



# Key Scottish Environment Statistics 2009

August 2009

## Introduction

Welcome to the ninth edition of the annual publication '**Key Scottish Environment Statistics**'. This is now a web-only publication.

This publication aims to provide an easily accessible reference document which offers information on a wide range of environmental topics. It covers key data sets on the state of the environment in Scotland, with an emphasis on the trends over time wherever possible. The data are supplemented by text providing brief background information on environmental impacts, relevant legislation and performance against targets. A PowerPoint version of this publication is also available on our website.

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

A continuously updated **internet database (Scottish Environment Statistics Online)** accompanies this publication and contains additional statistics to those presented here.

<http://www.scotland.gov.uk/SESO>

A general directory of websites that provide environmental statistics for Scotland is available at:

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

This publication includes figures produced by other organisations and which are not official statistics. They have been available on request from those organisations. For some of the statistics included in the publication, reference is made to targets set by the Scottish Government; more details can be found on the Scotland Performs website at:

<http://www.scotland.gov.uk/About/ScotPerforms>

Our aim is to produce a user-friendly and useful publication. This year we are consulting users through a short survey/questionnaire which can be found on the main page of our website. It would be helpful to us if you would complete the questionnaire and tell us what you think about *Key Scottish Environment Statistics* and how you use it. If you wish to send further comments on the format and contents of this publication they would be most welcome.

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Throughout this publication, a '-' represents figures that are not available and 'R' indicates that figures have been revised since previous publications.

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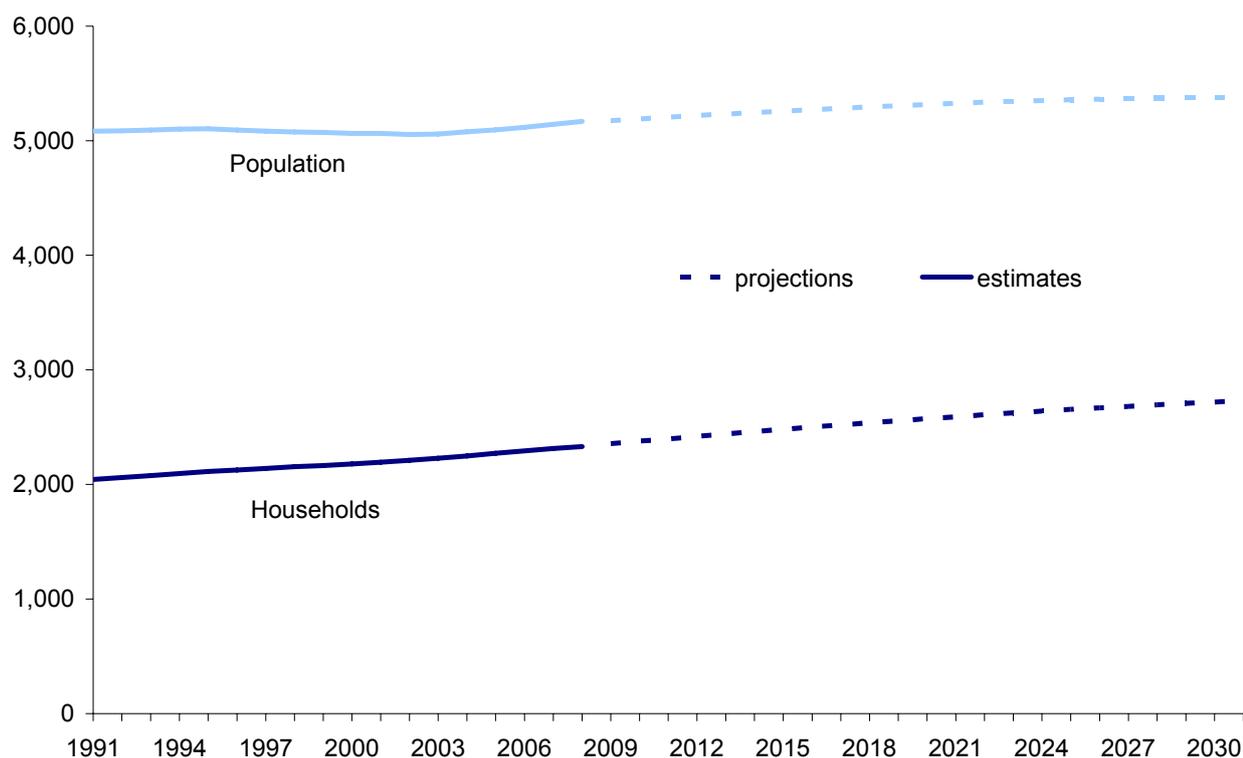
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## Population and Households: 1991-2031

Population/Households (thousands)



	Mid-year Estimates					Thousands
	1991	2000	2006	2007	2008	Projections 2031
<b>Population</b>	5,083	5,063	5,117	5,144	5,169	5,374
<b>Households</b>	2,043	2,177	2,291	2,314	2,331	2,731

People and households are large consumers of energy and water, a demand that can put great strains upon the environment. The population of Scotland declined steadily through most of the 1980s, followed by small increases in the seven years up to 1995. The population then decreased to 5.06 million in 2002 and has since increased to 5.17 million in 2008.

The 2006-based projections indicate that population will rise by 5% to 5.37 million between 2006 and 2031, whereas the overall UK population is set to increase by 17% in the same period.<sup>1</sup>

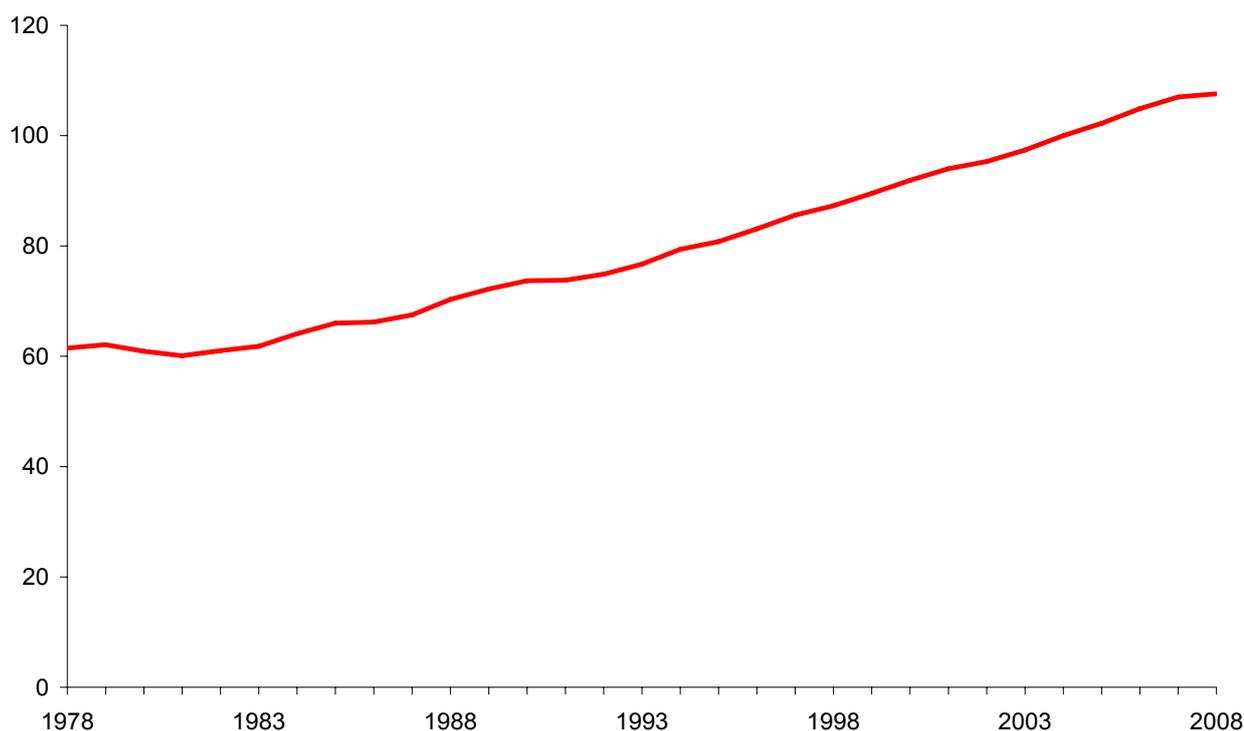
The number of households rose by 288,000 (14%) between 1991 and 2008, reflecting the fact that household structures are changing, with fewer people per household. Projections based on 2006 figures suggest that by 2031, the number of households in Scotland will increase by 19% to 2.7 million. This will contribute significantly to the demand for housing, not all of which can be accommodated on previously developed land.

In 2007, the Scottish Government set a purpose target, to match average European (EU15) population growth over the period from 2007 to 2017.

Source: [General Register Office for Scotland](#)

## Gross Domestic Product (GDP)<sup>R.2</sup>: 1978-2008

Scottish GDP at basic prices (2004=100)



	1978	1980	1990	2000	2005	2006	2007	2008
<b>Scottish GDP (2004=100)</b>	61.5	60.9	73.7	91.9	102.2	104.9	107.0	107.6

Maintaining economic growth is an important aspect of sustainable development. A healthy economy leads to higher living standards and greater prosperity for individuals. It also helps businesses to be profitable, which generates employment and income.

Gross Domestic Product (GDP) is an important measure of the activity and strength of the economy. However, a high GDP does not necessarily imply an efficient use of resources.

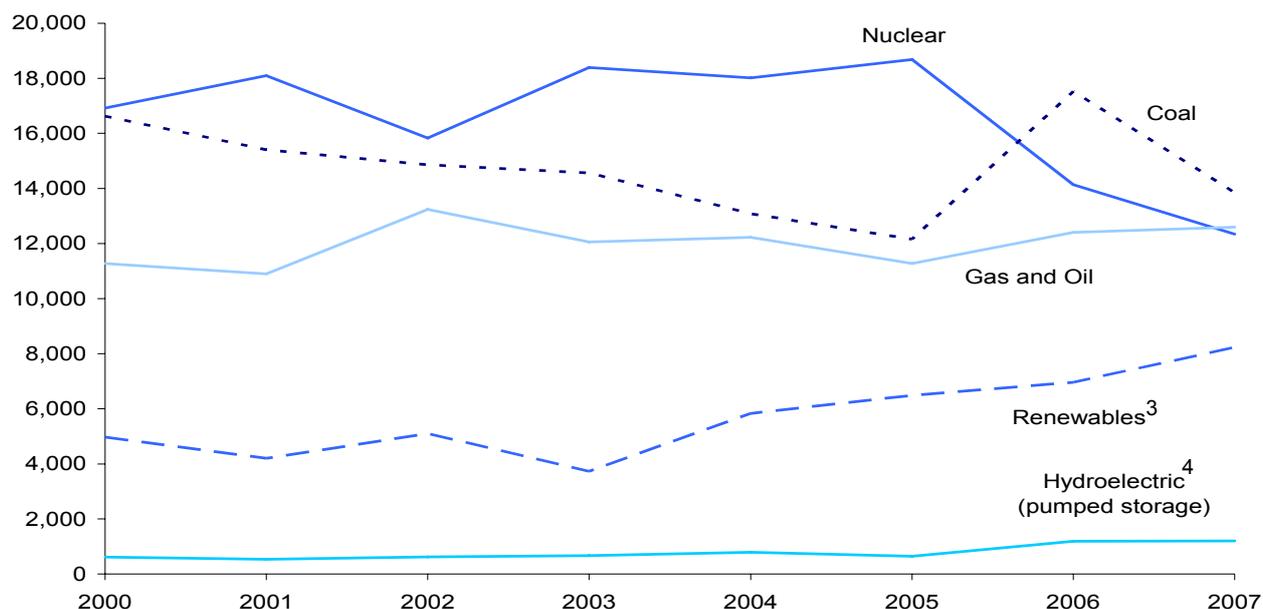
Between 1978 and 2008, the Scottish GDP index increased from 61.5 to 107.6, representing an average annual growth of 1.9%. Over the 2008 calendar year GDP in Scotland rose by 0.5%, compared to a rise of 0.8% in the UK. Although Scotland's GDP increased by 0.5% over the year to the end of 2008, it has fallen each quarter since the third quarter of 2008. UK GDP has been falling since the second quarter of 2008.

In 2007, the Scottish Government set a purpose target to raise the GDP growth rate to the UK level by 2011 and a further target to match the GDP growth rate of the small independent EU countries by 2017.

Source: [Scottish Government](#)

## Electricity Generation by Source<sup>R</sup>: 2000-2007

Electricity generated (GigaWatt hours)



	GigaWatt hours					
	2000	2003	2004	2005	2006	2007
<b>Nuclear</b>	16,918	18,394	18,013	18,681	14,141	12,344
<b>Coal</b>	16,624	14,566	13,081	12,160	17,529	13,853
<b>Gas and Oil</b>	11,274	12,059	12,226	11,270	12,404	12,595
<b>Renewables<sup>3</sup></b>	4,972	3,725	5,832	6,486	6,963	8,226
<b>Hydroelectric (pumped storage)<sup>4</sup></b>	613	670	786	643	1,184	1,198
<b>Total Generated</b>	50,400	49,415	49,938	49,240	52,221	48,216
<b>Gross Consumption<sup>5</sup></b>	40,801	41,238	41,364	41,922	41,281	40,855

The combustion of fossil fuel, especially coal, is a major contributor to carbon dioxide emissions. Carbon dioxide is one of a basket of six greenhouse gases that the UK is committed to reduce under the 1997 Kyoto Protocol.

In 2007, Scotland generated 48,216 GWh of electricity, some 8% less than in 2006. In 2007 coal was the main source of electricity generation in Scotland accounting for 29% of the total electricity generated. However the amount of electricity generated by coal fell by 21% compared to 2006. The amount generated by gas and oil increased by 1.5% in this same period and in 2007 accounted for around 26% of electricity generated in Scotland.

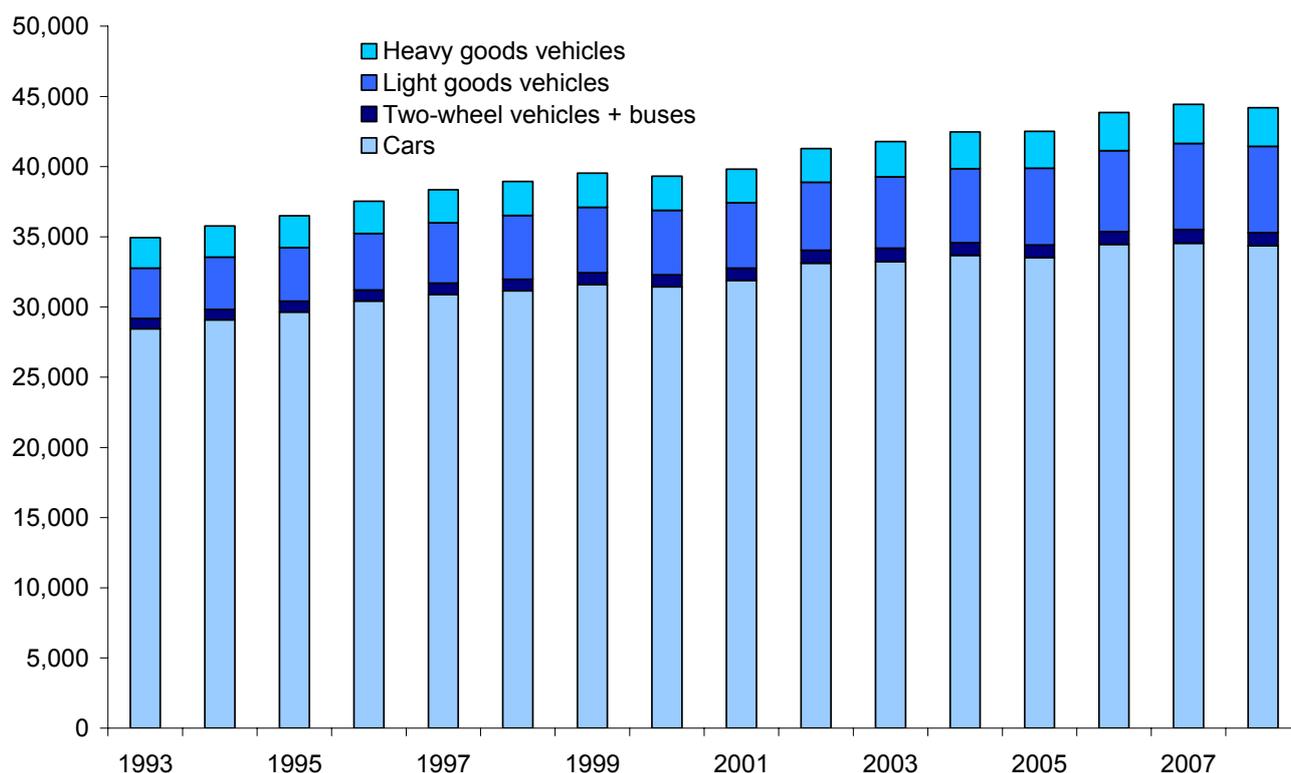
Nuclear power does not emit greenhouse gases although its use raises other environmental issues, including the long-term disposal of spent fuel. Unplanned outages at nuclear stations in 2006 and 2007 saw reductions in outputs. The electricity generated by nuclear fell by 34% between 2005 and 2007 and is now at the lowest level in the period 2000 - 2007.

Scotland generated 8,226 GWh of electricity from renewable sources in 2007. This equated to 20.1% of the gross consumption<sup>5</sup> of electricity in Scotland, compared with 12.2% in 2000. A target has been set that 50% of Scottish gross electricity consumption should come from renewable sources by 2020, with an interim target of 31% by 2011.

Source: [Department for Energy and Climate Change](#)

## Motor Traffic on All Roads: 1993-2008

Million vehicle kilometres



	Million vehicle kilometres						
Vehicle type	1993	1995	2000	2005	2006	2007	2008
<b>Cars</b>	28,449	29,646	31,433	33,517	34,466	34,545	34,357
<b>Two-wheeled motor vehicles</b>	203	203	250	313	302	326	315
<b>Buses</b>	538	565	599	586	609	650	630
<b>Light goods vehicles</b>	3,591	3,832	4,591	5,464	5,761	6,125	6,145
<b>Heavy goods vehicles</b>	2,156	2,250	2,436	2,639	2,721	2,781	2,751
<b>Total</b>	<b>34,938</b>	<b>36,496</b>	<b>39,319</b>	<b>42,520</b>	<b>43,859</b>	<b>44,426</b>	<b>44,197</b>

The pollutants emitted by road transport contribute greatly to poor air quality that damages human and ecosystem health. Leaded petrol was banned in the UK on 1 January 2000 as part of the European Strategy to reduce pollution from road traffic. Transport emissions also contain carbon dioxide and other greenhouse gases (GHGs), which contribute to climate change. A reduction in the volume of road traffic would also help to achieve reductions in GHG emissions and concentrations of atmospheric pollutants.

The volume of motor traffic on roads in Scotland has increased by 27% between 1993 and 2008. However, between 2007 and 2008 there was a 0.5% decrease in the volume of motor traffic on Scottish roads. In 2008, major roads (motorways and 'A' roads) accounted for 65% of the volume of motor traffic in Scotland. In addition, minor roads ('B', 'C' and unclassified) accounted for 15 billion vehicle kilometres of traffic per year. Cars accounted for 78% of road traffic.

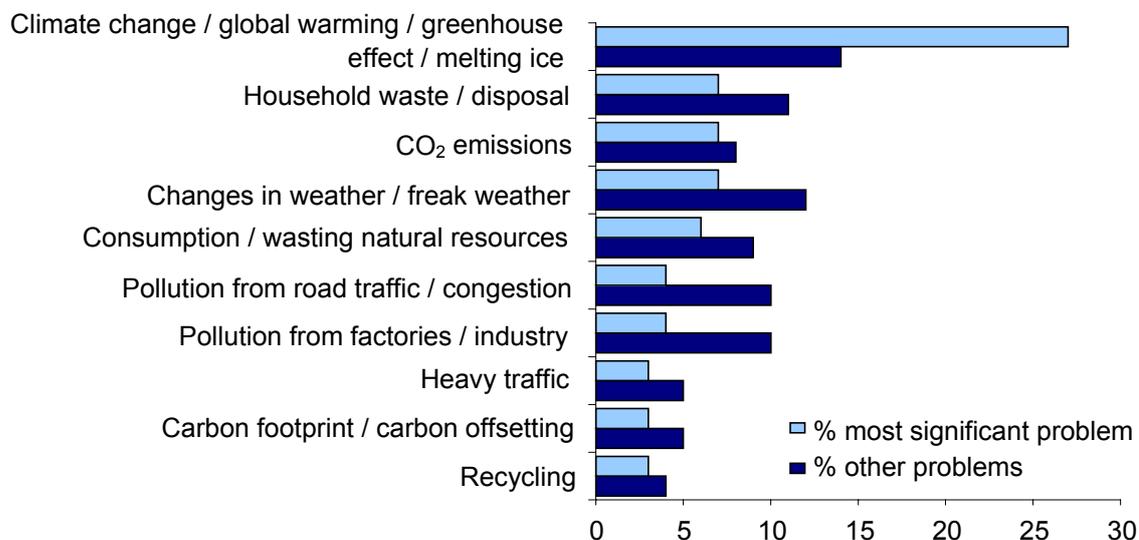
Source: [Department for Transport](#)

## Footnotes

- 1) General Register Office for Scotland (2007). [Population Projections of Scotland \(2006-based\)](#).
- 2) GDP estimates are based on output and are at constant 2004 prices. Seasonally adjusted. GDP estimates are in basic prices, also referred to as Gross Value Added (GVA).
- 3) Includes wind, wave, solar power, thermal renewables and hydroelectric (natural flow).
- 4) Pumped storage is not a renewable source of energy because it uses electricity produced by other means to create a store of hydrological power.
- 5) The amount of electricity generated minus net exports (but including losses).

## Perceived Significant Environmental Problems: 2008

What is the most significant environmental problem? Other environmental problems?  
(percentage of respondents)



Environmental issue	Percentage of respondents	
	most significant problem	other problems
<b>Climate change / global warming / greenhouse effect / melting ice</b>	27	14
<b>Household waste / disposal</b>	7	11
<b>CO<sub>2</sub> emissions</b>	7	8
<b>Changes in weather / freak weather</b>	7	12
<b>Consumption / wasting natural resources</b>	6	9
<b>Pollution from road traffic / congestion</b>	4	10
<b>Pollution from factories / industry</b>	4	10
<b>Heavy traffic</b>	3	5
<b>Carbon footprint / carbon offsetting</b>	3	5
<b>Recycling</b>	3	4

The Scottish Environmental Attitudes and Behaviours Survey 2008<sup>1</sup> included a question to gauge which specific environmental issues are most prominent in the public mind. Respondents were asked (unprompted): a) what they considered to be the 'most significant' environmental problem these days; and b) what they saw as 'other' environmental problems.<sup>2</sup>

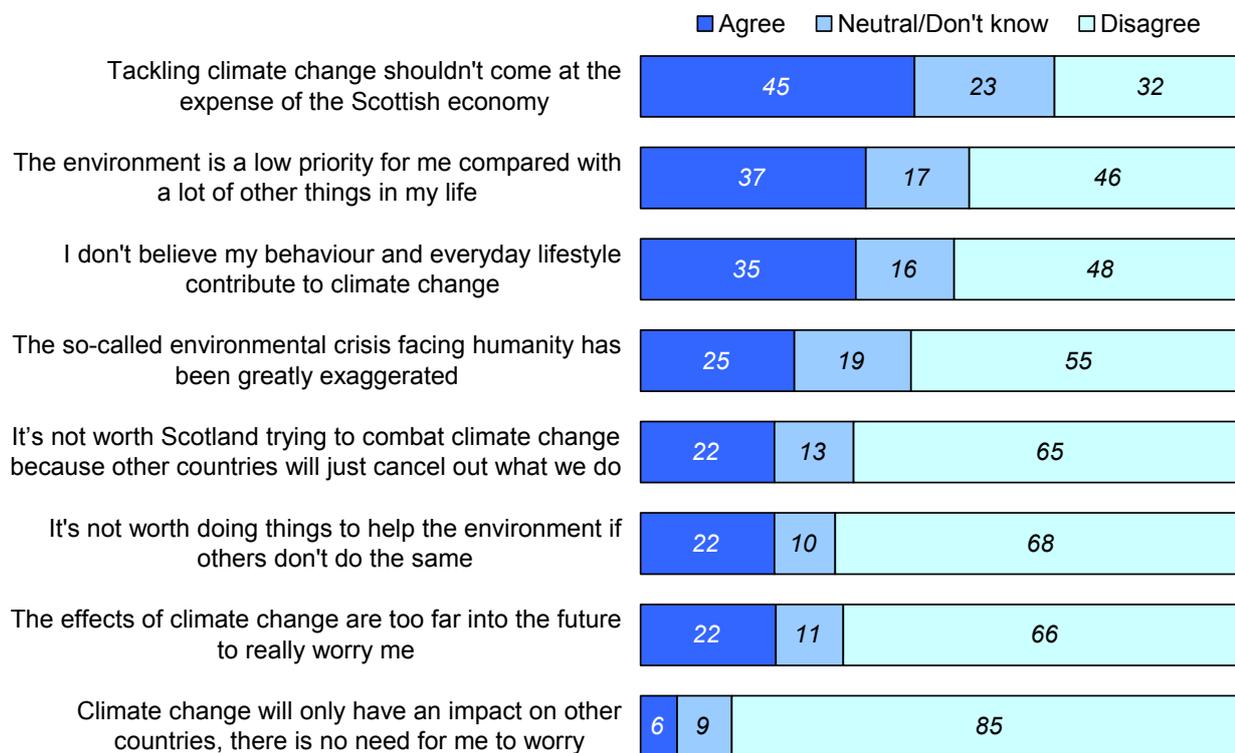
Climate change was by far the most common response - 41% of respondents in total mentioned the issue, and 27% identified it as the single most significant environmental issue. The next highest ranking issues were: changing weather patterns (mentioned by 19% overall), household waste (18%), CO<sub>2</sub> emissions (15%), and over-consumption (15%). It could be argued that all of these issues are in some way related to climate change. Overall, 53% of respondents mentioned climate change, CO<sub>2</sub> emissions or carbon footprint.

The Scottish Parliament passed the Climate Change (Scotland) Act 2009<sup>3</sup> with the aim of reducing Scotland's emissions by 80% by 2050. This includes all greenhouse gases.

Source: [Scottish Government](#)

## Agreement or Disagreement with Statements about Climate Change and the Environment: 2008

To what extent do you agree/disagree with each statement? (percentage of respondents)<sup>4</sup>



Respondents to the Scottish Environmental Attitudes and Behaviours Survey 2008<sup>1</sup> were asked to indicate the extent to which they agreed or disagreed with a series of statements about climate change and the environment. These are presented above.

Respondents were asked if they agreed with the statement, "It is not worth Scotland trying to combat climate change, because other countries will just cancel out what we do". Overall, 22% agreed with this statement and 65% disagreed. When asked if they agreed that "it's not worth me doing things to help the environment if others don't do the same", 22% agreed and 68% disagreed.

A sizeable proportion of people struggle to make the link between climate change and their own individual behaviour, with over a third (35%) agreeing, 'I don't believe my behaviour and everyday lifestyle contribute to climate change' (48% disagreed and 16% gave a neutral response).

The results further indicate that, when set against other day to day concerns, climate change is not top of the Scottish public's priorities. Over a third of respondents (37%) agreed that the 'environment is a low priority for me compared with a lot of other things in my life', while less than half (46%) disagreed with this. Also, more people agreed (45%) than disagreed (32%) that, 'tackling climate change shouldn't come at the expense of the Scottish economy', while 23% expressed no opinion or did not know.

Source: [Scottish Government](#)

## Footnotes

1) Scottish Government Social Research (2009). [Scottish Environmental Attitudes and Behaviours Survey 2008 \(SEABS '08\)](#).

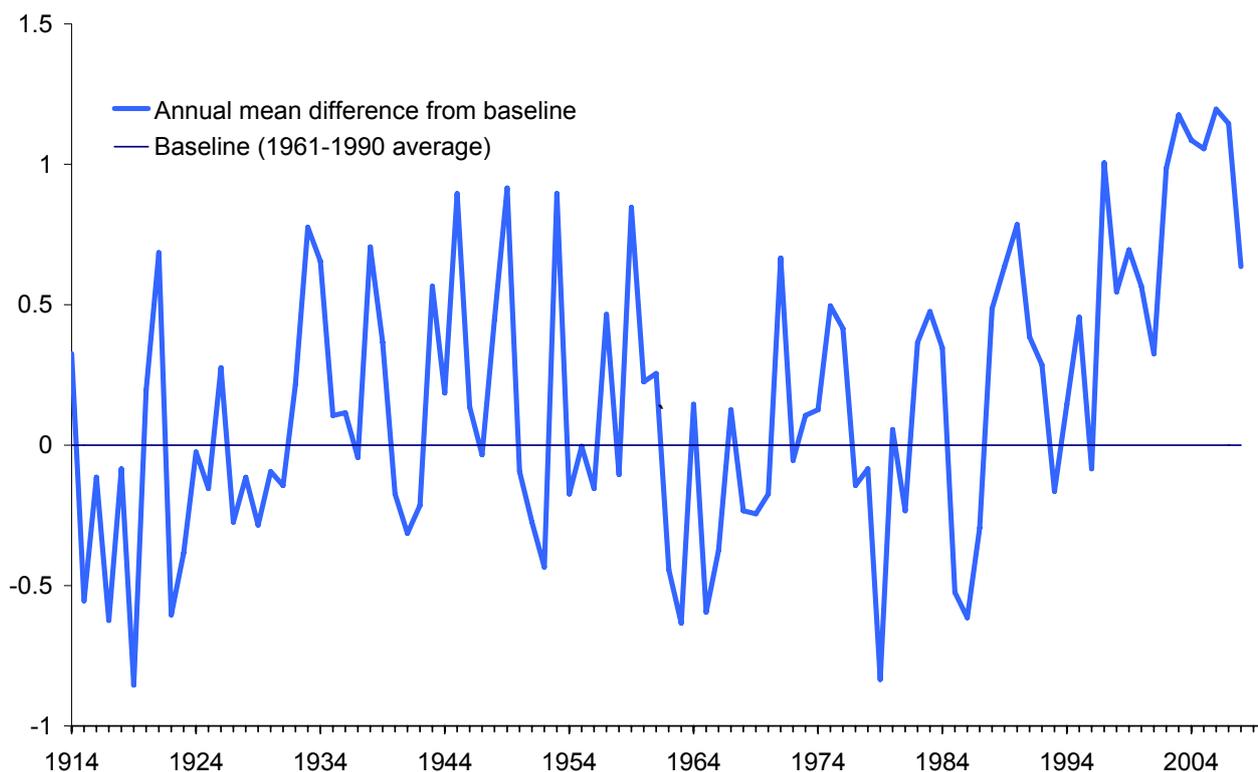
2) Actual question asked was: 'There is a lot of talk these days about environmental problems. When people talk about environmental problems, what do you see as the most significant problem? And what do you see as other environmental problems?'

3) Scottish Parliament (2009). [Climate Change \(Scotland\) Act 2009](#).

4) Figures may not sum to 100% due to rounding.

## Annual Mean Temperature<sup>R</sup>: 1914-2008

Annual mean temperature – difference from 1961-1990 average<sup>1</sup> (degrees Celcius)



	1910s <sup>2</sup>	1920s	1930s	1940s	1950s
<b>Difference from 1961-1990 baseline<sup>1</sup> (°C)</b>	-0.32	-0.07	0.27	0.24	0.10
	1960s	1970s	1980s	1990s	2000s <sup>2</sup>
<b>Difference from 1961-1990 baseline<sup>1</sup> (°C)</b>	-0.18	0.05	0.07	0.41	0.91

The balance between incoming solar energy and outgoing infrared radiation determines the earth's temperature. Changes in the amount of energy retained within the atmosphere affects global climate, which naturally exhibits long-term fluctuations. Current climate trends are unlikely to be entirely natural in origin however, and there is now evidence that human activities are having a discernible impact on the global climate.<sup>3</sup>

Whilst the global impacts of climate change are considerable, there are also wide-ranging implications for Scotland. Flood risk, water resources, agriculture, tourism and health may be affected, all of economic, social and environmental importance.

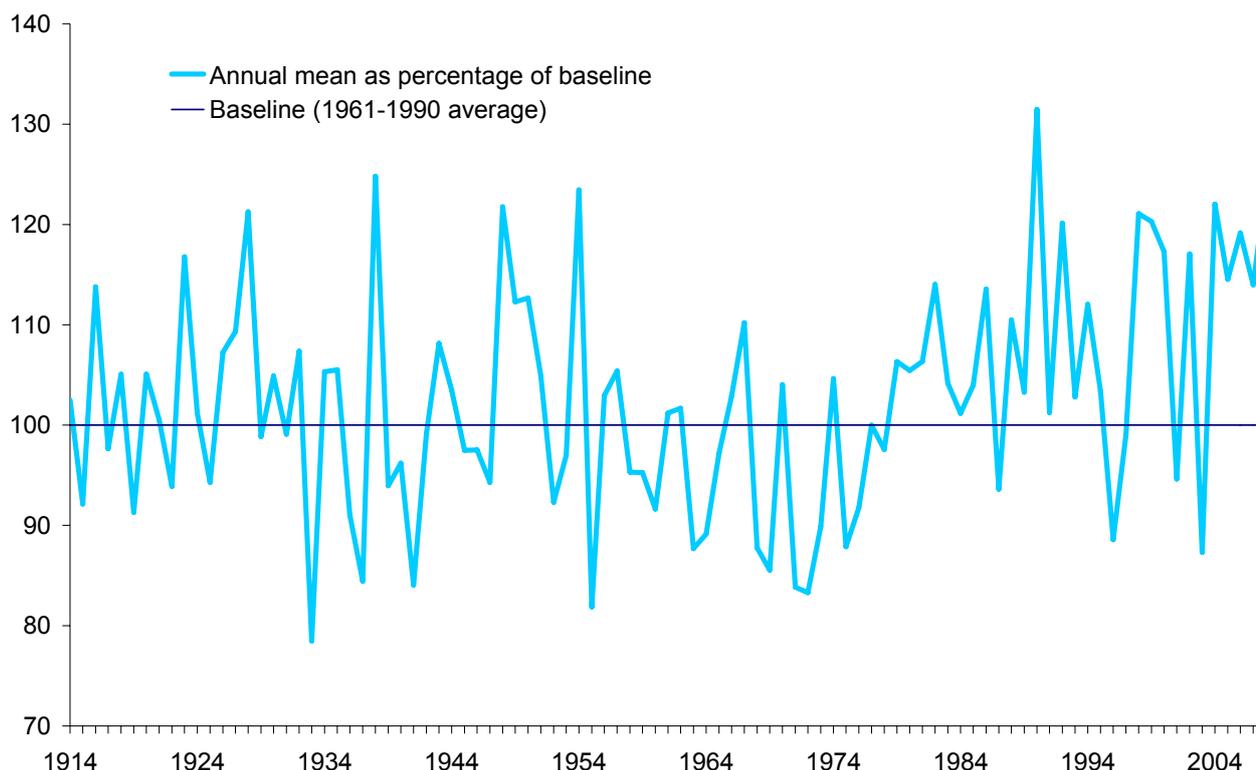
Over the period 1901-2000, the change in mean global surface temperature explained by a linear trend is 0.57 degrees Celsius (°C).<sup>4</sup> Similarly, a linear trend through the Scottish temperature series for the period 1914-2008 indicates an average annual increase of 0.007°C, or 0.7°C each 100 years. The temperatures between 2003 and 2007 in Scotland were the highest since the record began in 1914. The average annual temperature recorded in 2008 was over 0.5°C lower than in 2007 but remained in the upper quintile of temperatures recorded since 1914.

By 2080, temperatures in Scotland are predicted to rise by around 3.5°C during the summer months and around 2.6°C during the winter months.<sup>5</sup>

Source: [Met Office](#)

## Annual Precipitation<sup>R</sup>: 1914-2008

Annual precipitation as a percentage of 1961-1990 average<sup>1</sup>



	1910s <sup>2</sup>	1920s	1930s	1940s	1950s
<b>Average annual precipitation (mm)</b>	1,396	1,458	1,384	1,410	1,406
<b>Percentage of 1961–1990 baseline<sup>1</sup></b>	100.4	104.8	99.5	101.4	101.1
	1960s	1970s	1980s	1990s	2000s <sup>2</sup>
<b>Average annual precipitation (mm)</b>	1,328	1,320	1,469	1,530	1,560
<b>Percentage of 1961–1990 baseline<sup>1</sup></b>	95.5	94.9	105.6	110.0	112.2

Global warming will have an effect on all weather patterns, and changes in the amount of rainfall are predicted. The UK Climate Projections climate scenarios<sup>5</sup> indicate that rainfall patterns in Scotland will change to wetter winters and drier summers. It is estimated that by 2080, in some areas winters will be around 21% wetter, while summers will be around 16% drier. Precipitation changes have several implications for Scotland, affecting water resources, flood and drought risk and habitat loss.

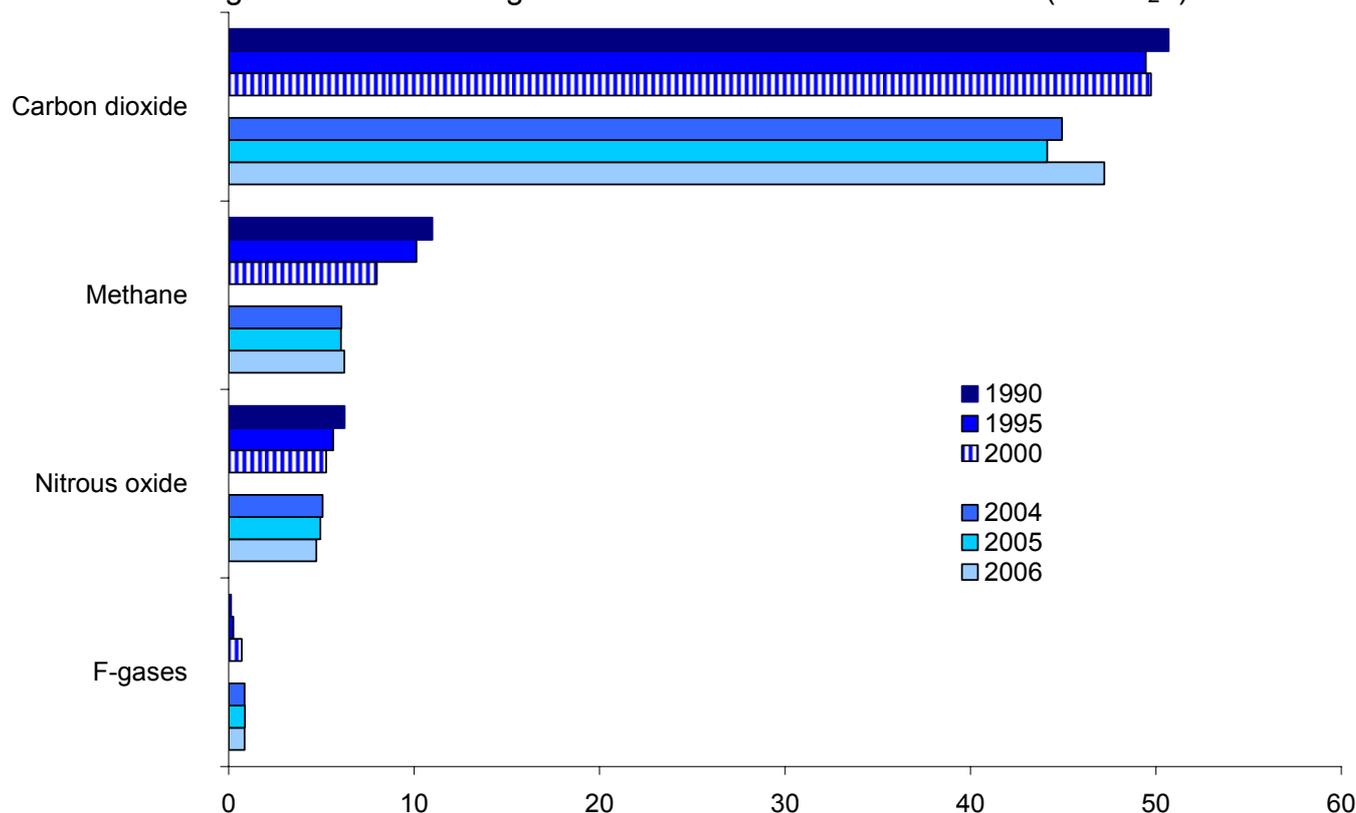
The average annual precipitation in the 1980s, 1990s and the period between 2000 and 2008 was higher than in previous decades, particularly the 1970s, which contained several years with below average rainfall.

The average winter<sup>6</sup> precipitation in the 1990s and 2000s was about 24% higher than the 1961-1990 baseline, compared to the 1960s which was about 10% lower. Summer<sup>7</sup> precipitation has not differed as much, with the average 1990s figure about 4% less than the baseline and the 2000s figure 11% more.

Source: [Met Office](#)

## Greenhouse Gas Emissions<sup>R</sup>: 1990-2006

Greenhouse gas emissions taking account of emissions and removals (Mt CO<sub>2</sub>e)<sup>8</sup>



Million tonnes of carbon dioxide equivalent<sup>8</sup>

'Basket' of GHGs	1990	1995	2000	2004	2005	2006
<b>Carbon Dioxide (CO<sub>2</sub>)</b>	50.7	49.5	49.7	44.9	44.1	47.2
<b>Methane (CH<sub>4</sub>)</b>	11.0	10.1	8.0	6.1	6.1	6.2
<b>Nitrous Oxide (N<sub>2</sub>O)</b>	6.2	5.6	5.3	5.1	4.9	4.7
<b>F-gases</b>	0.13	0.25	0.70	0.85	0.87	0.86
<b>Total Scottish emissions</b> <a href="#">9.10.11.12.13</a>	68.0	65.5	63.7	56.9	56.0	59.0
<b>UK emissions</b> <a href="#">13.14</a>	773.5	710.2	671.9	657.6	655.2	652.3

*It should be noted that improved data sources and estimation techniques have routinely led to revision of historic greenhouse gas emission estimates.*

'Greenhouse' gases (GHGs) in the atmosphere help to retain radiation, resulting in warming of the lower atmosphere and earth surface. The process, known as the greenhouse effect, is essential to maintain global temperatures that sustain life on earth. Atmospheric concentrations of GHGs have increased as a result of human activities since the industrial revolution (c.1750). This has enhanced the greenhouse effect and is influencing global climate change.

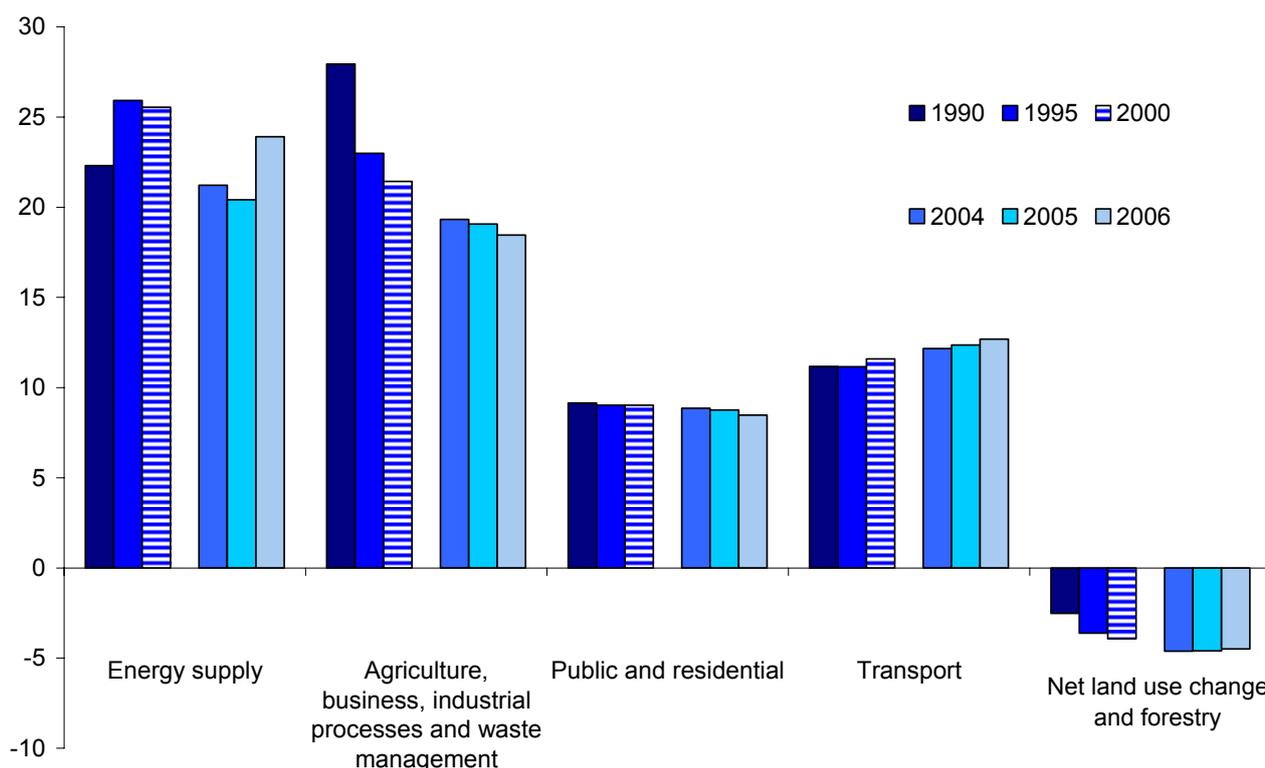
Since the baseline (1990 for carbon dioxide, methane and nitrous oxide, 1995 for the F-gases, i.e. hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride) greenhouse gas emissions in Scotland have reduced by 13.4% and in 2006 equalled 59.0 million tonnes of carbon dioxide equivalent.

The Climate Change (Scotland) Act 2009 sets a target to reduce greenhouse gas emissions by at least 80% by 2050<sup>15</sup>.

Source: [National Atmospheric Emissions Inventory](#)<sup>16</sup>

## Greenhouse Gas Emissions by Source<sup>R</sup>: 1990-2006

Greenhouse gas emissions taking account of emissions and removals (Mt CO<sub>2</sub>e)<sup>8</sup>



Sector	Million tonnes of carbon dioxide equivalent					
	1990	1995	2000	2004	2005	2006
Energy supply	22.3	25.9	25.5	21.2	20.4	23.9
Agriculture, business, industrial processes and waste management	27.9	23.0	21.4	19.3	19.1	18.5
Public and residential	9.1	9.0	9.0	8.9	8.8	8.5
Transport <sup>17</sup>	11.2	11.2	11.6	12.2	12.4	12.7
Net land use, land use change and forestry	-2.5	-3.6	-3.9	-4.6	-4.6	-4.5
<b>Total emissions</b> <a href="#">9.10.11.12.13</a>	<b>68.0</b>	<b>65.5</b>	<b>63.7</b>	<b>56.9</b>	<b>56.0</b>	<b>59.0</b>

*It should be noted that improved data sources and estimation techniques have routinely led to revision of historic greenhouse gas emission estimates.*

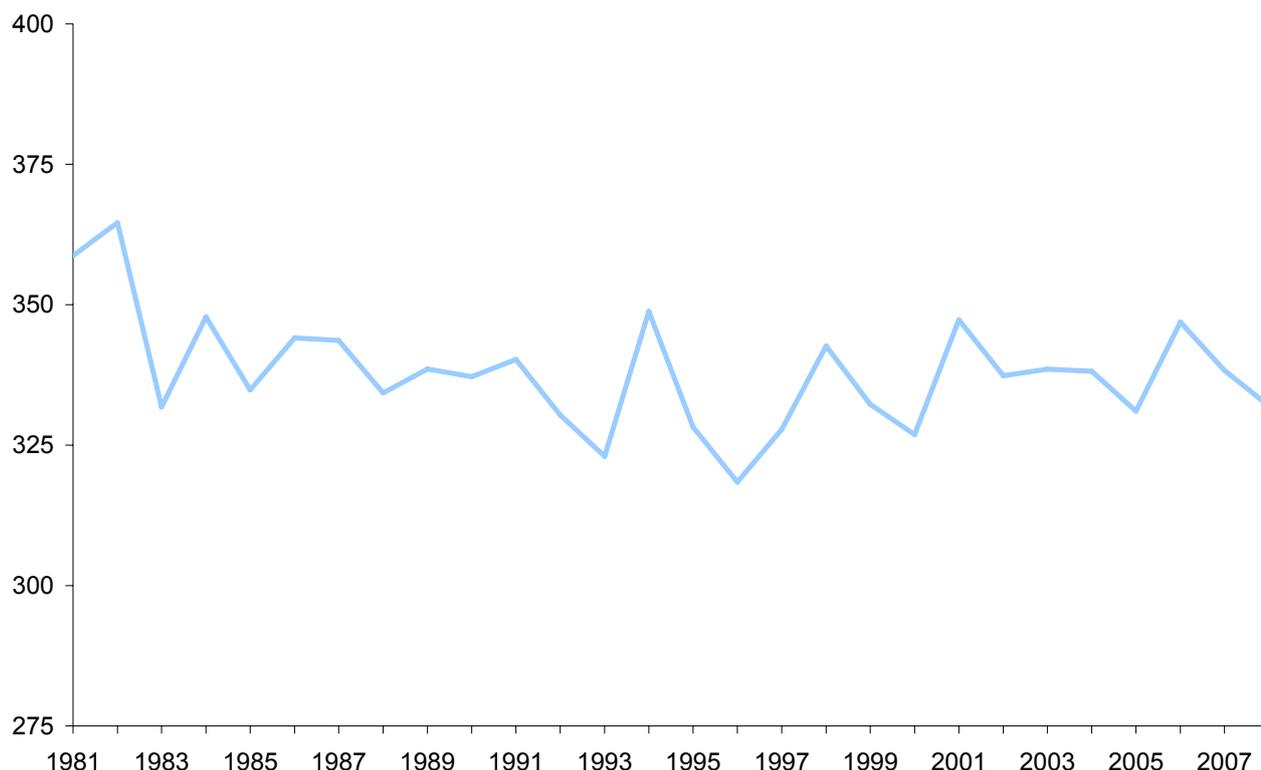
Scotland's emissions of greenhouse gases in 2006 were 59.0 Mt CO<sub>2</sub>e (around 9% of the UK total). The energy supply sector was the largest emitter of greenhouse gas emissions in 2006, contributing 40.5% of the emissions in Scotland. Emissions from this sector were 7.2% higher than in 1990, however between 1990 and 2005 emissions had decreased by 8.5%. Transport emissions contributed a further 21.5% to the 2006 total and have increased by 13.5% since 1990. Agriculture, business, industrial processes and waste management contributed 31.3% of net emissions in 2006, while the public and residential sector contributed 14.4%.

In Scotland, land use change and forestry, taken as a whole, acts as a sink, absorbing more greenhouse gas emissions than it releases. Estimates of emissions and removals from this sector are particularly uncertain since they depend critically on assumptions made on the rate of loss or gain of carbon in Scotland's carbon rich soils.

Source: [National Atmospheric Emissions Inventory](#) <sup>16</sup>

## Column Ozone Measurements<sup>R</sup>: 1981-2008

Column ozone concentrations over Lerwick (Dobson units)



**Column ozone concentrations (Dobson units)**

Station	1981	1985	1990	1995	2000	2005	2006	2007	2008
Lerwick	358.7	334.8	337.2	328.2	326.9	331.0	346.9	338.3	332.0

The stratospheric ozone layer, located around 10-30 km above the Earth's surface, forms a protective shield against harmful solar (UVB) radiation.<sup>18</sup> Thinning of the ozone layer has occurred since the beginning of the 1980s in all regions except equatorial ones. Depletion is most marked in the Antarctic where, in 2006, the Antarctic ozone hole reached 29.5 million square kilometres in area (over 300 times the land area of Scotland).<sup>19</sup>

The 1987 Montreal Protocol set guidelines to eliminate the global production and use of ODS. European production of CFCs for non-essential use fell to zero in 1995.<sup>19</sup> However, leaks from old equipment and the long life of these substances in the lower atmosphere mean that full recovery of the ozone layer is not predicted until about 2050.

Over the last 26 years, the annual average total ozone cover over Lerwick has shown the natural interannual variability which would be expected due to varying meteorological conditions, but generally levels have decreased over this period. Record levels of chemical ozone depletion were reported at Lerwick in March 2005. This has been attributed to local meteorological conditions and the passage of Arctic lower stratospheric air in which ozone had been depleted.

Source: [AEA Energy and Environment](#)

## Footnotes

- 1) The 1961-1990 averages used in this publication are calculated from 5km grid squares and differ from the averages published by the Met Office which are based upon 1km grid squares. The averages used are temperature: 7.03°C and precipitation: 1390.57mm.
- 2) The 1910s exclude 1910-1913 and the 2000s exclude 2009.
- 3) IPCC Fourth Assessment Report: Climate Change 2007 [A Report of the Intergovernmental Panel on Climate Change](#).
- 4) Inter-Governmental Panel on Climate Change (IPCC), Working Group 1 (WG1) Report, February 2007 [The Physical Science Basis of Climate Change](#)
- 5) [UK Climate Projections](#) 2009. The projected changes, based on the 1961-90 averages, use the Medium emissions scenario climate model, and are for the 2080s, i.e. a 2071-2100 average. The central estimate (50% probability) has been used.
- 6) December – February
- 7) June – August
- 8) Emissions are weighted by Global Warming Potential (GWP). GWP accounts for the potency of the gas as well as the amount emitted. For example, PFCs and SF<sub>6</sub> are released in small quantities, but are long-lived and therefore highly potent.
- 9) The uncertainty for Scottish emissions is ±23.8%. For more details see Baggott *et al.* (2008).
- 10) Figures may not sum due to rounding.
- 11) This figure does not include emissions from international aviation and shipping. In 2006, AEA have estimated that Scotland's share of UK greenhouse gas emissions from international aviation and shipping equalled 2.3 Mt CO<sub>2</sub>e, compared to 2.2 Mt CO<sub>2</sub>e in 2005 and 2.0 Mt CO<sub>2</sub>e in 1990. [Greenhouse Gas Emissions Data for International Aviation and Shipping, 1990-2006](#)
- 12) Emissions from off-shore oil and gas installations are not included in the Scottish inventory.
- 13) This total has not been adjusted to take account of the effect of trading in carbon units.
- 14) Includes emissions which have not been allocated to Scotland, England, Wales or Northern Ireland.
- 15) The target will be measured against a 1990 baseline for carbon dioxide, methane and nitrous oxide, and a 1995 baseline for the F-gases. The target includes Scotland's share of emissions from international aviation and shipping which are not

included in the data presented here (see footnote 11). In addition the target will take account of trading in carbon units.

16) Joanna Jackson, Yvonne Li, Neil Passant, Jenny Thomas, Glen Thistlethwaite, Amanda Thomson & Laura Cardenas (2008) "[Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2006](#)". AEA Technology, AEAT/ENV/R/2669.

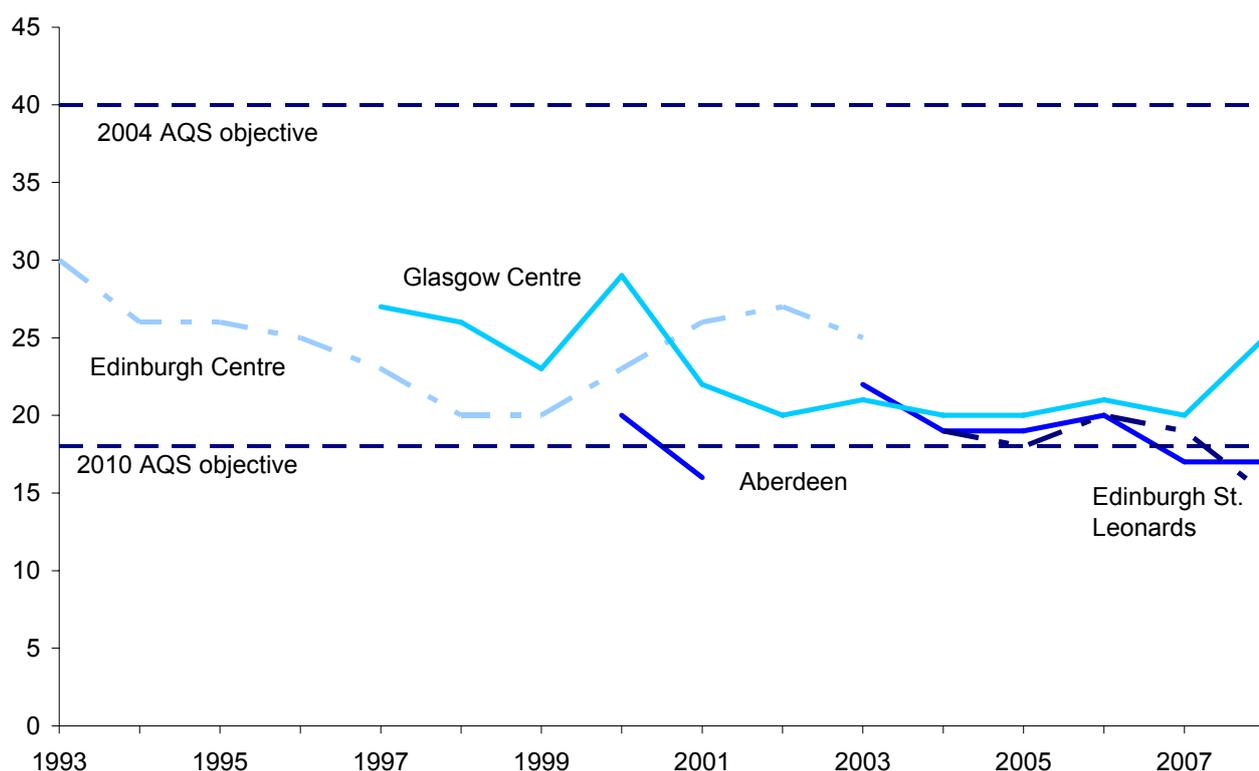
17) In accordance with the inventory specification, emission estimates due to road transport are based on UK sales of fuel. These have been apportioned on the basis of kilometres travelled in each part of the UK.

18) Stratospheric ozone should not be confused with tropospheric (ground level) ozone.

19) Department for Environment, Food and Rural Affairs: [e-Digest of Environmental Statistics](#).

## Particulate (PM<sub>10</sub>) concentrations: 1993-2008

Annual mean concentration (µg/m<sup>3</sup>)



Site <sup>1</sup>	Annual mean concentration (µg/m <sup>3</sup> )						
	1993	1995	2000	2005	2006	2007	2008
<b>Glasgow Centre</b>	-	-	29	20	21	20	21
<b>Edinburgh<sup>2</sup></b>	30	26	23	18	20	19	15
<b>Aberdeen</b>	-	-	20	19	20	17	18

Particulate pollution can harm the human respiratory and cardiovascular systems, and is linked to asthma and mortality. Smaller particles are the most damaging and current targets focus on particles less than 10µm in diameter (PM<sub>10</sub>).

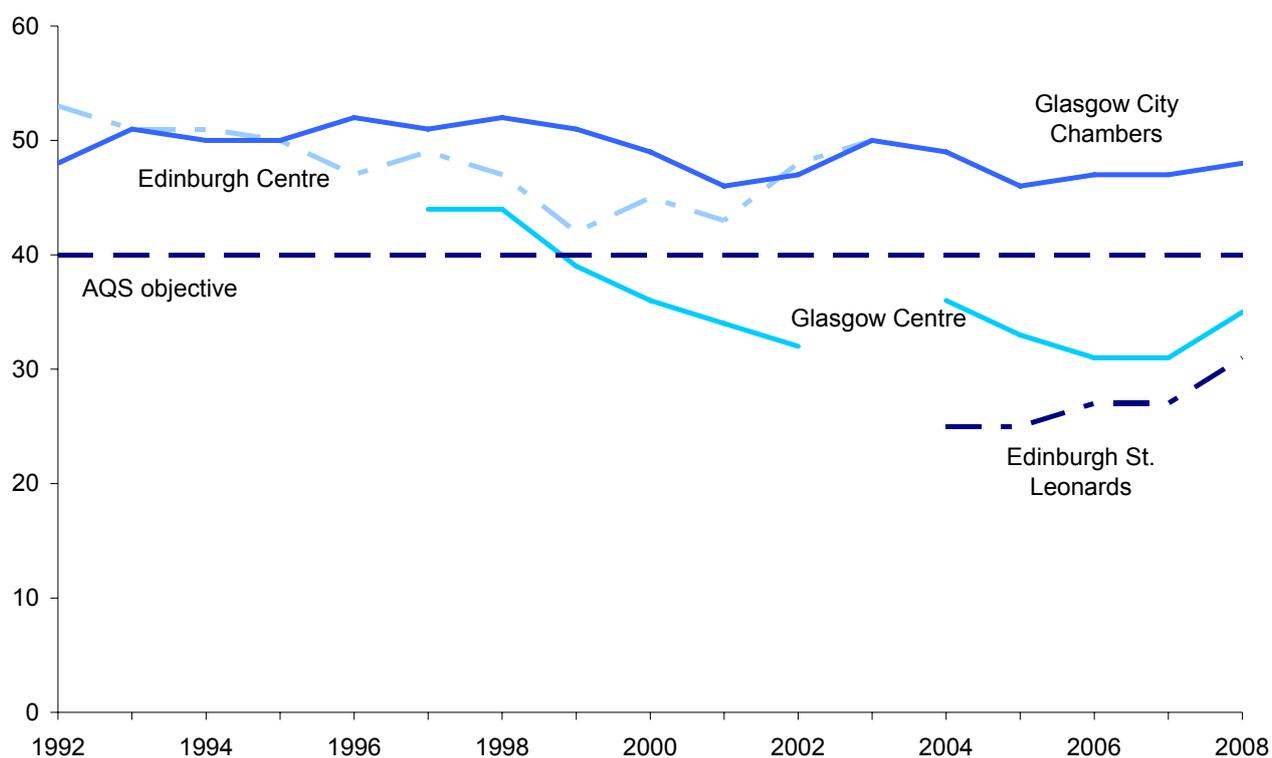
The greatest source of PM<sub>10</sub> is combustion. In particular, road transport accounted for around 21% of UK emissions of PM<sub>10</sub> in 2006.<sup>3</sup> Between 1990 and 2006, UK emissions of PM<sub>10</sub> fell by 50%.<sup>3</sup>

The Air Quality Strategy<sup>4</sup> objectives for PM<sub>10</sub> come in two stages. Stage 1 (to be met by the end of 2004): a 24-hour mean of 50µg/m<sup>3</sup> not to be exceeded more than 35 times a year, and an annual mean of 40µg/m<sup>3</sup>. Stage 2 (to be met by the end of 2010): a 24-hour mean of 50µg/m<sup>3</sup> not to be exceeded more than seven times a year, and an annual mean of 18µg/m<sup>3</sup>. The stage 1 annual mean objective was met at all of the automatic monitoring sites in 2008. The stage 2 annual mean objective was met at 24 of the 39 automatic monitoring sites in Scotland, including - Aberdeen, Grangemouth and Inverness.

Source: [Scottish Air Quality Database](#)

## Nitrogen dioxide concentrations: 1992-2008

Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ )



	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ )						
Site <sup>5</sup>	1992	1995	2000	2005	2006	2007	2008
Glasgow Centre <sup>6</sup>	-	-	36	33	31	31	35
Glasgow City Chambers	48	50	49	46	47	47	48
Edinburgh <sup>2</sup>	53	50	45	25	27	27	31

High concentrations of nitrogen dioxide ( $\text{NO}_2$ ) can affect human health, particularly by causing inflammation of the airways. Ecosystem health is also damaged by  $\text{NO}_2$  by contributing to acid deposition, eutrophication and promoting the formation of ground level ozone.

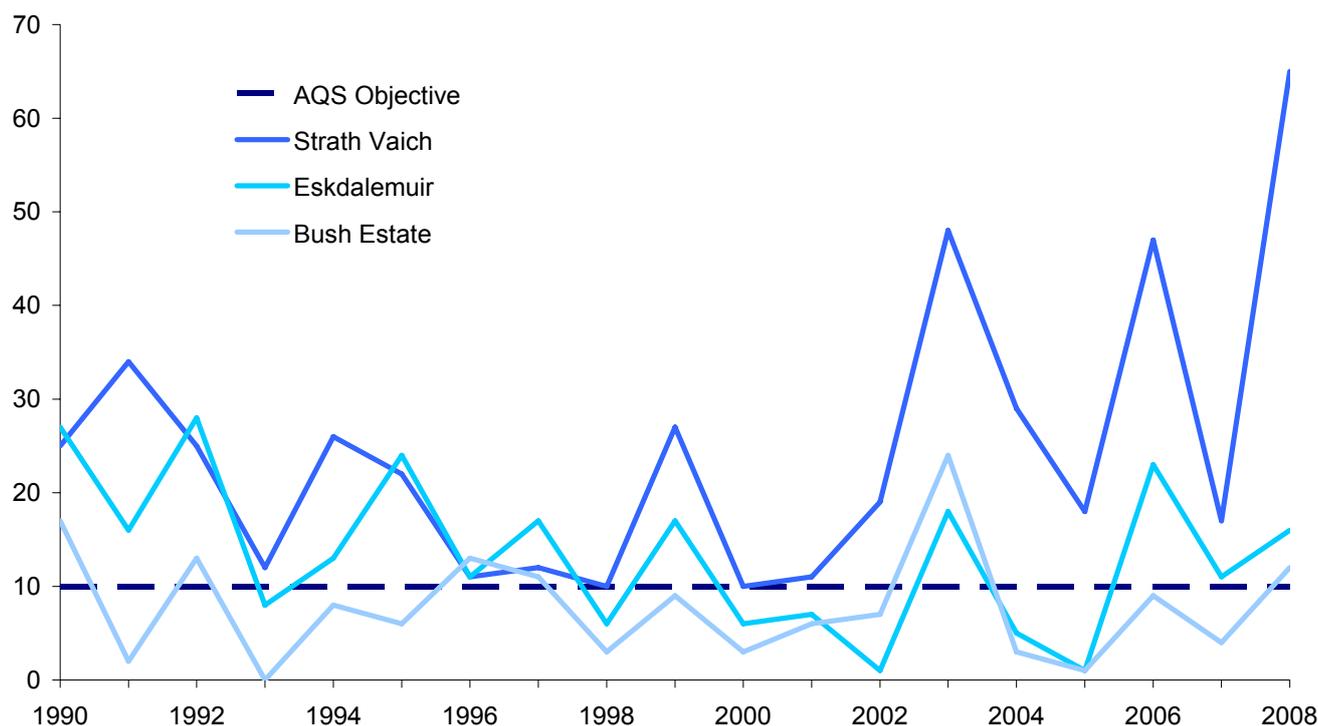
All combustion processes in air produce oxides of nitrogen ( $\text{NO}_x$ ). Road transport accounted for 32% of all UK  $\text{NO}_x$  emissions in 2006; this contribution is greatly increased in urban areas. Between 1990 and 2006, UK emissions of  $\text{NO}_x$  are estimated to have decreased by 49%<sup>3</sup>, due in part to the installation of catalytic converters in vehicles.

The Air Quality Strategy<sup>4</sup> objectives for  $\text{NO}_2$  (to be met by the end of 2005) are (1) an annual mean of  $40\mu\text{g}/\text{m}^3$  and (2) an hourly mean of  $200\mu\text{g}/\text{m}^3$  not to be exceeded more than 18 times a year. In 2008, the first objective was not met at 16 of the 50 automatic monitoring sites in Scotland, those failing included Aberdeen Roadside, Glasgow City Chambers and Glasgow Kerbside. The second objective was met at all but 6 automatic monitoring sites, Glasgow Kerbside and Aberdeen Roadside were amongst those who failed, they recorded exceedences of 72 and 20 respectively.

Source: [Scottish Air Quality Database](#)

## Ground level ozone concentrations: 1990-2008

Number of days exceeding  $100\mu\text{g}/\text{m}^3$  (maximum 8hr running mean)



Site <sup>7</sup>	1990	1995	2000	2005	2006	2007	2008
<b>Number of days exceeding <math>100\mu\text{g}/\text{m}^3</math> (maximum 8hr running mean)</b>							
<b>Strath Vaich</b>	25	22	10	18	47	17	65
<b>Eskdalemuir</b>	27	24	6	1	23	11	16
<b>Bush Estate</b>	17	6	3	1	9	4	12
<b>Annual mean concentration (<math>\mu\text{g}/\text{m}^3</math>)</b>							
<b>Strath Vaich</b>	66	67	66	67	72	68	73
<b>Eskdalemuir</b>	55	55	47	51	58	54	57
<b>Bush Estate</b>	55	53	55	55	58	56	58

Ozone in the stratosphere forms a layer that protects the earth against harmful ultra-violet radiation, but tropospheric (ground level) ozone is a damaging oxidant. Exposure to high ozone concentrations can cause respiratory damage, and affects vegetation by damaging leaves and reducing yields.

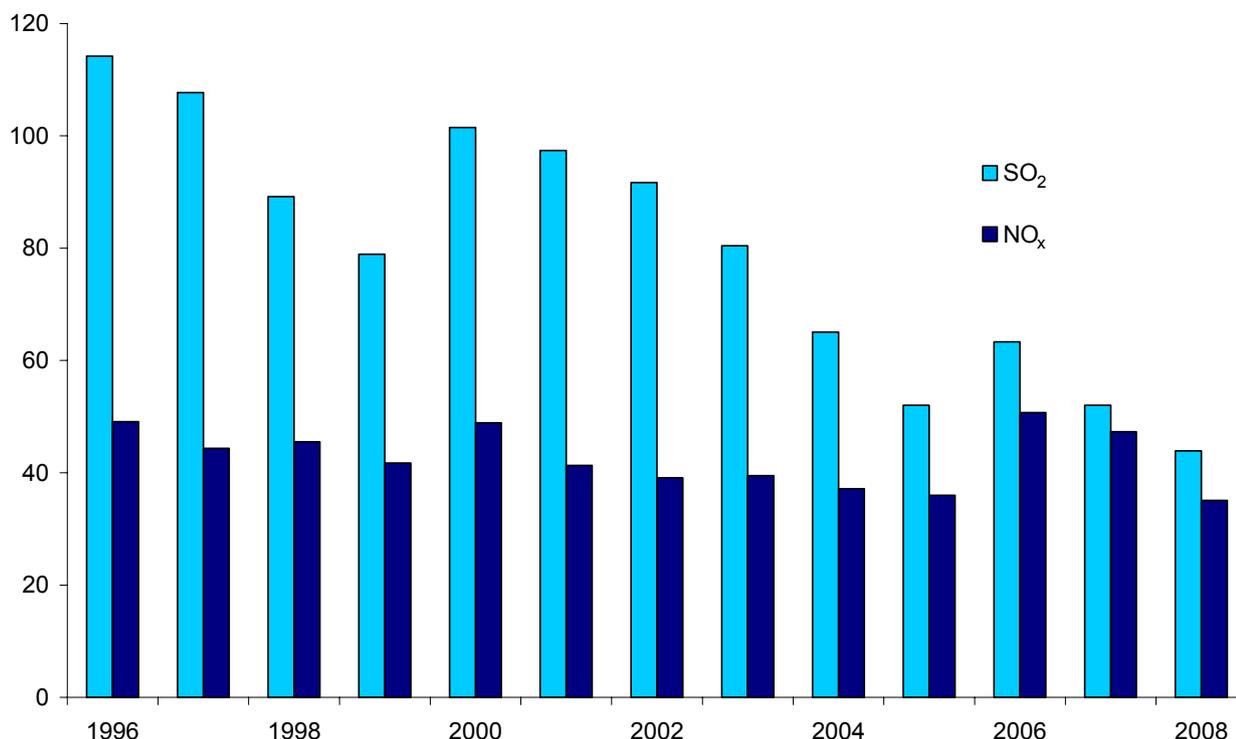
Ozone is formed by a slow, complicated series of reactions from other pollutants that may be blown over from Europe. The most important man-made precursors are nitrogen oxides and volatile organic compounds produced by road transport, industrial processes and solvent use. Ozone concentrations tend to be lower in urban areas where it is converted to nitrogen dioxide by reacting with nitrogen oxides.

The Air Quality Strategy<sup>4</sup> objective for ground level ozone (to be met by 2005) is for the maximum daily concentration (measured as an 8-hour running mean) of  $100\mu\text{g}/\text{m}^3$  not to be exceeded more than 10 times a year. In 2008, this objective was not met at 8 of the 10 sites, including Strath Vaich, Eskdalemuir and Bush Estate.

Source: [Scottish Air Quality Database](#)

## Emissions of sulphur dioxide and nitrogen oxides from large combustion plants<sup>R, 8</sup>: 1996-2008

Annual LCP emissions (thousand tonnes)



Annual emissions (thousand tonnes)

Source	SO <sub>2</sub>				NO <sub>x</sub>			
	1996	2000	2007	2008 <sup>9</sup>	1996	2000	2007	2008 <sup>9</sup>
Electricity supply	99.1	93.2	47.0	39.5	44.7	42.6	39.4	29.1
Refinery	11.3	6.0	2.7	2.2	2.9	2.9	3.6	2.1
Other industry	3.8	2.3	2.4	2.2	1.5	3.4	4.4	3.9

Sulphur dioxide (SO<sub>2</sub>) and oxides of nitrogen (NO<sub>x</sub>) affect human health through respiratory damage, and ecosystem health through acidification. SO<sub>2</sub> and NO<sub>x</sub> are released into the atmosphere through the combustion of fossil fuels. In 2006, large combustion plants (LCPs) accounted for 54% of the SO<sub>2</sub> emissions and 24% of NO<sub>x</sub> emissions in the UK.<sup>3</sup>

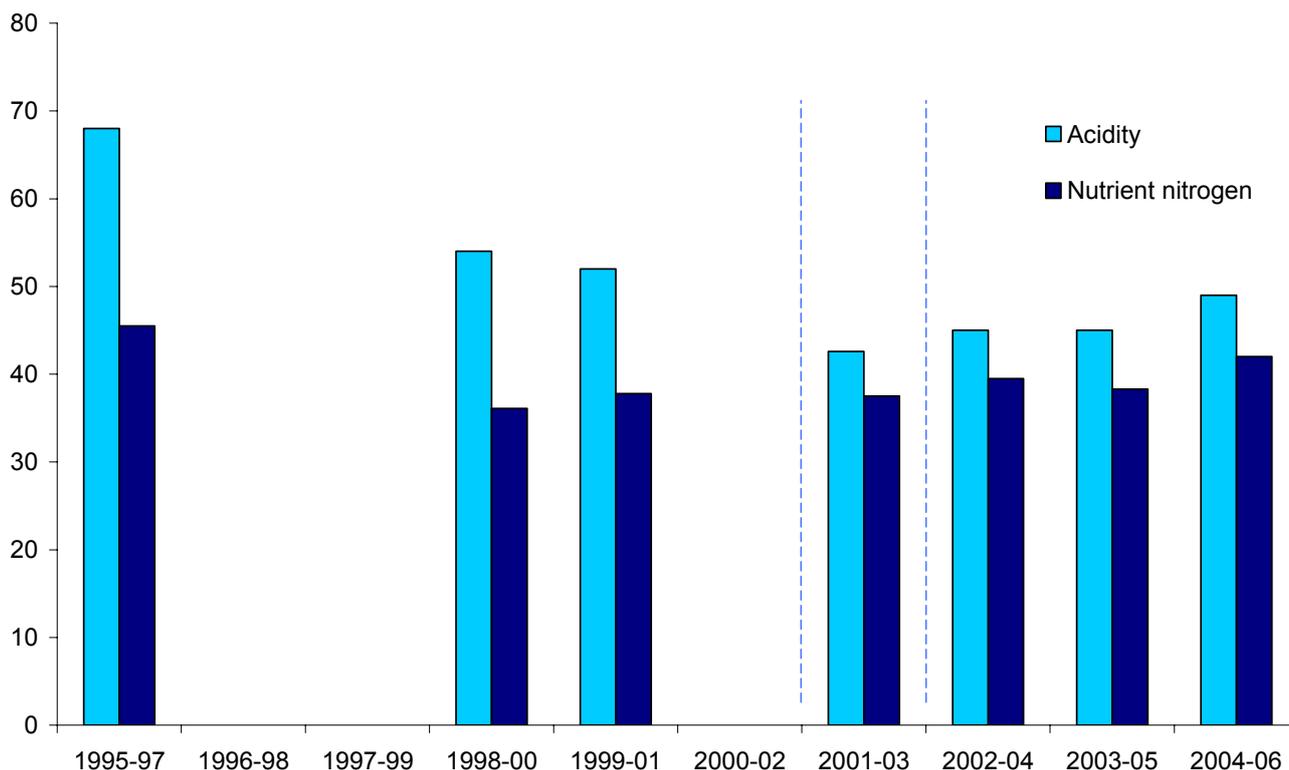
The Large Combustion Plants Directive (since revised by 2001/80/ EC) called for a 60% reduction in SO<sub>2</sub> emissions by 2003 and a 30% reduction in NO<sub>x</sub> emissions by 1998, from a 1980 baseline. By 2002, UK emissions for SO<sub>2</sub> and NO<sub>x</sub> were 78% and 64% respectively below 1980 levels<sup>3</sup>. In Scotland, SO<sub>2</sub> emissions from the electricity supply industry fell between 1996 and 1999, but rose in 2000. This was due to the increased use of coal-fired power stations, necessary to offset the reduced capacity of the nuclear sector because of refurbishment work at certain plants.

In 2008 emissions of SO<sub>2</sub> and NO<sub>x</sub> decreased by 16% and 26% respectively since 2007. This second consecutive year of reductions means that SO<sub>2</sub> and NO<sub>x</sub> emissions are now at the lowest they have been since records began in 1996. The large rise in 2006 was due mainly to increased emissions from the electricity supply sector, and specifically to the increased use of coal.

Source: [Scottish Environment Protection Agency](#)

## Sensitive habitats affected by air pollution<sup>10</sup>: 1995-1997 to 2004-2006

Percentage of sensitive habitat area affected by acid and nutrient nitrogen (N) deposition



### Percentage of sensitive habitat area affected by acid and nutrient nitrogen (N) deposition

	1995-97	1998-00	1999-01	2001-03	2002-04	2003-05	2004-06
<b>Acidity</b>	68	54	52	43	45	45	49
<b>Nutrient N</b>	46	36	38	38	40	38	42

Critical loads are thresholds above which the deposition of pollutants causing acidification and eutrophication causes significant harm to the environment. The pollutants come mainly from industry, transport and agriculture.

Around 60% of Scotland's land area contains habitats sensitive to acid deposition and 55% to eutrophication. Scotland experienced a reduction in acidity exceedance from 68% in 1995-1997 to 49% in 2004-2006, primarily due to reductions in sulphur emissions. Also the percentage area of sensitive habitats affected by nutrient nitrogen in Scotland fell from 46% to 42%.

The EU National Emissions Ceiling Directive sets limits for emissions of ammonia, nitrogen oxides, sulphur dioxide and volatile organic compounds (VOCs) to be achieved by 2010. The Gothenburg Protocol (United Nations Economic Commission for Europe, 1999) also sets ceilings for these emissions. The UK ratified the Protocol in 2005.

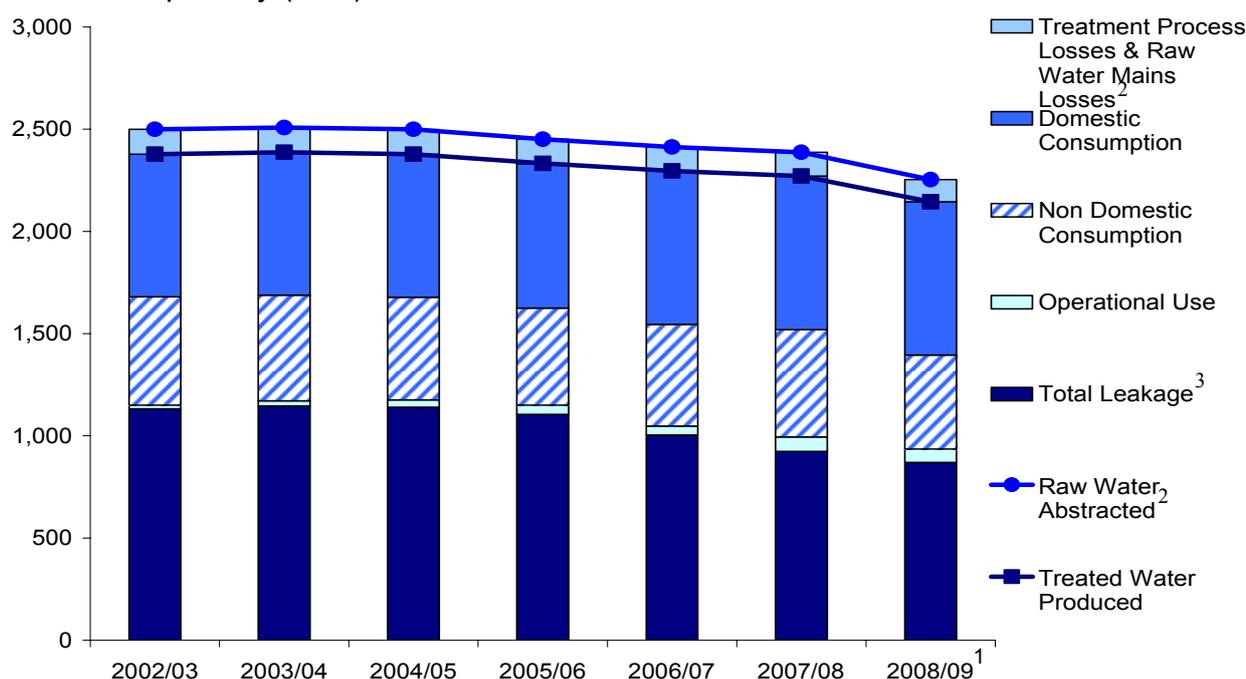
Source: [Centre for Ecology and Hydrology](#)

## Footnotes

- 1) PM<sub>10</sub> concentrations are measured at 51 automatic monitoring sites in Scotland. In 2008, 39 of these sites had capture rates of 75% or more - data for these sites is available on the [Scottish Air Quality](#) website
- 2) In 2003 the data capture rate for Edinburgh Centre was low (under 75%). The 2003 data for Edinburgh is therefore unreliable and will not be included in any charts or tables. The 2003 results for Edinburgh are: PM<sub>10</sub>: mean=25, NO<sub>2</sub>: mean=50. The site stopped recording on the 13th of October and the monitor was then relocated to an urban background site at Edinburgh St Leonards, which started recording on 24 November 2003.
- 3) Department for Environment, Food and Rural Affairs Environmental Statistics website: <http://www.defra.gov.uk/environment/statistics/index.htm>
- 4) Department for Environment, Food and Rural Affairs, Scottish Executive, Welsh Assembly Government & DOE Northern Ireland (2003). [The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum](#).
- 5) Concentrations of nitrogen oxides are measured at 57 automatic monitoring sites in Scotland. In 2008, 50 of these sites had a capture rate of at least 75% - data for these sites can be found on the [Scottish Air Quality](#) website.
- 6) In 2003, the data capture rate for nitrogen dioxide concentrations in Glasgow Centre was low (under 50%), it will therefore be excluded from the table and chart. The 2003 result for Glasgow is: annual mean=39.
- 7) Ozone concentrations are measured at 10 sites: Aberdeen (an urban background site), Auchencorth Moss (a rural site), Bush Estate (a rural site), Edinburgh St Leonards (an urban background site), Eskdalemuir (a rural site), Fort William (a suburban site), Glasgow Centre (an urban centre site), Glasgow Waulkmillglen Reservoir (a rural site), Lerwick (a rural site) and Strath Vaich (a remote site).
- 8) Large combustion plants have a rated thermal output of over 50 megawatts.
- 9) One minor site had not yet reported it's emissions at the time of publication, they have been substituted with emissions from the previous year.
- 10) 3-year average deposition is used to reduce substantial year to year variability. Deposition data for 1995-97 to 1999-01 are based on the same methodology. Data for 2001-2003 onwards also include nitric acid and those from 2002-2004 onwards include aerosols.

## Public Water Supplies – Water Abstracted and Supplied: 2002/03-2008/09

Million litres per day (MI/d)



Million litres per day (MI/d)

	2002/03	2005/06	2006/07	2007/08	2008/09 <sup>1</sup>
<b>Raw Water Abstracted<sup>2</sup></b>	<b>2,499</b>	<b>2,451</b>	<b>2,413</b>	<b>2,387</b>	<b>2,253</b>
<b>Treatment Process Losses and Raw Water Mains Losses<sup>2</sup></b>	<b>121</b>	<b>119</b>	<b>117</b>	<b>116</b>	<b>109</b>
<b>Treated Water Produced</b>	<b>2,378</b>	<b>2,332</b>	<b>2,296</b>	<b>2,271</b>	<b>2,144</b>
<b>Non Domestic Consumption</b>	<b>530</b>	<b>475</b>	<b>498</b>	<b>524</b>	<b>460</b>
<b>Domestic Consumption</b>	<b>698</b>	<b>707</b>	<b>751</b>	<b>752</b>	<b>749</b>
<b>Operational Use</b>	<b>18</b>	<b>45</b>	<b>44</b>	<b>71</b>	<b>66</b>
<b>Total Leakage<sup>3</sup></b>	<b>1,132</b>	<b>1,104</b>	<b>1,004</b>	<b>924</b>	<b>869</b>

For sustainable management of water resources, it is essential to meet consumers' demand and standards, whilst maintaining aquatic ecosystem health. Abstraction of water has impacts on geology, habitats, wildlife, biodiversity, and recreational use of water resources. This is being managed by Scottish Water and Scottish Environment Protection Agency under the Water Resource Planning and River Basin Management Planning Processes.

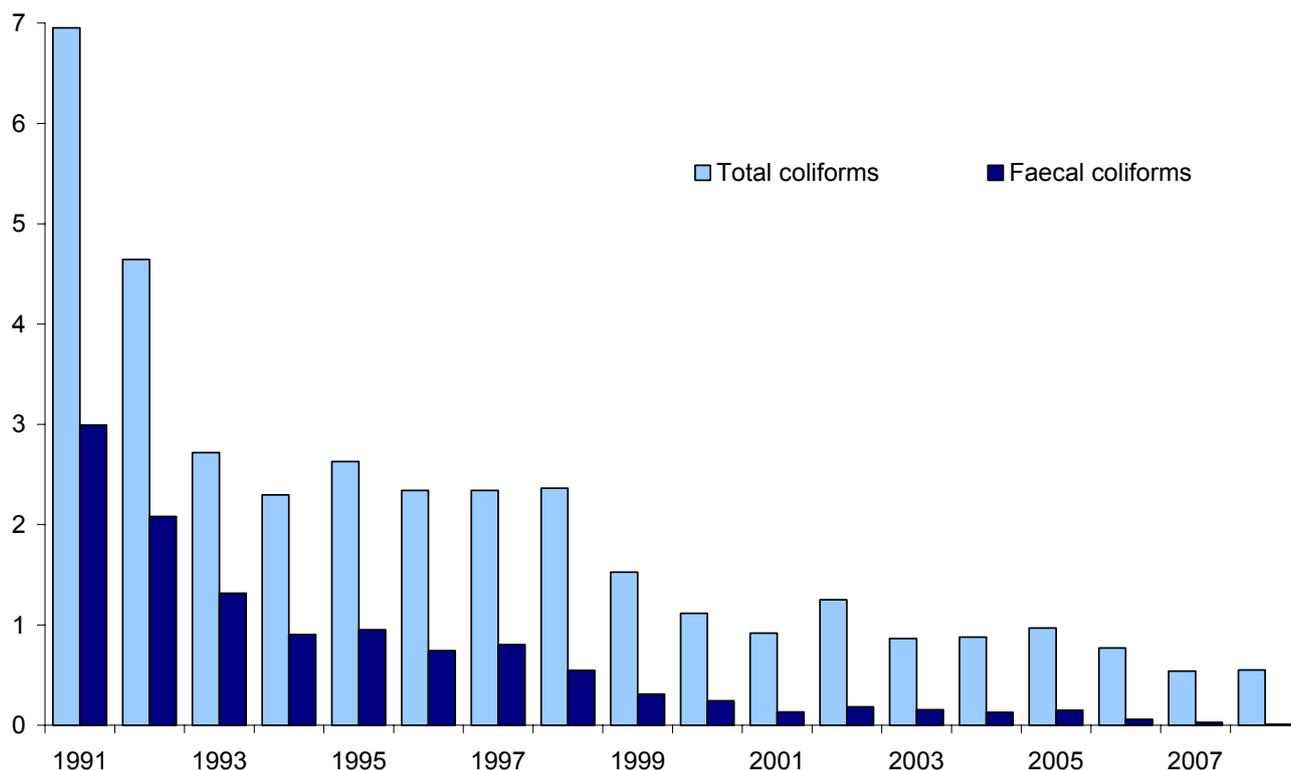
Between 2002/03 and 2008/09, estimated raw water abstractions decreased by 9.8% to 2,253 MI/d. Over the same period domestic consumption increased by 7.2%, while non domestic consumption in 2008/09 was 13.2% lower than that in 2002/03. In addition to a decrease in overall consumption, there was a reduction in treated water produced which was largely achieved by a reduction in leakage.

However, in 2008/09 leakage remained a major element of total demand (approximately 41%). Scottish Water plan to reduce this significantly by 2014 to the target<sup>4</sup> as agreed with the Water Industry Commission. Reductions will provide benefits both to customers by reducing the risk of drought impact and to the environment from reduced raw water abstraction.

Source: [Scottish Water](#)

## Drinking Water Quality: 1991-2008

Percentage of samples at consumer's taps failing test



	1991	1995	2000	2005	2006	2007	2008
<b>Percentage failure for total coliforms</b>	6.95	2.63	1.12	0.97	0.77	0.54	0.55
<b>Percentage failure for <i>E.coli</i> (faecal coliforms)</b>	2.99	0.95	0.24	0.15	0.06	0.03	0.01

The coliform group of organisms is present in large numbers in the gut of all warm-blooded animals and is also widely distributed in the environment. Their presence in tap water indicates a breach in the integrity of the water supply system.

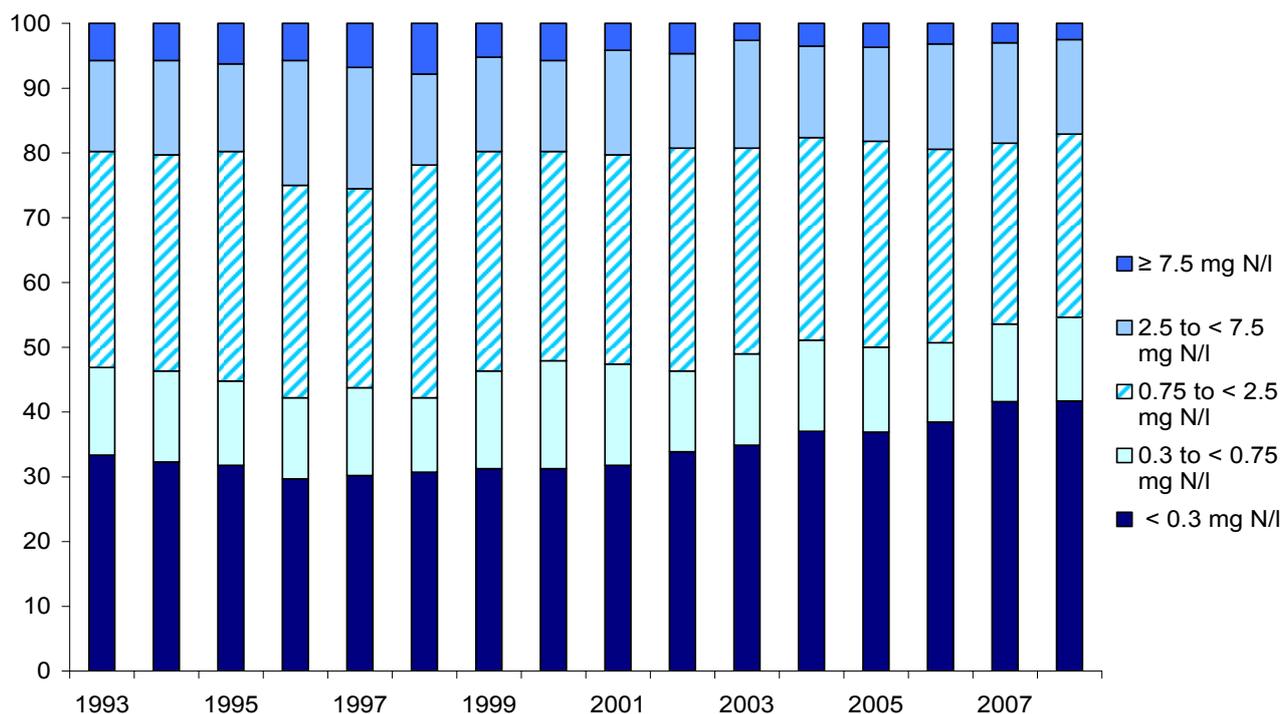
Scottish Water is required to analyse samples taken from water treatment works, service reservoirs and consumers' taps. The Water Supply (Water Quality) (Scotland) Regulations 2001 set strict standards for compliance for a wide range of parameters. The major centres of population in Scotland are served by modern water treatment works, which are generally well equipped to achieve the standards set. In recent years improvements have been made to some of the small, rural treatment works, many of which were previously unable to consistently treat water to the standard required by the Regulations.

Between 1991 and 2008, the percentage of samples from consumer taps containing coliforms fell from 6.95% to 0.55% and the percentage failure for *E.coli* fell from 2.99% to 0.01%. Between 2007 and 2008 the failure rate for *E.coli* decreased by 0.02 percentage points whilst the failure rate for total coliforms increased by 0.01 percentage points.

Source: [Drinking Water Quality Regulator for Scotland](#)

## Nitrate Concentrations in Rivers<sup>5</sup>: 1993-2008

Distribution of mean nitrate concentrations, percentage of sites<sup>6</sup> within each band



Percentage of sites<sup>6</sup> within each band

Band	1993	1995	2000	2005	2006	2007	2008
$\ge 7.5$ mg N/l	6	6	6	4	3	3	3
2.5 to <math>< 7.5</math> mg N/l	14	14	14	15	16	16	15
0.75 to <math>< 2.5</math> mg N/l	33	35	32	32	30	28	28
0.3 to <math>< 0.75</math> mg N/l	14	13	17	13	12	12	13
<math>< 0.3</math> mg N/l	33	32	31	37	38	42	42

The enrichment of waters by nutrients, such as nitrates and phosphates, may lead to damage to the aquatic environment through the accelerated growth of algae and other plant life. The rapid growth and subsequent decay of plant organisms depletes oxygen levels, and this can have harmful effects upon fish and other aquatic life. This process is termed eutrophication.

High nitrate levels tend to have a greater impact on marine and coastal waters than on freshwater; a substantial part of the nitrates in freshwater will eventually reach the sea. The main source of nitrates in freshwater is agriculture.

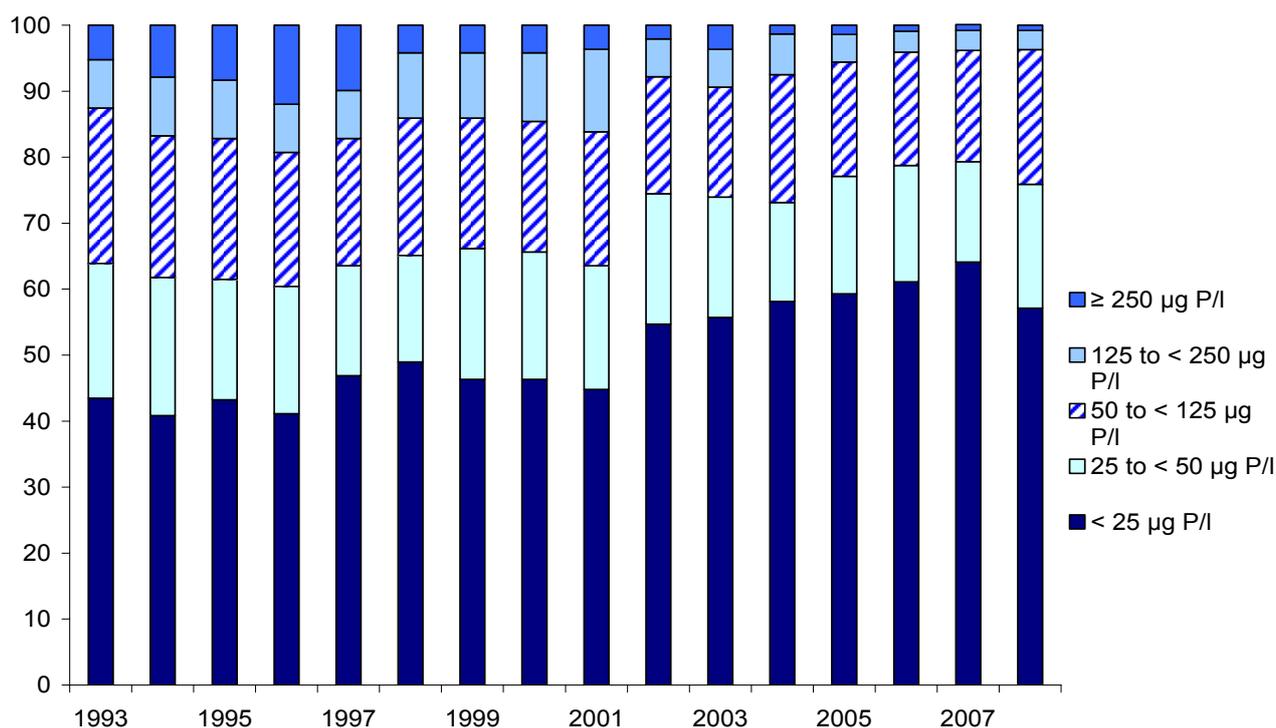
Concentrations of nitrate below 0.3 mg N/l are considered to be natural or background levels<sup>7</sup>; over 40% of the sites met this classification in 2008. Between 1993 and 2008 the percentage of sites with average nitrate concentrations  $\ge 2.5$  mg N/l rose to a peak of 25.5% in 1997. In 2008, this percentage was 17.1%.

Regulations have been made designating 14% of the area of Scotland<sup>8</sup> as Nitrate Vulnerable Zones (NVZs)<sup>9</sup>. In NVZs mandatory rules on farming practices aim to reduce nitrate water pollution from agricultural sources.

Source: [Scottish Environment Protection Agency](#)

## Orthophosphate Concentrations in Rivers<sup>10</sup>: 1993-2008

Distribution of mean orthophosphate concentrations, percentage of sites<sup>6</sup> within each band



Percentage of sites<sup>6</sup> within band

Band	1993	1995	2000	2005	2006	2007	2008
$\ge 250 \mu\text{g P/l}$	5	8	4	1	1	1	1
$125 \text{ to } < 250 \mu\text{g P/l}$	7	9	10	4	3	3	3
$50 \text{ to } < 125 \mu\text{g P/l}$	24	21	20	17	17	17	20
$25 \text{ to } < 50 \mu\text{g P/l}$	20	18	19	18	18	15	19
$< 25 \mu\text{g P/l}$	43	43	46	59	61	64	57

Raised levels of orthophosphate in freshwaters may lead to eutrophication. The main sources of orthophosphate are outputs from sewage treatment and diffuse pollution from agriculture.

Between 1993 and 2001 there was some fluctuation in the distribution of mean orthophosphate concentrations. Over the period 1993-2001 the percentage of sites with mean concentrations  $< 25 \mu\text{g P/l}$  averaged 45% and the percentage of those  $\ge 125 \mu\text{g P/l}$  averaged 16%. By 2007, the percentage of sites with mean concentrations  $< 25 \mu\text{g P/l}$  had increased to a peak of 64% and the percentage of sites  $\ge 125 \mu\text{g P/l}$  had fallen to 4%. However, in 2008 the percentage of sites with mean concentrations  $< 25 \mu\text{g P/l}$  fell to 57%. The long term reduction in orthophosphate concentrations is in part due to the installation of nutrient removal facilities in sewage treatment works.

Under the Urban Waste Water Treatment Directive (UWWTD) (91/271/EEC), catchments where nutrient levels are considered to be high are designated as sensitive areas. Discharges into waters that have been designated as sensitive require additional treatment to remove nutrients.

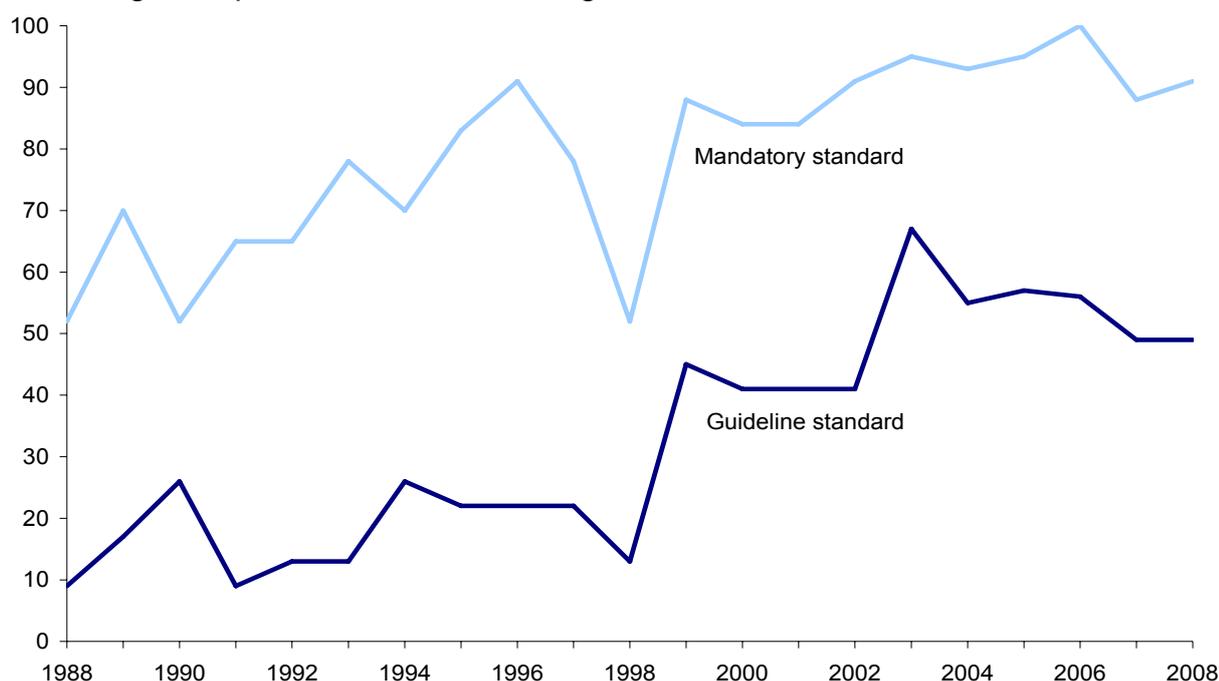
Source: [Scottish Environment Protection Agency](#)

## Footnotes

- 1) 2008/09 data subject to Water Industry Commission confirmation.
- 2) Figures for raw water abstracted and treatment process losses and raw water mains losses are estimates.
- 3) Total leakage is the combination of customer supply side leakage and Scottish Water distribution network losses.
- 4) The target for Scottish Water is to keep working towards the Economic Level of Leakage. This is the point where it is more costly to repair a leak than the cost saving due to the value of the water leaking from the system.
- 5) Data is expressed as mg N/l. To convert to mg NO<sub>3</sub>/l (nitrate), multiply by 62/14.
- 6) A set of around 200 sites, based on nitrate directive locations, was used. The percentages may not sum to 100% due to rounding.
- 7) This applies to most European rivers though for some rivers up to 1 mg N/l is reported. [European Environment Agency, 'Indicator Fact Sheet'. '\(WEU02\) Nitrogen and phosphorus in rivers'](#)
- 8) In Aberdeen, Moray, Banff and Buchan, Strathmore, Fife Lothians and Borders, and Lower Nithsdale.
- 9) Under [The Designation of Nitrate Vulnerable Zones \(Scotland\) Regulations 2002](#) and [The Designation of Nitrate Vulnerable Zones \(Scotland\) \(No. 2\) Regulations 2002](#) and [EC Nitrates Directive \(91/676/EEC\) Annex 1A\(3\)](#).
- 10) Soluble reactive phosphorus was measured as µg P/l. To convert to µg PO<sub>4</sub>/l (orthophosphate), multiply by 95/31.

## Compliance with the EC Bathing Water Directive (76/160/EEC): 1988-2008

Percentage compliance of coastal bathing water



	1988	1990	1995	2000	2005	2007	2008
<b>Mandatory standard compliance (%)</b>	52	52	83	84	95	88	91
<b>Guideline standard (%)</b>	9	26	22	41	57	49	49
<b>Failure to comply (%)</b>	48	48	17	16	5	12	9
<b>Number of identified coastal bathing waters<sup>1,2</sup></b>	23	23	23	58	58	59	77

High quality bathing waters are important for a wide variety of interests and they support Scotland's tourism industry. Monitoring the quality of these waters provides an indication of the health risks of bathing from both direct and diffuse discharges of effluents containing faecal contaminants.

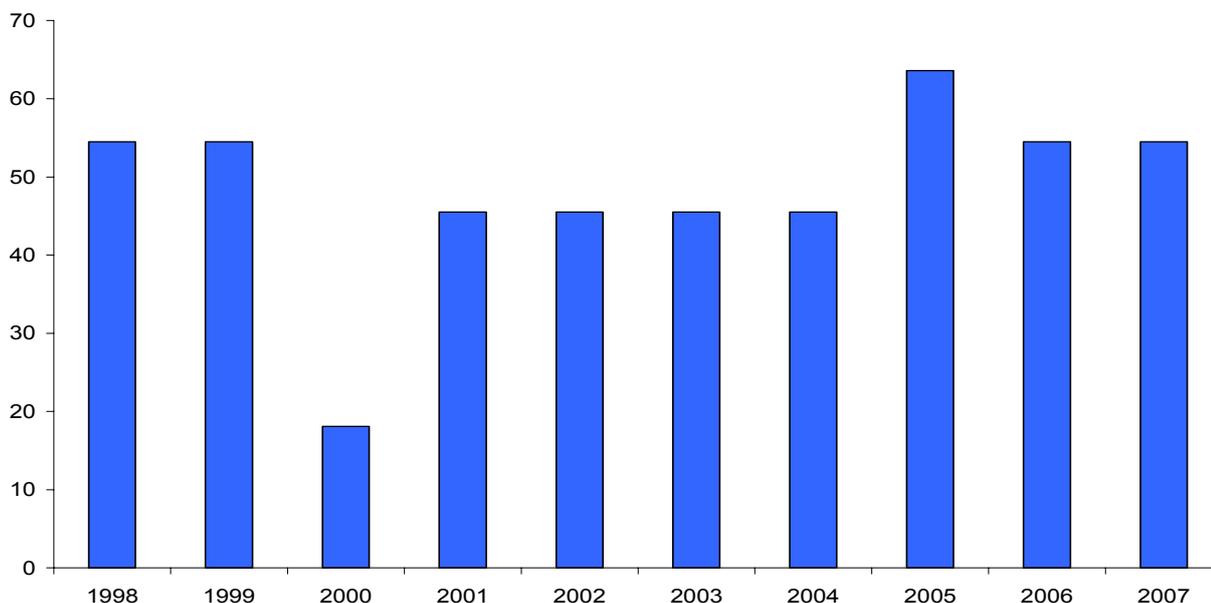
The EC Bathing Water Directive (76/160/EEC) sets out two quality standards - the 'mandatory' standard, and the stricter 'guideline' standard. Member states should comply with the mandatory standard and aim to comply with the guideline standard. In 2008, 91% of the 77 identified coastal bathing waters achieved the mandatory standard, and 49% also complied with the guideline standard.

It is important to note that the weather has a bearing on compliance, with wet weather often contributing to poorer results and, conversely, drier, sunnier weather associated with better results. When samples are taken in abnormal weather conditions, these may be excluded and a replacement sample taken immediately after the abnormal effects have ceased.

Source: [Scottish Environment Protection Agency](#)

## Percentage of commercial continental shelf finfish stocks at full reproductive capacity: 1998-2007<sup>3</sup>

Percentage of fish stocks at full reproductive capacity



	1998	2000	2004	2005	2006	2007 <sup>3</sup>
Number out of 11 finfish stocks at full reproductive capacity	6	2	5	7	6	6
Percentage at full reproductive capacity	55	18	46	64	55	55

Fish stocks require a healthy marine environment and sustainable harvest levels. If stocks are in a poor state or overfished it can have a knock-on effect on other parts of the marine ecosystem. The state of commercial fish stocks may be considered, alongside other indicators, as a proxy for the general sustainability of the marine environment.

The state of fish stocks can be assessed, in part, by estimating the biomass of the spawning population of each stock.<sup>4</sup> For each fish stock the biomass estimate is compared against a reference level; if above that level the stock is considered to be at full reproductive capacity and there is a good probability that harvest rates are sustainable. If a fish stock is below full reproductive capacity it indicates that spawning levels may be insufficient to guarantee stock replenishment and stock abundance will probably decrease. The data shown here relate to 11 commercial continental shelf finfish stocks<sup>5</sup> located in waters surrounding Scotland.

The number of finfish stocks monitored that were at full reproductive capacity fell from 6 in 1998 to a low of 2 in 2000. This then rose to a peak of 7 in 2005, before returning to 1998 levels in 2006 and 2007. The fish stocks not at full reproductive capacity in 2007 were North Sea Cod and West of Scotland Cod, whilst North Sea Herring, North Sea Norway Pout and West of Scotland Haddock were reported to be at risk of being below full reproductive capacity.

Source: [Marine Scotland Science](#), [ICES](#)<sup>6</sup>

## Footnotes

1) In 1999, a further 37 bathing waters were added to the 23 already identified. Two of these were inland bathing waters and are not included with the data presented here. Both have complied with the standards in every year since 1999. In 2006, 3 additional bathing waters were included. In 2007, three sites were de-designated and one site was split into two. In 2008, one site was de-designated, 19 new coastal waters were added and one inland water was added (not included in the data).

2) From 1999 to 2008, the percentage compliance of the 23 (22 in 2007 and 2008) original bathing waters with the mandatory standards was 87%, 83%, 78%, 96%, 100%, 96%, 96%, 100%, 77% and 86% respectively. In 2007, one of the original bathing water sites was dropped.

3) Advice on the status of fish stocks is provided by the International Council for the Exploration of the Seas (ICES). It gives annual advice on the basis of fish stock assessments that are carried out using commercial fisheries data. At each annual advisory meeting the most recent commercial fisheries data that is considered would have been collected during the calendar year preceding the meeting. In other words, advice given in 2006 would have been based on an analysis of commercial fisheries data collected up to and including 2005; advice in 2007 would have used data collected up to and including 2006, and so on. Moreover, an assessment undertaken for any year can provide information on the state of a stock at either the start or the end of that year. In 2007 ICES changed the way in which its advice was framed. Prior to 2007, it gave advice relative to the state of stocks at the start of the most recent data year in the stock assessments, but since 2007 it has published its advice in relation to the stock status at the end of the most recent year in the assessments. Although the indicators shown here are labelled consistently and relative to the most recent data year of the assessments that contributed to the annual ICES advice, readers should note the subtle change of interpretation since 2007.

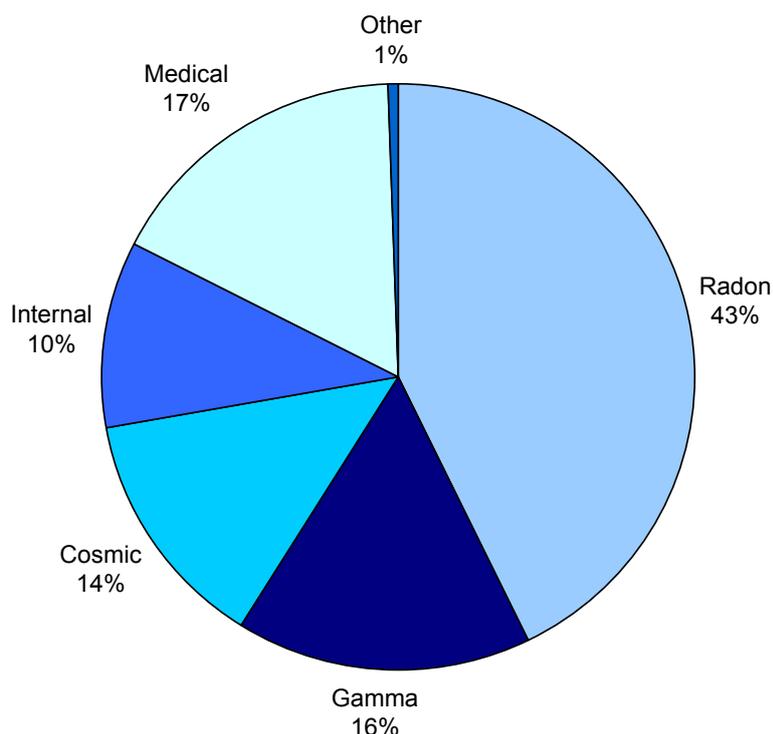
4) Data on fish stock is collected from fish landings, discards and research vessel surveys. This information is used by ICES to assess the size of a stock's sustainable stock biomass.

5) The fish stocks assessed are: North Sea Cod, North Sea Haddock, North Sea Herring, North Sea Norway Pout, North Sea Sand Eel, North Sea and West of Scotland Saithe, West of Scotland Cod, West of Scotland Haddock, Rockall Haddock, Northern Hake and North East Atlantic Mackerel.

6) ICES (2008). [Report of the ICES Advisory Committee on Fishery Management, Advisory Committee on the Marine Environment and Advisory Committee on Ecosystems, 2008.](#)

## Exposure of the Population to All Sources of Radiation: 2003<sup>1</sup>

Average annual dose in Scotland, 2,400 microsieverts<sup>2</sup>



Average annual dose (microsieverts)			
Natural sources		Artificial sources	
	µSv		µSv
Radon	1,040	Medical	410
Gamma rays	390	Other <sup>3</sup>	
Cosmic	330	Occupational	6
Internal (from diet)	250	Fallout	6
		Disposals	0.9
		Consumer products	0.1

The average annual dose of radiation to someone living in Scotland is 2,400 microsieverts, 83% of which comes from natural sources. The main source of natural radiation exposure is radon, a radioactive gas that is emitted from tiny amounts of uranium naturally present in materials such as rocks, soils, bricks and concrete.

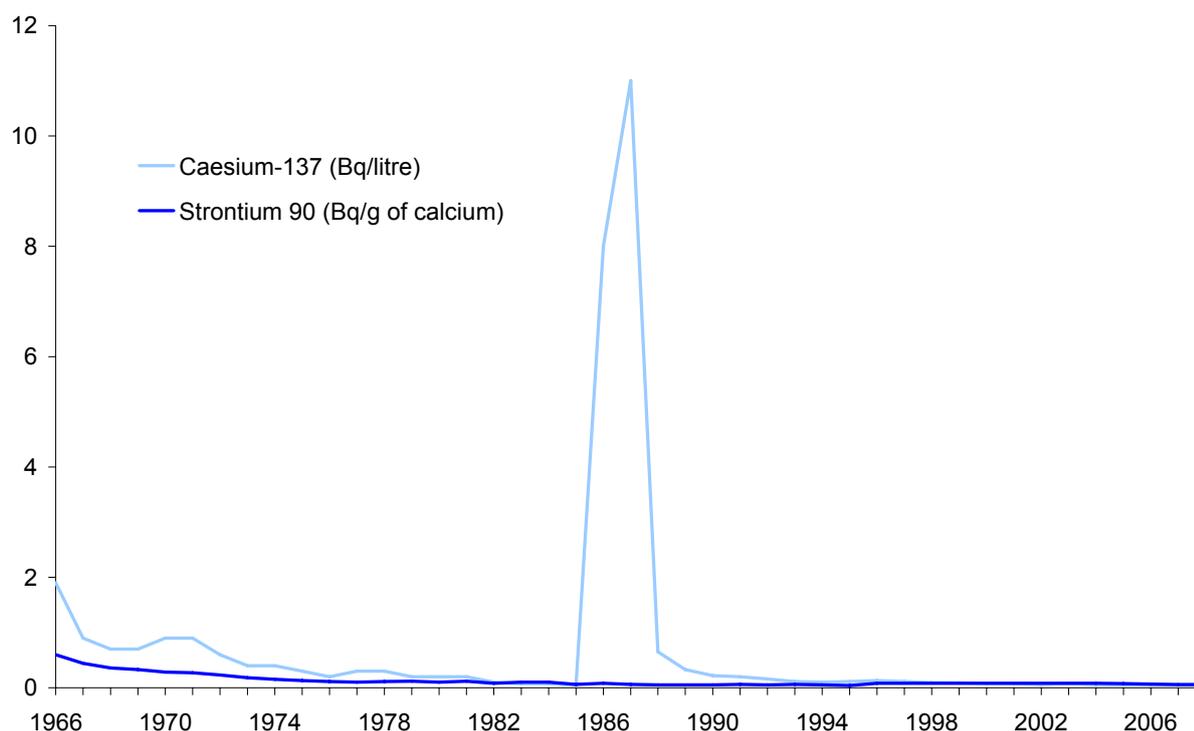
Radon decays and emits short-lived products that can increase the risk of lung cancer. The action level for radon in the home is 200 Bq/m<sup>3</sup>, above which, measures should be taken to reduce concentrations. Other important natural sources of radiation are cosmic rays, terrestrial gamma rays and long-lived radionuclides that enter the body through food and drink.

The greatest artificial source of exposure to radiation comes from medical x-rays. Nuclear waste disposals and fall-out account for less than 0.3% of exposure. The Chernobyl reactor incident in 1986 caused average annual doses from fall-out to increase by about five times that year.

Source: [Health Protection Agency – Radiation Protection Division](#)

## Activity Concentrations in Milk: 1966-2008<sup>4</sup>

Activity concentrations



	<b>Activity concentrations in milk</b>					
	<b>1966</b>	<b>1975</b>	<b>1987</b>	<b>2000</b>	<b>2007</b>	<b>2008</b>
<b>Caesium 137 (Bq/litre)</b>	1.90	0.30	11.00	<0.078	<0.050	<0.051
<b>Strontium 90 (Bq/gram of calcium)</b>	0.60	0.13	0.06	<0.083	<0.057	<0.054

Exposures to ionising radiation from radioactive substances can have an impact on human health. For this reason a number of foodstuffs are monitored each year to assess that the public has been adequately protected from ionising radiation.

One such foodstuff which is widely consumed is cows' milk, which can provide a valuable indicator of changes over time. From 1966 until 1980, there were gradual falls in the concentrations of caesium-137 ( $^{137}\text{Cs}$ ) and strontium-90 ( $^{90}\text{Sr}$ ) until the concentration was so low it was difficult to detect. This reflects a decline in atmospheric radioactive fall-out, following the ban on above-ground nuclear weapons testing under the 1963 Partial Test Ban Treaty between the UK, USA and former USSR.

Following the Chernobyl reactor incident in 1986, concentrations of  $^{137}\text{Cs}$  in milk peaked in 1987 and then began to fall again and are now below pre-Chernobyl levels.<sup>5</sup> However, even at its peak the  $^{137}\text{Cs}$  concentration in milk was still below the Community Food Intervention Levels, defined by Euratom Regulations EC/3954/87 and EC/2218/89, which were derived to ensure the protection of the public. Even at its peak concentration following the Chernobyl accident the levels of  $^{137}\text{Cs}$  in milk were around 100 times lower than the intervention level.

Source: [Scottish Environment Protection Agency](#)

**Footnotes**

1) Radon and gamma values are specific to Scotland. Other values are assumed to be the same as the UK average as published in NRPB's 2005 Review.

2) May not sum to total due to rounding.

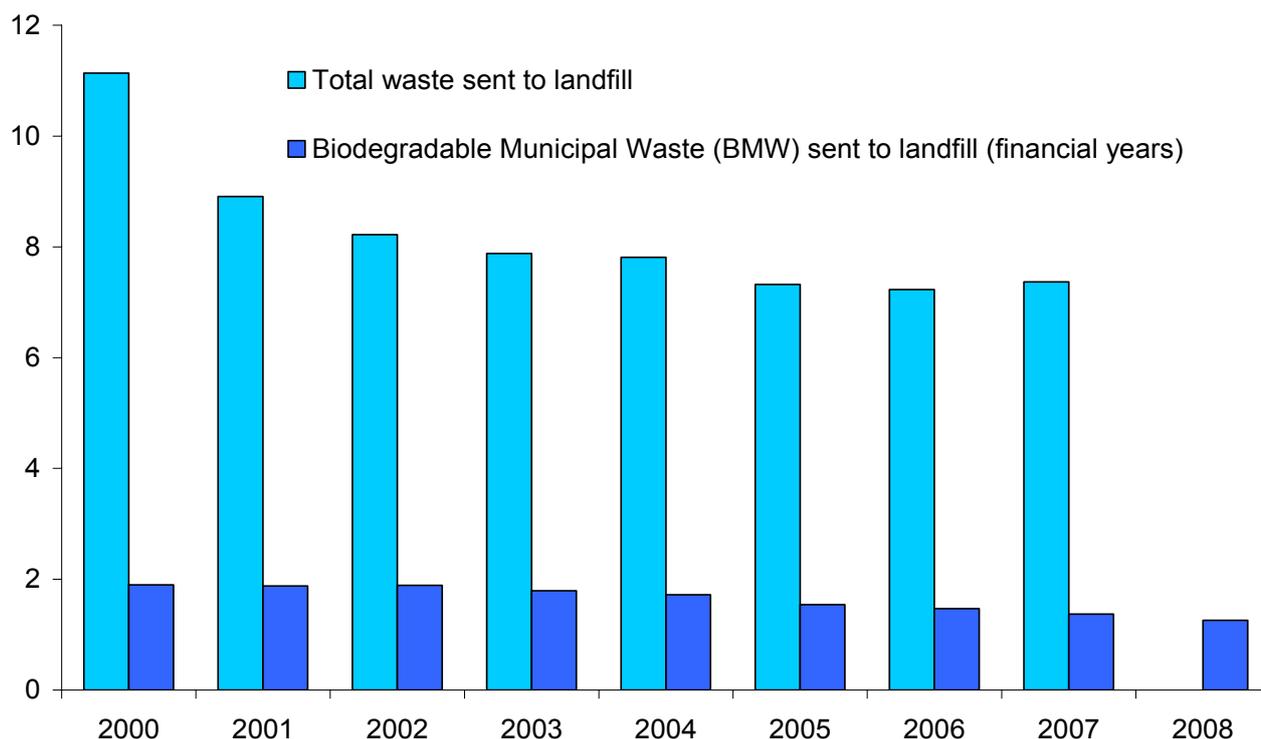
3) 'Other' includes fallout, disposals, occupational and consumer products (smoke alarms, luminous watches, etc.).

4) 1996-2008 figures are not strictly comparable with previous years, although still represent average concentrations in milk in Scotland.

5) Strontium-90 was not produced at the Chernobyl nuclear power reactor.

## Waste Sent to Landfill<sup>R</sup>: 2000-2008

Million tonnes



	Million tonnes							
	2000	2003	2004	2005	2006	2007	2008 <sup>1</sup>	
<b>Biodegradable Municipal Waste<sup>2</sup></b>	1.90	1.77	1.72	1.54	1.47	1.37	1.26	
<b>Total waste sent to landfill<sup>3</sup></b>	11.14	7.88	7.81	7.32	7.23	7.37	-	

The disposal of waste to landfill can result in the loss of many tonnes of valuable materials, release pollutants into the soil and watercourses, and emit methane, a greenhouse gas.

Landfill is at the bottom of the waste hierarchy. In Scotland, 7.4 million tonnes were landfilled in 2007 and Biodegradable Municipal Waste (BMW) accounted for 1.4 million tonnes (19%) of this total. Between 2000 and 2007 the total waste sent to landfill decreased by 34%, while the amount of BMW sent to landfill decreased by 28%. In 2008/09 BMW sent to landfill fell further to 1.26 million tonnes. BMW items such as paper and card, textiles, food and garden waste decompose and release the greenhouse gases methane and carbon dioxide.

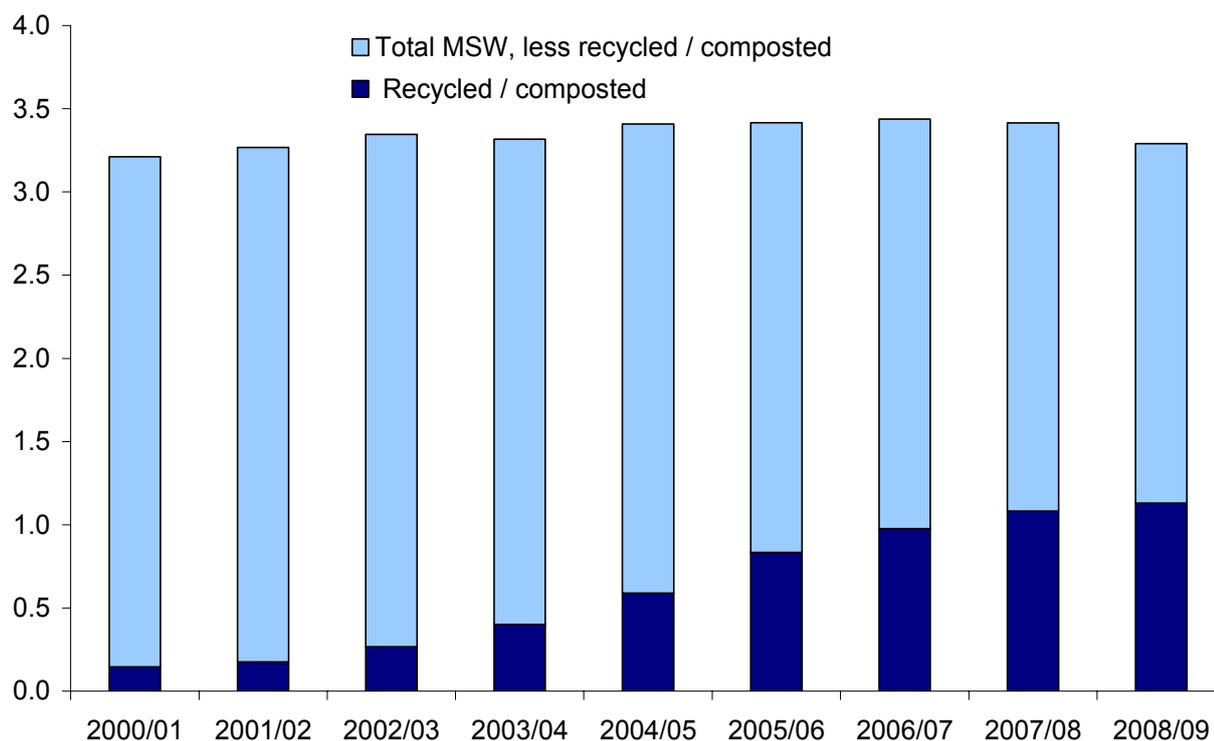
The EU Landfill Directive (1999/31/ EC) requires a reduction in the amount of biodegradable municipal waste sent to landfill. The target for the amount of BMW sent to landfill (also a national indicator) is 1.32 million tonnes by 2010. The EU Landfill Directive then also requires it to fall to 880,000 tonnes by 2013, and 620,000 tonnes by 2020.

The Landfill Tax was introduced in 1996 in order to discourage the disposal of waste to landfill. The tax rate was increased to £40 per tonne for biodegradable waste for 2009/10, and will continue to rise by £8 each year until at least 2013. The lower rate applying to inactive waste increased from £2 to £2.50 per tonne on 1 April 2008 and will be frozen at that figure until 2010/11.

Source: [Scottish Environment Protection Agency](#)

## Municipal Solid Waste (MSW)<sup>R4, 5</sup>: 2000/01-2008/09

Million tonnes



	Million Tonnes					
	2000/01	2004/05	2005/06	2006/07	2007/08	2008/09 <sup>1</sup>
<b>MSW arisings</b>	3.21	3.41	3.41	3.44	3.41	3.29
<b>MSW recycled / composted</b>	0.15	0.60	0.84	0.98	1.08	1.13
<b>Percentage recycled / composted</b>	4.6	17.5	24.6	28.4	31.7	34.3

Irrespective of the EU Landfill Directive targets, the strong dependence on landfill for waste management in Scotland is not sustainable since it involves the depletion of both renewable and finite natural resources. In addition, extracting and processing raw materials may consume large quantities of energy, release pollutants and destroy landscapes and ecosystems. Reducing, reusing and recovering waste are key sustainable development and Zero Waste objectives.

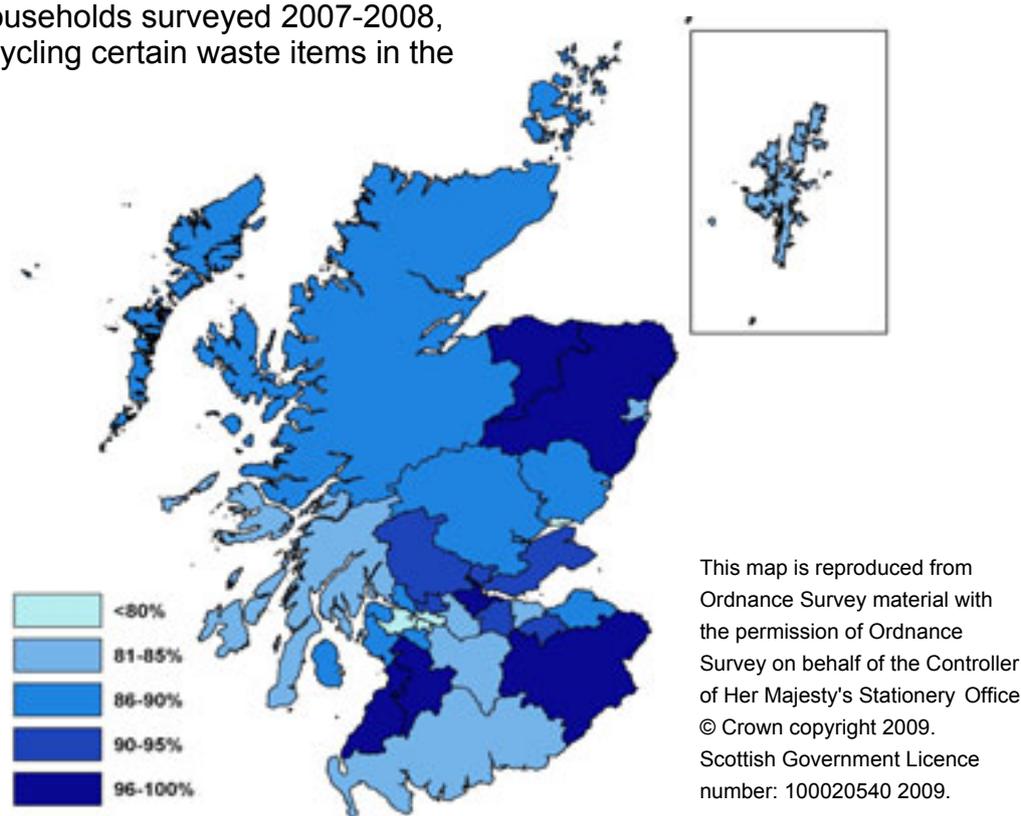
Municipal waste arisings rose from 3.21 million tonnes in 2000/01 to 3.44 million tonnes in 2006/07 before falling to 3.29 million tonnes in 2008/09. Over the same period the percentage of municipal waste recycled or composted rose from 4.6% to 34.3%. This reflects an increase in the amount of material recycled or composted of more than 670%.

The Scottish Government have set a target to increase the percentage of municipal waste being recycled or composted to 70% by 2025 with interim targets of 40% by 2010, 50% by 2013 and 60% by 2020. In addition, there is also a target of stopping growth in municipal waste by 2010.

Source: [Scottish Environment Protection Agency](#)

## Waste Recycling Behaviour: 2000-2008

Percentage of households surveyed 2007-2008, who reported recycling certain waste items in the past month



Scottish Government GI Science & Analysis Team 2009, job4615db.

### Percentage surveyed who reported recycling waste items in the past month

Item	Adult Respondents		Households			
	2000	2002	2003 <sup>6</sup>	2005	2007 <sup>7</sup>	2008
<b>Glass bottles and jars<sup>8</sup></b>	29	31	35	50	67	71
<b>Newspaper/magazines/paper/card</b>	30	33	45	69	81	83
<b>Plastic bottles<sup>8</sup></b>	6	8	13	36	58	65
<b>Metal cans</b>	9	10	14	37	59	65
<b>One or more of above items</b>	43	45	55	75	84	87

The reduction, reuse and recovery of household waste are key sustainable development and Zero Waste objectives. The Scottish Household Survey<sup>9</sup> provides information on recycling behaviour. Before 2003, adults were asked which of certain waste items they had recycled, if any, from home in the past month. From 2003 the same question was asked of households.

In 2008, 87% of households surveyed said they had recycled one or more of the tabulated items in the past month, increasing from 55% in 2003. Over 80% had recycled paper and card and 65% had recycled plastic bottles and metal cans. Since 2003, the percentage of households recycling waste has increased for each item in the survey.

The chart shows the percentage of households surveyed who said they recycled some waste material in the past month, by local authority area, averaged over 2007 and 2008.

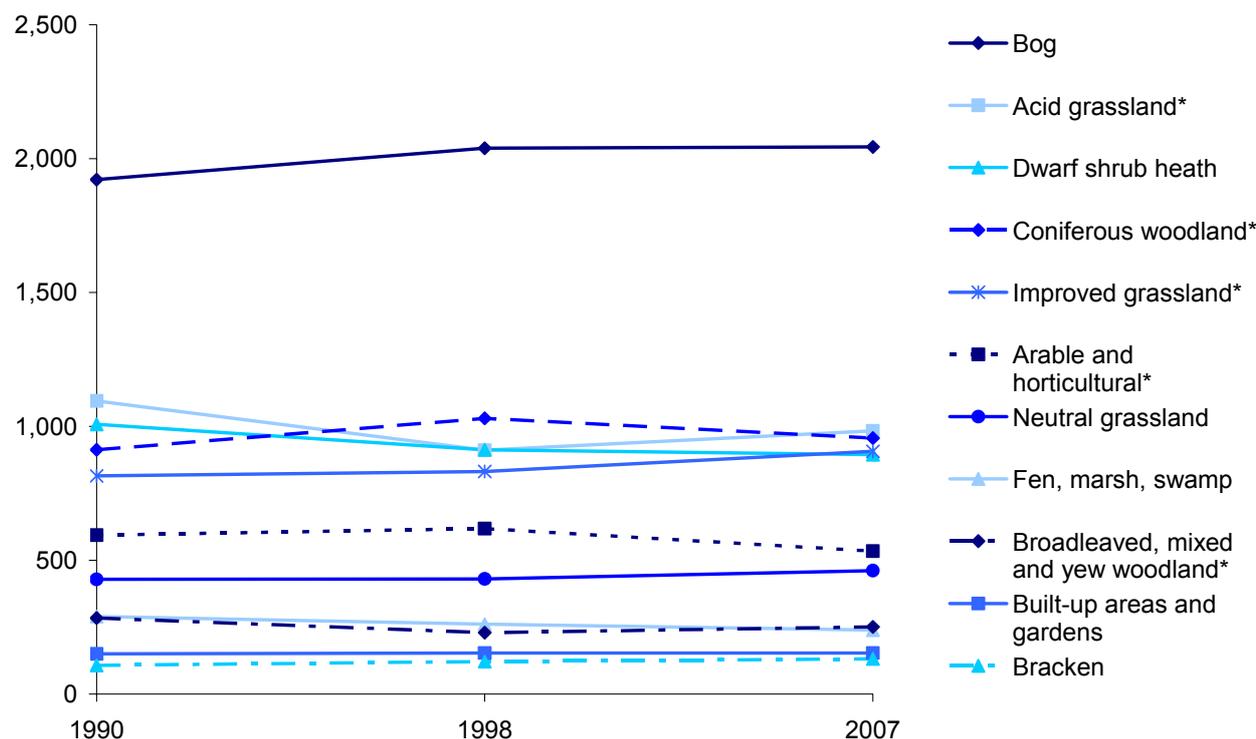
Source: [Scottish Government \(Data\)](#), [Ordnance Survey<sup>10</sup>](#) (Map Boundaries)

## Footnotes

- 1) 2008/09 data is provisional.
- 2) The BMW data for 2001-2007 are for financial years. To calculate the BMW in the years before 2003/2004, it has been assumed that 63% of the waste landfilled was biodegradable. A mass balance calculation, assuming 63% of waste arisings are biodegradable, has been used to provide the data from 2003/2004 onwards. [Landfill Allowance Scheme \(Scotland\) Regulations 2005](#)
- 3) The total to landfill from all sources.
- 4) The definition of municipal waste has changed slightly over the time period in which this data has been collected.
- 5) The definition of municipal waste at present is all waste collected by or on behalf of local authorities, excluding road maintenance wastes and end-of-life vehicles, separately collected construction and demolition wastes and industrial waste.
- 6) The survey method changed from a survey of adults to a survey of households from the second quarter of 2003. The 2003 data used is from quarters 2, 3 and 4 only.
- 7) From 2007 this question was asked of three quarters of the sample. Previously, it was asked of all households. In previous years the question asked whether or not the household recycled each of four items (yes or no). In 2007 this was changed to how much (all/most/some/none) was recycled. The table shows those reporting recycling all, most or some of each item.
- 8) In 2007 there was a change to the items: 'glass bottles' became 'glass bottles and jars' and 'plastic' became 'plastic bottles'.
- 9) The Scottish Household Survey is a continuous cross-sectional survey based on a sample of the population in private residences in Scotland.
- 10) This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright 2009. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Scottish Government Licence number: 100020540 2009. Due to OS licence conditions, you/your agent may only use this map for official business dealings with the Scottish Government. If you wish to use the map for other uses, you must first obtain a separate licence from OS.  
Scottish Government GI Science & Analysis Team 2009, job4615db.

## Broad Habitat Change<sup>R</sup>: 1990-2007

Changes in the extents of the most widespread Broad Habitats (thousand hectares)



Habitat	Area (thousand hectares)			
	1990 <sup>1</sup>	1998	2007	% Change (1998-2007)
<b>Acid grassland</b>	1,095	911	983	7.9*
<b>Coniferous woodland</b>	913	1,030	956	-7.1*
<b>Improved grassland</b>	815	831	907	9.1*
<b>Arable and horticultural land</b>	593	618	534	-13.6*
<b>Broadleaf, mixed and yew woodland</b>	284	229	251	9.5*

(\* statistically significant,  $p < 0.05$ )

A classification of 'broad habitat' was defined for consistent reporting and monitoring of priority habitats that were identified under the UK Biodiversity Action Plan<sup>2</sup>. The habitats range from developed land, such as built-up areas and gardens, to semi-natural land, such as grasslands, bog and bracken. The Countryside Survey 2007<sup>3</sup> reported the status of 19 of the 27 broad habitats occurring in Scotland. Changes in the extents of the 11 most widespread broad habitats are presented above.

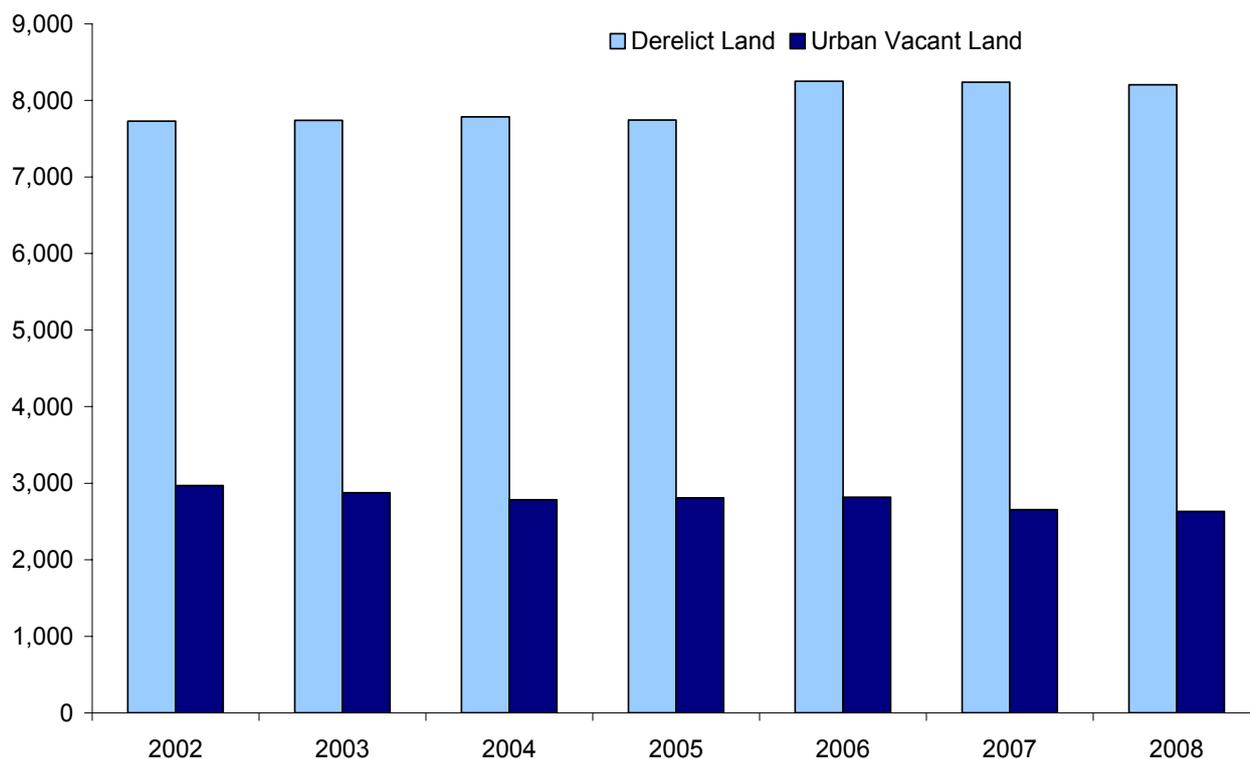
Between 1998 and 2007 the area of broadleaved woodland, improved grassland and acid grassland increased. Coniferous woodland and arable and horticultural land decreased in the same time period. The area of the other broad habitats showed no significant change.

The largest change over the period 1998 to 2007 was in arable and horticultural land which decreased by nearly 84,000 hectares (13.6%). The largest increase in area of broad habitat was for acid grassland which increased by 72,000 hectares (7.9%) between 1998 and 2007, with most of this change being concentrated in the Scottish Uplands.

Source: [Countryside Survey 2007](#)

## Derelict and Urban Vacant Land<sup>4</sup>: 2002-2008

Area of Derelict and Urban Vacant Land (hectares)



Area (ha)

	2002	2004	2005	2006	2007	2008
<b>Derelict Land</b>	7,728	7,786	7,742	8,252	8,236	8,203
<b>Urban Vacant Land</b>	2,968	2,784	2,808	2,815	2,654	2,630
<b>Total<sup>5</sup></b>	10,696	10,570	10,549	11,068	10,890	10,832

Derelict land together with vacant land in urban areas is an unused resource. Every year the Scottish Government conducts a survey of derelict and urban vacant land in each local authority. The main purpose of the survey is to provide a national data source to inform the programming of the rehabilitation, planning and reuse of derelict and urban vacant sites.

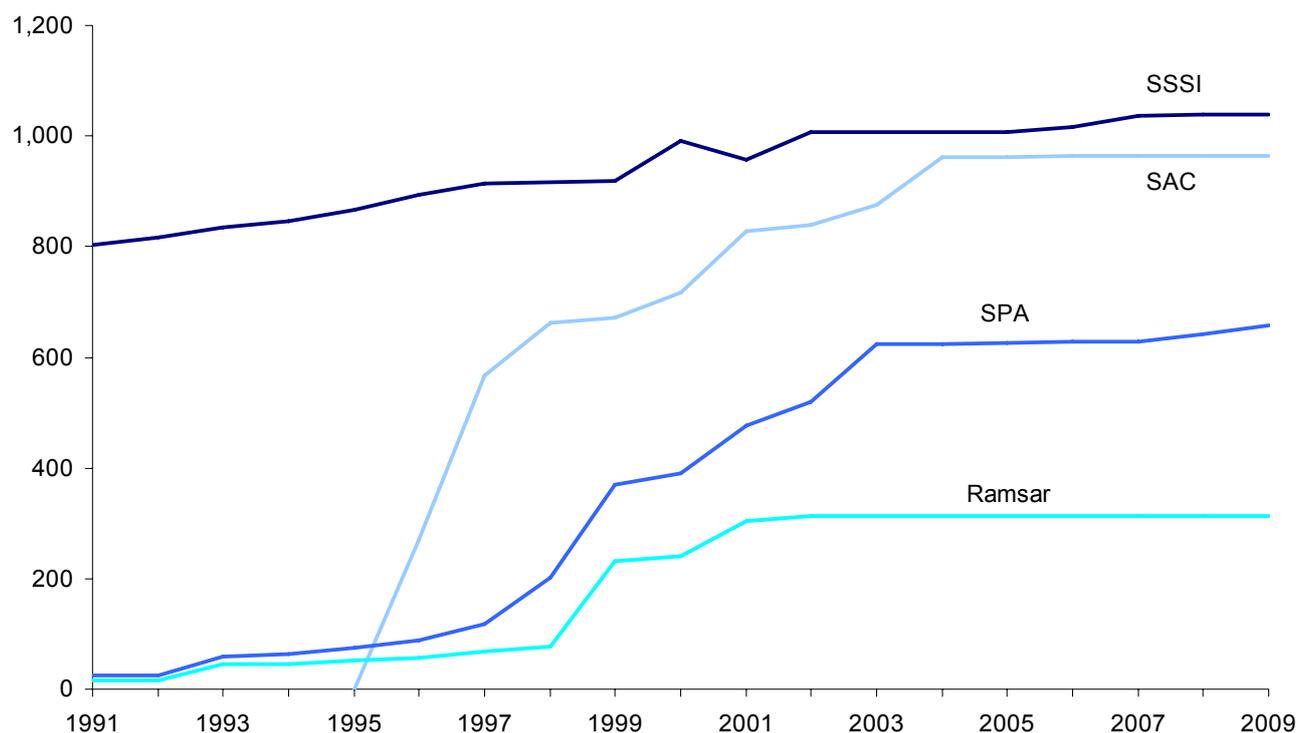
Vacant land is land which is unused for the purposes for which it is held and is viewed as an appropriate site for development. This land must either have had prior development on it or preparatory work has taken place in anticipation of future development. Derelict land<sup>6</sup> (and buildings) is land which has been so damaged by development, that it is incapable of development for beneficial use without rehabilitation. In addition, the land must currently not be used for the purpose for which it is held or a use acceptable in the local plan.

The annual Scottish Vacant and Derelict Land Survey<sup>7</sup> shows that the total amount of derelict and urban vacant land in Scotland increased by 136 hectares, from 10,696 hectares in 2002 to 10,832 hectares in 2008. Of this 10,832 hectares, 76% was classified as derelict. Five councils; North Lanarkshire, Glasgow City, North Ayrshire, Highland and Renfrewshire together contain 55% of all recorded derelict and urban vacant land.

Source: [Scottish Government](#)

## Designated Areas: 1991-2009<sup>8</sup>

Area (thousand hectares)



Area<sup>9</sup> (thousand hectares)

	1991	1995	2000	2005	2007	2008	2009
<b>SSSI</b> <sup>10,11</sup>	804	866	991	1,008	1,037	1,038	1,038
<b>SAC</b> <sup>12</sup>	-	0	718	963	963	963	963
<b>SPA</b>	26	76	391	626	628	641	657
<b>Ramsar</b>	15	53	240	313	313	313	313

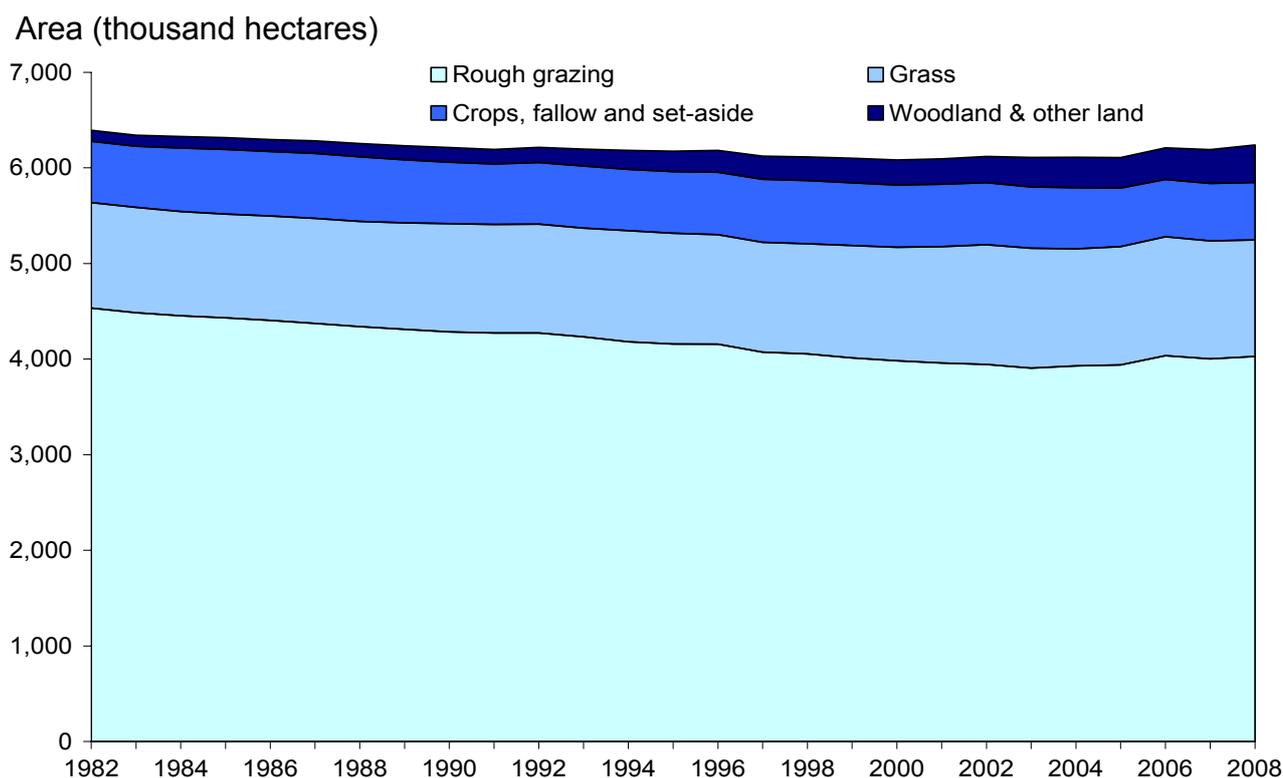
Sites of Special Scientific Interest (SSSIs) protect flora, fauna, geological or physiographical features of outstanding quality. In Scotland, SSSIs are notified by Scottish Natural Heritage under the Nature Conservation (Scotland) Act 2004 (which amended the 1981 Wildlife and Countryside Act). In 1991, SSSIs covered a total of 804,000 hectares. This has steadily increased and at 31 March 2009 there were 1,456 SSSIs in Scotland, covering a total of approximately 1,038,000 hectares (13% of land in Scotland).

Special Areas of Conservation (SACs) are designated under the 1992 EC Habitats Directive to protect certain species and habitat types throughout the EU. Special Protection Areas (SPAs) are classified under the 1979 EC Wild Birds Directive to safeguard the habitat of certain wild bird species. Ramsar sites are designated under the 1971 Convention on Wetlands of International Importance especially as Waterfowl Habitat (commonly known as the Ramsar Convention). At 31 March 2009, there were 239 SACs, 146 SPAs and 51 Ramsar sites in Scotland. The area of SACs rose from 0 hectares in 1995 to 963,000 hectares in 2005 and has remained stable to 2009. The area of SPAs rose from 26,000 hectares in 1991 to 657,000 hectares in 2009.

A site may be protected by more than one designation. For example, at 31 March 2009 66% of the area of SACs and 86% of the area of SPAs and Ramsar sites were designated as SSSIs.

Source: [Scottish Natural Heritage](#)

## Agricultural Land Use: 1982-2008



	Area (thousand hectares)						
	1982	1990	1993	2000	2006	2007	2008
<b>Rough grazing</b>	4,533	4,286	4,233	3,983	4,036	4,002	4,028
<b>Grass</b>	1,104	1,130	1,137	1,187	1,244	1,235	1,219
<b>Crop, fallow and set-aside</b>	641	644	650	652	600	601	602
<b>Woodland and other</b>	114	153	175	262	330	354	392
<b>Total land<sup>13</sup></b>	6,392	6,213	6,195	6,083	6,210	6,192	6,241
<b>Set-aside land<sup>14</sup></b>	-	-	90	78	68	62	18

Agricultural land use has a strong influence on the landscape and environment of Scotland. In particular, changes in agricultural land use have an impact on wildlife habitats, water pollution, and emissions of the greenhouse gas carbon dioxide.

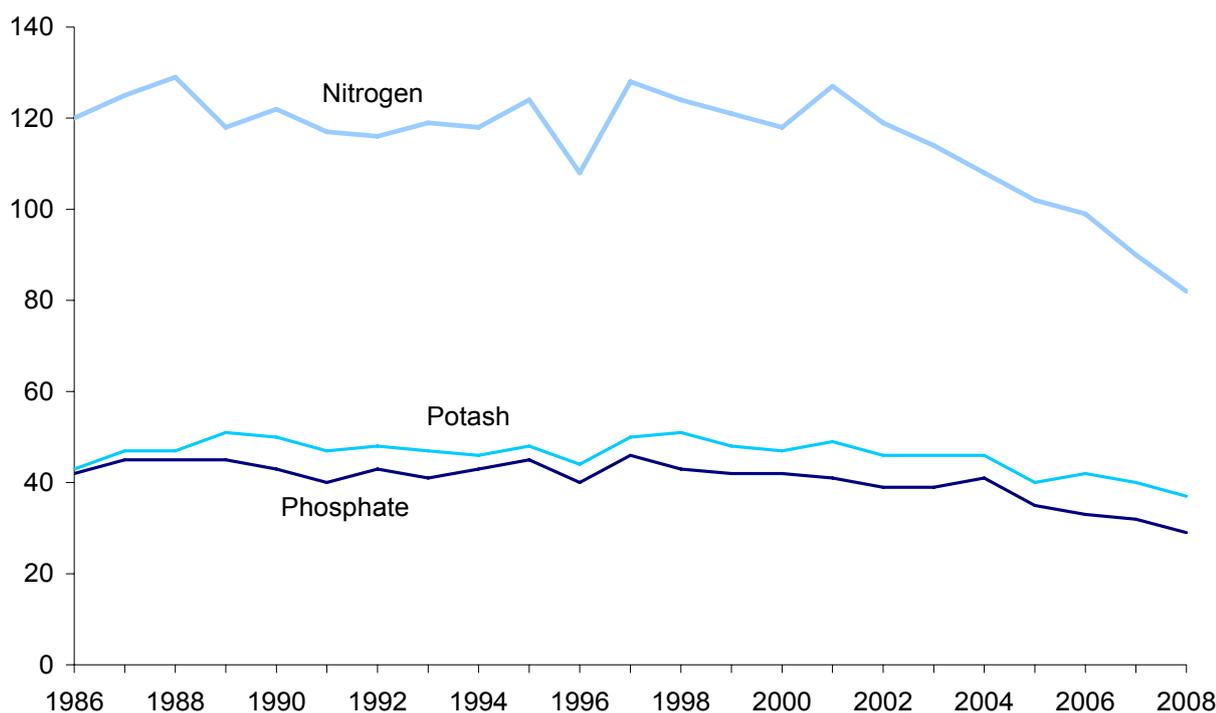
Between 1982 and 2000 the total land used for agriculture in Scotland decreased by 5% to 6.1m ha. This has since risen to 6.2m ha in 2008. The area of rough grazing decreased by 0.6m ha (14%) between 1982 and 2003 but has since risen to reach 4m ha in 2008. In 2008 the area of woodland and other land was more than three times the 1982 figure.<sup>15</sup>

The amount of land set-aside has been recorded separately since 1993. Trends have reflected changes in the European Union compulsory set-aside rate. There was a decrease in set-aside land from 93,000ha in 1994 to 40,000ha in 1997, after which it increased to a peak of 91,000ha in 2003. Since then it reduced gradually to 62,000ha in 2007, before dropping sharply to 18,000ha in 2008, reflecting the change to a 0 per cent compulsory set-aside rate.

Source: [Scottish Government](#)

## Fertiliser Application to Crops and Grass<sup>16</sup>: 1986-2008

Overall application rate of fertiliser (kg/ha)



Overall application rate of fertiliser (kg/ha)<sup>17</sup>

	1986	1990	1995	2000	2005	2007	2008
<b>Nitrogen (N)</b>	120	122	124	118	102	90	82
<b>Phosphate (P<sub>2</sub>O<sub>5</sub>)</b>	42	43	45	42	35	32	29
<b>Potash (K<sub>2</sub>O)</b>	43	50	48	47	40	40	37

Fertilisers contain nutrients, such as nitrogen, phosphorus and potassium, which improve plant growth and crop yields. The inappropriate or mistimed use of fertilisers may cause nutrient enrichment and eutrophication of waters. Excess nitrates in drinking water are also a danger to human health. The EC Nitrates Directive (91/676/EEC) provides a framework to protect water bodies from agricultural nitrate pollution. This includes the designation of Nitrate Vulnerable Zones, where an action programme controlling fertiliser use is implemented.

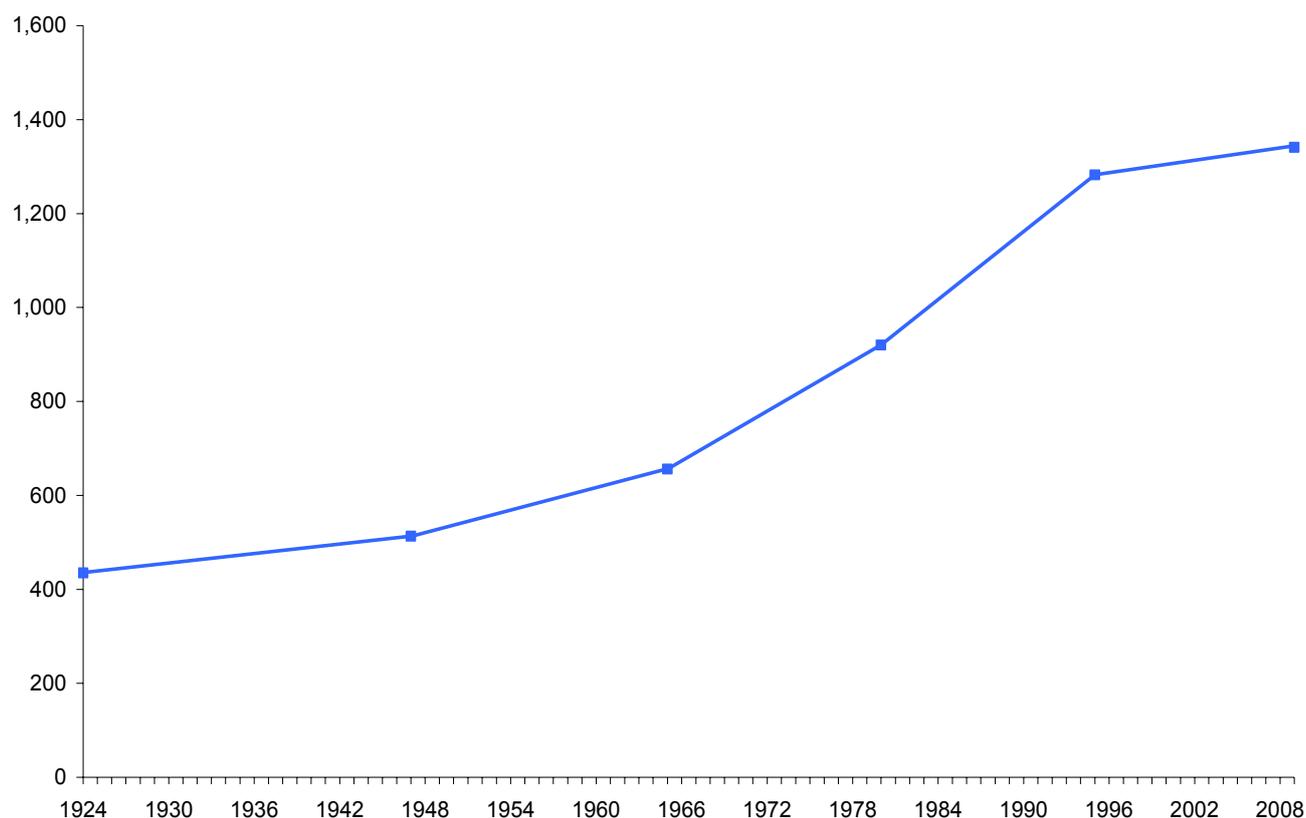
Changes in overall application rate are due to changes in either the proportion of crop area treated or average rate of application, or both. Weather and economic factors may contribute to changes in fertiliser use.

Between 1986 and 2000, overall phosphate and potash application rates remained relatively stable, although both have seen a decline in recent years. Overall nitrogen application rates have declined since 2001, reflecting a longer term reduction in application rates to grassland and a recent reduction for tillage crops. In 2008 the nitrogen application rate was 82 kg/ha, a reduction of 34% compared to 1995.

Source: [Defra](#), [Scottish Government](#)<sup>18</sup>

## Area of Woodland: 1924-2009

Area (thousand hectares)



	1924	1947	1965	1980	1995	2009 <sup>19</sup>
<b>Area (000 hectares)</b>	435	513	656	920	1,282	1,341
<b>% of total land</b>	5.5	6.5	8.3	11.7	16.3	17.2

The extent of woodland<sup>20</sup> is of significant environmental importance. Woodland provides wildlife habitats and affects the physical environment, and is also valued as a location for recreation and for its contribution to the landscape. It can also contribute to the sustainable production of wood products and paper, and provide a source of renewable energy.

Woodland is managed by the Forestry Commission, other public bodies (including other government departments and local authorities), and private owners. The Forestry Commission manages a third of woodland in Scotland. Planting and management of non-Forestry Commission woodland is normally carried out with the assistance of government grants. 56% of Scotland's woodland area is certified as sustainably managed.

New planting of woodland peaked in 1988 and 1989 when over 25,000 hectares of new woodland a year were created. Since then new planting has declined to around 3,400 hectares in 2008-09. In 2009, the area of woodland in Scotland was 17.2% of the total land area, compared with 5.5% in 1924 and 11.7% in 1980.

Source: [Forestry Commission<sup>21</sup>](#)

## Footnotes

- 1) Due to changes in definitions that have been applied retrospectively, the estimates from 1990 are not in all cases directly comparable to the later surveys.
- 2) UK Biodiversity Steering Group (1995). Biodiversity: The UK Steering Group Report. HMSO.
- 3) Norton, L. R., Murphy, J., Reynolds, B., Marks, S., Mackey, E.D. (2009). [Countryside Survey: Scotland Results from 2007](#). Centre for Ecology and Hydrology, Scottish Government, Scottish Natural Heritage. Countryside Survey data owned by NERC – Centre for Ecology & Hydrology Countryside Survey. © Database Right/Copyright NERC– Centre for Ecology & Hydrology. All rights reserved.
- 4) A small number of councils did not participate in every survey. In these cases, the most recent available data is used to provide an estimate for the appropriate year. Sites must be at least 0.1 hectares in size to be included.
- 5) Figures may not sum due to rounding.
- 6) Land also qualifies as derelict if it has an unremedied previous use which could constrain future development.
- 7) Scottish Government (2009). [Scottish Vacant and Derelict Land Survey 2008](#).
- 8) Figures are as at 31st March each year.
- 9) Area (ha) figures are rounded to the nearest thousand hectares and % to the nearest whole number. Area (ha) figures exclude the area in England of cross-border sites. Area (ha) figures for SACs include both land and marine areas.
- 10) Some SSSIs overlap, and where this occurs the area of overlapping land will be counted more than once. In 2009 this accounted for around 2,500 hectares, so the net area of SSSI sites at 31<sup>st</sup> March 2009 is approx 1,036,000 hectares.
- 11) The area of an SSSI is based on the documented area stated on each citation at the time the site was notified or reviewed. Where an SSSI has been reviewed under the Nature Conservation (Scotland) Act 2004 and the citation area figure has been changed to a more accurate GIS measurement, SSSI area totals will reflect the revised area from the date of SSSI review, but retrospective SSSI area totals have not been adjusted. As a result of this it is possible for the overall SSSI area figure to change from one year to the next without there being any actual change in SSSI site boundaries on the ground.
- 12) Some SACs overlap, and where this occurs the area of overlapping land will be counted more than once. In 2009 this accounted for around 5,500 hectares, so the net area of SAC sites at 31<sup>st</sup> March 2009 is approx 957,000 hectares. Figures include both designated SACs and candidate SACs submitted to the EC.
- 13) Figures may not sum to total due to rounding.
- 14) Figures from [Scottish Government June Agricultural Census](#).
- 15) Only includes woodland on agricultural holdings. For total woodland area see page 46.

16) Excludes Orkney, Shetland and the Western Isles.

17) Total quantity of nutrient used (kg) divided by the total extent of crop area (ha) (including any areas without application of the nutrient).

18) Department for Environment, Food and Rural Affairs, Scottish Government (2009). [The British Survey of Fertiliser Practice 2008](#).

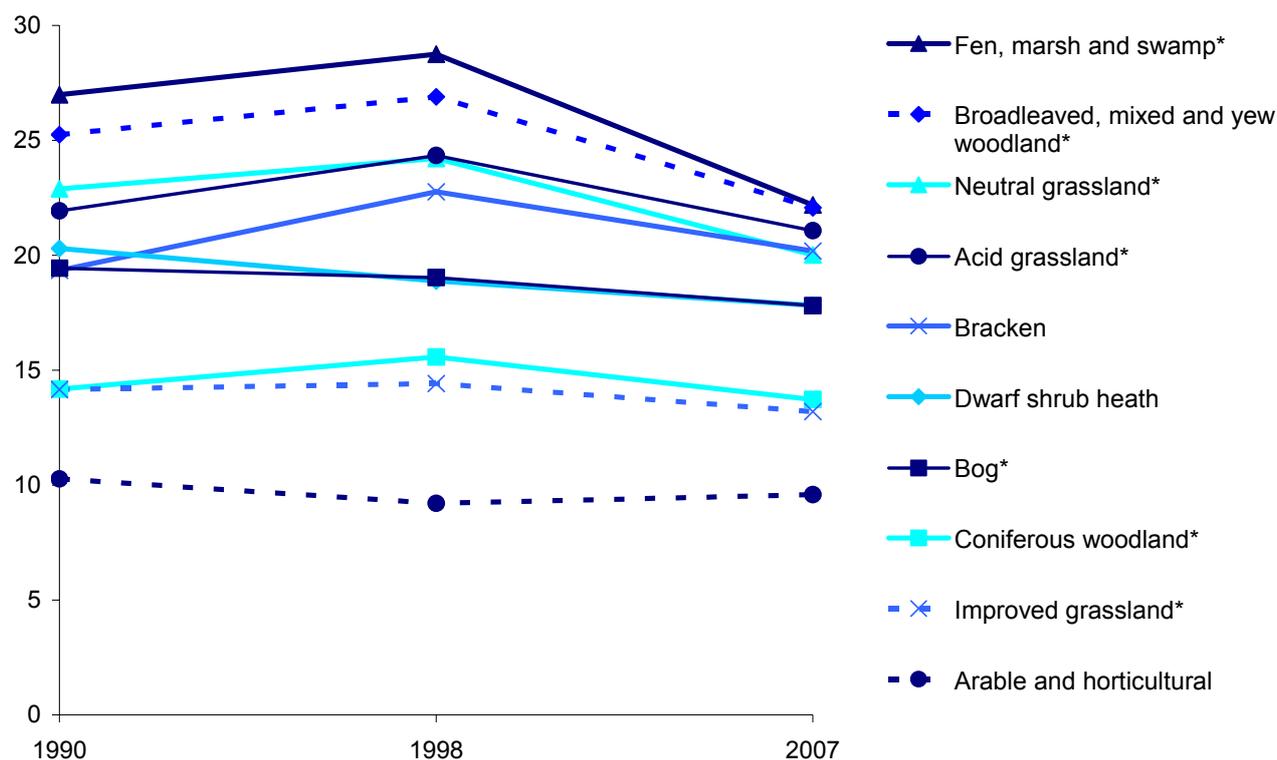
19) The non-Forestry Commission component of the 2009 figure is based on data obtained from the 1995-1999 National Inventory of Woodlands and Trees.

20) Woodland is defined as land under stands of trees with a canopy cover of at least 20%, or having the potential to achieve this, including integral open space, wooded agricultural land, and felled areas that are awaiting restocking.

21) Forestry Commission (2009). [Woodland Area, Planting and Restocking 2009](#) edition. [Forestry Statistics 2008](#) and [website](#).

## Changes in Plant Species Richness<sup>R</sup>: 1990-2007

Mean number of vascular<sup>1</sup> plant species per 1km square<sup>2</sup>



Mean number of vascular<sup>1</sup> plant species per 1km square

Broad habitat of plots	1990	1998	2007	% change 1998-2007
Acid grassland	21.9	24.3	21.1	-13*
Broadleaved, mixed and yew woodland	25.2	26.9	22.1	-18*
Coniferous woodland	14.2	15.6	13.7	-12*
Bog	19.4	19	17.8	-6*
Improved grassland	14.2	14.4	13.2	-8*
Fen, marsh and swamp	27	28.7	22.2	-23*
Neutral grassland	22.9	24.2	20	-17*

(\*statistically significant,  $p < 0.05$ )

Plant species diversity is one measure of botanical composition that can provide an indication of changes in habitat quality. Changes are often associated with land management and atmospheric pollution. Effects of climate change may become evident in the future.

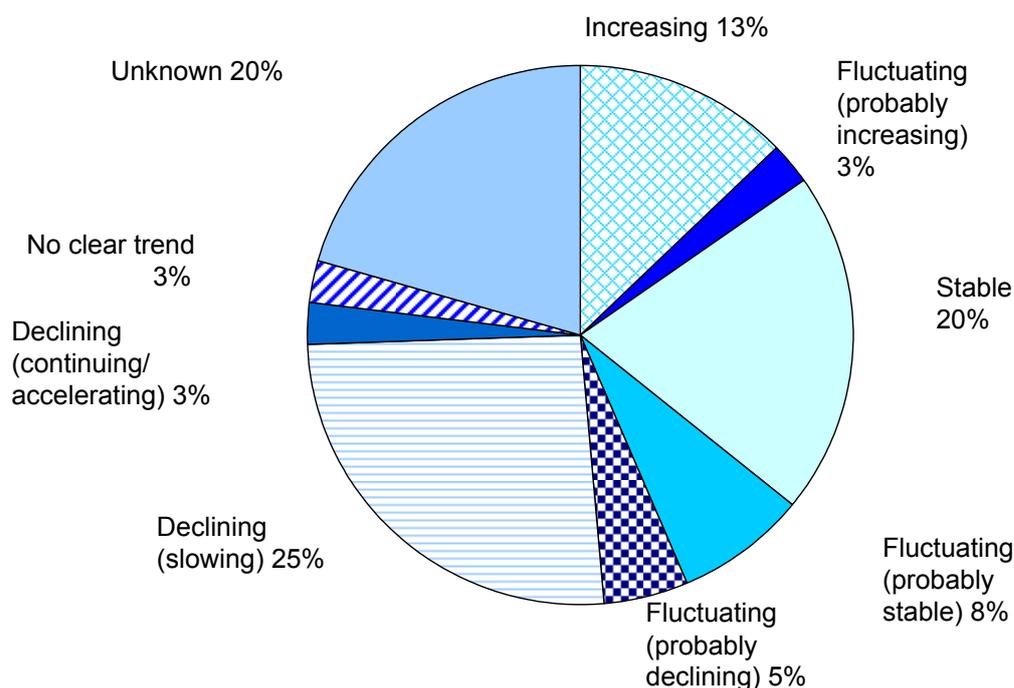
The Countryside Survey 2007<sup>3</sup> reported changes between surveys in 1998 and 2007 of 195 1km sample squares. Plant diversity, in terms of the number of vascular plant species recorded, was estimated from plots placed within each square.

Vascular plant diversity declined between 1998 and 2007 across the majority of habitats, with significant changes to plant species richness in seven broad habitats. There was a 23% decrease in plant species richness in fen, marsh and swamp, and a 18% decrease in species richness in broadleaved, mixed and yew woodland. In the ten most widespread habitats, the only habitats that did not show significant reductions in species richness were bracken, dwarf shrub heath and arable and horticultural.

Source: [Countryside Survey 2007](#)

## Status of UK BAP Habitats in Scotland: 2008

Status of UK BAP Habitats



Based on 39 UK BAP priority habitats in Scotland

	Number of Habitats	Percentage of Habitats
<b>Increasing</b>	5	13
<b>Fluctuating (probably increasing)</b>	1	3
<b>Stable</b>	8	20
<b>Fluctuating (probably stable)</b>	3	8
<b>Fluctuating (probably declining)</b>	2	5
<b>Declining (slowing)</b>	10	25
<b>Declining (continuing/accelerating)</b>	1	3
<b>No clear trend</b>	1	3
<b>Unknown</b>	8	20

Biodiversity refers to the variety of life. The conservation and enhancement of our rich and varied natural heritage of plants and animals, habitats and ecosystems, is essential to the quality of our lives and for a sustainable future.

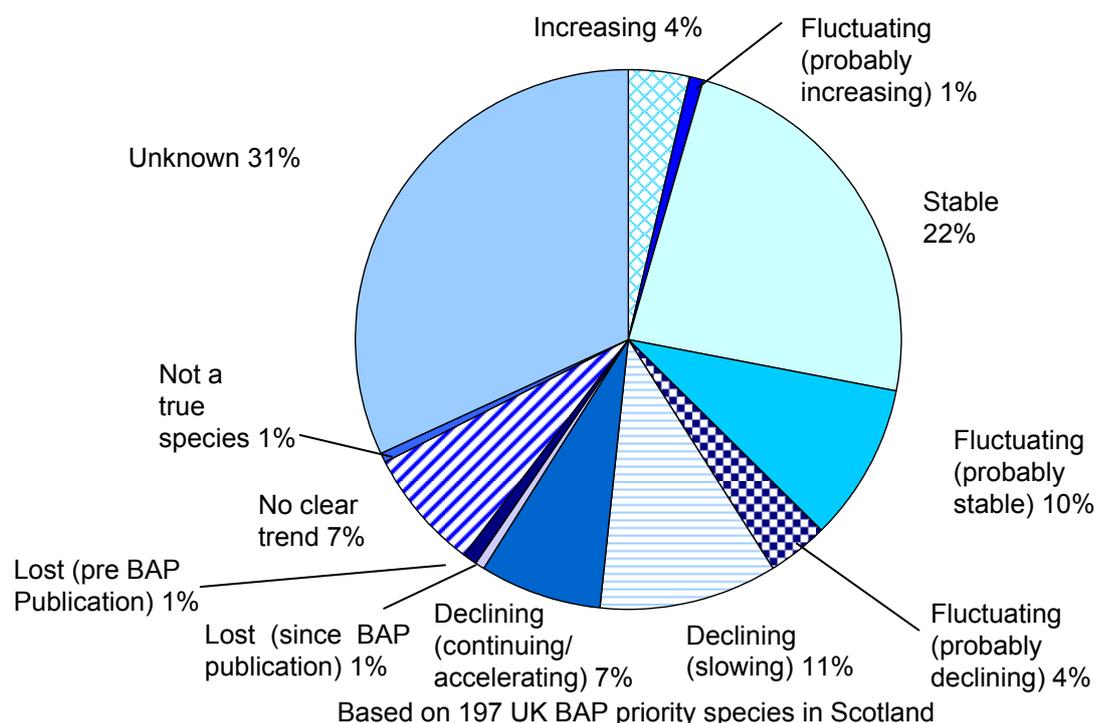
In 1992, the UN Convention on Biological Diversity recognised the need to protect biodiversity. The UK was one of the 150 countries to sign up to the convention, and in 1994 the UK Biodiversity Action Plan (UK BAP)<sup>4</sup> was launched. The plan aims to conserve and enhance the populations of species and habitats which are considered threatened within the UK. The Scottish Biodiversity Forum is responsible for implementing the objectives of the UK BAP in Scotland.<sup>5</sup>

Between 1995 and 1999, action plans were developed for 45 habitats in the UK<sup>6</sup>, 39 of these occurred in Scotland. As at 2008, of these 39, 15% of the habitats were increasing<sup>7</sup>, 28% were considered stable<sup>7</sup> and 33% were in decline<sup>7</sup>. For the remainder, 20% had an unknown trend and for 1 habitat the trend was unclear.

Source: [Biodiversity Action Reporting System \(BARS\)](#)

## Status of UK BAP Species in Scotland: 2008

### Status of UK BAP Species



	Number of Species	Percentage of Species
<b>Increasing</b>	7	4
<b>Fluctuating (probably increasing)</b>	2	1
<b>Stable</b>	46	22
<b>Fluctuating (probably stable)</b>	19	10
<b>Fluctuating (probably declining)</b>	7	4
<b>Declining (slowing)</b>	21	11
<b>Declining (continuing/accelerating)</b>	14	7
<b>Lost (pre UK BAP publication)</b>	2	1
<b>Lost (since BAP publication)</b>	1	1
<b>No clear trend</b>	14	7
<b>Not a true species</b>	1	1
<b>Unknown</b>	63	31

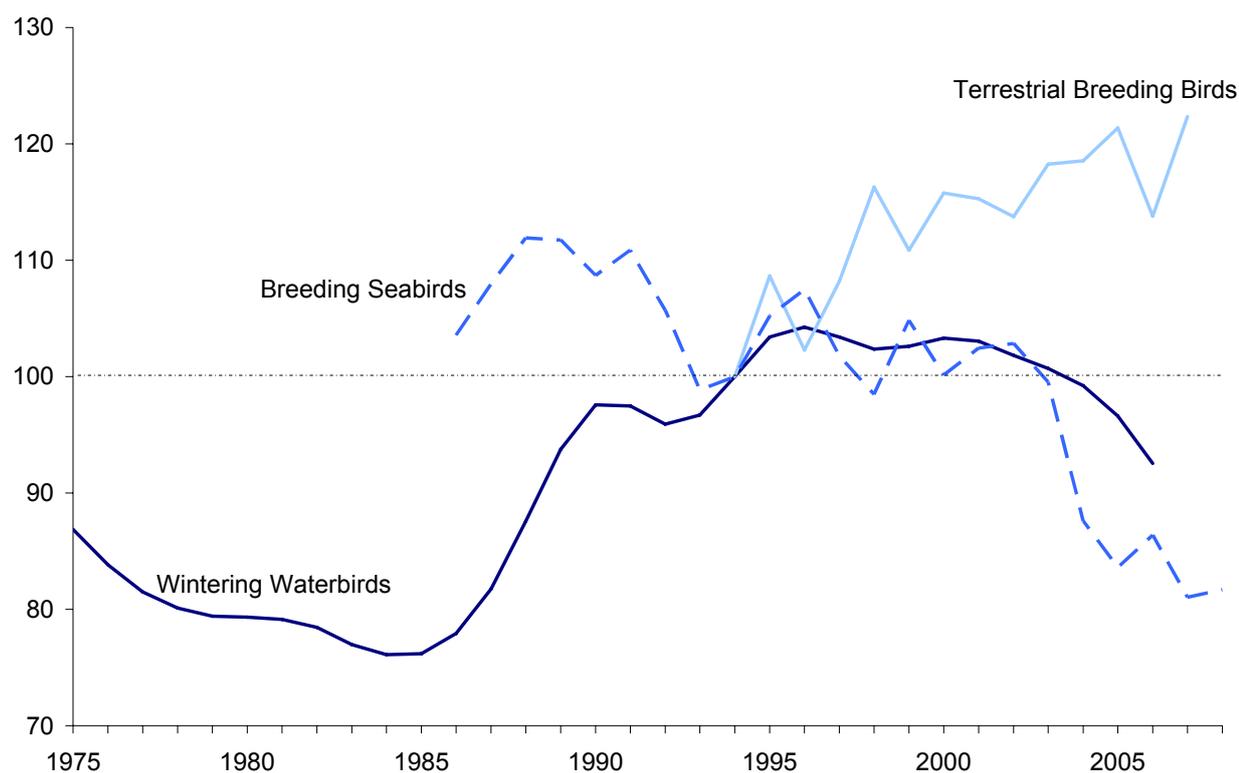
In 1994 the UK Biodiversity Action Plan (BAP)<sup>4</sup> was launched. The action plan aims to conserve and enhance the populations of species and habitats which are considered threatened in the UK. In Scotland 197 species are considered threatened and have been assigned individual Biodiversity Action Plans. The Scottish Biodiversity Forum is responsible for implementing the objectives of the UK BAP in Scotland.<sup>5</sup>

Between 1995 and 1999, action plans were developed for 391 species in the UK<sup>6</sup> that had been identified as priorities. 197 of these occur in Scotland. In the 2008 assessment for Scotland, 5% of the species were increasing<sup>7</sup>, 32% were stable<sup>7</sup> and 22% were in decline<sup>7</sup>. For the remainder of the species considered 7% showed no clear trend, 32% had an unknown trend, 1 species<sup>8</sup> (Wryneck) had been lost since the commencement of BAP in 1994, 2 had been lost pre BAP and 1 was no longer considered a true species.

Source: [Biodiversity Action Reporting System \(BARS\)](#)

## Status of Wild Bird Populations: 1975-2008

Index (1994 = 100)



Index (1994=100)

	1975	1986	1994	2000	2005	2006	2007	2008
<b>Wintering Waterbirds<sup>9</sup></b>	87	78	100	103	97	93	-	-
<b>Terrestrial Breeding Birds</b>			100	116	121	114	122	-
<b>Breeding Seabirds</b>		104	100	100	84	86	81	82

Bird populations are relatively well studied and can provide an indication of the changing biodiversity of Scotland's habitats.

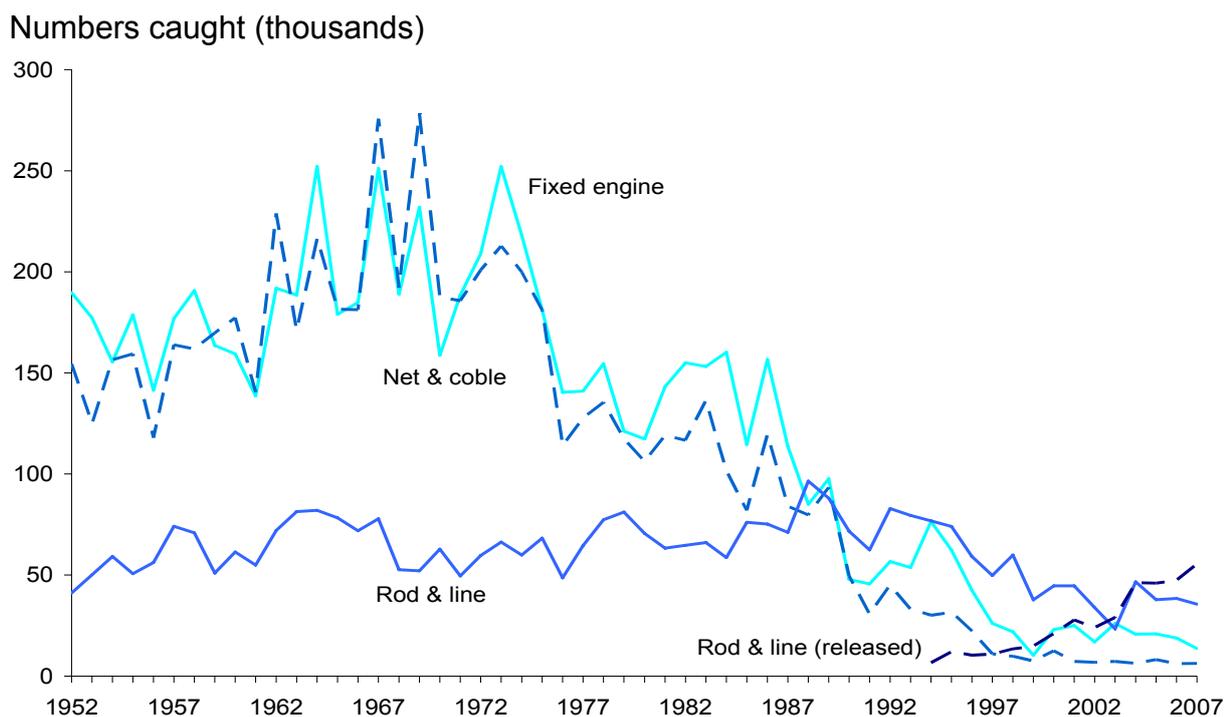
The number of wintering waterbirds rose between the mid 1980s and mid 1990s, reaching a peak in 1996, since then there has been a steady decline. Seabird numbers have been in decline since 1991 and continued to decline until 2008. While the number of terrestrial breeding birds has risen since 1994, this follows declines, particularly in farmland birds, in earlier years.

Naturally occurring birds and their habitats are protected under the Nature Conservation Scotland Act 2004 and the EC Birds Directive (79/409/EEC and amendments). Following the publication of the UK Biodiversity Action Plan (1994), species action plans have been developed for 26 particularly vulnerable species of birds, 19 of which occur in Scotland.

The Scottish Government has established a National Indicator to increase the index of abundance of terrestrial breeding birds in Scotland against a 2006 base year. This is used as a proxy measure of biodiversity, as biodiversity cannot be measured by a single indicator.

Source: [British Trust For Ornithology](#)/ [Joint Nature Conservation Committee](#)/ [Wildfowl And Wetlands Trust](#)/ [Shetland Oil Terminal Environmental Advisory Group](#)

## Catches of Wild Salmon<sup>10</sup>: 1952-2007



	Number caught (thousands)						
Method <sup>11</sup>	1952	1970	1980	1990	2000	2006	2007
Fixed engine	190	159	117	48	23	19	14
Net & coble	154	187	106	50	13	6	6
Rod & line <sup>12</sup> (retained)	41	63	71	72	45	38	39
Rod & line <sup>12</sup> (released)	-	-	-	-	21	48	56

The salmon fishing industry is a significant economic and leisure resource in rural Scotland. To protect this resource sustainable management practices are essential. Climate change, water pollution, predation and disease may affect populations. Yearly variations in weather, timing of runs and fishing effort can affect catch sizes. Consequently, a difference in catch does not necessarily indicate a difference in the abundance of the stock that provides the catch.

Catch sizes for the fixed engine and net & coble fisheries have fallen by over 90% since 1952. Catches rose during the 1950s and 1960s but have declined rapidly since the early 1970s. The fishing effort has declined at a similar rate, and effort in 2007 was less than 10% of that in 1952 for both fisheries.<sup>13</sup>

Catches by rod & line have remained relatively steady over the period 1952-2007. Since 1994, salmon that have been caught and released by anglers have been reported separately. In 2007, 39,000 salmon were retained and 56,000 released. No figures for fishing effort for rod & line catches are available.

The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 contains provisions for the conservation and sustainable management of salmon fisheries in Scotland, for example, through regulating the introduction of salmon and salmon eggs into salmon fishery districts for which there is a district salmon fishery board, and regulating the permissible methods and times during which fishing is permitted.

Source: [Marine Scotland Science](#)

## Footnotes

- 1) Vascular plants (sometimes referred to as higher plants) comprise ferns, flowering plants, shrubs and trees.
- 2) The changes in plant species richness in 10 of the most widespread broad habitats are displayed.
- 3) Norton, L. R., Murphy, J., Reynolds, B., Marks, S., Mackey, E.D. (2009). [Countryside Survey: Scotland Results from 2007](#). Centre for Ecology and Hydrology, Scottish Government, Scottish Natural Heritage. Countryside Survey data owned by NERC – Centre for Ecology & Hydrology Countryside Survey. © Database Right/Copyright NERC– Centre for Ecology & Hydrology. All rights reserved.
- 4) Department of the Environment (1994). [Biodiversity: the UK Action Plan](#). HMSO.
- 5) Scottish Executive (2004). [Scotland's Biodiversity: It's in Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland](#). Scottish Biodiversity Forum.
- 6) In 2007/08 an updated UKBAP priority list was published containing 1150 species and 65 habitats across the UK, of which 606 species and 60 habitats are in Scotland. The next assessment of this indicator (in 2011) will be based upon this updated list.
- 7) Including categories which are said to be fluctuating. The probable behaviour has been assumed true.
- 8) This species has declined to such an extent it is now considered to be only an occasional breeder. None of the other trend categories adequately reflect this status.
- 9) The population of wintering water birds is measured in the winter beginning in the year indicated, i.e. 2003 indicates populations measured from approximately November 2003 – March 2004
- 10) Includes grilse (salmon which have matured, or are about to mature, after one winter at sea).
- 11) Fixed engine fisheries operate in coastal areas. Net & coble fisheries are generally restricted to estuaries and the lower reaches of rivers. Rod & line fisheries cover recreational angling within river systems.
- 12) Since 1994, numbers of fish reported as caught and released by anglers have been reported separately. Prior to this, only numbers caught and retained are available.
- 13) Scottish Fisheries Research Services (2008). ["Statistical Bulletin: Scottish Salmon and Sea Trout Catches 2007"](#)

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