

**TRENDS IN CRITICAL LOAD EXCEEDANCES
FOR ACIDITY AND NUTRIENT NITROGEN
FOR THE YEARS 1995-97, 1998-2000, 1999-2001 AND 2010**

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CONTENTS

1. INTRODUCTION
2. DATA USED
 - 2.1 Critical loads
 - 2.2 Deposition
3. CRITICAL LOAD EXCEEDANCES
4. EXCEEDANCES FOR THE UK
 - 4.1 Acidity
 - 4.2 Nutrient nitrogen
5. EXCEEDANCES FOR ENGLAND
 - 5.1 Acidity
 - 5.2 Nutrient nitrogen
6. EXCEEDANCES FOR WALES
 - 6.1 Acidity
 - 6.2 Nutrient nitrogen
7. EXCEEDANCES FOR SCOTLAND
 - 7.1 Acidity
 - 7.2 Nutrient nitrogen
8. EXCEEDANCES FOR NI
 - 8.1 Acidity
 - 8.2 Nutrient nitrogen
9. CONCLUSIONS

REFERENCES

APPENDIX 1: Acidity and nutrient nitrogen exceedance statistics by habitat and country for 1995-97, 1998-2000, 1999-2001 and 2010.

1 INTRODUCTION

The national critical loads of acidity and nutrient nitrogen have undergone a series of updates both in 2003 and 2004 as new data and knowledge have become available (Hall *et al.*, 2003a and 2004a). The major changes took place in 2003 with the introduction of mapping UK critical loads for Biodiversity Action Plan (BAP) Broad Habitats sensitive to acidification and eutrophication. The impact of any changes to the critical load values on critical load exceedances (ie, the excess deposition above the critical load) have already been reported (Hall *et al.*, 2003b and 2004b). This report examines the trends in exceedance using the latest (February 2004) acidity and nutrient nitrogen critical loads by acidifying and eutrophying deposition for the years 1995-1997, 1998-2000, 1999-2001 and 2010.

A brief overview of the critical loads and deposition data used is provided in Section 2, with reference made to other publications containing more technical information. Section 3 describes the calculation of critical load exceedances and some guidance on their interpretation. Sections 4-8 examine the trends in critical load exceedances for acidity and nutrient nitrogen by country and by habitat for the years 1995-97, 1999-2001 and 2010. Finally Section 9 draws together the key conclusions. The full exceedance statistics (ie, habitat area exceeded, percentage habitat area exceeded, accumulated exceedance) by country and habitat for all years are provided in Appendix 1.

2 DATA

2.1 Critical loads

The February 2004 critical loads data were used in the exceedance calculations presented in this report. Full details of these data are given in Hall *et al.*, (2004a and 2004b) and will not be repeated here. Table 2.1 below summarises the habitats for which acidity and nutrient nitrogen critical loads and exceedances are currently calculated in the UK.

Table 2.1. The Broad Habitats for which acidity and nutrient nitrogen critical loads are calculated in the UK.

Broad Habitat	Critical loads calculated for:	
	Acidity	Nutrient nitrogen
Acid grassland	YES	YES
Calcareous grassland	YES	YES
Dwarf shrub heath	YES	YES
Bog	YES	YES
Montane	YES	YES
Coniferous woodland (managed)	YES	YES
Broadleaved woodland (managed)	YES	YES
Unmanaged woodland ¹	YES	YES
Atlantic oak ²	YES ³	YES
Freshwaters	YES	NO ⁴
Supralittoral sediments (dune grasslands)	NO	YES

¹ Critical loads for nutrient nitrogen set to protect the woodland ground flora.

² Critical loads for nutrient nitrogen set to protect epiphytic lichens.

³ Areas of Atlantic oak woodland included in the unmanaged woodland habitat for acidity critical loads assessments.

⁴ The freshwater sites studied for acidification in the UK are not considered to be sensitive to eutrophication.

Maps of critical loads exceedances can be generated for each individual habitat type (Section 3). However, to summarise the critical loads for all habitats, and hence exceedances, into fewer maps, a statistic of the critical loads data is required. A commonly used statistic is the 5th-percentile critical load; this is the critical load that will protect 95% of the habitat area in any given grid square. These 5th-percentile values are defined by ranking the 1km critical load values (from smallest to largest) for all habitats together with their respective habitat areas and generating a cumulative frequency distribution of the habitat areas; where the habitat area is equal to or greater than 5% of the total habitat area in a 1km grid square, the corresponding 5th-percentile critical load can be set. For example:

<u>Critical loads (keq ha⁻¹ year⁻¹)</u> <u>(ranked low to high)</u>	<u>Habitat area</u> <u>(ha)</u>	<u>Habitat</u>
0.2	2	Bog
0.3	2	Acid grassland
0.5	6	Montane
0.75	45	Dwarf shrub heath
0.75	25	Coniferous woodland

Total habitat area = 80ha

5% of 80 = 4ha

Critical load where area $\geq 4\text{ha}$ is $0.3 \text{ keq ha}^{-1} \text{ year}^{-1}$

Therefore the 5th-percentile critical load for this square is $0.3 \text{ keq ha}^{-1} \text{ year}^{-1}$ and is based on a combination of data for different habitats. This 5th-percentile value will protect those habitats with the same (ie, acid grassland) or higher critical loads (ie, montane, dwarf shrub heath, coniferous woodland), but not those with a lower critical load (bog).

This procedure is carried out to generate 5th-percentile critical load maps (Figures 2.1 and 2.2). It should be noted that the habitat(s) determining the 5th-percentile critical load values in each grid square may not be same for all maps. These maps are used with the national deposition data to produce exceedance maps for all habitat types combined (Section 4). However, to generate the exceedance statistics by habitat and country (Sections 4-8), the 1km habitat-specific critical loads data are used (Section 3).

2.2 Deposition data

The national deposition data sets are calculated and mapped to a 5km grid covering the UK and provide values that are the sum of wet, dry and cloud deposition. In addition, separate deposition values are supplied which are based on habitat-specific dry deposition velocities. These deposition data are overlaid on maps of critical loads to calculate critical load exceedances. When calculating critical load exceedances for individual habitats, the deposition values for low-growing vegetation (grassland, moorland) are used for the non-woodland terrestrial habitats, and deposition values for woodland are applied to the woodland habitats. For freshwater habitats, average deposition values for all vegetation types are used. However, when calculating exceedances of 5th-percentile critical loads the average deposition values are used, because data for a combination of habitat types can define the 5th-percentile values (Section 2.1).

Maps of the latest (March 2004) versions of the average, moorland and woodland total acid deposition (ie, non-marine sulphur plus oxidised and reduced nitrogen) and total nitrogen deposition (ie, oxidised plus reduced nitrogen) for 1995-97, 1998-2000 and 1999-2001 (Figures 2.3 and 2.4) have been used in the calculation of present day exceedances in this report and appendices. In addition, the results based on a scenario for 2010 are included to demonstrate the expected reductions in critical load exceedances following implementation of the National Emissions Ceilings Directive (NECD).

Preliminary investigations suggest that nitrogen deposition is currently underestimated. Methods to include aerosol deposition is the subject of ongoing Defra research¹.

¹ For further information on the methods used to calculate and map deposition maps refer to RGAR (1997), NEG-TAP (2001), Smith & Fowler (2001), Smith *et al.* (2001) and Smith *et al.* (1997).

The trends in deposition from 1995 to 2010 have been characterised by calculating the total deposition budgets for each country and for the UK, for the data sets for 1995-97, 1999-2001 and 2010 and determining the percentage reductions in deposition (Tables 2.2 and 2.3). In addition, maps of the ratios of acid and nitrogen deposition to moorland vegetation (Figures 2.5 and 2.6) highlight the regions of the country where the largest differences in deposition are observed.

Table 2.2 shows the changes in acid deposition for moorland, woodland and the average. The largest reductions in acid deposition between 1995-97 and 1999-01 occur in Wales (~20%), and in England (~20%) between 1999-01 and 2010. Overall, between 1995-97 and 2010, deposition reductions for all countries are in the order of 21-35%. However, reductions are not uniform and Figure 2.5 shows that in some areas (Liverpool, Leeds/Huddersfield, London, and a few isolated points in Scotland) there is actually an increase in acid deposition.

Table 2.2. Acid deposition data (S + NO_x + NH_x)

Deposition habitat	Country	% decrease in deposition		
		1995-1997 to 1999-2001	1999-2001 to 2010	1995-97 to 2010
Average (applied to freshwater habitat)	England	10.1%	21.1%	31.2%
	Wales	20.5%	14.2%	34.7%
	Scotland	18.3%	15.7%	34.0%
	NI	17.3%	9.6%	26.9%
	UK	13.8%	18.4%	32.1%
Moorland (applied to non-woodland terrestrial habitats)	England	9.5%	19.7%	29.2%
	Wales	21.4%	13.1%	34.4%
	Scotland	18.5%	14.6%	33.1%
	NI	15.6%	5.8%	21.4%
	UK	13.3%	17.0%	30.2%
Woodland (applied to woodland habitats)	England	7.5%	19.8%	27.3%
	Wales	20.1%	14.2%	34.3%
	Scotland	17.0%	15.4%	32.5%
	NI	14.6%	18.1%	32.7%
	UK	11.3%	18.2%	29.5%

Table 2.3. Nitrogen deposition data (NO_x + NH_x)

Deposition habitat	Country	% decrease in deposition		
		1995-1997 to 1999-2001	1999-2001 to 2010	1995-97 to 2010
Moorland (applied to non-woodland terrestrial habitats)	England	0.8%	18.0%	18.7%
	Wales	19.2%	11.9%	31.1%
	Scotland	11.5%	10.2%	21.7%
	NI	12.0%	2.7%	14.7%
	UK	5.8%	14.6%	20.4%
Woodland (applied to woodland habitats)	England	0.5%	18.8%	19.4%
	Wales	17.4%	13.7%	31.1%
	Scotland	10.5%	12.5%	22.9%
	NI	11.6%	3.1%	14.7%
	UK	5.0%	16.0%	21.0%

Table 2.3 shows the changes in total nitrogen deposition for moorland and woodland; changes to average nitrogen deposition are not included since these data are not used in the nutrient nitrogen exceedance calculations for any of the habitats. The largest

reductions are in Wales, with a total reduction of ~31% between 1995-97 and 2010. Figure 2.6c also shows large reductions in Devon, Cornwall, the south coast of England, Cumbria, Galloway, Aberdeenshire, and Argyll and Bute. Between 1999-01 and 2010 the largest reductions are in England (~18%), however, the reductions in England between 1995-97 and 1999-01 are less than 1%. The map in Figures 2.6a shows some increases in nitrogen deposition between 1995-97 and 1999-01 across Somerset, East Anglia, Lincolnshire, the Midlands, Cheshire, Lancashire, Yorkshire, Ayrshire and the Highland region of Scotland and parts of Northern Ireland. However, between 1999-01 and 2010 decreases in nitrogen deposition are observed across most of the country except around London, north-east Highland region, Orkney and the Northern Ireland border area. The smallest overall reductions in nitrogen deposition between 1995-97 and 2010 are in Northern Ireland (~15%).

In all years, reductions in nitrogen deposition are less than for acid deposition; this is clear from Tables 2.2 and 2.3 and also from Figures 2.5 and 2.6.

3 CRITICAL LOAD EXCEEDANCES

Where the deposition of acidifying or eutrophying compounds is above the critical load, the area is said to be exceeded, ie:

$$\text{Exceedance} = \text{Deposition} - \text{Critical Load}$$

For eutrophication, the exceedance is calculated using total nitrogen deposition (derived from nitrogen oxides and ammonia). In the UK critical loads work, we are only considering eutrophication to terrestrial habitats (Section 2.1).

For acidification, to both terrestrial and freshwater habitats, the contribution of both sulphur and nitrogen compounds must be taken into account. This is done using the Critical Loads Function (CLF) developed in Europe (Posch *et al.*, 1999; Posch & Hettelingh, 1997; Posch *et al.*, 1995; Hettelingh *et al.*, 1995). It defines separate acidity critical loads in terms of sulphur and nitrogen, referred to as the “minimum” and “maximum” critical loads of sulphur and nitrogen (Figure 3.1). It is these “minimum” and “maximum” critical loads that are used in the calculation of critical loads exceedance for acidity (Figure 3.2).

Exceedances for the terrestrial habitats are calculated using 1km grid resolution critical loads data and 5km resolution deposition data, by assuming that the deposition values remain constant across all 1km grid squares in each 5km grid square. The critical loads data can be for an individual habitat or percentile maps that combine the data for all habitats (Section 2.1). The exceedance statistics in this report (Sections 4-8) are based on the 1km habitat-specific critical loads data, while the exceedance maps (Section 4) are based on 1km 5th-percentile critical loads for all habitat types combined. The freshwater exceedance results are based on the critical load values for each site (based on the site catchment data) and catchment-weighted deposition values derived from the 5km deposition data.

In addition to the exceedance values, the areas of sensitive habitats associated with the exceedances are also calculated. By summing the exceedance values for these habitat areas, the “accumulated exceedance” (AE) is determined, ie,

$$\begin{array}{l} \text{AE} \\ (\text{keq year}^{-1}) \end{array} = \begin{array}{l} \text{exceedance} \\ (\text{keq ha}^{-1} \text{ year}^{-1}) \end{array} * \begin{array}{l} \text{exceeded habitat area} \\ (\text{ha}) \end{array}$$

Therefore, the AE is a measure of exceedance that combines ***both the magnitude of exceedance and the habitat area exceeded.***

The critical loads data on which exceedance calculations are currently based, are derived from empirical or steady-state mass balance methods, which are used to define ***long-term*** critical loads for systems at ***steady-state***. Therefore, exceedance is an indication of the ***potential*** for harmful effects to systems at steady-state, and a habitat that is currently exceeding its critical load is not necessarily already showing the signs of damage. In addition, reducing deposition to below the critical load does not mean the ecosystems immediately recover. There are time lags before chemical recovery takes place, and further delays before biological recovery. The timescales for both chemical and biological recovery could be very long, particularly for the most

sensitive ecosystems. *These points need to be considered when interpreting the exceedance results in this report.*

Sections 4-8 summarise the main trends in critical load exceedances from:

- 1995-1997 to 1999-2001
- 1999-2001 to 2010
- 1995-1997 to 2010

for England, Wales, Scotland, Northern Ireland and the UK as a whole. It should be noted that where the area exceeded (or percentage area exceeded) does not decrease over time, the magnitude of the exceedance is likely to reduce and this will be reflected with a decrease in the Accumulated Exceedance values. The full exceedance statistics by habitat and country for 1995-1997, 1998-2000, 1999-2001 and 2010 are given in Appendix 1 of this report.

4 EXCEEDANCES FOR THE UK

4.1 Acidity (UK)

- Table 4.1 shows the total area of sensitive habitats exceeded in the UK decreases by 25.3% from 1995-97 (72.6% exceeded) to 2010 (47.3% exceeded).
- The largest reduction in the total habitat area exceeded is for Scotland: a 32.3% reduction from 68.0% in 1995-97 to 35.7% in 2010.
- The lowest proportion of habitats exceeded in all years is in Scotland.

Table 4.1.

Percentage area of habitats exceeded for acidity, by country and for the UK.

Country	% of total area of habitats exceeded for acidity in:		
	1995-1997	1999-2001	2010
England	75.7%	71.6%	63.1%
Wales	89.9%	82.5%	73.0%
Scotland	68.0%	51.4%	35.7%
Northern Ireland	81.1%	70.3%	66.2%
UK	72.6%	60.2%	47.3%

- The exceedance maps of the 5th-percentile critical loads (Figure 4.1) also show a decrease in the area and magnitude of exceedance from 1995-97 to 2010, especially across Scotland, Wales and south-west England.
- Figure 4.2 shows the percentage areas of individual and all habitats exceeded for 1995-97, 1998-2000, 1999-2001 and 2010. The highest percentage exceedances in all years are for acid grassland, bog and montane, followed by the woodland habitats. The results for 1998-2000 and 1999-2001 are, not surprisingly, very similar.
- Table 4.2 shows:
 - The calcareous grassland habitat is not exceeded in any time period.
 - Between 1995-97 and 2010 the largest reduction in habitat area exceeded is for dwarf shrub heath (38.9% reduction) and the smallest reduction for freshwaters (11.1% reduction).
 - Accumulated exceedances (AE) are reduced by between 55% (acid grassland) and 71% (dwarf shrub heath) between 1995-97 and 2010.
 - For most habitats the decreases in the area exceeded are larger between 1999-01 and 2010 than between 1995-97 and 1999-01. Exceptions are dwarf shrub heath and freshwaters.
 - Reductions in AE are similar for the two time periods, although slightly greater for montane, managed broadleaved woodland and unmanaged woodland for the period 1999-01 to 2010.

Table 4.2. Trends in acidity exceedances for the UK

Habitat	% decrease in exceeded habitat area			% decrease in AE		
	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010
Acid grassland	7.3%	8.4%	15.7%	34%	32%	55%
Calcareous grassland	Not exceeded			Not exceeded		
Dwarf shrub heath	22.8%	16.1%	38.9%	45%	47%	71%
Bog	12.0%	16.4%	28.4%	34%	33%	56%
Montane	2.4%	21.1%	23.5%	27%	46%	61%
Conifers (managed)	9.4%	14.5%	23.9%	40%	41%	65%
Broadleaved (managed)	6.7%	13.3%	20.0%	25%	41%	56%
Unmanaged woodland	11.4%	15.4%	26.8%	30%	45%	61%
Freshwaters	6.0%	5.1%	11.1%	43%	39%	65%
All habitats	12.9%	13.0%	25.3%	35%	39%	61%

4.2 Nutrient nitrogen (UK)

- Table 4.3 shows the total area of sensitive habitats exceeded in the UK decreases by 16.3% from 1995-97 to 2010; that is from 65.5% to 49.2%.
- The largest reduction in the total habitat area exceeded is for Wales: a 22.5% reduction from 94.5% in 1995-97 to 72.0% in 2010.
- The lowest proportion of habitats exceeded in all years is in Scotland.

Table 4.3.

Percentage area of habitats exceeded for nutrient nitrogen, by country and for the UK.

Country	% of total area of habitats exceeded for acidity in:		
	1995-1997	1999-2001	2010
England	94.0%	92.3%	80.3%
Wales	94.5%	82.7%	72.0%
Scotland	45.5%	37.8%	29.1%
Northern Ireland	89.3%	76.6%	73.0%
UK	65.5%	58.7%	49.2%

- The exceedance maps of the 5th-percentile critical loads (Figure 4.3) also show a reduction in the area and magnitude of exceedance, especially across Scotland, Wales and southern England.
- Figure 4.4 shows the percentage areas of individual and all habitats exceeded for 1995-97, 1998-2000, 1999-2001 and 2010. The habitats with the highest areas exceeded are montane, managed woodlands, unmanaged woodlands and Atlantic oak; the areas exceeded remain above 80% in 2010.
- Table 4.4 shows:
 - The largest reduction in the area exceeded is for calcareous grassland: 43.1% reduction from 1995-97 to 2010, with the majority of this reduction (41.7%) occurring between 1999-2001 and 2010.
 - For most habitats the larger reductions in area exceeded and AE occur between 1999-01 and 2010.
 - The smallest reductions in the areas exceeded between 1995-97 and 2010 are for managed broadleaved woodland (1.6% reduction) and unmanaged woodland (1.7% reduction). These small reductions in areas exceeded are accompanied by decreases in AE of 30%.

- Accumulated exceedances are reduced by between 30% (unmanaged woodland) and 68% (supralittoral sediment) between 1995-97 and 2010.
- There is a 0.4% increase in the area of the montane habitat exceeded between 1995-97 and 1999-01; however, due to deposition reductions over this time it is accompanied by a 9% decrease in the accumulated exceedance

Table 4.4. Trends in nutrient nitrogen exceedances for the UK

Habitat	% decrease in exceeded habitat area			% decrease in AE		
	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010
Acid grassland	14.1%	12.9%	27.0%	42%	43%	67%
Calcareous grassland	1.4%	41.7%	43.1%	7%	64%	62%
Dwarf shrub heath	7.5%	7.7%	15.2%	38%	41%	63%
Bog	7.4%	1.4%	8.8%	26%	24%	43%
Montane	plus 0.4%	14.8%	14.4%	9%	35%	41%
Conifers (managed)	2.6%	5.4%	8.0%	24%	26%	43%
Broadleaved (managed)	0.6%	1.0%	1.6%	7%	25%	30%
Unmanaged woodland	0.8%	0.9%	1.7%	7%	24%	30%
Atlantic oak	2.0%	14.8%	16.8%	20%	28%	43%
Supralittoral sediment	10.2%	22.8%	33.0%	15%	62%	68%
All habitats	6.8%	9.5%	16.3%	19%	29%	43%

5. EXCEEDANCES FOR ENGLAND

5.1 Acidity (England)

- The total area of sensitive habitats exceeded in England decreases by 12.6% from 1995-97 (75.7% exceeded) to 2010 (63.1% exceeded) (Table 4.1).
- Figure 5.1 shows the percentage areas of individual and all habitats exceeded for 1995-97, 1998-2000, 1999-2001 and 2010. For five habitats (acid grassland, dwarf shrub heath, bog, montane, managed coniferous woodland) the exceeded area remains above 80% in all years and reductions in the areas exceeded over time are small.
- Table 5.1 shows:
 - The calcareous grassland habitat is not exceeded in any time period.
 - Between 1995-97 and 2010 the largest reductions in the area exceeded (29.7% reduction) and in AE (60% reduction) are for unmanaged woodland.
 - 100% of the montane habitat is exceeded in all years although the AE decreases by 52% between 1995-97 and 2010. However, the montane habitat mapped in England only occupies 1.9 km².
 - For the woodland habitats the reductions in areas exceeded and AE are greater between 1999-01 and 2010 than for 1995-97 to 1999-01.

Table 5.1. Trends in acidity exceedances for England

Habitat	% decrease in exceeded habitat area			% decrease in AE		
	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010
Acid grassland	1.3%	3.2%	4.5%	29%	29%	50%
Calcareous grassland	Not exceeded			Not exceeded		
Dwarf shrub heath	3.1%	5.3%	8.4%	31%	37%	56%
Bog	0.2%	0.4%	0.6%	25%	27%	46%
Montane	0.0%	0.0%	0.0%	40%	19%	52%
Conifers (managed)	3.6%	6.6%	10.2%	25%	36%	52%
Broadleaved (managed)	5.2%	13.8%	19.0%	21%	41%	54%
Unmanaged woodland	11.1%	18.6%	29.7%	26%	45%	60%
Freshwaters	2.8%	4.7%	7.5%	33%	27%	51%
All habitats	4.1%	8.5%	12.6%	26%	36%	53%

5.2 Nutrient nitrogen (England)

- The total area of sensitive habitats exceeded in England decreases by 13.7% from 1995-97 (94.0% exceeded) to 2010 (80.3% exceeded) (Table 4.3).
- Figure 5.2 shows the percentage areas of individual and all habitats exceeded for 1995-97, 1998-2000, 1999-2001 and 2010. 100% of the area of six habitats (see below) remains exceeded in all years.
- Table 5.2 shows:
 - There are no reductions in the area exceeded for bog, montane, managed coniferous woodland, managed broadleaved woodland, unmanaged woodland and Atlantic oak. However, the accumulated exceedances for these habitats decrease by 28-46% between 1995-97 and 2010.

- Between 1995-97 and 2010 the largest reductions in the areas exceeded are for calcareous grassland (43.8% reduction) and supralittoral sediment (42.3% reduction). In both cases virtually all of the reduction takes place between 1999-01 and 2010. Reductions in AE are also greater for these habitats.
- 100% of the montane habitat is exceeded in all years, but a 46% reduction in AE is obtained. However, the montane habitat mapped in England only occupies 1.9 km².
- For all habitats, except montane, reductions in AE are greater between 1999-01 and 2010 than for 1995-97 to 1999-01.

Table 5.2. Trends in nutrient nitrogen exceedances for England

Habitat	% decrease in exceeded habitat area			% decrease in AE		
	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010
Acid grassland	4.3%	11.1%	15.4%	30%	40%	58%
Calcareous grassland	0.1%	43.7%	43.8%	10%	65%	61%
Dwarf shrub heath	6.0%	10.7%	16.7%	23%	38%	52%
Bog	0.0%	0.0%	0.0%	15%	25%	36%
Montane	0.0%	0.0%	0.0%	32%	21%	46%
Conifers (managed)	0.0%	0.0%	0.0%	12%	25%	34%
Broadleaved (managed)	0.0%	0.0%	0.0%	4%	25%	28%
Unmanaged woodland	0.0%	0.0%	0.0%	4%	25%	29%
Atlantic oak	0.0%	0.0%	0.0%	16%	21%	34%
Supralittoral sediment	6.7%	35.6%	42.3%	1%	66%	66%
All habitats	1.7%	12.0%	13.7%	9%	28%	35%

6 EXCEEDANCES FOR WALES

6.1 Acidity

- The total area of sensitive habitats exceeded decreases by 16.9% from 1995-97 (89.9% exceeded) to 2010 (73.0% exceeded) (Table 4.1).
- Figure 6.1 shows the percentage areas of individual and all habitats exceeded for 1995-97, 1998-2000, 1999-2001 and 2010. This shows the exceeded areas for three habitats (acid grassland, bog, montane) remain above 80% in all years, with minimal or no reductions over time.
- Table 6.1 shows:
 - The calcareous grassland habitat is not exceeded in any time period.
 - The largest reduction in the area exceeded (and in AE) between 1995-97 and 2010 is for the freshwater habitat: 33.6% reduction in area exceeded accompanied by an 80% reduction in AE.
 - 100% of the montane habitat is exceeded in all years, but the accumulated exceedance decreases by 43% between 1995-97 and 2010. However, the montane habitat mapped in Wales only occupies 18 km².
 - For most habitats the reductions in the areas exceeded and AE are similar between 1995-97 and 1999-01 and between 1999-01 and 2010. Exceptions are (a) managed coniferous woodland: greater reduction in exceeded area between 1999-01 and 2010; (b) freshwaters: greater reduction in exceeded area between 1995-97 and 1999-01; (c) bog: greater reduction in AE between 1995-97 and 1999-01.

Table 6.1. Trends in acidity exceedances for Wales

Habitat	% decrease in exceeded habitat area			% decrease in AE		
	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010
Acid grassland	2.3%	2.1%	4.4%	34%	31%	54%
Calcareous grassland	Not exceeded			Not exceeded		
Dwarf shrub heath	7.1%	12.3%	19.4%	45%	42%	68%
Bog	0.7%	0.3%	1.0%	40%	29%	58%
Montane	0.0%	0.0%	0.0%	29%	20%	43%
Conifers (managed)	1.9%	25.6%	27.5%	46%	47%	72%
Broadleaved (managed)	11.3%	10.9%	22.2%	41%	43%	66%
Unmanaged woodland	12.9%	11.3%	24.2%	43%	47%	70%
Freshwaters	22.0%	11.6%	33.6%	57%	53%	80%
All habitats	7.4%	9.5%	16.9%	40%	37%	62%

6.2 Nutrient nitrogen (Wales)

- The total area of sensitive habitats exceeded decreases by 22.5% from 1995-97 (94.5% exceeded) to 2010 (72.0% exceeded) (Table 4.3).
- Figure 6.2 shows the percentage areas of individual and all habitats exceeded for 1995-97, 1998-2000, 1999-2001 and 2010. 100% of the area of five habitats (see below) remains exceeded in all years.
- Table 6.1 shows:

- There are no reductions in the area exceeded in any year for montane, managed coniferous woodland, managed broadleaved woodland, unmanaged woodland and Atlantic oak. However, the accumulated exceedances decrease by 40-49% between 1995-97 and 2010.
- Although 100% of the montane habitat is exceeded in all years, the montane habitat mapped in Wales only occupies 18 km².
- Between 1995-97 and 2010 the largest reduction in the area exceeded is for calcareous grassland (46.5% reduction). This is accompanied by a 68% decrease in AE.
- For most habitats decreases in the areas exceeded are similar between 1995-97 and 1999-01 and between 1999-01 and 2010. The exception is supralittoral sediment where the decrease between 1995-97 and 1999-01 is twice that between 1999-01 and 2010.
- Decreases in AE for the two time periods are similar for the woodland habitats and acid grassland. For the other grassland and moorland habitats and supralittoral sediments decreases in AE values are larger between 1995-97 and 1999-01.

Table 6.2. Trends in nutrient nitrogen exceedances for Wales

Habitat	% decrease in exceeded habitat area			% decrease in AE		
	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010
Acid grassland	18.6%	17.5%	36.1%	48%	48%	73%
Calcareous grassland	24.2%	22.3%	46.5%	49%	37%	68%
Dwarf shrub heath	10.6%	8.5%	19.1%	46%	39%	67%
Bog	5.5%	4.5%	10.0%	44%	31%	61%
Montane	0.0%	0.0%	0.0%	30%	14%	40%
Conifers (managed)	0.0%	0.0%	0.0%	30%	27%	49%
Broadleaved (managed)	0.0%	0.0%	0.0%	26%	27%	46%
Unmanaged woodland	0.0%	0.0%	0.0%	23%	23%	40%
Atlantic oak	0.0%	0.0%	0.0%	26%	26%	45%
Supralittoral sediment	26.5%	12.7%	39.2%	55%	38%	72%
All habitats	11.8%	10.7%	22.5%	36%	32%	57%

7 EXCEEDANCES FOR SCOTLAND

7.1 Acidity (Scotland)

- The total area of sensitive habitats exceeded in Scotland decreases by 32.3% from 1995-97 (68.0% exceeded) to 2010 (35.7% exceeded) (Table 4.1).
- Figure 7.1 shows the percentage areas of individual and all habitats exceeded for 1995-97, 1998-2000, 1999-2001 and 2010. This shows that there are three habitats (acid grassland, bog and montane) with exceeded areas greater than 80% in 1995-97, but the exceeded areas for these and the other habitats are predicted to be substantially reduced in 2010.
- Table 7.1 shows:
 - The calcareous grassland habitat is not exceeded in any time period.
 - Reductions in the areas of habitat exceeded between 1995-97 and 2010 range from 6.9% (freshwaters) to 44.6% (dwarf shrub heath). Although the reduction in the area of freshwater habitats exceeded is small, this is accompanied by a 74% reduction in AE, showing the magnitude of exceedance has decreased significantly.
 - Reductions in AE values from 1995-97 to 2010 range from 60% (acid grassland) to 81% (dwarf shrub heath).
 - The area of montane habitat exceeded decreases by 23.6% from 1995-97 to 2010, with the largest reduction (21.1%) occurring between 1999-01 and 2010.

Table 7.1. Trends in acidity exceedances for Scotland

Habitat	% decrease in exceeded habitat area			% decrease in AE		
	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010
Acid grassland	10.9%	13.2%	24.1%	37%	37%	60%
Calcareous grassland	Not exceeded			Not exceeded		
Dwarf shrub heath	26.5%	18.1%	44.6%	53%	59%	81%
Bog	15.9%	22.1%	38%	45%	46%	70%
Montane	2.5%	21.1%	23.6%	27%	47%	61%
Conifers (managed)	11.8%	15.7%	27.5%	47%	47%	72%
Broadleaved (managed)	10.7%	12.8%	23.5%	40%	41%	64%
Unmanaged woodland	12.4%	11.9%	24.3%	39%	52%	70%
Freshwaters	3.1%	3.8%	6.9%	45%	53%	74%
All habitats	16.6%	15.7%	32.3%	43%	46%	69%

7.2 Nutrient Nitrogen (Scotland)

- The total area of sensitive habitats exceeded in Scotland decreases by 16.4% from 1995-97 (45.5% exceeded) to 2010 (29.1% exceeded) (Table 4.3).
- Figure 7.2 shows the percentage areas of individual and all habitats exceeded in 1995-97, 1998-2000, 1999-2001 and 2010. The percentage areas of habitat exceeded for montane and the woodland habitats are significantly greater (approximately 2-9 times greater) than the other habitats, with almost 70% or more of these habitats still exceeded in 2010.
- Table 7.2 shows:

- Reductions in the areas of habitats exceeded from 1995-97 to 2010 range from 6.1% (calcareous grassland) to 27.6% (Atlantic oak). For calcareous grassland this reduction in the area exceeded results in 100% of this habitat not being exceeded by 1999-01.
- For the montane and woodland habitats most of the reduction in exceeded areas and in AE occurs between 1999-01 and 2010.

Table 7.2. Trends in nutrient nitrogen exceedances for Scotland

Habitat	% decrease in exceeded habitat area			% decrease in AE		
	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010
Acid grassland	14.6%	12.8%	27.4%	51%	51%	76%
Calcareous grassland	6.1%	0.0%	6.1%	100%	0%	100%
Dwarf shrub heath	7.3%	7.4%	14.7%	47%	52%	75%
Bog	9.0%	1.9%	10.9%	42%	29%	59%
Montane	0.5%	14.9%	14.4%	9%	35%	41%
Conifers (managed)	3.9%	8.9%	12.8%	27%	28%	48%
Broadleaved (managed)	3.9%	7.0%	10.9%	20%	23%	38%
Unmanaged woodland	3.4%	5.9%	9.3%	16%	27%	39%
Atlantic oak	3.4%	24.2%	27.6%	19%	41%	52%
Supralittoral sediment	6.7%	2.8%	9.5%	75%	52%	88%
All habitats	7.7%	8.7%	16.4%	30%	33%	53%

8 EXCEEDANCES FOR NI

8.1 Acidity (NI)

- The total area of sensitive habitats exceeded in Northern Ireland decreases by 14.9% from 1995-97 (81.1% exceeded) to 2010 (66.2% exceeded) (Table 4.1). The montane and managed broadleaved woodland habitats are not present in Northern Ireland (Hall *et al.*, 2003a).
- Figure 8.1 shows the percentage areas of individual and all habitats exceeded for 1995-97, 1998-2000, 1999-2001 and 2010. Four habitats (acid grassland, dwarf shrub heath, bog, managed coniferous woodland) have exceeded areas greater than 80% in 1995-97 and this remains above 80% for the bog habitat in 2010.
- Table 8.1 shows:
 - Calcareous grassland is not exceeded in any time period.
 - Reductions in the habitat areas exceeded from 1995-97 to 2010 range from 4.8% (freshwaters) to 26.8% (managed coniferous woodland).
 - Reductions in AE between 1995-97 and 2010 range from 39% (unmanaged woodland) to 65% (dwarf shrub heath).
 - The reductions in exceeded area and AE are greater for all habitats between 1995-97 and 1999-01 than for 1999-01 and 2010.

Table 8.1. Trends in acidity exceedances for Northern Ireland

Habitat	% decrease in exceeded habitat area			% decrease in AE		
	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010
Acid grassland	8.2%	3.1%	11.3%	35%	22%	49%
Calcareous grassland	Not exceeded			Not exceeded		
Dwarf shrub heath	13.0%	6.4%	19.4%	48%	33%	65%
Bog	5.8%	3.2%	9.0%	37%	22%	51%
Montane	Not present			Not present		
Conifers (managed)	21.2%	5.1%	26.8%	48%	28%	63%
Broadleaved (managed)	Not present			Not present		
Unmanaged woodland	7.5%	3.7%	11.2%	24%	20%	39%
Freshwaters	4.3%	0.5%	4.8%	45%	35%	64%
All habitats	10.8%	4.1%	14.9%	40%	25%	55%

8.2 Nutrient Nitrogen (NI)

- The total area of sensitive habitats exceeded in Northern Ireland decreases by 16.3% from 1995-97 (89.3% exceeded) to 2010 (73.0% exceeded) (Table 4.3). The montane, managed broadleaved woodland and Atlantic oak habitats are not present in Northern Ireland (Hall *et al.*, 2003a).
- Figure 8.2 shows the percentage areas of individual and all habitats exceeded for 1995-97, 1998-2000, 1999-2001 and 2010. For five habitats more than 80% of their area is exceeded in 1995-97, and this remains above 80% in 2010 for three of them (bog, managed coniferous woodland, unmanaged woodland).
- Table 8.2 shows:
 - Between 1995-97 and 2010 the largest reduction in the habitat area exceeded is for acid grassland (26.0% reduction). This is accompanied by a 63% decrease in the AE.

- The smallest reduction in exceeded habitat area between 1995-97 and 2010 is for unmanaged woodland (0.9% reduction); however, the AE decreases by 21%.
- For most habitats the larger decreases in exceeded area and AE occur between 1995-97 and 1999-01. The exceptions are calcareous grassland and supralittoral sediment where the reductions in AE are greater between 1999-01 and 2010.

Table 8.2. Trends in nutrient nitrogen exceedances for Northern Ireland

Habitat	% decrease in exceeded habitat area			% decrease in AE		
	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010	1995-97 to 1999-01	1999-01 to 2010	1995-97 to 2010
Acid grassland	19.8%	6.2%	26.0%	53%	20%	63%
Calcareous grassland	5.9%	4.7%	10.6%	34%	43%	62%
Dwarf shrub heath	13.6%	5.1%	18.7%	49%	26%	62%
Bog	9.9%	plus 0.1%	9.8%	40%	7%	44%
Montane	Not present			Not present		
Conifers (managed)	2.8%	0.0%	2.8%	35%	10%	42%
Broadleaved (managed)	Not present			Not present		
Unmanaged woodland	2.1%	plus 1.2%	0.9%	15%	7%	21%
Atlantic oak	Not present			Not present		
Supralittoral sediment	12.9%	6.8%	19.7%	22%	41%	54%
All habitats	12.7%	3.6%	16.3%	39%	14%	47%

9. CONCLUSIONS

The key conclusions on the trends in critical loads exceedances, based on the critical loads and deposition data described in Section 2 are summarised below:

- Reductions in the area of sensitive habitats exceeded in the UK between 1995-97 and 2010 are greater for acidity (25.3%) than for nutrient nitrogen (16.3%).
- Reductions in acid deposition across the UK between 1995-97 and 2010 are greater than reductions in nitrogen deposition over this time period.

Acidity

- The largest reductions in habitat area exceeded (32.3%) and AE (69.0%), between 1995-97 and 2010, are predicted in Scotland. The percentage of habitats exceeded for other countries are similar to one another (12.6% to 16.9%) and the reductions in AE range from 53% to 62%.
- Across the UK the largest reductions in exceedances are for dwarf shrub heath, with a 38.9% reduction in the area of habitat exceeded and a 71% decrease in AE. The area of dwarf shrub heath exceeded in Scotland is reduced by 44.6% between 1995-97 and 2010.
- In other countries the largest reductions in exceedances are seen for unmanaged woodland (England), freshwaters (Wales) and managed coniferous woodland (Northern Ireland).
- In Wales and Scotland the overall reductions in exceeded habitat area and AE are similar between 1995-97 and 1999-01 and between 1999-01 and 2010. For England the overall reductions are greater between 1999-01 and 2010 and in Northern Ireland they are greater between 1995-97 and 1999-01.
- The larger reductions in acid deposition occur across the UK between 1999-01 and 2010, especially in England with reductions ~20% compared to reductions of 8-10% across England between 1995-97 and 1999-01.

Nutrient nitrogen

- The largest reductions in habitat area exceeded (22.5%) and AE (57%) between 1995-97 and 2010, are predicted in Wales. For other countries the reductions in area exceeded ranges from 13.7% to 16.4% and the reductions in AE range from 35% to 53%.
- The largest reductions in the habitat areas exceeded across the UK are for calcareous grassland (43.1%) and supralittoral sediment (33%). Reductions in AE are also high for these two habitats (62% and 68% respectively) and also for acid grassland (68%) and dwarf shrub heath (62%), despite the fact that the reductions in area exceeded are much less for these two habitats (27% for acid grassland and 15.2% for dwarf shrub heath), reflecting the greater decrease in the magnitude of exceedance rather than the area exceeded.
- The largest decreases in the exceeded areas of calcareous grassland and supralittoral sediment are seen in England and Wales.
- In Scotland the largest decreases in exceedances are seen for Atlantic oak and acid grassland. Between 1995-97 and 1999-01 the remaining areas exceeded of calcareous grassland in Scotland become non-exceeded due to deposition reductions, giving rise to a 100% decrease in the AE value. Another large

reduction in AE in Scotland is seen for supralittoral sediment (88%) although the area exceeded is only reduced by 9.5%.

- In Northern Ireland the largest reductions in exceeded area (26%) and AE (63%) are seen for acid grassland.
- In Wales and Scotland the overall reductions in exceeded habitat area and AE are similar between 1995-97 and 1999-01 and between 1999-01 and 2010. For England the overall reductions are greater between 1999-01 and 2010 and in Northern Ireland they are greater between 1995-97 and 1999-01.
- The larger reductions in nitrogen deposition occur across the UK between 1999-01 and 2010, especially in England with reductions of 18-19% compared to 1995-97 to 1999-01 where reductions in England are <1%.

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APPENDIX 1

Acidity and nutrient nitrogen exceedance statistics by habitat and country for 1995-97, 1998-2000, 1999-2001 and 2010.

Contents

- 1.1 UK – acidity exceedance statistics
- 1.2 UK – nutrient nitrogen exceedance statistics
- 2.1 England – acidity exceedance statistics
- 2.2 England – nutrient nitrogen exceedance statistics
- 3.1 Wales – acidity exceedance statistics
- 3.2 Wales – nutrient nitrogen exceedance statistics
- 4.1 Scotland – acidity exceedance statistics
- 4.2 Scotland – nutrient nitrogen exceedance statistics
- 5.1 Northern Ireland – acidity exceedance statistics
- 5.2 Northern Ireland – nutrient nitrogen exceedance statistics

1.1 UK – acidity exceedance statistics

(a) Habitat area exceeded

Broad Habitat	Mapped habitat area (km ²)	Habitat area (km ²) exceeded by deposition data for:			
		1995-1997	1998-2000	1999-2001	2010
Acid grassland	15334	14135	13038	13020	11732
Calcareous grassland	1808	0	0	0	0
Dwarf shrub heath	24703	17299	12113	11664	7680
Bog	5463	4856	4346	4199	3305
Montane	3054	2926	2789	2852	2209
Coniferous woodland (managed)	8377	6695	5888	5903	4695
Broadleaved woodland (managed)	7452	5645	5100	5151	4157
Unmanaged woodland	4011	2807	2311	2349	1731
Freshwaters	7791	2278	1831	1807	1413
All habitats	77993	56641	47416	46945	36922

(b) Percentage habitat area exceeded

Broad Habitat	Percentage habitat area exceeded by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	92.2	85	84.9	76.5
Calcareous grassland	0	0	0	0
Dwarf shrub heath	70	49	47.2	31.1
Bog	88.9	79.6	76.9	60.5
Montane	95.8	91.3	93.4	72.3
Coniferous woodland (managed)	79.9	70.3	70.5	56
Broadleaved woodland (managed)	75.8	68.4	69.1	55.8
Unmanaged woodland	70	57.6	58.6	43.2
Freshwaters	29.2	23.5	23.2	18.1
All habitats	72.6	60.8	60.2	47.3

(c) Accumulated Exceedance

Broad Habitat	Accumulated Exceedance (keq year ⁻¹) by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	1773066	1227704	1176834	802973
Calcareous grassland	0	0	0	0
Dwarf shrub heath	1121456	650484	620158	329731
Bog	421371	294723	277606	187210
Montane	247060	172809	179917	97123
Coniferous woodland (managed)	955336	572054	574608	336408
Broadleaved woodland (managed)	892102	652364	670072	393676
Unmanaged woodland	350958	236160	245388	135535
Freshwaters	267421	168271	153442	92969
All habitats	6028770	3974569	3898025	2375625

1.2 UK – nutrient nitrogen exceedance statistics

(a) Habitat areas exceeded

Broad Habitat	Mapped habitat area (km ²)	Habitat area (km ²) exceeded by deposition data for:			
		1995-1997	1998-2000	1999-2001	2010
Acid grassland	15241	10546	8378	8399	6427
Calcareous grassland	3577	2582	2480	2532	1042
Dwarf shrub heath	24820	9365	7109	7489	5581
Bog	5541	2756	2305	2343	2267
Montane	3129	3024	2996	3038	2574
Coniferous woodland (managed)	8385	7998	7600	7781	7328
Broadleaved woodland (managed)	7482	7363	7289	7320	7242
Unmanaged woods (ground flora)	3296	3183	3142	3158	3127
Atlantic oak (epiphytic lichens)	822	803	759	786	664
Supralittoral sediment	2128	1089	822	872	386
All habitats	74422	48707	42879	43717	36638

(b) Percentage habitat area exceeded

Broad Habitat	Percentage habitat area exceeded by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	69.2	55	55.1	42.2
Calcareous grassland	72.2	69.3	70.8	29.1
Dwarf shrub heath	37.7	28.6	30.2	22.5
Bog	49.7	41.6	42.3	40.9
Montane	96.7	95.8	97.1	82.3
Coniferous woodland (managed)	95.4	90.6	92.8	87.4
Broadleaved woodland (managed)	98.4	97.4	97.8	96.8
Unmanaged woods (ground flora)	96.6	95.3	95.8	94.9
Atlantic oak (epiphytic lichens)	97.6	92.4	95.6	80.8
Supralittoral sediment	51.2	38.6	41.0	18.2
All habitats	65.5	57.6	58.7	49.2

(c) Accumulated Exceedance

Broad Habitat	Accumulated Exceedance (keq year ⁻¹) by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	548422	305826	317310	179913
Calcareous grassland	77713	76629	82893	29723
Dwarf shrub heath	438432	256846	272963	161958
Bog	199131	143503	147419	112620
Montane	123957	97522	112593	73146
Coniferous woodland (managed)	1004782	728381	767797	571843
Broadleaved woodland (managed)	1309795	1165018	1215614	911416
Unmanaged woods (ground flora)	540151	480807	501824	379738
Atlantic oak (epiphytic lichens)	83410	61350	66421	47778
Supralittoral sediment	20684	16247	17551	6613
All habitats	4346477	3332129	3502384	2474747

2.1 England – acidity exceedance statistics

(a) Habitat area exceeded

Broad Habitat	Mapped habitat area (km ²)	Habitat area (km ²) exceeded by deposition data for:			
		1995-1997	1998-2000	1999-2001	2010
Acid grassland	2669	2586	2550	2551	2467
Calcareous grassland	1714	0	0	0	0
Dwarf shrub heath	2462	2350	2283	2276	2144
Bog	1006	999	997	997	993
Montane	1.9	1.9	1.9	1.9	1.9
Coniferous woodland (managed)	1716	1572	1502	1510	1397
Broadleaved woodland (managed)	5565	4234	3915	3948	3180
Unmanaged woodland	2392	1779	1497	1514	1069
Freshwaters	1042	535	505	506	457
All habitats	18568	14057	13251	13304	11709

(b) Percentage habitat area exceeded

Broad Habitat	Percentage habitat area exceeded by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	96.9	95.6	95.6	92.4
Calcareous grassland	0	0	0	0
Dwarf shrub heath	95.5	92.7	92.4	87.1
Bog	99.3	99.1	99.1	98.7
Montane	100	100	100	100
Coniferous woodland (managed)	91.6	87.5	88	81.4
Broadleaved woodland (managed)	76.1	70.3	70.9	57.1
Unmanaged woodland	74.4	62.6	63.3	44.7
Freshwaters	51.3	48.5	48.6	43.9
All habitats	75.7	71.4	71.6	63.1

(c) Accumulated Exceedance

Broad Habitat	Accumulated Exceedance (keq year ⁻¹) by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	503991	371500	356923	253193
Calcareous grassland	0	0	0	0
Dwarf shrub heath	350610	253369	241404	152892
Bog	209927	163713	157390	114398
Montane	565	365	339	273
Coniferous woodland (managed)	315662	237379	235987	151518
Broadleaved woodland (managed)	719266	552590	566858	333898
Unmanaged woodland	240418	171875	177561	97285
Freshwaters	116074	84226	77800	57053

2.2 England – nutrient nitrogen exceedance statistics

(a) Habitat area exceeded

Broad Habitat	Mapped habitat area (km ²)	Habitat area (km ²) exceeded by deposition data for:			
		1995-1997	1998-2000	1999-2001	2010
Acid grassland	2620	2610	2485	2498	2207
Calcareous grassland	3312	2466	2429	2464	1015
Dwarf shrub heath	2466	2459	2306	2311	2047
Bog	1007	1007	1007	1007	1007
Montane	1.9	1.9	1.9	1.9	1.9
Coniferous woodland (managed)	1719	1719	1719	1719	1718
Broadleaved woodland (managed)	5588	5588	5588	5588	5586
Unmanaged woods (ground flora)	2252	2252	2252	2252	2252
Atlantic oak (epiphytic lichens)	150	150	150	150	150
Supralittoral sediment	1183	822	695	744	322
All habitats	20299	19075	18631	18734	16307

(b) Percentage habitat area exceeded

Broad Habitat	Percentage habitat area exceeded by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	99.6	94.8	95.3	84.2
Calcareous grassland	74.5	73.3	74.4	30.7
Dwarf shrub heath	99.7	93.5	93.7	83
Bog	100	100	100	100
Montane	100	100	100	100
Coniferous woodland (managed)	100	100	100	100
Broadleaved woodland (managed)	100	100	100	100
Unmanaged woods (ground flora)	100	100	100	100
Atlantic oak (epiphytic lichens)	100	100	100	100
Supralittoral sediment	69.6	58.7	62.9	27.3
All habitats	94.0	91.8	92.3	80.3

(c) Accumulated Exceedance

Broad Habitat	Accumulated Exceedance (keq year ⁻¹) by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	207214	140318	145988	87552
Calcareous grassland	73782	74953	80834	28435
Dwarf shrub heath	173261	127260	133522	83180
Bog	114174	94090	97606	73441
Montane	351	237	238	189
Coniferous woodland (managed)	313514	267488	276542	207630
Broadleaved woodland (managed)	1086699	1003306	1044727	783390
Unmanaged woods (ground flora)	428371	394797	410472	306229
Atlantic oak (epiphytic lichens)	31043	24835	25936	20614
Supralittoral sediment	15328	14365	15171	5192
All habitats	2443737	2141650	2231035	1595853

3.1 Wales – acidity exceedance statistics

(a) Habitat area exceeded

Broad Habitat	Mapped habitat area (km ²)	Habitat area (km ²) exceeded by deposition data for:			
		1995-1997	1998-2000	1999-2001	2010
Acid grassland	3143	3109	3033	3036	2969
Calcareous grassland	45	0	0	0	0
Dwarf shrub heath	1078	1044	979	968	836
Bog	56	55	55	55	55
Montane	18	18	18	18	18
Coniferous woodland (managed)	1048	1027	1002	1008	740
Broadleaved woodland (managed)	790	683	585	593	507
Unmanaged woodland	395	353	298	302	258
Freshwaters	1225	724	475	455	313
All habitats	7798	7013	6445	6435	5696

(b) Percentage habitat area exceeded

Broad Habitat	Percentage habitat area exceeded by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	98.9	96.5	96.6	94.5
Calcareous grassland	0	0	0	0
Dwarf shrub heath	96.9	90.8	89.8	77.5
Bog	98.4	97.7	97.7	97.4
Montane	100	100	100	100
Coniferous woodland (managed)	98.1	95.7	96.2	70.6
Broadleaved woodland (managed)	86.4	74	75.1	64.2
Unmanaged woodland	89.4	75.5	76.5	65.2
Freshwaters	59.1	38.8	37.1	25.6
All habitats	89.9	82.6	82.5	73.0

(c) Accumulated Exceedance

Broad Habitat	Accumulated Exceedance (keq year ⁻¹) by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	491297	336173	325679	226258
Calcareous grassland	0	0	0	0
Dwarf shrub heath	132380	78690	73340	42572
Bog	9903	6442	5918	4177
Montane	4277	3583	3055	2439
Coniferous woodland (managed)	195471	105071	104821	55604
Broadleaved woodland (managed)	103517	59146	61361	34915
Unmanaged woodland	51500	27957	29334	15680
Freshwaters	60783	29669	25924	12140
All habitats	1049128	646731	629432	393785

3.2 Wales – nutrient nitrogen exceedance statistics

(a) Habitat area exceeded

Broad Habitat	Mapped habitat area (km ²)	Habitat area (km ²) exceeded by deposition data for:			
		1995-1997	1998-2000	1999-2001	2010
Acid grassland	3146	3022	2545	2437	1886
Calcareous grassland	171	102	43	60	22
Dwarf shrub heath	1094	1084	995	968	873
Bog	56	56	53	53	51
Montane	18	18	18	18	18
Coniferous woodland (managed)	1052	1052	1052	1052	1052
Broadleaved woodland (managed)	798	798	798	798	798
Unmanaged woods (ground flora)	226	226	226	226	226
Atlantic oak (epiphytic lichens)	171	171	171	171	171
Supralittoral sediment	369	185	84	88	42
All habitats	7102	6715	5985	5871	5139

(b) Percentage habitat area exceeded

Broad Habitat	Percentage habitat area exceeded by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	96.1	80.9	77.5	60
Calcareous grassland	59.5	24.8	35.3	13
Dwarf shrub heath	99.1	90.9	88.5	80
Bog	100	95.1	94.5	90
Montane	100	100	100	100
Coniferous woodland (managed)	100	100	100	100
Broadleaved woodland (managed)	100	100	100	100
Unmanaged woods (ground flora)	100	100	100	100
Atlantic oak (epiphytic lichens)	100	100	100	100
Supralittoral sediment	50.2	22.7	23.7	11.0
All habitats	94.5	84.3	82.7	72.0

(c) Accumulated Exceedance

Broad Habitat	Accumulated Exceedance (keq year ⁻¹) by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	187476	92586	96754	50161
Calcareous grassland	3596	1439	1839	1161
Dwarf shrub heath	84022	45436	45011	27394
Bog	5496	3224	3076	2119
Montane	2787	2258	1958	1686
Coniferous woodland (managed)	196092	131422	137229	100852
Broadleaved woodland (managed)	132278	93097	98135	71928
Unmanaged woods (ground flora)	41378	30128	31947	24753
Atlantic oak (epiphytic lichens)	29628	20969	22055	16220
Supralittoral sediment	3494	1155	1556	967
All habitats	686245	421714	439562	297241

4.1 Scotland – acidity exceedance statistics

(a) Habitat area exceeded

Broad Habitat	Mapped habitat area (km ²)	Habitat area (km ²) exceeded by deposition data for:			
		1995-1997	1998-2000	1999-2001	2010
Acid grassland	8336	7388	6494	6478	5377
Calcareous grassland	6.9	0	0	0	0
Dwarf shrub heath	20190	13083	8148	7725	4068
Bog	3959	3377	2895	2748	1873
Montane	3034	2906	2769	2832	2189
Coniferous woodland (managed)	5111	3683	3079	3080	2279
Broadleaved woodland (managed)	1096	728	601	610	470
Unmanaged woodland	1016	553	408	427	305
Freshwaters	5338	981	819	816	614
All habitats	48087	32699	25213	24716	17175

(b) Percentage habitat area exceeded

Broad Habitat	Percentage habitat area exceeded by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	88.6	77.9	77.7	64.5
Calcareous grassland	0	0	0	0
Dwarf shrub heath	64.8	40.4	38.3	20.2
Bog	85.3	73.1	69.4	47.3
Montane	95.8	91.3	93.3	72.2
Coniferous woodland (managed)	72.1	60.3	60.3	44.6
Broadleaved woodland (managed)	66.4	54.8	55.7	42.9
Unmanaged woodland	54.4	40.2	42	30.1
Freshwaters	18.4	15.3	15.3	11.5
All habitats	68.0	52.4	51.4	35.7

(c) Accumulated Exceedance

Broad Habitat	Accumulated Exceedance (keq year ⁻¹) by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	672265	449784	425416	269503
Calcareous grassland	0	0	0	0
Dwarf shrub heath	568119	281176	268746	109527
Bog	157835	96898	86783	47091
Montane	242218	168861	176523	94411
Coniferous woodland (managed)	390201	202499	205793	109046
Broadleaved woodland (managed)	69319	40628	41853	24863
Unmanaged woodland	42780	24226	26208	12683
Freshwaters	84754	51240	46502	21693
All habitats	2227491	1315312	1277824	688817

4.2 Scotland – nutrient nitrogen exceedance statistics

(a) Habitat area exceeded

Broad Habitat	Mapped habitat area (km ²)	Habitat area (km ²) exceeded by deposition data for:			
		1995-1997	1998-2000	1999-2001	2010
Acid grassland	8283	3921	2663	2708	1651
Calcareous grassland	24	1.5	0	0	0
Dwarf shrub heath	20284	4949	3111	3470	1970
Bog	4005	1226	825	863	790
Montane	3109	3005	2976	3018	2554
Coniferous woodland (managed)	5111	4724	4343	4520	4068
Broadleaved woodland (managed)	1096	977	903	934	857
Unmanaged woods (ground flora)	570	457	422	437	403
Atlantic oak (epiphytic lichens)	501	482	438	465	343
Supralittoral sediment	547	61	28	24	8.6
All habitats	43530	19802	15709	16439	12646

(b) Percentage habitat area exceeded

Broad Habitat	Percentage habitat area exceeded by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	47.3	32.2	32.7	19.9
Calcareous grassland	6.1	0	0	0
Dwarf shrub heath	24.4	15.3	17.1	9.7
Bog	30.6	20.6	21.6	19.7
Montane	96.6	95.7	97.1	82.2
Coniferous woodland (managed)	92.4	85	88.5	79.6
Broadleaved woodland (managed)	89.1	82.4	85.2	78.2
Unmanaged woods (ground flora)	80.1	74.1	76.7	70.8
Atlantic oak (epiphytic lichens)	96.1	87.5	92.7	68.5
Supralittoral sediment	11.1	5.0	4.4	1.6
All habitats	45.5	36.1	37.8	29.1

(c) Accumulated Exceedance

Broad Habitat	Accumulated Exceedance (keq year ⁻¹) by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	112774	54808	55304	26840
Calcareous grassland	2	0	0	0
Dwarf shrub heath	133612	61692	70300	33417
Bog	49604	29191	28811	20444
Montane	120820	95027	110396	71271
Coniferous woodland (managed)	428088	288641	310718	224381
Broadleaved woodland (managed)	90819	68615	72751	56099
Unmanaged woods (ground flora)	37500	28804	31413	22822
Atlantic oak (epiphytic lichens)	22739	15546	18430	10943
Supralittoral sediment	1178	281	290	140
All habitats	997135	642605	698413	466357

5.1 Northern Ireland – acidity exceedance statistics

(a) Habitat area exceeded

Broad Habitat	Mapped habitat area (km ²)	Habitat area (km ²) exceeded by deposition data for:			
		1995-1997	1998-2000	1999-2001	2010
Acid grassland	1187	1053	960	955	919
Calcareous grassland	42	0	0	0	0
Dwarf shrub heath	973	821	703	694	632
Bog	442	425	400	399	385
Montane	0	0	0	0	0
Coniferous woodland (managed)	503	413	305	304	279
Broadleaved woodland (managed)	0	0	0	0	0
Unmanaged woodland	208	122	106	106	99
Freshwaters	186	38	32	30	29
All habitats	3541	2872	2506	2488	2343

(b) Percentage habitat area exceeded

Broad Habitat	Percentage habitat area exceeded by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	88.7	80.9	80.5	77.4
Calcareous grassland	0	0	0	0
Dwarf shrub heath	84.4	72.3	71.4	65
Bog	96.1	90.6	90.3	87.1
Montane	0	0	0	0
Coniferous woodland (managed)	82.2	60.6	60.5	55.4
Broadleaved woodland (managed)	0	0	0	0
Unmanaged woodland	58.7	51.2	51.2	47.5
Freshwaters	20.4	17.2	16.1	15.6
All habitats	81.1	70.8	70.3	66.2

(c) Accumulated Exceedance

Broad Habitat	Accumulated Exceedance (keq year ⁻¹) by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	105512	70247	68817	54018
Calcareous grassland	0	0	0	0
Dwarf shrub heath	70347	37248	36668	24739
Bog	43706	27670	27514	21545
Montane	0	0	0	0
Coniferous woodland (managed)	54002	27105	28006	20240
Broadleaved woodland (managed)	0	0	0	0
Unmanaged woodland	16260	12102	12286	9887
Freshwaters	5810	3136	3216	2083
All habitats	295637	177508	176507	132512

5.2 Northern Ireland – nutrient nitrogen exceedance statistics

(a) Habitat area exceeded

Broad Habitat	Mapped habitat area (km ²)	Habitat area (km ²) exceeded by deposition data for:			
		1995-1997	1998-2000	1999-2001	2010
Acid grassland	1192	993	685	757	683
Calcareous grassland	69	12	8.1	8.1	4.9
Dwarf shrub heath	976	873	698	741	691
Bog	473	466	420	420	420
Montane	0	0	0	0	0
Coniferous woodland (managed)	504	504	486	490	490
Broadleaved woodland (managed)	0	0	0	0	0
Unmanaged woods (ground flora)	247	247	241	242	245
Atlantic oak (epiphytic lichens)	0	0	0	0	0
Supralittoral sediment	29	20	16	16	14
All habitats	3491	3116	2555	2674	2547

(b) Percentage habitat area exceeded

Broad Habitat	Percentage habitat area exceeded by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	83.3	57.5	63.5	57.3
Calcareous grassland	17.6	11.7	11.7	7
Dwarf shrub heath	89.5	71.5	75.9	70.8
Bog	98.6	88.7	88.7	88.8
Montane	0	0	0	0
Coniferous woodland (managed)	100	96.5	97.2	97.2
Broadleaved woodland (managed)	0	0	0	0
Unmanaged woods (ground flora)	100	97.3	97.9	99.1
Atlantic oak (epiphytic lichens)	0	0	0	0
Supralittoral sediment	68.6	55.4	55.7	48.9
All habitats	89.3	73.2	76.6	73.0

(c) Accumulated Exceedance

Broad Habitat	Accumulated Exceedance (keq year ⁻¹) by deposition data for:			
	1995-1997	1998-2000	1999-2001	2010
Acid grassland	40959	18113	19264	15360
Calcareous grassland	334	236	220	126
Dwarf shrub heath	47537	22458	24131	17966
Bog	29856	16999	17926	16615
Montane	0	0	0	0
Coniferous woodland (managed)	67087	40829	43308	38980
Broadleaved woodland (managed)	0	0	0	0
Unmanaged woods (ground flora)	32903	27078	27992	25935
Atlantic oak (epiphytic lichens)	0	0	0	0
Supralittoral sediment	684	446	534	314
All habitats	219360	126160	133374	115296