors which may influence population distribution and are therefore not forecasts. The reliability of projections decreases over time due to the cumulative process of population change, as well as the inherent uncertainty of demographic behaviour.

<http://www.nisra.gov.uk/demography/default.asp21.htm>

Use of data

Population estimates and projections, as well as household estimates, allow service providers to make informed decisions on how services and funds may need to be allocated in the future.

Some environmental statistics can be expressed as a rate per 1,000 population or per household, others can be linked to the size of the population (for example, household waste). Population and households can also be linked to emissions, pollution levels and pressure on natural resources.

Data Quality Assessment

Very Good – Population estimates, population projections and household estimates are currently classified as National Statistics. These data are also subject to a rigorous validation process by the Northern Ireland Statistics & Research Agency. Further data quality documentation is available at:

Northern Ireland Mid-year Estimates and Projections data quality document:

http://www.nisra.gov.uk/archive/demography/population/Population_DataQuality.pdf

Population Projections for the UK:

<http://www.ons.gov.uk/ons/guide-method/method-quality/quality/quality-information/population/quality-and-methodology-information-for-national-population-projections.pdf>

Census Figures:

<http://www.nisra.gov.uk/census/2011/background/coverage.html>

Household Projections:

http://www.nisra.gov.uk/archive/demography/population/household/HHP12_Methodology.pdf

Population Statistics Supporting Documentation:

<http://www.nisra.gov.uk/demography/default.asp303.htm>

Data links

Mid-year population estimates are published on the NISRA website; the latest figures for mid-2015 were released in June 2015:

<http://www.nisra.gov.uk/demography/default.asp17.htm>

Northern Ireland Level projections are published at the same time as ONS publish the projections for England and Wales. 2014-based population projections were published in October 2015: <http://www.nisra.gov.uk/demography/default.asp20.htm>

As ONS produces population projections for the United Kingdom and constituent countries, data are comparable within the UK.

<http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Population+Projections>

Population estimates are comparable with UK:

<http://www.ons.gov.uk/ons/guide-method/method-quality/specific/population-and-migration/pop-ests/population-estimates-for-las/a-comparison-of-data-sources-and-methods.pdf>

Environmental Pressures (Figures 1.3 to 1.5)

Description of data and methodology (including strengths and limitations)

Northern Ireland airport passenger numbers are provided by the Civil Aviation Authority. Data on the number of journeys per person by main mode of transport and average distance travelled per person by mode of transport are sourced from the Travel Survey for Northern Ireland (TSNI). This survey is run by the Central Survey Unit of Northern Ireland Statistics & Research Agency, on behalf of the Department for Infrastructure.

Figure 1.3 Northern Ireland airport passenger numbers, 2001 – 2015

These data are provided by the Civil Aviation Authority and represent travellers who board or disembark an aircraft on a commercial flight at the reporting NI airport. They therefore exclude transit passengers who remain on board aircraft which land at the airport and then depart for another destination. Comparison from year to year can be difficult due to the nature of the data. Airlines are constantly reviewing their flights and can discontinue routes or establish new routes.

Figure 1.4 Number of journeys per person per year by main mode of transport, 2001-2003 to 2013-2015 and Table 1.5 Average distance travelled per person per year by mode of transport, 2001-2003 to 2013-2015

Information for the travel survey is collected using two methods. Individuals complete a seven day travel diary, which collects information on all journeys 50 metres or more. Details collected for each journey include the purpose of the journey, the length of the journey and the method of travel. Personal information is also collected in a computer interview. This allows details such as age, sex, working status, etc. to be linked to the journey data. As the sample size is relatively small (it has varied between 856 and 1,037 households interviewed in one year), three years of data need to be combined to ensure the analysis carried out is robust.

Use of data

Figure 1.3 Northern Ireland airport passenger numbers, 2001 – 2015

These data are used to input into and monitor government policies and strategies such as the Review of the Regional Transportation Strategy.

Figure 1.4 Number of journeys per person per year by main mode of transport, 2001-2003 to 2013-2015 and Table 1.5 Average distance travelled per person per year by mode of transport, 2001-2003 to 2013-2015

The TSNI is the only source of information on how, over the region as a whole, people use different forms of transport to meet their travel needs as individuals or family groups. It provides information to inform government policy, set objectives and monitor performance in relation to transport and travel in Northern Ireland.

Data Quality Assessment

Civil Aviation Authority (Figure 1.3):

Very Good – These data are derived from an administrative system with full coverage and incorporating various validation checks. In addition, variance checks are employed as an integral part of the publication production process with any large discrepancies between current and previous year or any inconsistencies queried with the data provider.

Travel Survey for Northern Ireland (Figures 1.4 & 1.5):

Very Good – These data are currently classified as National Statistics and are produced from a government survey which is of high quality. The data validation process ensures any discrepancies discovered are thoroughly checked, if necessary queried with the data provider, and corrected. In addition, variance checks are employed as an integral part of the publication production process with any large discrepancies between current and previous year checked and validated.

Data links

Figure 1.3 Northern Ireland airport passenger numbers, 2001 – 2015

DRD publish these data in Northern Ireland Transport Statistics

<https://www.infrastructure-ni.gov.uk/articles/northern-ireland-transport-statistics>

These data can also be found on Civil Aviation Authority website www.caa.co.uk

Figure 1.4 Number of journeys per person per year by main mode of transport, 2001-2003 to 2013-2015

DfI publish these data in the Travel Survey for Northern Ireland (TSNI)

<https://www.infrastructure-ni.gov.uk/articles/travel-survey-northern-ireland>

Figure 1.5 Average distance travelled per person per year by mode of transport, 2001-2003 to 2013-2015

DfI publish these data in the Travel Survey for Northern Ireland (TSNI)

<https://www.infrastructure-ni.gov.uk/articles/travel-survey-northern-ireland>

Public Opinion & Sustainability of Lifestyle (Figures 1.6 to 1.8)

Description of data and methodology (including strengths and limitations)

Data provided relate to the level of public concern for the environment and what actions the public take for environmental reasons. These data are sourced from the Continuous Household Survey (Tables 1.6, 1.7 and 1.8) run by the Central Survey Unit (CSU) of Northern Ireland Statistics & Research Agency. Further information on these statistics can be found at:

http://www.csu.nisra.gov.uk/CHS/results/CHS_results_6.htm

The annual Continuous Household Survey (CHS) is designed, conducted and analysed by the Central Survey Unit of the Northern Ireland Statistics and Research Agency (NISRA). It is based on a sample of the general population resident in private households and has been running since 1983. The CHS is based on a probability

sample of 4,500 addresses. This type of sample design is used so that estimates about the whole population can be made. The size of the sample is also sufficiently large so that the levels of precision around these estimates meet the standards required by customers.

The survey consists of both a household schedule and an individual schedule and both are administered as a CAPI (Computer Assisted Personal Interviewing) or face-to-face interview conducted by experienced NISRA survey interviewers in the respondents' homes. This method of data collection is considered to be the best option for collecting the type of detailed factual and attitudinal information asked in the survey. It is also recognised as the best method for ensuring that data collected are accurate and of the highest quality.

Both the household and individual schedules consist of core items that are included each year, modules that recur on a regular cycle and ad hoc modules. Core items include the enumeration of the household, accommodation, tenure, employment status, employment activity, educational qualifications, adult health and smoking/drinking behaviour. Non-core items include attitudes to environmental issues, prevalence of overnight and day trips, prevalence of smoking and sports and leisure activities. The 'environmental data' are collected in the household schedule and are based on the responses of approximately 2,500 households. The household schedule is completed by the Household Reference Person or spouse on behalf of the whole household.

The interviews are spread equally over a 12 month period (from April to the following March) to minimise the effect of seasonal influences on the data.

In any data from a survey there is the possibility of non-response bias. Non-response bias arises if the characteristics of non-respondents differ significantly from those of respondents in such a way that they are reflected in the responses given in the survey. Accurate estimates of non-response bias can only be obtained by comparing characteristics of the achieved sample with the distribution of the same characteristics in the population at the time of sampling. Such comparisons are usually made to the latest Census or Mid Year Populations Estimates. In recent years, no significant non-response bias at the household level (the level in which the 'environmental data' is collected) has been found on CHS. One of the main contributing factors for this is that the survey consistently achieves a household co-operation rate in excess of 70%. This coupled with the sample design deployed on CHS has helped to minimise non-response bias.

Because CHS data are based on a sample rather than the whole population it is subject to sampling error. Sampling error is the difference between the estimate derived from a sample and the 'true' value that would result if a census of the whole population were taken under the same conditions. Users should be aware of this when interpreting the data.

If the survey observations are collected from a random sample (like the CHS sample design), statistical theory allows us to estimate the likely size of the sampling error for any percentage estimate in a survey. The size of the sampling error is usually expressed in terms of a statistical measure called the standard error. The standard error (SE) of a survey estimate is calculated using the following formula:

$$SE = \sqrt{p(100-p)/n}$$

Where:

p = the proportion (population variance)

n = achieved sample size

Another commonly used measure of sampling error is the confidence interval, which is calculated using the standard error. Confidence intervals usually indicate the range of values around a survey estimate within which we are 95% sure that the true value for the whole population lies. Confidence intervals are more intuitive to use than standard errors and will usually be familiar to users who often use them when thinking about the level of precision around survey estimates. At the 95% confidence level, the range of values equates to approximately two standard errors (actually 1.96) plus or minus from the survey estimate.

Use of data

The surveys are designed to provide a regular source of information on a wide range of social and economic issues relevant to Northern Ireland. They can be used to gauge public awareness, opinion and attitude towards environmental issues over time.

Data Quality Assessment

Continuous Household Survey (Figures 1.6, 1.7 and 1.8)

Very Good - These data are currently classified as National Statistics and are produced from government surveys which are of high quality. In addition, variance checks are employed as an integral part of the publication production process with any large discrepancies between current and previous year queried with the data provider.

Data links

The following link shows levels of concern for the environment from the 2015-16 CHS data based on the responses of 2,495 households:

http://www.csu.nisra.gov.uk/CHS/results/tables/Concern_Environment.mht

If referencing the data, note that the true population lower limit figures were calculated by multiplying the SE by -1.96 and subtracting this from the survey estimate. The true population upper limit figures were calculated by multiplying the SE by +1.96 and then adding this to the survey estimate.

By way of illustration, the table in the link shows that the CHS survey estimated that 16% of Northern Ireland households in 2015-16 were 'very concerned' about the environment. By calculating the confidence intervals using the methods described above, users can be 95% confident that the true population figure of 'very concerned' NI households lies somewhere in the range 15% - 17%.

Statistics on carrier bag levy can be found at: <https://www.daera-ni.gov.uk/publications/carrier-bag-levy-annual-statistics>

Chapter 2: Air & Climate

Air Quality (Figures 2.1 to 2.5)

Description of data and methodology (including strengths and limitations)

The data provide information on air quality including ambient concentrations of nitrogen oxides, particulate matter, ozone, polycyclic aromatic hydrocarbons and sulphur dioxide. The ambient air quality data are provided by Ricardo Energy & Environment, an international consulting firm, working in the areas of climate change, energy and environment. Data are fed to Ricardo Energy & Environment from individual monitoring sites. Ricardo Energy & Environment currently looks after the UK (and NI) Air Quality Archive.

The data presented in this report for each air pollutant is generally an average of values for selected air pollution monitors (monitors are selected by type – e.g. ‘roadside’, ‘urban’, and ‘rural’). These averages are useful for indicating trends across specific types of sites in the NI monitoring network; however, they can mask problems / exceedences at individual sites. Although the average value for a pollutant may be below an EU threshold, this does not mean that no sites in NI are experiencing exceedences.

Use of data

The data are collected for the purpose of monitoring air quality; to assess levels of pollutants which are contained in the UK Air Quality Strategy and the EU Air Quality Directives.

The information presented in this report represents a spread of monitoring data obtained from a range of sites; NI and UK government use the data to assess levels of pollutants at individual sites with regard to EU Air Quality Directive Limit Values and Objectives.

District councils use information from specific sites to assess local air quality in their areas (with regard to the UK Air Quality Strategy); to declare Air Quality Management Areas where air quality is a problem, and then develop Air Quality Action Plans to tackle the problem.

Data quality assessment

Good - The ambient air quality data are sourced from the Automatic Urban and Rural Network, the UK’s national air quality monitoring network. The Network is operated to a documented quality assurance and quality control programme, and data are subject to validation and ratification procedures, described on the Air Quality Archive at: http://www.airqualityni.co.uk/verification_and_ratification.php. However, there can sometimes be gaps in the data due to equipment failure at monitoring stations, meaning that data from individual stations in particular years may not meet minimum criteria. The department makes every effort to ensure the efficient operation of monitoring sites, with arrangements in place with contractors and local site operators to deal with equipment failure. Monitoring stations are closed or re-sited only when there

is a clear need, and where it is felt that the long-term evidence base provided by monitoring of specific pollutants will not be adversely affected.

Data links

Data from monitoring sites (shown on a map) are available immediately (or as soon as possible) at www.airqualityni.co.uk.

DAERA produces an annual report on air quality (Air Pollution in NI) – see website for details (<http://www.airqualityni.co.uk/news-and-reports/technical-reports>).

Data are fully compatible with UK (and by extension with EU) reporting and monitoring standards (<http://uk-air.defra.gov.uk/>).

Please also see <http://uk-air.defra.gov.uk/air-pollution/uk-eu-limits> for air quality information on standards, objectives, target values and limit values.

Ammonia Emissions (Figure 2.6)

Description of data and methodology (including strengths and limitations)

The ammonia emissions data are provided by North Wyke Research. These data are compiled as part of the annual submission of the UK ammonia emissions inventory, required under the UNECE (United Nations Economic Commission for Europe) Gothenburg Protocol and the EC National Emissions Ceilings Directive.

Activity data regarding livestock numbers and fertiliser nitrogen use are collected on an annual basis by Devolved Administration from the relevant survey web-sites (<https://www.daera-ni.gov.uk/articles/agricultural-census-historical-data>) and through direct liaison with the relevant statistical bodies (e.g. Farm Business Survey).

Activity data regarding farm management practices (e.g. livestock housing types, manure storage and spreading practices) are derived from ad-hoc surveys, mostly relating to England (e.g. <https://www.gov.uk/government/collections/farm-practices-survey>) but extrapolated to the UK as a whole.

The reported data are subject to uncertainties – of the order of $\pm 20\%$ at the UK level.

Use of data

The data are used by the UK Government for official reporting purposes under the UNECE Gothenburg Protocol and The EC National Emissions Ceilings Directive. The data are also used by academic groups for modelling the impacts of ammonia emissions through eutrophication, acidification and fine particulate formation.

Data quality assessment

Good – Activity data regarding livestock numbers and fertiliser nitrogen are generally considered to be robust. However, activity data regarding farm management practices are less robust and improved data sources are being sought.

Data links

The data are reported annually on the National Atmospheric Emissions Inventory website in the publication 'Air Quality Pollutant Inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2014' (specifically for the 2014 submission) – see <http://naei.defra.gov.uk/reports/>

Data are reported at UK level using the same methods.

Greenhouse Gases (Figures 2.7 to 2.9)

Description of data and methodology (including strengths and limitations)

The data on all greenhouse gas emissions and carbon dioxide emissions are reported by source sector. These data are sourced from Ricardo Energy & Environment, an international consulting firm, working in the areas of climate change, energy and environment. Further details on greenhouse gases can be found in the Northern Ireland greenhouse gas inventory 1990-2014 statistical bulletin and in the 'Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland' reports at:

- <https://www.daera-ni.gov.uk/publications/northern-ireland-greenhouse-gas-inventory-1990-2014-statistical-bulletin>
- http://naei.defra.gov.uk/reports/reports?report_id=894

The United Nations Framework Convention on Climate Change (UNFCCC) was ratified by the United Kingdom in December 1993 and came into force on the 21st March 1994. The objective of the Convention is to stabilise greenhouse gas (GHG) emissions to the atmosphere and reduce the anthropogenic interference with the climate system. In order to achieve this, the international community needs to monitor progress, requires accurate information on trends of emissions of GHGs, and the collective ability to alter these trends.

The basic equation for estimating most emissions is: activity data multiplied by an emission factor. Activity data can include, for example, the combustion of a given fuel at a power station, or the number of cows. An emission factor is the emissions per unit of activity, reflecting on the carbon content of the fuel for example. For some sources, the calculation of emissions is more complicated, and therefore a model is used to estimate emissions, for example, in the transport sector.

In the compilation of GHG inventories for the constituent countries of the UK, where possible, the same methodology has been used to calculate emission estimates as for the UK Inventory. However, for many emission sources the data available for constituent country emissions are less detailed than for the UK as a whole, and for some sources country-level data are not available at all.

For more detail see 'Data Sources and Inventory Methodology' in the latest (1990-2014) Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland report: http://naei.defra.gov.uk/reports/reports?report_id=894

The statistics on greenhouse gas emissions follow international guidelines on quality and methodology for National Greenhouse Gas Inventories from the Intergovernmental

Panel on Climate Change. These guidelines focus on the quality components of accuracy, completeness and transparency. The UNFCCC carries out regular reviews of the national inventories. The most recent published review from 2013 found that the UK inventory was generally in line with the Intergovernmental Panel on Climate Change (IPCC) Guidelines. Link to 2013 UNFCCC review of UK annual submission:

http://unfccc.int/documentation/documents/advanced_search/items/6911.php?preref=600008011

The major limitation of the data applies across the UK, but to Northern Ireland in particular, and concerns the uncertainty around the statistics. The 2014 NI GHG emission estimates are based on a wide range of data sources that are associated with some degree of uncertainty; an overall analysis of the inventory totals using a Monte Carlo simulation model indicates that the uncertainty relating to the 2014 NI inventory total emissions is $\pm 7\%$. The 95% confidence interval for the percentage reduction between 1990 and 2014 is between 8% and 29%, with a central estimate of 17.4%. The confidence intervals around the estimates are considerably narrower than in previous inventories due to new analysis from the Agricultural Greenhouse Gas Inventory Research Platform.

Use of data

The GHG inventories for England, Scotland, Wales and Northern Ireland help to support evidence-based development of climate change policy by the Scottish Government, Welsh Government and the Northern Ireland Executive, and are a mechanism to enable the tracking of progress towards achieving country-specific GHG emission reduction targets.

The implementation of new UK and country-specific legislation means that the requirements of the GHG inventories for the constituent countries are evolving, with a much greater focus on (i) sector-specific data accuracy, and (ii) sensitivity to policy impacts.

The UK Climate Change Act commits the UK to reducing emissions by at least 80% by 2050 from 1990 baseline levels.

Data quality assessment

Very Good - These estimates produced are of high quality and each year the greenhouse gas inventory is extended and updated, and the whole historical data series is revised to incorporate methodological improvements and new data. This takes into account revisions to the datasets which have been used in its compilation. However there is always going to be some level of uncertainty in the estimates of greenhouse gas emissions, and this uncertainty changes from year-to-year as the methodology and input data of the inventories changes. These uncertainties are presented as confidence intervals and such figures are contained within the appendices of the Devolved Administration report.

Data links

The Greenhouse Gas Inventories measure anthropogenic emissions, and so are strongly linked to the population and economic activity of a region. Emissions in a particular year can also be heavily influenced by the weather.

For more detail see the latest NI Greenhouse Gas Inventory statistical bulletin, available at <https://www.daera-ni.gov.uk/publications/northern-ireland-greenhouse-gas-inventory-1990-2014-statistical-bulletin>

For further information, please follow the link: <https://www.daera-ni.gov.uk/topics/protect-environment/climate-change>

Renewable Energy (Figure 2.10)

Description of data and methodology (including strengths and limitations)

Renewable Electricity generation and total electricity consumed data for Northern Ireland are provided by Northern Ireland Electricity Networks Ltd (NIE Networks) to the Department for the Economy (DfE) on a monthly basis.

When calculating the monthly renewable figures, NIE Networks includes:

1. Generation for wind farms called up by the System Operator for Northern Ireland (SONI)
2. Generation for wind farms called up by NIE Networks
3. Generation from all other renewable sources

Electricity produced by those who generate their own electricity (mainly for their own use but some of which may 'spill' onto the distribution network) is excluded as information about such 'micro generation' or consumption is not available to NIE Networks.

Use of data

The figures are used by DfE to:

- (i) Monitor progress against the NI Executive's Programme for Government 2011-15 target of 20% consumption from renewable sources by 2015; and
- (ii) Monitor progress against the 40% consumption from renewable sources by 2020 Strategic Energy Framework (SEF) target;
- (iii) Answer Assembly Questions, correspondence cases, Ministerial briefings and general queries.

Data are used by many organisations/groups including:

- NI Assembly - Monitoring PfG 2011-15 Commitments
- DfE – Monitoring SEF target, PfG target, AOs, correspondence cases
- Department for Infrastructure – Part input for AOs, correspondence cases etc.
- DAERA – Part input for AOs, correspondence cases etc.

- Ofgem
- Department for Business, Energy & Industrial Strategy (BEIS) – Input for UK Renewables Roadmap
- Environmental Organisations
- Industry stakeholders – Electricity generators, suppliers, installers, manufacturers, users

Data quality assessment

Good – The data are primarily gathered by NIE Networks, on a monthly basis. Following receipt, DfE perform checks to verify that information is consistent both within and across returns. Trend analyses are used to monitor annual variations and emerging trends. Any queries arising from these checks are presented to NIE Networks for clarification and if required, returns may be amended and/or re-submitted. When compiling the figures NIE Networks acknowledge that they do not have sight of generation output or consumption arising from micro generation and these figures are not included in any calculations so not all renewable generation or all electricity consumption are captured in the figures.

Data links

DfE publish a report on electricity consumption and renewable generation in Northern Ireland bi-annually. The most recent report can be found here: <https://www.economy-ni.gov.uk/articles/electricity-consumption-and-renewable-generation-statistics>. The data are used to monitor performance against Programme for Government 2011-15 (PfG) and Strategic Energy Framework (SEF) targets and on an ad hoc basis in relation to answering AQ's, correspondence cases and general queries.

The Department for Business, Energy & Industrial Strategy (BEIS) collect data to monitor against targets and they publish renewable electricity statistics which are available at <https://www.gov.uk/government/collections/renewables-statistics>

Environmental Installations (Figure 2.11)

Description of data and methodology (including strengths and limitations)

This indicator provides data on planning applications for environmental installations, provided by DfI Planning NI. These include single wind turbines, wind farms, solar panels, biomass energy, heat pumps, anaerobic digestion, hydroelectric schemes etc.

Data are taken from an administrative system, with full coverage and incorporating various validation checks.

Use of data

The data provide useful and relevant information on the level and trends in planning applications and decisions to users. It allows comparison between different years. In particular, the percentage of decisions permitted, and the percentage of decisions made in a specified time period allow for an assessment of the performance and efficiency of planners.

Data quality assessment

Very Good – Any data produced is subject to quality assurance before final release.

Data links

Link to full publication on DFI website:

<https://www.infrastructure-ni.gov.uk/publications/northern-ireland-planning-statistics-april-2015-march-2016>

Climate Change (Figures 2.12 to 2.15)

Description of data and methodology (including strengths and limitations)

These data tables provide details of temperature and rainfall changes from 1844 and 1854 respectively, to present. These meteorological data are sourced from Armagh Observatory, which has the longest series of meteorological records from a single site in the UK or Ireland.

The raw temperature data have been standardised and corrected for various instrumental and exposure effects. The complete daily rainfall series from 1836 to present has been standardised and is subject to data verification and correction.

Use of data

This databank is operated by Armagh Observatory as a resource for education, scientific research and the general public.

Data quality assessment

Very Good – These data are produced from daily readings of air temperature and rainfall.

Data links

Further details can be found at: <http://climate.arm.ac.uk/contents.html>

Chapter 3: Water

Water (Figures 3.1, 3.2, 3.3, 3.4, 3.5, 3.6)

Description of data and methodology (including strengths and limitations)

The figures in this section report on the condition of Northern Ireland's inland waters including river, lake and groundwater quality. Data relating to the levels of compliance with waste water standards are also reported. These data are provided by the Northern Ireland Environment Agency.

The Water Framework Directive monitoring strategy can be found here:
<https://www.daera-ni.gov.uk/publications/aquatic-monitoring-strategy-2006-07-and-water-framework-directive-monitoring-plans-2006>

Directive 2000/60/EC requires the establishment of monitoring programmes for surface waters and addresses types; methods and frequency of monitoring required, and the development of monitoring networks built on existing programmes to ensure they meet the monitoring, classification and reporting requirements of the WFD.

The document Rationale for Water Framework Directive Freshwater Classification describes how WFD freshwater classification has been undertaken for the first River Basin Plan. It describes the rationale behind classification, the biological, chemical and physical quality elements monitored, the monitoring networks and how classification was produced - <https://www.daera-ni.gov.uk/publications/uktag-recommendations-surface-water-classification-schemes-purposes-water-framework>

Northern Ireland Environment Agency (NIEA) has operated a groundwater monitoring network since 2000. In 2006 a major review was undertaken to ensure a fit-for-purpose network was in place to meet the requirements of the Water Framework Directive (2000/60/EC) for groundwater monitoring. Since then a lot of boreholes have been lost from the network as groundwater is no longer utilized for public supply. The current groundwater monitoring network consists of a small number of boreholes and springs and NIEA rely on the co-operation of land/ property owners to continue sampling from their groundwater source to monitor this network. This means that the network can change due to businesses closing or changing groundwater usage.

Article 8 of the Water Framework Directive (WFD) establishes the requirement for a monitoring programme for groundwater. Monitoring data are used to inform whether Article 4 environmental objectives are met, including the assessment of groundwater chemical status and significant, long-term pollutants trends resulting from human activity. Data from the monitoring network also inform the programme of measures and support the validation of Annex II risk assessments. Furthermore the Groundwater Daughter Directive (2006/118/ EC) deals with objectives for groundwater quality (which is informed by monitoring) and creates measures to prevent and control groundwater pollution. It includes criteria for assessing good groundwater chemical status, for identifying pollution trends, and for establishing starting points for trend reversal.

Reducing nutrients is an integral part of the Water Framework Directive (2000), which establishes a comprehensive, cross-border approach to water protection organised around river basin districts (RBDs), with the aim of achieving good status for European bodies of water by 2015. NIEA monitors a number of quality elements and parameters when considering eutrophication pressures, including nitrates. Eutrophic waters are identified using WFD nutrient standards

In 2009, a revision of the surface freshwater monitoring network was carried out to include broadening the monitoring coverage in Northern Ireland under the EC Water Framework Directive (2000/60/EEC) (WFD) for the 6-year period 2009-2014. The proposal aimed to reduce the numbers of monitored sites from 579 to 528 whilst continuing to fulfil monitoring obligations under WFD, Freshwater Fish Directive (FFD) and Nitrates Directive (ND). However further financial constraints led to another

revision of the network. In 2010, the new approach incorporated monthly sampling at a reduced number of core sites with the remainder of sites monitored for 2 years within the 6-year River Basin Plan cycle on a rolling programme basis (2009-2014). This means that the average number of monthly samples analysed for nutrients has been reduced.

For the first river basin plan in 2009 size thresholds taken from the Directive were used to delineate 623 surface water bodies (rivers, lakes, transitional and coastal). During the first cycle there have been improvements made on the water body sets through better understanding of catchment characteristics and increased local knowledge. This has resulted in changes to the number of water bodies within the Northern Ireland. This is a refinement of the reporting and management units, but the total area covered by the Plan is not affected. The classification tools and standards that will be used for WFD classification from 2015 have changed during the first river basin cycle. It was always considered that, given the complexity of the classification tools and with the WFD emphasis on looking at various elements in connection with one another (e.g. for rivers, phosphorus, aquatic plants (macrophytes) and phytobenthos (diatoms) for nutrient enrichment) that there would be the need for further development. So revisions have been made to these tools and standards so that they now align much better. For the second cycle there are 496 surface water bodies in Northern Ireland, including 450 rivers, 21 lakes, and 25 transitional and coastal waters. More information on these revisions can be found at the following link:

<https://www.daera-ni.gov.uk/sites/default/files/publications/doe/water-body-boundary-changes-for-the-final-river-basin-plans-2015.pdf>

<https://www.daera-ni.gov.uk/sites/default/files/publications/doe/water-report-ni-wfd-statistics-october-2015.pdf>

The data for Industrial Discharge Quality are obtained through samples of effluent lifted by water quality staff, with testing carried out at the laboratory in Lisburn. Results are then fed into the database to allow the calculation of compliance statistics.

Compliance with the requirements of the Urban Waste Water Treatment (UWWT) Regulations is assessed by NIEA based on monitoring data supplied by Northern Ireland Water (NIW) according to an agreed sample programme. Details of the sampling requirements, analysis procedures, analytical quality control criteria and compliance assessment are included in the UWWT Regulations.

<http://www.legislation.gov.uk/nisr/2007/187/contents/made>

To obtain the Water Utility Discharge Quality data samples are collected of WWTW effluent by SERCO Ltd which is contracted by NIW and the PPP operators. These samples are analysed in the NIW Waste Water Analysis Laboratory, Altnagelvin, Londonderry. SERCO takes samples for WWTW effluent quality analysis for the requirements of the UWWT Regulations and the Water Order. The results are sent from NIW to NIEA Water Utility Regulation Group (WURG) where they are loaded onto the database to allow compliance assessment to take place. This compliance assessment is of the quality of the effluent and the number of samples. There is also a program (AMAP) that audits the results of NIW. Samples of effluent are lifted by water quality staff. Testing is carried out by the laboratory in Lisburn. Results are sent to the

Regulation Group where they are compared to the Self-Monitoring results from NIW. A Quality Audit (conducted to UKAS standards; ISO 170925) is carried out annually by Regulation Group staff on the NIW Waste Water Analysis laboratory.

Use of data

Data are requested by consultants, environmental pressure groups and academia. Data are also used by the Commission for determining compliance (the compliance data is used to produce the Annual Compliance Summary Report for the Water Utility sector which is published annually on the NIEA website), to inform enforcement, to encourage improved performance, to input into NIW Price control investment programs and may also be used within the UK for ongoing work with the development of WFD environmental standards and procedures. The Data also allow for reporting against Departmental targets.

Data are often requested by Catchment Officers attending Catchment Stakeholder Groups. Local angling and other environmental groups also request information regarding specific WWTWs.

These data are used in the NIEA Annual Statistics booklet and in the NIEA State of the Environment Reports.

The data also contribute towards future plans and have been used to answer questions from elected representatives and parliamentary committees.

The data are used for monitoring against the following directives:

- The Water Framework Directive (Classification, Priority Substances and Shellfish Waters) Regulations (Northern Ireland) 2015
http://www.legislation.gov.uk/nisr/2015/351/pdfs/nisr_20150351_en.pdf
- Groundwater Daughter Directive (2006/ 118/ EC)
- Nitrates Directive (91/676/EC) aims to protect water quality across Europe by preventing nitrates from agricultural sources polluting ground and surface waters and by promoting the use of good farming practices.
<http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1991L0676:20081211:EN:PDF>

The EC Urban Waste Water Treatment Directive (UWWTD, 91/271/EEC) (<http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1991:135:0040:0052:EN:PDF>) sets down minimum standards for the discharge of treated effluent from waste water treatment works (WWTWs). The Directive is transposed into Northern Ireland legislation by the Urban Waste Water Treatment Regulations (Northern Ireland) 2007 S. R. No 187 (<http://www.legislation.gov.uk/nisr/2003/278/introduction/made>). The goals of both Directives are complementary and aimed at reducing nutrient inputs into waters from the urban and agricultural sectors

The data are often requested by Catchment Management Officers attending Catchment Stakeholder Groups. Local angling and other environmental groups also request

information regarding specific WWTWs. It is also used when reporting to the Chief Executive/ Minister on achievement of Departmental targets. Compliance data are supplied on a quarterly basis in an edited form to the Utility Regulator.

Data quality assessment

Figures 3.1, 3.2

Good – These data are of high quality and are collected through quality controlled scientific monitoring programmes. Monitoring of river, lake and groundwater quality is carried out routinely against national standards for the Water Framework Directive (WFD). The WFD Classifications are required to report to Europe on a 6-yearly basis. The next update required is 2021; an interim update will be carried out and included in this report in 2018 (including updates to end of 2017).

Figures 3.3, 3.4, 3.5, 3.6

Very Good – These data are of high quality and are collected through quality controlled scientific monitoring programmes. Monitoring of river, lake and groundwater quality is carried out routinely against national standards for the Water Framework Directive. Monitoring of effluent discharge is conducted and compliance is assessed against limits set under the Water (NI) Order and Pollution Prevention and Control Regulations (NI). In addition, variance checks are employed as an integral part of the publication production process and any large discrepancies between current and previous year queried with the data provider.

Data links

Data are first published in the Northern Ireland Water Framework Directive Statistics Report. They will also appear in the NIEA water statistics booklet and on the NIEA WFD web mapper. There will be EC publications that include the data such as from the European Environment Agency.

Please see links below:

<https://www.daera-ni.gov.uk/sites/default/files/publications/doe/water-report-ni-wfd-statistics-october-2015.pdf>

<https://www.daera-ni.gov.uk/publications/northern-ireland-water-management-facts-and-figures-2014>

<http://appsdaera-ni.gov.uk/RiverBasinViewer/>

<https://www.daera-ni.gov.uk/articles/nitrates-directive>

http://ec.europa.eu/environment/water/index_en.htm

A major reason for collecting the data is to allow comparison within Europe and the UK.

Some examples include:

<http://www.eea.europa.eu/themes/water/interactive>

<http://data.defra.gov.uk/env/doc/Environmental%20Statistics%20key%20facts%202012.pdf>

The Water Utility Compliance Assessment Reports are published annually on the webpage (link below) annually when Ministerial approval is given. The exact date for this can vary from year to year

This webpage has links to previous reports dating back to 2001:

<https://www.daera-ni.gov.uk/articles/regulating-sewage-discharges>

The annual compliance data also feature in the NI State of the Environment Report.

UWWTD compliance is reported to the European Environment Agency (EEA) every two years via the Environment Agency and DEFRA.

The data are quality checked by Regulation Group using a web-based tool supplied by the EEA.

After the data are supplied to the EEA, they are published in a report the most recent being, Waste Water Treatment in the United Kingdom – 2012, published by DEFRA.

<https://www.gov.uk/government/publications/waste-water-treatment-in-the-uk-2012>

River and lake quality: <https://www.daera-ni.gov.uk/topics/water/river-basin-management>

<https://www.daera-ni.gov.uk/consultations/draft-water-framework-directive-priority-substances-and-classification-amendment>

Groundwater quality: <https://www.daera-ni.gov.uk/articles/groundwater>

Discharge quality: <https://www.daera-ni.gov.uk/topics/water/discharges>

Water (Figure 3.7)

Description of data and methodology (including strengths and limitations)

The figures in this section report on drinking water quality with data provided by the Drinking Water Inspectorate, a unit within the Northern Ireland Environment Agency.

<https://www.daera-ni.gov.uk/articles/duties-drinking-water-inspectorate-dwi>

The UK drinking water quality regulators assess drinking water quality based on 'overall % compliance' which takes account of all the sampling carried out by the water companies at water treatment works, within the distribution system, and finally at the customers tap. This reflects the companies' regulatory compliance and is also the figure which is reported to the EU in making returns on the Drinking Water Directive.

Public Water Supplies – NI Water are responsible for collecting and compiling the data (lifting & analysing samples). Any contraventions of the regulations are notified to the Drinking Water Inspectorate (DWI). Details of these contraventions are held on the public water supplies database. For the public supply sampling is carried out by samplers accredited by the United Kingdom Accreditation Service (UKAS) and the

analysis is undertaken using UKAS (ISO 17025) accredited laboratories in order to ensure the integrity of the data.

Private Water Supplies – The DWI have a regulatory responsibility for the sampling and analysis of registered private water supplies. An annual sampling programme is in place for each supply. The frequency of sampling and the range of parameters tested are determined by the type of the supply and the volume of water used or population served. DWI work closely with the local councils who lift the samples on their behalf. The data collected are then stored on the private water supplies database. For private water supplies the sampling is carried out by trained samplers and the analysis is undertaken using UKAS (ISO 17025) accredited laboratories in order to ensure the integrity of the data.

The data produced, through the analysis of drinking water has to comply with strict quality systems to ensure the integrity of the data. In NI this means the analysis is required to be undertaken by a competent person and that laboratories have ISO 17025 (and Drinking Water Testing Specification (DWTS)) accreditation.

The data for certain parameters is based on a limited number of annual samples, and the number of analyses undertaken per year can change dependent on population. The number of pesticides analysed also changes from year to year and is based on the assessment of risk.

For private water supplies the number of supplies monitored may change during the year as new supplies come onto the list and other supplies are removed. Also, the list of parameters and their frequency can be adjusted based on the assessment of risk.

Use of data

The data are collected from both Public and Private Water Supplies in order to monitor and assess compliance with The Water Supply (Water Quality) Regulations (Northern Ireland) 2007 and The Private Water Supplies Regulations (Northern Ireland) 2009 respectively. The data are also used in making a return to Europe on the Drinking Water Directive (DWD) under Water Information System for Europe (WISE).

Public Water Supplies – The data are used in the following ways:

- By the Drinking Water Inspectorate to ensure compliance with the regulations and to identify trends and to initiate enforcement if required;
- By NI Water to inform their drinking water safety plans (Regulation 27 risk assessments) and are also used to inform investment;
- To inform local councils on the quality of drinking water within their areas;
- Returns to Europe under WISE;
- By the Consumer council dealing with customer complaints, and
- By Consumers interested in the quality of their drinking water.

Private Water Supplies – The data are used in the following ways:

- By the Drinking Water Inspectorate to ensure compliance with the regulations, and that the water is clean and safe to drink.
- To inform risk assessments of private water supplies, to identify where treatment is needed, and inform where enforcement may be required;
- To inform local councils on the quality of private water supplies within their areas;
- Returns to Europe under WISE, and
- To inform the supply owner/users of the quality of their supply.

Data quality assessment

Very Good – These data are of high quality and are collected through quality controlled monitoring programmes.

Data links

NI Water publish their data on the public water supply in their Drinking Water Quality Annual Report. This report is published by the end of June each year and can be found at <http://www.niwater.com/reports/>.

The latest DWI annual report was published in December 2016 and can be downloaded from: <https://www.daera-ni.gov.uk/publications/drinking-water-quality-northern-ireland>

The NI data are comparable with the rest of the UK and are reported to Europe as part of the UK member state return under WISE. Europe then produces a synthesis report on the quality of drinking water in the Member States of the European Union.

Water (Figure 3.8)

Description of data and methodology (including strengths and limitations)

The figures in this section report on water pollution incidents. These data are provided by Northern Ireland Environment Agency: <https://www.daera-ni.gov.uk/articles/pollution-response-northern-ireland>

The initial report/complaint data are received via telephone and email from the public, other government departments, stakeholders or NIEA staff.

A dedicated team inputs this data into the database and assigns a member of staff to investigate the report and input any further data associated with this report. The Lead Investigating Officer (LIO) will investigate the incident and update the Pollution Incidents Management System (PIMS) database with the details.

The data are audited monthly to ensure correctness of detail and confirming that current procedures and processes are being complied with.

One limitation is that decisions are made on the appropriate enforcement action for each incident and this is based on numerous factors – some of these factors will not be evident from raw data. The user will not be aware of all the factors when attempting to interpret the raw data.

The strength of the data is their reliability and accuracy. This is due to the robust methodologies by which they are collated, managed and regularly audited. The data have been available for a number of years allowing trend analyses and graphical demonstration of same.

Use of data

The information is collected for the purpose of recording, monitoring and managing all aspects and enforcement outcomes associated with water pollution incidents in Northern Ireland.

Regular requests are made to the team by the DAERA Minister, MLAs, Councillors, Press Office, NGOs and other stakeholders to provide them with the number, type and severity of pollution incidents in their area. Specific incident details are often requested. Data are supplied to the Minister and Press Office in respect of certain significant or high profile incidents e.g. where there is significant media interest.

The data are reported annually on the NIEA Website:

<https://www.daera-ni.gov.uk/articles/pollution-response-northern-ireland>

Data quality assessment

Very Good – These data are of high quality and are collected through quality controlled scientific monitoring programmes.

Data links

UK partner Environment Agencies produce annual statistics on their respective web sites. NIEA incident severity categorisation is directly comparable to England and Wales with NIEA High Severity = E&W Category 1; Medium Severity = E&W Category 2; Low Severity = E&W Category 3.

Chapter 4: Marine

Marine (Figure 4.1)

Description of data and methodology (including strengths and limitations)

This section looks at the quality of Northern Ireland's bathing water. These data are provided by DAERA Marine and Fisheries Division.

Directive 2006/7/EC requires regular review of identified bathing waters. The number of bathers is assessed at bathing waters as the main criterion for assessing whether a bathing water should be identified or de-identified.

The bathing water quality data are collected by enumerating bacterial counts from samples of bathing waters. Bacterial counts are standardised using 90th and 95th percentiles and these figures used for comparison against the EU Directive.

Use of data

During the bathing season (01 June – 15 September) weekly data is displayed on the NI Direct website and the Departmental website.

All the bathing water data is compiled at the end of the bathing season and compliance results are forwarded to the Environment Agency in England who then inform the EU.

Data quality assessment

Very Good – These data are of high quality and are collected through scientific monitoring programmes. Monitoring of marine bathing waters is carried out in line with national standards developed for the Bathing Water Directive. DAERA Marine and Fisheries Division participates in both internal and external quality control schemes and has full UKAS (United Kingdom Accreditation Service) accreditation for the microbiological analysis required under Annex I of Directive 2006/7/EC. These measures and controls mean there are high levels of confidence in the data reported.

Data links

The data are published on the NI Direct website.

<http://www.nidirect.gov.uk/index/information-and-services/environment-and-greener-living/environmental-quality-in-your-area/bathing-water-quality.htm>

and the Departmental website

<https://www.daera-ni.gov.uk/articles/bathing-water-quality>

All data are reported back to the Environment Agency in England and then to the EU. Data are comparable to that in other parts of the UK and Europe as all data are referenced to the Directive 2006/7/EC (http://ec.europa.eu/environment/water/water-bathing/index_en.html)

Marine (Figure 4.2)

Description of data and methodology (including strengths and limitations)

This section looks at the quality of Northern Ireland's beaches and marinas. These data are provided by Keep Northern Ireland Beautiful (previously called Tidy Northern Ireland).

Beaches with an 'excellent' water quality compliance result may be eligible for the Blue Flag award, which also looks at beach management and facilities such as litter collection, toilets, car parking, disability access and life-saving equipment. Each application for Blue Flag status is brought before a jury of experts to ensure it meets all criteria and the beach/marina is inspected by Keep Northern Ireland Beautiful as the

national operator for Blue Flag. In addition an international inspector from the Foundation for Environmental Education may carry out spot inspections.

Use of data

The Blue Flag Award is the definitive international beach award recognised in 46 countries, owned and run by the independent non-profit organisation Foundation for Environmental Education. The programme is designed to raise environmental awareness and increase good environmental practice amongst tourists, local communities and beach and marina operators.

Data quality assessment

Very Good – These data are taken from an administrative system with full coverage and incorporating various validation checks.

Data links

For more information please see the following link:

<http://www.keepnorthernirelandbeautiful.org/cgi-bin/generic?instanceID=29>

A map of all Blue Flag Beaches can be found on the International Blue Flag Beach website: <http://www.blueflag.global/>

Marine (Figures 4.3 and 4.4)

Description of data and methodology (including strengths and limitations)

These sections look at the quality of Northern Ireland's estuarine and coastal water. These data are provided by DAERA Marine and Fisheries Division.

Monitoring of marine water quality, including shellfish waters, is carried out in line with national standards developed for the Water Framework Directive. DAERA Marine and Fisheries Division participates in both internal and external quality control schemes. These measures and controls mean there are high levels of confidence in the data reported.

Use of data

To allow DAERA Marine and Fisheries Division to monitor the status of these water bodies and assess current standards against relative Directives

Data quality assessment

Figures 4.3

Very Good – These data are of high quality and are collected through scientific monitoring programmes.

Figure 4.4

Good - These data are of high quality and are collected through scientific monitoring programmes however, there may be some gaps in the data.

Data links

For more details please see:

http://www.legislation.gov.uk/nisr/2015/351/pdfs/nisr_20150351_en.pdf

and

<https://www.daera-ni.gov.uk/articles/bathing-water-quality>

<https://www.daera-ni.gov.uk/articles/designated-shellfish-waters>

<https://www.daera-ni.gov.uk/topics/water/river-basin-management>

Marine (Figure 4.5)

Description of data and methodology (including strengths and limitations)

This section looks at Northern Ireland's sea temperature. These data are provided by the Agri-Food and Biosciences Institute (AFBI).

Data are collected using temperature sensors (thermistors) attached (near the surface and seabed) to a permanent mooring in the north western Irish Sea. Data are downloaded from sensors during regular marine surveys. Sensors are robust, have a five year battery life and are accurate to 0.1 degrees Celsius. Temperature values are recorded every three hours and the figures presented in this report show a daily average of these values.

Use of data

Data are collected as part of a long-term research programme investigating the influence of the physical environment on the marine ecosystem in the Irish Sea. The time-series now consists of some 21 years of data and it will now be possible for marine scientists to undertake a detailed analysis of the data to investigate inter-annual variability in the seasonal development of water column stratification and to determine whether there are any trends in the data.

Data Quality Assessment

Very Good – Daily sea temperature levels are recorded every three hours, at the Irish Sea mooring site, and from these readings a daily mean is calculated. The raw temperature data are subject to a regular calibration check.

Data links

Thermistors record temperature data which are reported in degrees Celsius which is accepted and comparable to other temperature measurements in UK and Europe.

<https://www.afbini.gov.uk/articles/coastal-monitoring>

Beach and Marine Litter (Figures 4.6 and 4.7)

Description of data and methodology (including strengths and limitations)

The objective of Descriptor 10 of the EU Marine Strategy Framework Directive is that:

'Properties and quantities of marine litter do not cause harm to the coastal and marine environment.'

Marine litter is a global concern, affecting all the oceans of the world. Every year, millions and millions of tons of litter end up in the ocean posing environmental, economic, health and aesthetic problems.

The persistence of marine litter is the result of poor practices of solid waste management, lack of infrastructure and a lack of awareness of the public at large about the consequences of their actions.

The distribution of litter is highly variable, which needs to be taken into consideration for monitoring programmes. It is necessary to identify the activity to which it is linked including, where possible, its origin. There is still a need for further development of several indicators, notably those relating to biological impacts and to micro-particles, as well as for the enhanced assessment of their potential toxicity.

Monitoring programmes were initiated in recent years firstly by the Northern Ireland Environment Agency and then carried on by the Department of Agriculture, Environment and Rural Affairs Marine Division.

To account for litter in both the coastal and the marine environment, monitoring addressed two issues:

- Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source.
- Trends in the amount of litter deposited on the sea- floor, including analysis of its composition, spatial distribution and, where possible, source.

Since September 2012, four surveys per year have been carried out on 14 reference beaches around Northern Ireland using the internationally adopted OSPAR survey methodology. This method will be used across Europe for reporting under the Marine Strategy Framework Directive (MSFD). Designated bathing beaches were not considered necessary for survey due to the cleansing operations in place.

Once a suitable beach has been identified, a one kilometre section of it is chosen to be the reference area. Within this kilometre, a section 100 metres long is chosen for the detailed survey. This area is usually chosen to avoid things like streams running over the beach, or because a particular landmark will make identification of the start point easier. All the start and end points were recorded using a handheld Global Positioning System (GPS) during the first survey of each beach, and used to ensure the same

stretch of beach was subsequently surveyed. Along the one kilometre stretch every item over 50 centimetres, and any industrial gloves are recorded. Over the 100 metre section every item of litter, no matter what size, is recorded. Most litter ends up in a band a few metres wide around the high tide line and stays there. Once all the data have been collected, results are combined from the 100 metre stretch on each of the 14 beaches to work out the average number of pieces of litter over a kilometre, or any other figure required.

However, properly stating the scale of the problem presents a number of issues. If we simply count the number of items we fall into the trap of allowing a bottle to count as one item (if whole) or, perhaps, 100 (if broken) greatly skewing the results. The same applies many times over when applied to plastic.

Use of data

Keep Northern Ireland Beautiful (previously Tidy Northern Ireland) carry out systematic surveys of litter on Northern Ireland's coastline, carried out as part of the Department of Environment's response to the requirements of descriptor 10 of the Marine Strategy Framework Directive (MSFD), which relates to marine litter.

Data Quality Assessment

Good. Beach surveys can only provide some of the information necessary to supply a full picture of the total load of litter in the coastal and marine environment. Any interpretation of data on beached marine litter, as a reflection of the overall marine litter situation in a given area, should be made with this uncertainty in mind. Monitoring of offshore marine litter when related to beach surveys gives some idea of the types and distribution of litter and their sources in advance of an agreed European reporting protocol.

Data links

<http://www.keepnorthernirelandbeautiful.org/cgi-bin/generic?instanceID=26>

<https://www.daera-ni.gov.uk/articles/marine-litter>

The raw data has been made available for public use under the open data principle on the KNIB website <http://www.keepnorthernirelandbeautiful.org/cgi-bin/generic?instanceID=50> and at www.data.nicva.org

Chapter 5: Land

Land (Figure 5.1)

Description of data and methodology (including strengths and limitations)

The data are collected as part of a soil quality monitoring programme, the Representative Soil Sampling Scheme (RSSS), run by Agri-Food and Biosciences Institute (AFBI). The RSSS in Northern Ireland is an annual survey of the most intensive grassland soils on a 5-yr cycle with 100 farms/fields sampled at random each

year (500 samples in total per cycle). This scheme started in winter 2004/05 and is used to monitor soil fertility trends in intensive grasslands in NI. In particular, the soil phosphorus (P) data are used to monitor the effectiveness of the Nitrates Action Programme (NAP) and Phosphorus Regulations in reducing soil-P and P lost by drainage and overland flow to watercourses i.e. in reducing the eutrophication of NI surface waters (lakes and rivers).

See: <https://www.daera-ni.gov.uk/articles/nitrates-action-programme-nap-and-phosphorus-regulations-2011-2014>

The RSSS scheme focuses on the intensive cattle sector of NI agriculture i.e. specifically, those farms producing more than 170 kg excreta-nitrogen per hectare per year. Based on the Agricultural Census of NI 2001 dataset, this corresponds to approximately 5,200 farms (using crops+grass area, rather than total area farmed, in the calculations). From this subset, 100 farms are selected at random each year on a 5 year cycle (total of 500 samples collected). Thus, the year 1 farm selection would be re-sampled in years 6, 11 ...; year 2 farms would be re-sampled in years 7, 12,... and so on, on a 5-yr rolling programme.

In order to identify temporal variation in the samples taken, spatial variation is minimised during sample collection from each field. Due to the small field sizes in NI, the soil samples are taken from a constant support area of 0.25ha (50m x 50m) centred in the field to be sampled. A soil sample is taken every 2m along a 72m transect across a diagonal of the field and the samples bulked together to give the representative sample for that field. The ends of each transect are located/recorded using a differential GPS (± 2 m accuracy).

For agronomic purposes, all RSSS soil samples are taken from the top 75mm by soil samplers. All samples are air-dried, milled and sieved at 2mm before being stored in all-plastic containers in preparation for chemical analysis. Soil-P is measured using the Olsen-P method of analysis:

Olsen S, Cole C, Watanabe F, Dean L (1954) Estimation of available phosphorus in soils by extraction with sodium bicarbonate. USDA Circular Nr 939, US Gov.Print. Office, Washington, D.C.

The strengths of the data lie in the fact that (i) identical locations are sampled between cycles due to the use of GPS technology and (ii) the samples are collected during the winter period (Nov-Feb) when farming activity is at a minimum.

Due to the selection process described above, one limitation of the data is that the farms selected represent some of the most intensive farms in NI so that a decline in soil-P may take longer than for non-intensive farms. Also, the fields sampled tend to be close to the farmhouse (in-fields) and, as these tend to be the most used, they tend to receive more nutrients than fields further away (out-fields). Another issue with sampling is that slurry may have been applied at some time in the 6 weeks before sample collection. If slurry contamination is evident, the soil is not sampled but, where the contamination is not evident, a small proportion of soils may have been included in the sample each year and will appear in the database. This is more likely when severe

weather conditions lead to an extension of the RSSS sampling period into late February/early March. Finally, note that the soil-P data are indexed and so are less useful than the raw analytical result e.g. P-Index 2 represents soil-P concentrations within the range 16-25 mgP/l so a concentration just outside this range at, say, 26 mgP/l will be assigned to P-Index 3.

Use of data

The data are used by policy makers in DAERA to identify any trends in soil nutrients, especially soil-P. With the introduction of the NAP in 2007, farmers in NI are allowed to apply P chemical fertiliser to their fields only if soil-P tests for those fields identify a requirement for P based on fertiliser recommendations in RB209 (UK fertilizer manual). However, as soil-P reserves are generally high across NI, this restriction essentially means that no application of P chemical fertiliser is usually needed. As such, the growing grass must then depend on the soil-P reserves for growth and this depletion in P should eventually lead to a reduction in the amount of soil-P measured as part of the annual RSSS.

However, it is known that soil-P reserves take some time to decline even though no P fertiliser is applied (commonly assumed to have a half-life of ~9 years). Reduction in mean soil-P from cycle to cycle indicates the NAP is having a positive effect in reducing soil-P and P lost by drainage and overland flow from the land to surface waters. In turn, the reduced P loss from land to water leads to a reduction in the enrichment (eutrophication) of these waters, which is what the NAP regulations were designed to do.

The nutrient (P, K, Mg, S) and pH data are also used by DAERA to recommend fertiliser application rates for grass.

Data Quality Assessment

Very Good - Data on soil phosphorus are of high quality and are sourced from AFBI's Representative Soil Sampling Scheme, which runs in a five year cycle, with sets of 100 managed grassland soils sampled at random each year.

Data links

The data are usually reported on first in AFBI annual reports to DAERA.

See:

<https://www.afbini.gov.uk/afbi-annual-reports>

and

<https://www.afbini.gov.uk/articles/representative-soil-sampling>

The data are comparable with/complementary to data available from:

- (i) the National Soils Research Institute (NSRI), at the University of Cranfield who

monitor soils in England and Wales (<https://www.cranfield.ac.uk/centres/soil-and-agrifood-institute/research-groups/national-soil-resources-institute> and <http://www.landis.org.uk/>)

(ii) the James Hutton Institute, Aberdeen who monitor soils in Scotland (<http://www.hutton.ac.uk/>)

(iii) the European soil portals (<http://eusoils.jrc.ec.europa.eu/> and <http://www.eurogeosurveys.org/projects/gsoil/>)

(iv) the Tellus project (BGS/GSNI) see http://www.bgs.ac.uk/gsni/tellus/geochemical_survey/index.html and <http://www.tellusborder.eu/>

Land (Figure 5.2)

Description of data and methodology (including strengths and limitations)

This section examines the role of agri-environment schemes on our land. These data are sourced from Department of Agriculture, Environment and Rural Affairs (DAERA) formerly DARD.

The data are collected using two DAERA systems: the Customer information System, and Grants and the Subsidies System. These systems record information about the participant agreements including the total area under agreement and detailed information about land management of habitats. However, reports from the two separate systems must be collated, validated and summarised before meaningful results can be produced from the data.

In some cases DAERA/DARD has converted the data to a percentage of agricultural land under agreement to give it context to the end user. The data may be misinterpreted if not quoted relative to overall agricultural land area. The statistics quoted for Countryside Management Schemes are a combined total for two different schemes - NICMS and CMS. These schemes are managed and delivered under different legislation and rules.

Use of data

The Agri-environment Programme (AEP) was funded under Measure 2.2 of the NI Rural Development Programme (NIRDP) 2007 – 2013 and continues primarily under Measure 10 of the 2014-2020 NIRDP. Progress of the AEP is measured against NIRDP targets which were set at the beginning of the Programme in 2007 and in 2015. Progress is published at the end of each Programme year, in the Mid-Term Evaluation (link provided below) and at the end of the NIRDP. <https://www.daera-ni.gov.uk/publications/northern-ireland-rural-development-programme-nirdp-2007-2013-mid-term-evaluation-update>

The targets are based on the number of participants in agri-environment schemes and the area of land (ha) under agreement. Therefore the data is collected to monitor

progress against these targets for the purpose of reporting the information to the European Union.

The data is used by the Monitoring Committee of the NIRDP and also by the Environmental Sub-group of this Committee. There are bi-annual meetings of both groups and interim progress is also reported using the data. Requests for this information are regularly received by students completing degrees and post-graduate qualifications.

Requests have been received from non-government organisations with farming and / or environmental interests.

This data is occasionally used to answer official communications from the NI Assembly.

The data may also be publicly displayed at events such as the annual RUAS Balmoral Show and RUAS Winter Fair to highlight that the funding for these schemes is being used by farmers to manage their land to benefit the environment.

Data has also been collected to report against targets set in DAERA/DARD Business Plan.

Data Quality Assessment

Very Good – This data is derived from the following computer systems - Grants and Subsidies (GAS) and Agri-environment Schemes (CISAES). These systems are used to record individual land parcels data, including agri-environment scheme agreement data. Validation checks are incorporated within and between these computer systems to ensure that data generated are accurate and the data are checked for discrepancies as part of the scheme's annual payment process.

Data links

The Annual and End of Programme data for the NIRDP are published approximately six months after the 31 December of the year of report. It is / will be published on the DAERA website at www.daera-ni.gov.uk and at www.ec.europa.eu.

Member States and regions within member states of the EU each have a Rural Development Programme. Data showing progress against targets are published by the Managing Authority and by Europe.

For example the Mid-Term Evaluation of the Rural Development Programme for England is published at:

http://ec.europa.eu/agriculture/rurdev/countries/uk/mte-rep-uk-england_en.pdf

And for the Scotland Rural Development Programme at:

<http://www.scotland.gov.uk/Publications/2011/03/21113609/0>

The Information is also published on the EU website at www.ec.europa.eu

Land (Figure 5.3)

Description of data and methodology (including strengths and limitations)

This section examines woodland plantings. These data are sourced from the Northern Ireland Forest Service.

The data are used to report against Forest Service annual reports and are subject to appropriate validation and audit.

Use of data

Data are collected in order to manage the Forestry Grant Scheme. The data are used to inform forestry service publications such as the annual report.

Data Quality Assessment

Very Good – Data are subject to validation and audit.

Data links

Detailed statistics are published in the web publication - Forestry Statistics which include UK statistics on woodland areas, planting, environment etc. and some statistics are available on international forestry.

<http://www.forestry.gov.uk/forestry/infd-7aqdgc>

Chapter 6: Biodiversity

Biodiversity (Figure 6.1)

Description of data and methodology (including strengths and limitations)

Nature conservation designations area data are compiled via a series of scientific site surveys, and office based scientific analysis. Site surveys utilise Global Navigation Satellite System (GNSS) technology and office analysis utilises Geographical Information Systems (GIS) and Ordnance Survey NI (OSNI) basemaps and ortho-rectified aerial photography.

The resolution attached to GNSS technologies and OSNI GIS basemaps is constantly evolving and improving: therefore the precision attached to new designation boundaries and associated area calculations has also improved.

Data are provided in a clear manner giving ease of interpretation, but readers should be aware that there is overlap of designated areas i.e. ASSI/SAC/SPA.

Use of data

The designation of ASSIs is a requirement under EC Directives. Data are required from time to time for monitoring progress towards the achievement of various related targets.

The data are also used to answer questions from the general public, nature conservation bodies and political representatives; and for NIEA management purposes.

The EC Habitats Directive places an obligation on Member States to report on conservation gains/losses through its 'Article 17' reporting process; data collected form an integral part of this.

Data Quality Assessment

Very Good – These data are of high quality with data collected through scientific monitoring programmes.

Data links

Please see links below for more information:

<https://www.daera-ni.gov.uk/topics/biodiversity-land-and-landscapes/protected-areas>

<https://www.daera-ni.gov.uk/topics/biodiversity>

The following links may assist with any geographical analysis you may wish to undertake:

<https://www.daera-ni.gov.uk/articles/digital-datasets>

www.spatialni.gov.uk

Please also see links to Joint Nature Conservation Committee (JNCC) which is the UK Government's advisor on nature conservation matters:

<http://jncc.defra.gov.uk/page-23>

<http://jncc.defra.gov.uk/page-1409>

<http://jncc.defra.gov.uk/page-1399>

Biodiversity (Figure 6.2)

Description of data and methodology (including strengths and limitations)

Methodology for collection of data follows UK Common Standards Monitoring protocols.

Data are generally collected and analysed on a rolling programme. The aim is to visit each site on a six-year cycle, but the anticipated timetable has been slipping somewhat

in recent years. Data may therefore be up to 5 years out of date (and occasionally longer).

The summary data for 2016 show a more significant change than is normally the case, in part because of the way some of the data have been analysed. The most recent assessment of a number of bird features was undertaken at a single point in time, rather than on the more normal rolling basis. For many species, and for migratory birds in particular, comparisons between consecutive years can be difficult to interpret, as numbers can be substantially affected both by variation in breeding success between years, and by stochastic changes in environmental conditions in various parts of the migratory routes. These factors may have implications both for survival and distance travelled. Given the decline in numbers of several migratory species, this has produced a more pronounced effect on the trend line for favourable condition, with the proportion of favourable features declining from 68% to 64%.

Use of data

Data are collected for the purpose of informing site management decisions on the protected site network (ASSIs, SACs and SPAs). Data are also used for reporting purposes (e.g. Article 17 Report on favourable conservation status which is required by the EC Habitats Directive).

Article 17 Report available at:

<http://jncc.defra.gov.uk/page-6387>

Data are used by outside bodies, both within government (e.g. DARDNI) and outside (National Trust).

Data Quality Assessment

Good – These data are of high quality with data collected through scientific monitoring programmes. The condition of features within Areas of Special Scientific Interest is assessed over a six year monitoring programme. However, there is a time lag issue with the data.

The timetable for assessment is running behind schedule; hence the classification is good rather than very good.

Data links

The data are provided (in part) for UK Biodiversity Indicators.

<http://jncc.defra.gov.uk/page-4229>

Biodiversity (Figure 6.3)

Description of data and methodology (including strengths and limitations)

This section reports on wild bird populations. These data are sourced from the British Trust for Ornithology (BTO).

The data on Northern Ireland wild bird population is monitored as part of the UK Breeding Bird Survey. The data are generally collected by volunteers across the UK and are usually collected on a 10km square basis. Through careful design the survey provides reliable trends. In 2014, 118 squares were surveyed in Northern Ireland. Of these, 52 squares were surveyed by professional fieldworkers, funded by the Northern Ireland Environment Agency. (Funding for the latter was not available in 2015) However because of the relatively small number of squares surveyed in Northern Ireland, information on trends is only available for the 35 most common species.

Further details on the UK Breeding Bird Survey can be found at:

<http://www.bto.org/volunteer-surveys/bbs/bbs-publications/bbs-reports>

Generally only the more common species of birds are picked up by the survey methodology. The survey methodology cannot be used to survey trends in the more scarce or rare species. These 'wild bird' population estimates can be used to provide a general indication of the overall 'health' of the environment.

The Wild Bird Index (WBI) measures average population trends of a suite of representative wild birds, as an indicator of the general health of the wider environment. The WBI is an easy-to-understand indicator that can be calculated for different geographic areas and habitats. This means that different Wild Bird Indices (WBIs) can be produced for areas such as farmland and woodland, or inside and outside protected areas if suitable data are available.

Use of data

The wild bird data are collected to enable estimates of changes in both the sizes and ranges of the populations so help prioritise conservation action by a range of bodies e.g. Government Departments, NGOs. The data can be used by NIEA to identify Northern Ireland Priority Species under the terms of the Northern Ireland Biodiversity Strategy.

The data can also be used by NIEA to identify species that may need to be included in the schedules of any appropriate wildlife legislation e.g. the WANE Act.

The RSPB and other conservation NGOs could use the data to select species for specific conservation action.

Data Quality Assessment

Very Good (medium to long term) – The indices reported are considered to give reliable medium to long term trends but strong reliance should not be attached to levels for individual years or short term changes from year to year.

A statement on the Quality of BTO data can be found at <http://www.bto.org/research-data-services/data-services/data-quality>.

Data links

The BTO data are collected across the UK and these trends can be directly compared to trends for similar species in Scotland, England and Wales as well as trends at a UK level.

A range of 'atlas' type reports are available from the BTO web site.

Biodiversity (Figure 6.4)

Description of data and methodology (including strengths and limitations)

These data are collected in order to monitor important wetland (coastal and freshwater) sites in Northern Ireland. This is undertaken as part of the UK Wetland Bird Survey (WeBS) coordinated by the British Trust for Ornithology. Further details on the Wetland Bird Survey can be found at:

<http://www.bto.org/volunteer-surveys/webs>

All key sites are surveyed at least three times through the relevant 'winter' period by a combination of trained amateur and professional ornithologists. Typically the same people undertake the same survey work each year providing important continuity in execution of methodology. BTO provide quality assurance as part of the data validation process.

Data are input by a combination of a professional data input company and on-line data entry by the surveyors themselves with data discrepancies identified by regional coordinators and data checking systems for correction. Any unusual counts are checked by the National Organisers and are confirmed with the counters if necessary.

Survey dates are fixed at UK level to try and minimise effect of bird movements between sites – this allows more accurate assessment of not only site populations but also at regional and national scales.

While WeBS coverage includes survey of all the major wetland sites in NI/UK, it isn't entirely comprehensive such that e.g. open coast isn't routinely covered nor are areas of 'open countryside'. There is also limited coverage of open marine sites. This may have importance for some species/groups e.g. gulls and some waders and duck/diver species. It is therefore important to be aware that changes in site populations as monitored by WeBS may not be a reflection of population changes for selected species.

For each site the peak monthly count for that survey season is used.

The following species/groups are included in the analysis –

- All species of swans, geese and duck – note that this includes all feral/exotic species
- Divers, cormorant, shag, grebes and herons (latter includes egrets)
- Water rail, moorhen, coot and kingfisher

- All species of wader

Note that all species of gull and tern have been excluded from the analysis. All other species occasionally/routinely recorded during WEBS coverage are also excluded e.g. raptors and rare/unusual passerines, auks, gannet etc.

Use of data

The data are used by NIEA to monitor the condition of designated sites (ASSIs, SPAs, Ramsar). The condition is reported to a range of external bodies e.g. JNCC, DEFRA, Europe, Wetlands International.

Data inform management decisions about sites and especially provides the evidence needed when assessing development proposals at designated sites.

Regional/national datasets are critical when assessing short/medium/long term changes in populations.

The data are of particular value when used in conjunction with data from other national monitoring schemes to understand international scale changes in bird distribution e.g. responses to climate change.

Data Quality Assessment

Very Good (medium to long term) – The indices reported are considered to give reliable medium to long term trends but strong reliance should not be attached to levels for individual years or short term changes from year to year.

Data links

Data are first released online and in annual booklet form by BTO – see website:

<http://www.bto.org/volunteer-surveys/webs>

WeBS is a UK level programme with a similar exercise taking place in the Republic of Ireland (Irish WeBS - IWeBS)

Monitoring of waterbird populations is undertaken at some level within most European countries e.g. as part of monitoring sites designated under the European Birds Directive and/or as necessary under the Ramsar Convention.

Monitoring programmes are undertaken at a wider international level through e.g. Ramsar programme and international programmes such as African-Eurasian Waterbird Agreement (AEWA) <http://www.unep-aewa.org/>

Wetlands International, Waterbird Population Estimates
<https://www.wetlands.org/publications/waterbird-populations-estimates-fifth-edition/>

Biodiversity (Figure 6.5)

Description of data and methodology (including strengths and limitations)

The Green Flag Award scheme is the benchmark national standard for parks and green spaces in the UK. The Green Flag Award aims to encourage the provision of good quality public parks and green spaces that are managed in environmentally sustainable ways.

It continues to provide the high level of quality against which our parks and green spaces are measured. It is also seen as a way of encouraging others to achieve high environmental standards, setting a benchmark of excellence in recreational green areas. What's more, winning a Green Flag Award can generate excellent publicity for a site. Both the media and the public are becoming increasingly aware that a site flying a Green Flag is a high quality green space, which can only be a boost to its popularity.

Green Flag Award site assessments are carried out by trained judges independent from Keep Northern Ireland Beautiful (managing body).

The sites are judged on eight criteria as follows:

1. A welcoming place
2. Healthy, safe and secure
3. Clean and well maintained
4. Sustainability
5. Conservation and heritage
6. Community involvement
7. Marketing
8. Management

The 2016/17 Green Flag Award Sites are:

Antrim Castle Gardens, Antrim/Belmont Cemetery, Ballynure Cemetery, Ballyclare Cemetery, Kilbride Cemetery, Sixmile Water Park, Lilian Bland Park, Mallusk Cemetery, Newtownabbey Way, Rashee Cemetery, Sentry Hill Historic House & Visitor Centre, Castle Park, Kiltonga Nature Reserve, Edenvilla Park, Tannaghmore Gardens, Loughbrickland Park, Solitude Park, Clare Glen, Dromore Town Park, Lurgan Public Park, Palace Demesne, Scarva Park, Ballyeaston Church Ruin, Belfast Botanic Gardens, Belmont Park, Cavehill Country Park, Dunville Park, Falls Park, Roselawn Cemetery, Sir Thomas and Lady Dixon Park, Waterworks Park, Knocknagoney Park, Ormeau Park, Barnett Demesne, Lagan Meadows, Musgrave Park, Grove Park, Woodvale Park, Stormont Estate, Castle Gardens, Wallace Park, Carnfunnock Country Park, Ecos Nature Park, Eden Allotment Gardens, Bashfordsland Wood and Oakfield Glen, Diamond Jubilee Wood, Dixon Park, The People's Park, Dungannon Park, Maghera Walled Garden, Slieve Gullion Forest Park.

Use of data

Data are used for publicity of the programme via press release; the information is also shared with the local council and general public.

Data quality assessment

Very Good - Green Flag Award site assessments are carried out by trained judges using set criteria.

Data links

The list of award winning sites is released on the Keep Northern Ireland Beautiful website in the summer <http://www.keepnorthernirelandbeautiful.org/cgi-bin/generic?instanceID=28>

The Green Flag Award Scheme is delivered throughout the UK in Scotland, England and Wales, there are a total of 1,521 parks, cemeteries, universities, shopping centres and community gardens have met the high standard needed to receive Green Flag Award.

The Green Flag Award scheme is also extending internationally, including Australia, Channel Islands, Germany, Netherlands, New Zealand, Republic of Ireland and United Arab Emirates.

This year twenty-two sites in the Republic of Ireland have also received a pilot Green Flag Award, they are: Poppintree Park and Bushy Park (Dublin City Council); Malahide Demesne and Millennium Park (Fingal County Council); Grangegorman Military Cemetery and St. Stephen's Green (Office of Public Works). In Ireland the scheme is managed locally by An Taisce.

Chapter 7: Built Heritage

Historic Environment (Figures 7.1a & 7.1b)

Description of data and methodology (including strengths and limitations)

Data displayed in Figure 7.1a is collected to inform the protection of Historic Environment assets in Northern Ireland. This outlines the total number of scheduled historic monuments in Northern Ireland in the years 01/02-15/16. Under Article 3 of the Historic Monuments and Archaeological Objects (NI) Order 1995 the Department is required to compile and maintain a schedule of monuments. The Department is also obliged to publish this information.

Data outlined in Figure 7.1b reflects regulation of proposed works sought under Scheduled Monument Consent, to areas that have a statutory designation on them. The statistic reflects applications for scheduled monument consent as well as requests for addendums to existing consents.

Ancillary to these statistics, each site is scored on the basis of future risk and present condition by a warden and registered on a database (Northern Ireland Sites and Monuments Records Database). This scoring is used to inform a strategic risk based inspection regime, targeting resources where the need is greatest to achieve compliance. Information can be gleaned from the database at any given time in order to help prioritise inspections.

The database is designed to receive all information in relation to the scheduling programme, in relation to designation, consents, agreements and warden condition reports. A major strength is that all the key players in the Scheduling Process, (including the Field Monument Wardens who work remotely) can enter reports and information so that it is readily available to others for review and analysis. An on-screen history of each site is systematically built up, providing a valuable amount of data to the user at an immediate level. It is possible to validate the impacts of land-use change, population and ownership changes on scheduled monuments.

Use of data

Data on scheduled monuments, particularly the GIS data is used on a widespread scale by other bodies including DAERA to inform decision making on a range of protection and land management issues.

The data is used in the compilation of annual reports, and to inform local authorities on statutorily designated sites in their areas.

All Historic Environment GIS map based data is available online to the general public, informing them of statutorily protected sites and monuments in their respective areas. For local community groups this can be a valuable aid in the setting up of heritage trails and interpretive literature.

The polygons available on GIS are extremely useful in providing a geo-spatial reference immediately for a protected zone. Works proposed inside these areas require the necessary scheduled monument consent in advance.

Most scheduled monuments are located on agricultural land and land use change, particularly land improvement toward arable or grazing, or development, is one of the biggest factors in regard to potential impacts onto historic sites.

In terms of demographics it would be fair to say that in lesser populated areas historic sites and monuments generally fare better in terms of their overall condition.

Data Quality Assessment

Very Good – The figures are derived from an administrative database which incorporates various validation checks. The scheduled monuments data are audited regularly to ensure that the targeted numbers of sites have been scheduled. Consents data are recorded as applications are sought throughout the year

Data links

The total number of scheduled monuments is published online, in list form, categorised under County and specifying the site, its unique number, the townland and the grid reference. This is updated when new sites are scheduled on an annual basis.

The GIS data and a public version of the Northern Ireland Sites and Monuments Record (NISMR) database are also available online and are updated as and when new sites are scheduled

<https://www.communities-ni.gov.uk/services/sites-and-monuments-record>

Under the Valletta Convention it is necessary to develop and implement national policies for the Protection of Archaeological assets as sources of scientific and documentary evidence in line with principles of integrated conservation.

Other heritage bodies based in the UK also designate scheduled monuments in this way and hold comparable data

For more information on the Protection of Historic Monuments, please see:

<https://www.communities-ni.gov.uk/articles/scheduled-monuments>

Built Heritage (Figure 7.2)

Description of data and methodology (including strengths and limitations)

The information is currently recorded manually at the end of each financial year from the Northern Ireland Buildings Database. It is intended that the database will be upgraded over the next year to allow this information to be automatically generated.

The Department protects historic buildings by listing following an assessment process. Further details are published on the DfC website at the following location:

<https://www.communities-ni.gov.uk/articles/listed-buildings>

Data are based on numbers of records held in the database and do not reflect the total number of Buildings protected under this Article.

A clarification is included in each report confirming that because some listings include multiple buildings, such as terraces or farm buildings under a single listing reference, the total number of structures is greater than the figure given.

Changes in these data principally reflect the ongoing Second Survey of Buildings of Architectural and Historic interest.

Use of data

The main use of these data is to review the number and range of buildings that are listed in Northern Ireland over time. This information was initially collected, in this form, for a Northern Ireland Audit Office report on the protection of historic buildings which was published in March 2011. The Department for Communities is required under Section 80 of the Planning Act (Northern Ireland) 2011 to compile and amend a list of buildings of Special, Architectural and Historic interest.

The data are used by the following:

1. DfC – to keep an overview of listing numbers and to utilise when responding to queries or making presentations on their work.

2. The Northern Ireland Environmental Statistics Report. Data have been included from each year's return since 2011.
3. Public (Listing information).

Data Quality Assessment

Very Good – The figures are derived from the DfC Buildings database with full coverage and incorporating various validation checks. Buildings are selected to become listed after systematic or ad-hoc surveys. The systematic First Survey of the whole of Northern Ireland was completed by 1994 and a Second Survey is ongoing. In addition, variance checks are employed as an integral part of the publication production process with any large discrepancies between current and previous year or any inconsistencies queried with the data provider.

Data links

Data are comparable with other parts of the UK who also list buildings.

Built Heritage (Figure 7.3)

Description of data and methodology (including strengths and limitations)

The Historic Environment Division undertook a benchmarking exercise with other agencies across the UK in 2014/15 with regard to the criteria for adding and removing buildings from the database. The criteria for removal and addition were subsequently reissued. The work of adding and removing data from the database is undertaken on HED's behalf by the Ulster Architectural Heritage Society's (UAHS) Buildings at Risk officer.

The information is comparable with other UK agencies.

A limitation is that the data is not comprehensive in that additions are based upon staff awareness rather than a systematic condition survey of all of Northern Ireland's listed buildings.

In 2013/14, a baseline statistical survey of condition was commissioned by the Department. This recorded that, the majority (66.9%) of buildings were 'Not at Risk' and 17.8% of buildings were of 'Low' risk. 4.2% of buildings were classed as 'Critical', 0.3% of buildings were classed as 'High' risk and 8.5% were classed as 'Moderate' risk.

This means that 30.8% of Northern Ireland's listed buildings were considered at some form of risk. This reduces to 4.5% when low and moderate risk are discounted. This last figure equates to 392 of Northern Ireland's 8,702 listed buildings. The Built Heritage at Risk in Northern Ireland (BHARNI) register recorded c 475 buildings in the same period. This means that it is statistically likely that some buildings at moderate risk are included within this figure.

Use of data

In October 2005, the Northern Ireland Environment Agency (then containing the Historic Environment Division and called the Environment and Heritage Service (EHS)) launched its draft strategy for the next ten years at a major conference. One of the proposed measures, under the heading of 'Changing Public Attitude and Behaviour' was to have 'fewer listed buildings at risk'.

The associated target is 'A decrease of at least 200 in the number of listed buildings on the Built Heritage at risk register'.

While this is no longer a Programme for Government Target in NI, this area of Historic Environment Division's work remained very high on both the public and political agenda. The subsequent NI Sustainable Development Strategy also contained a target to remove 200 structures from the BHARNI Register by 2016 (see target 18 on page 125).

Data quality assessment

Good – these data are not based upon a comprehensive survey but upon buildings which the Department becomes aware of through the activities of its employees and contractors. There is therefore a danger that a proportion of suitable buildings have not been identified. The data is compiled by the Ulster Architectural Heritage Society for the Department and the Department. There has been inconsistencies, on occasion, in the reporting provided to the Department by the Society's changing caseworkers

In 2013/14, a baseline statistical survey of condition was commissioned by the Division. This recorded that, the majority (66.9%) of buildings were 'Not at Risk' and 17.8% of buildings were of 'Low' risk. 4.2% of buildings were classed as 'Critical', 0.3% of buildings were classed as 'High' risk and 8.5% were classed as 'Moderate' risk.

This means that 30.8% of Northern Ireland's listed buildings were considered at some form of risk. This reduces to 4.5% when low and moderate risk are discounted. This last figure equates to 392 of Northern Ireland's 8,702 listed buildings. The Built Heritage at Risk in Northern Ireland (BHARNI) register recorded c 475 buildings in the same period. This means that it is statistically likely that some buildings at moderate risk are included within this figure.

Data links

Data are first published in this report.

Data are comparable with UK agencies- background links below:

<https://historicengland.org.uk/advice/heritage-at-risk/buildings/buildings-at-risk/buildings-at-risk-sale/>

<http://www.historic-scotland.gov.uk/barr>

<http://www.buildingsatrisk.org.uk/>

<http://www.savebritainsheritage.org/>

<http://cadw.wales.gov.uk/historicenvironment/recordsv1/buildingsatrisk/?lang=en>

Built Heritage (Figure 7.4)

Description of data and methodology (including strengths and limitations)

Collection and compilation of data is via DfC Database (Grant and Buildings).

The information is currently recorded manually at the end of each financial year from the DfC Grants Database. It is intended that the database will be upgraded over the next few years to allow this information to be automatically generated.

Data are comparable with other parts of the UK who also list buildings which are of special architectural or historic interest.

Use of data

The data are used in the following ways:

1. Monitoring of Spend and Financial Management
2. Ministers Queries/FOI/Environmental Information Regulations
3. Colleges/Schools
4. Other UK Departments for comparison purposes

Data Quality Assessment

Very Good - The figures are derived from the DfC Historic Buildings Grants database incorporating various validation checks.

Data links

The Listed Building Grant Scheme was replaced by the Historic Environment Fund in September 2016. However the Repair Stream of this fund is comparable. More information on the Fund can be found here: <https://www.communities-ni.gov.uk/articles/historic-environment-support>

Built Heritage (Figure 7.5)

Description of data and methodology (including strengths and limitations)

Historically, excavation has been one of the main sources of information about our past, particularly for the comparatively long period when there were no written records. Unfortunately, the process also involves the destruction of the very material which provides this information, so excavation is generally viewed as a last resort with the exception of small scale research projects. In Northern Ireland, a licence is required for

all archaeological excavations and more general searches for archaeological objects, with licenses issued to suitably qualified individuals in specified locations and for particular reasons. The Historic Environment Division (HED) of DfC is the licensing authority, processing applications, issuing licences and supervising the excavation process through to publication of the results.

It should be borne in mind that other factors can influence the number of licences issued. For example, proposed changes in planning control or policy can lead to an increase or decrease in planning applications and associated excavation licence applications. It is also important to recognise that the scale of excavation varies widely from licence to licence, as does the amount of archaeology encountered. Some licences are for small scale investigation on a single house plot or development site. Others are issued in association with major housing schemes or infrastructure developments such as road schemes, sites of energy production and quarries.

One condition of the excavation licence is that the licensee must produce a report on the results of the excavation – a short report within 4 weeks and a full illustrated report within 6 months. In those excavations which take place because of a planning condition, production of a report is also a condition of the planning permission.

These reports reflect the size and complexity of the area excavated and can range from a short document incorporated into the Historic Environment Record curated by HED to a major publication or monograph. Production of these documents ensures that sites which could not be preserved in situ are preserved by record and ensures that information on the archaeology of Northern Ireland is publically available.

Use of data

The Historic Environment Division of DfC maintains an excavation database, recording the history of each application from receipt to classification of excavation reports as final. The database is central to managing the licensing process, tracking the record of each licence and licensee and allowing independent checks that HED staff is complying with customer care targets in the process of applications. All applications to carry out excavations and the associated documentation through to final report are also now integrated into the NICS digital information management system.

Data Quality Assessment

Very good – All excavations must be licensed and Historic Environment Division is the sole body for processing and granting licences. All applications are logged on the HED database with a unique identifier and also have an individual hard copy file. A percentage of files are checked to ensure that the processing has been carried out correctly and HED reports quarterly on the percentage of applications that have been processed within the stipulated timeframes via the NIEA balanced scorecard. The processing of licence applications is also subject to annual scrutiny by Internal Audit.

Data links

Data on excavations is not comparable with other parts of the UK as NI is the only part of the UK in which a licence to carry out archaeological excavation is required.

Further information on archaeological objects and excavation licensing can be found at <https://www.communities-ni.gov.uk/articles/protecting-northern-irelands-archaeology>
Summaries on excavations carried out throughout Ireland can be found at <http://www.excavations.ie/>

Chapter 8: Waste

Waste (Figures 8.1 to 8.4)

Description of data and methodology (including strengths and limitations)

The figures in this section report on the amount of Local Authority Collected (LAC) municipal waste produced, the amount of waste produced per household and per capita, the amount of LAC municipal waste sent for preparing for reuse, dry recycling and composting, the amount of LAC municipal waste sent for energy recovery and amount of LAC municipal waste and household waste landfilled.

LAC municipal waste is defined as waste which is collected under arrangements made by a district council. Includes materials (except soil, rubble and plasterboard) collected directly from households (e.g. kerbside collections) or indirectly (e.g. bring sites, civic amenity sites, collected by private and voluntary organisations not included elsewhere or street sweepings).

Data used in this report are taken from the Northern Ireland LAC Municipal Waste Management Statistics Annual Report which uses data from WasteDataFlow (WDF), a web based system for LAC municipal waste reporting by UK local authorities for government.

Use of data

Data contained in this release are published primarily to provide an indication of the progress towards achieving waste strategy targets.

The waste data help to inform the lifestyle choices of the public, specifically decisions about how to dispose of waste. Waste statistics are used in the 'Rethink Waste' campaign (<https://www.recyclenow.com/ni>) which influences choices that ultimately impact upon the quantity and type of waste that is generated, reused and recycled. The Department of Agriculture, Environment and Rural Affairs delivers the Northern Ireland Waste Management Strategy through the Rethink Waste Programme.

Data contained in this release provide an indication of the progress towards achieving waste strategy targets. They allow for the assessment of the performance of the councils and waste management groups in Northern Ireland in managing waste arisings, recycling, composting and landfill. Targets are set for an annual period and performance against targets is considered in the Progress against targets section. The revised Northern Ireland Waste Management Strategy sets out targets for the management of local authority collected municipal waste. - To achieve a recycling rate of 45% (including preparing for re-use) of household waste by 2015. - To achieve a

recycling rate of 50% (including preparing for re-use) of household waste by 2020. - Proposals to achieve a recycling rate of 60% (including preparing for re-use) of LACMW by 2020.

Waste data feed into Northern Ireland specific and UK wide research projects carried out by Waste and Resource Action Programme (WRAP) (<http://www.wrap.org.uk>).

Additionally, waste management information is used to inform the media, special interest groups (such as the Chartered Institute of Waste Management (CIWM) which is the professional body representing waste and resource professionals), academics (for example those who would have an interest and/or involvement in the WRAP research mentioned above) and by the DAERA to respond to parliamentary/assembly questions and ad hoc queries from the public.

The Northern Ireland Neighbourhood Information Service (NINIS) provides access to waste information with the aim of making it available to as wide an audience as possible by providing interactive charts and mapping facilities that enable the statistics to be interpreted readily in a spatial context.

(<http://www.ninis2.nisra.gov.uk/InteractiveMaps/Agriculture%20and%20Environment/Environment/Local%20Authority%20Collected%20Municipal%20Waste%20Recycling/atlas.html>)

Data quality assessment

Very good: These data are derived from WDF with full coverage for all district councils and incorporating various validation checks. The system provides a complete picture of district council controlled waste activity in NI and sampling errors associated with survey data are not, therefore, an issue. In addition, variance checks are employed as an integral part of the publication production process with any large discrepancies between current and previous year queried with the data provider.

Data links

Please refer to <https://www.daera-ni.gov.uk/sites/default/files/publications/daera/lac-municipal-waste-management-statistics-2015-16.pdf> (Pages 19-26) for a detailed description of the data and methodology, for information on how the data are used, for an assessment on data quality and for further links.

Please refer to <https://www.daera-ni.gov.uk/articles/northern-ireland-local-authority-collected-municipal-waste-management-statistics> and <https://www.daera-ni.gov.uk/articles/published-waste-data> for the published statistics reports from which the data presented in this report are taken.

Please refer to the State of the Environment report for a graph of LAC Municipal Waste and GVA per capita: [SOE Waste Chapter](#) page 176.

NI Waste Management Strategy: <https://www.daera-ni.gov.uk/sites/default/files/publications/doe/waste-policy-delivering-resource-efficiency-northern-ireland-waste-management-strategy-2013.pdf>

Appendix 4: Glossary of terms

A	
Arboriculturist	Arboriculturists cultivate and manage trees, hedgerows and shrubs. The work is undertaken in both rural and urban settings and includes all aspects of felling, preserving, planting and protecting trees, sometimes using heavy equipment. They also provide information and advice on specific tree-related issues.
Acidification	The process of a substance becoming more acidic or decreasing in pH, generally in reference to surface waters and soils.
Agri-food	Agricultural production and food and drink processing.
Ammonia (NH ₃)	A colourless, corrosive, pungent-smelling, gaseous pollutant, formed mainly by the decomposition of organic material.
Annual Mean	The average over the year.
Anthropogenic	Caused or produced by humans
Areas of Special Scientific Interest (ASSI)	Protected areas that represent the best of our wildlife and geological sites that make a considerable contribution to the conservation of our most valuable natural places.
B	
Biodegradable	Capable of being decomposed by bacteria or other living organisms and thereby avoiding pollution.
Biodiversity	The variability among living organisms and the ecological complexes of which they are part.
C	
Carbon Dioxide (CO ₂)	A naturally occurring gas found in the atmosphere which is the most important greenhouse gas produced by human activities, primarily through the combustion of fossil fuels.
Catchment	Term used to describe an area which is drained by a river.
Chlorophyll	A green pigment, present in all green plants and in cyanobacteria, which is responsible for the absorption of light to provide energy for photosynthesis.
Climate Change	A change in global climate which is attributed directly or indirectly to human activity and which is in addition to natural climate variability observed over comparable time periods.
<i>Clostridium Perfringens</i>	Species of clostridium bacteria whose spores produce a toxin that causes blood poisoning, gas gangrene, infection of wounds, and a type of food poisoning that may be mild for healthy adults but can be serious for elderly, infirm, or the very young. Also called Welch's Bacillus. Written also as <i>C. perfringens</i> or <i>Clos. Perfringen</i> .
Coliforms	A broad class of bacteria found in our environment, including the faeces of man and other warm-blooded animals.

Colony Forming Units	A measure of viable (living) bacterial numbers
Compliance	Adhering to laws, regulations and policies.
Controlled Waste	Household, industrial and commercial waste or any such wastes that require a waste management licence for treatment, transfer or disposal.
D	
Designation	The process of identifying an area and affording it a special status.
Discharge Consent	Authorisation from an environmental regulator required prior to the discharge of anything other than uncontaminated water to surface waters or ground waters
Dissolved Oxygen	The amount of oxygen dissolved in a body of water as an indication of the degree of health of the water and its ability to support a balanced aquatic ecosystem.
E	
Ecosystem	A natural unit consisting of all plants, animals and micro-organisms in an area which function together with the non living environmental factors.
Effluent	A discharge of pollutants into the environment, partially or completely treated or in its natural state; generally used in regard to discharges into waters.
Emission	The direct or indirect release of substances, vibrations, heat or noise from individual or diffuse sources into air, water or onto land.
European Union (EU)	A super national and intergovernmental body comprising twenty-seven European countries.
Eutrophication	The enrichment by nutrients, especially compounds of nitrogen and/or phosphorous, causing an increase in the growth of algae and plants that produces an undesirable disturbance to the natural balance of an ecosystem.
F	
Faecal Coliforms	A subgroup of bacteria of the coliform type that live mainly in the gut of warm-blooded animals.
Fluorinated gases ('F-gases')	A family of man-made gases used in a range of industrial applications. Because they do not damage the atmospheric ozone layer, they are often used as substitutes for ozone-depleting substances. However, F-gases are powerful greenhouse gases, with a global warming effect up to 23,000 times greater than carbon dioxide (CO ₂), and their emissions are rising strongly.
G	
Good Environmental Status	The overall state of the environment that provides ecologically diverse and dynamic ecosystems which are healthy and productive.

GPS	Global Positioning System, a radio navigation system that allows land, sea, and airborne users to determine their exact location, velocity, and time 24 hours a day, in all weather conditions, anywhere in the world.
Greenfield	Undeveloped land in a city or rural area either used for agriculture, landscape design, or left to naturally evolve.
Greenhouse Gases	Components of the atmosphere which contribute to the greenhouse effect by absorbing and radiating solar heat.
Groundwater	All water which is below the surface of the ground in the saturated zone and which is in direct contact with the ground or subsoil.
H	
Habitat	Place where an organism (e.g. human, animal, plant, micro-organism) or population lives, characterised by its surroundings, both living and non-living.
Habitats Directive	EC Directive aiming to achieve the conservation of natural habitats and species, as well as the protection and where possible improvement of biodiversity. The main aim is to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements, and create a network of protected areas across the European Union known as "Natura 2000".
Heritage Assets	Buildings, landscapes, buried remains and historic areas of architectural or historic interest. Some have statutory protection as listed buildings or scheduled monuments. Others are included in designated conservation areas, historic parks and gardens, World Heritage Sites, and Areas of Outstanding Natural Beauty.
Household waste	Waste collected by Local Authorities from households.
Hydrogen Ion	An ionized hydrogen atom, occurring in plasmas and in aqueous solutions of acids, in which it is solvated by one or more water molecules.
Hydromorphological	Hydromorphology is a term used in river basin management to describe the combination of hydrological and geomorphological (structural) processes and attributes of rivers, lakes, estuaries and coastal waters.
I	
Indicator	An observed value representative of a phenomenon to study. In general, indicators quantify information by aggregating different and multiple data.
Indigenous	Originating and living, or occurring naturally in an area or environment.
Inorganic	Not composed of organic matter.
K	
kt NH ₃	Kilotonnes of Ammonia.

L	
Lake	An area of variable size filled with water, localized in a basin, that is surrounded by land, apart from any river or other outlet that serves to feed or drain the lake.
Landfill	Area of land in or on which waste is deposited.
Land Use	The human employment of the land; a change in land use at any location may involve a shift to a different type of use (e.g. from farming to residential) or a change in the intensity of use.
Leachate	Liquid that leaks from waste disposal sites.
Listed building	A building officially designated as being of architectural or historic importance and having protection from demolition or major alterations.
M	
Macroinvertebrates	Organisms without backbones, which are visible to the eye without the aid of a microscope.
Macrophytes	An aquatic plant large enough to be seen by the naked eye.
Mandatory	Obligatory.
Methane (CH ₄)	A colourless, non-poisonous, flammable gas with a high global warming potential. It is the principal component of natural gas and is produced by the anaerobic decomposition of organic matter. Important sources include marshes and landfill sites.
Municipal Waste	Household waste and any other waste under the control of (i.e. collected by) Councils or agents acting on their behalf
N	
Nitrous Oxide (N ₂ O)	A colourless, non-flammable gas which contributes to the greenhouse effect. It is used in medicine as an anaesthetic and is commonly known as “laughing gas”.
Nitrogen dioxide (NO ₂)	Some nitrogen dioxide is formed naturally in the atmosphere by lightning and some is produced by plants, soil and water. However, only about 1% of the total amount of nitrogen dioxide found in our cities' air is formed this way. It is an important air pollutant because it contributes to the formation of photochemical smog, which can have significant impacts on human health.
Nutrient	Element or chemical essential for growth.
O	
Organic	Containing carbon compounds.
OSPAR	An international convention for the protection of the marine environment of the north east Atlantic, to which both the UK and Ireland are signatories. The name ‘OSPAR’ is derived from the earlier Oslo and Paris Conventions, which were combined in 1998.

Ozone	A pungent, colourless, naturally occurring but toxic gas. Close to the earth's surface ground-level ozone is produced photochemically from hydrocarbons, NOx and sunlight, and is a major component of smog. In the stratosphere, it protects the earth from harmful ultraviolet radiation.
P	
Particulate	Fine particle of solid or liquid suspended in gas.
pH	A unit for measuring hydrogen ion concentrations. A pH of 7 indicates a "neutral" water or solution. At pH lower than 7, a solution is acidic. At pH higher than 7, a solution is alkaline.
PM ₁₀	Particulate Matter less than 10 microns in diameter, such as solid or liquid particles of soot, dust, smoke, fumes, and aerosols. The size of the particles allows them to easily enter the air sacs in the lungs where they may be deposited, resulting in adverse health effects. PM10 also reduces visibility.
Pollutants	Substances which, when present in the environment under certain conditions, may become injurious to human, animal, plant or microbial life, or to property, or which may interfere with the use and enjoyment of life or property.
Pollution	The introduction of pollutants into the environment.
Polycyclic aromatic hydrocarbons (PAHs)	A group of more than 100 different chemicals that are released from burning coal, oil, gasoline, trash, tobacco, wood, or other organic substances such as charcoal-broiled meat. They are also called polynuclear aromatic hydrocarbons
Priority habitats and species	Habitats and species that are conservation priorities which are under threat because of their rarity and rate of decline.
Phytobenthos	Benthic organisms that are plants or algae.
Photoplankton	Plankton consisting of microscopic plant.
R	
Ramsar sites	Covers all aspects of wetland conservation and wise use, recognising wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities.
Recycling	Using waste materials in manufacturing other products of an identical or similar nature.
Renewable Energy	Energy derived from a resource that can be exploited without depletion because it is constantly replenished, e.g. solar radiation and wind.
S	
Scheduling	Including on a list for legal preservation or protection.
Special Areas of Conservation (SACs)	Given greater protection under the European legislation of The Habitat's Directive. They have been designated because of a possible threat to the special habitats or species which they contain and to provide increased protection to a variety of animals, plants and habitats of importance to biodiversity both

	on a national and international scale.
Special Protection Areas (SPAs)	Designated under the European Commission Directive on the Conservation of Wild Birds. All European Community member States are required to identify internationally important areas for breeding, over-wintering and migrating birds and designate them as Special Protection Areas (SPAs).
Sulphur Dioxide (SO ₂)	A pungent, colourless, gas. Released naturally by volcanic activity, large amounts are also produced by the combustion of fossil fuels, especially coal and oil.
Surface water	Water on the surface of the planet such as in a stream, river, lake, wetland, or ocean.
Sustainable Development	The ability to meet our needs and enjoy a better quality of life without jeopardising the quality of life of future generations.
T	
Total Phosphorus	Total phosphorus (TP) is a measure of all the forms of phosphorus, dissolved or particulate, that are found in a sample.
Turbidity	Muddiness created by stirring up sediment or having foreign particles suspended.
W	
Waste	Any substance or object which the holder discards or intends or is required to discard.
Waste Arisings	A measure of the amount of waste generated by a specified sector or activity.
Water body	Any significant accumulation of water.
Water Framework Directive	EU Directive aiming to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater. Its main aims are to: protect and enhance aquatic ecosystems and prevent their deterioration; promote sustainable water use; reduce discharges, emissions and losses of priority substances; and contribute to reducing the effects of floods and droughts.